You are cordially welcome, whether you are an established or potential new member of the open innovation fun club! You are reading a gem of the OI-Net project, a joint effort between numerous partner institutions and individual experts for the creation of a European curriculum on Open Innovation.

Since 2003, when Prof. Henry Chesbrough published the book on Open Innovation, we have been discussing the benefits and potential limitations in academia; delivering important messages to both large companies and SMEs by consultants, and raising interest of governments and public organizations. However, academia has not been developing much on creating a curriculum on open innovation. This book is a potential solution to create a comprehensive one.

Ingredients for this book were cooked in Lappeenranta in 2012, when a team of open innovation fans initiated a European project on the topic. It has been a long five year journey, but for sure worth taking.

Based on the experiences of an extensive network of experts on teaching and consulting innovation management, opinions from both academics and companies and intensive collaboration among project partners, this book provides answers to why and how open innovation matters, with an introduction of envisioning the future.

This was mainly a European approach, but we believe it is also beneficial to non-Europeans to read. Why? Because if you are not open, you are closed! It was said properly (on binary mode one or zero) in one of the 80s blockbuster movies by an investment banker: ‘if you are not inside, you are outside’. The same applies here.

I sincerely thank all those who were involved in the OI-Net project, authors and especially editors of this book; Anne-Laure Mention, Arie P. Nagel, Joachim Hafkesbrink and Justyna Dabrowska! You made an excellent and innovative work.

December 2016, Kouvola, Finland
Open Innovately Yours,

Marko Torkkeli
Professor, OI-Net project coordinator
Lappeenranta University of Technology (project lead partner)
# TABLE OF CONTENT

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF CONTRIBUTORS</td>
<td>8</td>
</tr>
<tr>
<td><strong>PART 1. ENVISIONING THE FUTURE OF INNOVATION EDUCATION: MAINSTREAM</strong></td>
<td></td>
</tr>
<tr>
<td>INDUSTRY HIGHLIGHTS: HOW NEW INNOVATION ECOSYSTEM LOGICS TRANSFORMED</td>
<td>32</td>
</tr>
<tr>
<td>OPEN INNOVATION AT SWAROVSKI</td>
<td></td>
</tr>
<tr>
<td><strong>PART 2. WALKING THE TALK: A EUROPEAN INITIATIVE TO SPUR OPEN</strong></td>
<td>38</td>
</tr>
<tr>
<td>INNOVATION EDUCATION</td>
<td></td>
</tr>
<tr>
<td>INDUSTRIAL NEEDS FOR OPEN INNOVATION EDUCATION</td>
<td>42</td>
</tr>
<tr>
<td>HOW IS OPEN INNOVATION ADDRESSED IN UNIVERSITIES TODAY?</td>
<td>61</td>
</tr>
<tr>
<td>AN OVERVIEW ON EXISTING CURRICULA IN EUROPE</td>
<td></td>
</tr>
<tr>
<td>MULTIDISCIPLINARY APPROACH – LEARNING OUTCOMES</td>
<td>69</td>
</tr>
<tr>
<td>OPEN INNOVATION CURRICULA: KEY INDICATORS AND SUCCESS FACTORS</td>
<td>79</td>
</tr>
<tr>
<td>TEACHING SKILLS FOR OPEN INNOVATION</td>
<td>89</td>
</tr>
<tr>
<td>QUICK TIPS FOR THE PROMOTION OF OPEN INNOVATION AMONG HEI PROGRAMMES</td>
<td>106</td>
</tr>
<tr>
<td><strong>PART 3. TOMORROW’S TEACHING: AN ESSENTIAL GUIDE</strong></td>
<td>108</td>
</tr>
<tr>
<td>3.1. SETTING THE SCENE: DEFINING OPEN INNOVATION</td>
<td></td>
</tr>
<tr>
<td>INTRODUCTION TO THE OPEN INNOVATION PARADIGM</td>
<td>113</td>
</tr>
<tr>
<td>OPEN INNOVATION PROCESS</td>
<td>163</td>
</tr>
</tbody>
</table>
3.2. FRAMING OPEN INNOVATION IN A BROADER THEORETICAL LANDSCAPE

OPEN INNOVATION AND STRATEGY, STRATEGIC ALLIANCES AS AN EXAMPLE 205
NETWORK EXTERNALITIES AND OPEN INNOVATION 218
USER-LED INNOVATION 235
THE LAW AND MANAGEMENT OF INTELLECTUAL PROPERTY IN OPEN INNOVATION ECOSYSTEMS 245

3.3. INSTANTIATING OPEN INNOVATION: FROM INDIVIDUAL TO SOCIETY LEVEL

OPEN INNOVATION AT THE INDIVIDUAL LEVEL 268
OPEN INNOVATION IN SMEs 282
QUALITY MANAGEMENT IN OPEN INNOVATION PARADIGM CONTEXT 302
OUTSOURCING DEVELOPMENT AND LIFE CYCLE MANAGEMENT 326
OPEN INNOVATION IN SUPPLY CHAINS; OPEN SUPPLY CHAINS 340
SPECIFIC EXAMPLES ON FOSTERING OPEN INNOVATION AT THE INDUSTRY LEVEL: UNIVERSITY-INDUSTRY COLLABORATION 372
OPEN INNOVATION WITHIN INDUSTRIAL NETWORKS 382
OPEN INNOVATION WITHIN GEOGRAPHICAL AND INSTITUTIONAL SETTINGS 395
PUBLIC POLICY COMPONENTS RELATED TO OPEN INNOVATION 406

3.4. IMPLEMENTING OPEN INNOVATION: TOOLS, METHODS & PROCESSES

OPEN INNOVATION AND BUSINESS MODELS 416
OPEN INNOVATION IN THE FUZZY FRONT END OF THE INNOVATION PROCESS 428
3.5. SKETCHING THE NEW FRONTIERS OF OPEN INNOVATION

CIVIC OPEN INNOVATION  514

OPEN INNOVATION IN WECONOMY  525
LIST OF CONTRIBUTORS

EDITORS

ANNE-LAURE MENTION

Anne-Laure Mention is the Director of the Global Business Innovation Enabling Capability Platform at RMIT, Melbourne, Australia. She is also a Professor at the School of Management at RMIT, Melbourne; a visiting professor at Université de Liège, Belgium and the Deputy Head of the Centre d’Evaluation de la Performance des Entreprises and a visiting professor at Tampere University of Technology, Finland. She previously held a Head of Research Unit and an Expertise position at the Luxembourg Institute of Science and Technology and Public Research Centre Henri Tudor respectively. She holds several other visiting positions in Europe and Asia. Anne-Laure is one of the founding editors of the Journal of Innovation Management, and the Deputy Head of the ISPIM Advisory Board. She is the co-editor of a book series on Open Innovation, published by World Scientific/Imperial College Press. Her research interests revolve around open and collaborative innovation, innovation in business to business services, with a particular focus on financial industry and fintech, technology management, and business venturing. She has been awarded twice the prestigious IBM Faculty Award for her research on innovation.

ARIE NAGEL

Arie Nagel was a professor, teaching at various Master courses at the Eindhoven University of Technology and at MBA’s in the Netherlands and Ljubljana, Slovenia. His thesis on Increasing the Strategic Innovation Capability of a Firm (1992) was nominated for the first Igor Ansoff award. He specialised in Technology Management, Strategic Management, Strategic Product Innovation, Organisation Science, International Management and Strategic Alliances. Today he is a Management Consultant, based in Eindhoven, Netherlands. He also is volunteering for development aid and assists various medium sized organisations abroad in sorting out strategic and organisational issues. He was president of ISPIM from 1993-1997. He published and contributed to various books and numerous articles. Among others he was a co-author of the book: Bringing Technology and Innovation into the Boardroom (Palgrave 2003). His passion is astrophotography.
JOACHIM HAFKESBRINK

Joachim Hafkesbrink, full Professor of Economics, Management and Organization at FOM - Hochschule für Organisation and Management, Bochum (Germany) and Executive Board Member of RIAS – Rhein-Ruhr Institute for Applied Systeminnovation e.V. He has over 30 years of experience as an innovation management researcher and consultant. In 1986 he obtained a PhD in economics and social sciences with a specialisation in innovation theory and management from the University of Duisburg-Essen. His track record in innovation management projects, innovation and evaluation studies and consultancy for ministries and professional associations in Germany embraces a variety of industrial sectors and technology areas such as the printing and publishing industry, the machinery building sector, the chemical industry and social services. He is author of more than 120 articles and books on innovation related subjects.

JUSTyna DĄBROWSKA

Justyna Dąbrowska is a Project Manager at Lappeenranta University of Technology (LUT), Kouvol Unit, Finland and a PhD Candidate at the LUT School of Business and Management, Finland. She holds a Master’s degree in Management and Marketing with specialization in Human Resources Management. She has a wide experience in managing large international projects on open innovation, education and acceleration of go-to-market in ICT industry. She is involved in conducting research in innovation management with focus on micro foundations of open innovation. Her additional research interests include cross-cultural aspects of innovation management, leadership and entrepreneurship.
CONTRIBUTORS

EKATERINA ALBATS

Ekaterina Albats (M.Sc.(Tech.)) is a Ph. D. candidate at the School of Business and Management, Lappeenranta University of Technology (LUT), Finland. Ekaterina is working in LUT as a project researcher since February 2013 and as a project coordinator since September 2014. She has a background in innovation management and marketing. Ekaterina’s research interests lie in the fields of open innovation, university-industry collaboration and academic entrepreneurship. Ekaterina is also doing research on emerging economies. Currently Ekaterina is working in the INSPIRE project devoted to leveraging open innovation in SMEs, in the C3PO project that develops a cloud-based platform for city co-design (www.c3poprojectblog.wordpress.com) as well as a part of the Open Innovation Academic Network (www.oi-net.eu), which brings together academics and companies for designing the curricular on open innovation teaching. Ekaterina’s previous position – media researcher, MindShare (Moscow, Russia), working on marketing and media research for such clients as Oriflamme, Lufthansa, Castrol, Ritter Sport, Zurich and Nike on the Russian market.

SALEH AL-SHARIEH

Dr. Saleh Al-Sharieh is a Researcher at the European Technology Law and Human Rights Division of the Department of European and Economic Law at the University of Groningen Faculty of Law. He is a member of STeP, the ‘Security, Technology and e-Privacy Research Group’. His research focuses on technology law, intellectual property law, and human rights law. Prior to joining STeP, he taught intellectual property and technology law at the University of Ottawa Faculty of law and Carleton University Department of Law and Legal Studies in Ottawa, Canada. Dr. Al-Sharieh holds a Doctorate of Laws (LL.D) from the University of Ottawa Faculty of Law, where he was a Doctoral Fellow of the Social Sciences and Humanities Research Council (SSHRC). He is also a holder of a Master of Laws in Law and Technology (LL.M. in Law & Technology), a Master of Laws (M.A. in Law), and a Bachelor of Laws (L.L.B).

MARCIN BARON

Marcin Baron (Ph.D. Econ.): assistant professor at University of Economics in Katowice, Poland (Faculty of Economics, Department of Strategic and Regional Studies). Graduate of University of Economics in Katowice and Foreign Commonwealth Office scholar in Oxford, UK. Completed the masterclasses on knowledge intensive networks (at Södertörn University, Sweden) and on EU
cohesion policy (by Regional Studies Association, European Commission and the Committee of the Regions; in Brussels, Belgium). Combines academic theory with 15-year expertise in innovation and regional policy as well as innovation management. Currently focused on territorial aspects of open innovation. Skilled in foresight techniques and strategic management tools. Experienced project manager and researcher, active in international teams and regional platforms. Joins social activities related to leadership, creativity and entrepreneurship. Interested in photography and alpine skiing.

**Maja Basic**

Maja Basic completed her b.Sc, MBA and PhD at the University of Zagreb. Her doctoral thesis studied the relationship between internationalisation of firms and their open innovation perspectives. Maja was awarded the 2014 Australian Government Endeavour Research Fellowship at the University of South Australia and the Australian National University Enterprise. Maja’s research interests encompass the internal dynamics of the firms’ internationalisation modes, speed and performance, and their innovation and networking practices on one side, and economic development based on institutional policies promoting the former on the other side. Since November 2008 Maja works as a teaching and research assistant at the University of Zagreb, Faculty of Economics and Business. She holds classes in International Business, International Entrepreneurship, Technology Transfer and International Economics. Maja worked as a research, financial and administrative assistant in several European Commission’s projects, and is a member of the Academy of International Business, MBA Croatia and the charity organisation POZA.

**Marcel Bogers**

Marcel Bogers is an associate professor of innovation and entrepreneurship at the Unit for Innovation, Entrepreneurship and Management, Department of Food and Resource Economics, University of Copenhagen. He obtained a combined B.Sc. and M.Sc. in Technology and Society (Innovation Sciences) from Eindhoven University of Technology and a Ph.D. in Management of Technology from Ecole Polytechnique Fédérale de Lausanne (Swiss Federal Institute of Technology). His main interests center on the design, organization and management of technology, innovation and entrepreneurship in general, and on openness and participation in innovation and entrepreneurial processes in particular.

**Elena Casprini**

Elena Casprini is a Postdoc Research Fellow in Management at Scuola Superiore Sant’Anna where she has obtained her Ph.D. with a thesis on Business Model Innovation. She has
been a Visiting Ph.D. at Cass Business School (London, UK) and she is also involved in academic and research activities with the Department of Business and Law at University of Siena (Italy). Her main research interests are about business model innovation, open innovation and family firms. In particular, she is investigating how family firms implement open innovation and how established firms may innovate their business model.

**MARINA DABIC**

Marina Dabic is full Professor of Entrepreneurship and International Business at University of Zagreb, Faculty of Economics & Business, Croatia and Nottingham Business School, NTU, the United Kingdom. In 2016 Palgrave Mcmillan published her coauthored book Entrepreneurial universities in innovation - seeking countries: challenges and opportunities. She edited five book series: published in Poland, Slovenia, Croatia and UK. Prof. Dabic has edited several special issues on innovation, HRM and transfer technology. She is actively involved in evaluation of Horizon 2020 projects, quality assurance process through AACSB and within EFMD she served as reviewer board member for EPAS accreditation. She participated in more than 100 conferences and published more than 80 papers appeared in wide variety of international journals including Journal of International Business Studies (ABS 4 s*), Journal of World Business (ABS 3*), Journal of Business Ethics (ABS 3*), IHRMJ (ABS 3*) International Marketing Review (ABS 3*), European Management Journal (ABS 2*), Thunderbird Business Review, the International Journal Physical Distribution Logistic management (ABS 2*), Management International Review among others. In her career she achieved success in working on numerous projects, as well as the primary supervisor on the projects granted by European commission.

**ALBERTO DI MININ**

Alberto Di Minin is an Associate Professor of Management at the Scuola Superiore Sant’Anna in Pisa. He is also a Research Fellow with the Berkeley Roundtable on the International Economy (BRIE), University of California – Berkeley and Social Innovation Fellow with the Meridian International Center of Washington, DC. He is currently the Italian Representative on the SMEs & Access to Finance Programme Committee, for Horizon 2020, with the European Commission. He teaches innovation management and innovation policy. He is the Co-Director of the Executive Doctorate in Business Administration Program at the Sant’Anna, the Director of the Confucius Institute of Pisa, and the Director of the Galilei Institute in Chongqing University. His research deals with Open Innovation, appropriation of innovation and science and technology policy. He also works on technology transfer, intellectual property and R&D management.
SANDRA M. DINGLI

Sandra Dingli is an Associate Professor at the University of Malta. She set up The Edward de Bono Institute at the University of Malta in October 1992 in collaboration with Dr Edward de Bono, the inventor of Lateral Thinking. She was Director of the Institute from 1992 until 2013. In 2004 Sandra successfully designed, launched and coordinated a Master of Arts in Creativity and Innovation. Sandra’s research interests include innovation management, open innovation, foresight, new digital technology, the creative industries, virtual worlds, philosophy of mind and artificial intelligence. Although she dedicates most of her time to research, European projects and lecturing, her extensive work experience includes participation in the sectors of art and culture, tourism, human resources development, youth entrepreneurship and television production. She has published extensively in the UK and in Malta. Her most well-known publication is Creativity and Strategic Innovation Management, which she co-authored with Malcolm Goodman (Routledge, 2013, second edition 2017). Sandra is regularly invited to deliver presentations and workshops at local and international conferences on topics related to creativity, innovation management and foresight. She is an avid traveler and explorer and she enjoys travelling to distant countries to learn about different cultures.

HANNES ERLER

Hannes Erler is an international keynote speaker with practical knowledge in central subjects of innovation management, especially in earlier phases of innovation like networking with focus on inter-organizational collaboration and strategic alliances. He held the position of “Director Open Innovation Networks” at Swarovski Professional until the end of 2017. In his new function as “Swarovski Innovation Evangelist” he drives the evolution of Swarovski as a credible partner for collaborative innovation in the international innovation and scientific communities. He was invited to speak at over 30 conferences and innovation events from 2014 to 2016 and was a recipient of the “Best Open Innovation Award 2015” from Zeppelin University Friedrichshafen in the category “Open Innovation Network”. In previous functions, among others, he was also responsible for the operation of a cross-functional innovation incubation group called i-LAB, as well as heading up the product development department for many years. During his tenure, the mechanical engineer has undergone several executive trainings, including courses at Harvard Business School and at IMD in Lausanne, as well as additional trainings in systematic organizational development and coaching.
YVONNE KIRKELS

Yvonne Kirkels works as senior lecturer and researcher at Fontys University of Applied Science, faculty Business Management & Engineering. Her fields of interest are (Open) Innovation and Business Management of SMEs, entrepreneurship and social networks. Yvonne obtained her master’s degree in International Business in the field of Innovation Management at the University of Maastricht. She has a work history of several years in the field of marketing and completed her PhD thesis in 2010 on bridging organisations within the network between design and high-tech industry at the University of Technology in Eindhoven. Besides teaching and several coordinating activities at bachelor and master level, Yvonne is a member of the Fontys research group ‘Business Entrepreneurship’ which aims at creating a rich learning environment in which education, research and practice go hand in hand by o.a. developing knowledge regarding open innovation and SMEs in the Brainport region, Southeast Netherlands.

CARL JOACHIM KOCK

Following a first degree in Business from the Philipps-Universität Marburg, Germany, Prof. Kock graduated with a Master of Science in Management and a Ph.D. in Managerial Science from the Wharton School, University of Pennsylvania. In 2003 he joined IE Business School, a leading institution of graduate business education located in Madrid, Spain, where he currently conducts research on issues in corporate governance, environmental management, innovation, and sources of competitive advantage and consults to industry. His work has been published in several high ranking academic journals and received other accolades. He also teaches at the Masters/MBA, PhD and executive levels and has won and was nominated for numerous Best Teacher awards.

KATARINA KOŠMRLJ

Katarina Kosmrlj graduated from the Faculty of social sciences of the University of Ljubljana. She works as a researcher and teaching assistant at the Faculty of Management University of Primorska and as a PhD student in Statistics. Her main fields of interest and research are methodology, especially survey methodology, quality and evaluation. She has been involved in several projects concerning tertiary education, quality assessment and assurance, evaluation of institutions, projects and programmes, quality and management in education, and education for sustainable development. She is also a member of the International Summer School organization team and helps developing a system of quality assessment at the Faculty.
Seidali Kurtmollaiev is a postdoctoral researcher at the Center for Service Innovation (CSI) at NHH-Norwegian School of Economics. His research interest cover topics within strategy, management, and marketing related to service innovation.

Antero Kutvonen holds a position as Post-Doctoral Researcher in LUT and has been working in a research position there since 2007. He has published in several journals, such as the European Journal of Innovation Management and Int. Journal of Innovation and Learning. His research deals with issues at the intersection of open innovation and strategy as well as management of innovation, business ecosystems and technology.

Simona Lache is professor in the field of mechanical engineering, at Transilvania University of Brasov, Romania. She graduated the Faculty of Mechanical Engineering of the same university in 1992 and obtained her PhD in 2001. Since 2008 she holds the position of vice-rector for quality evaluation and since 2012 she is also responsible for the university internationalization. Her publications are in the field of mechanical engineering, as well as in quality assurance of higher education and university - business cooperation. She was involved in several international projects related to developing transnational cooperation between universities and entreprises, fostering entrepreneurship by developing business incubators, or creating models for quality international practical placements for students.

From academy to entrepreneurship, Monique LANDY was born and has been living and working in France near LYON, before joining European networks in 1990. Before this date, she started her career teaching English at HE level before creating and managing a bachelor level diploma for food technicians and engineers. As an expert of both academic and industry sectors in the food sector, she was selected to create the 1rst UETP (COMETT University Enterprise Training Partnership) for the food sector in Rhône-Alpes. She has extended its partnership to more universities, companies and research centers, joined multi sector projects and generated numerous transnational cooperations through various EU programs. She has been doing external
evaluations of EU projects for national agencies. She is now vice-president of a transnational non-profit organization and international project manager. Besides she shares with her husband the creation of an innovative SME, still growing and leading to the accreditation of a new orphan drug.

**Gundega Lapina**

Dr. paed., assoc.prof. in RISEBA University, Latvia. Gundega Lapina is holding a PhD in pedagogy (2008), as well as degree of a physicist (1989). Gundega Lapina is associated professor in RISEBA University, Latvia. She is giving courses on Innovation management, Innovation and Intellectual Property, Open Innovation and Creativity in Professional Work. The courses are practically oriented, linking theory to practice. Her research topics are related to innovation, focusing on innovation pedagogy and innovation management. Since 2012 G. Lapina has taken the academic and administrative positions in RISEBA, taking responsibility on managing the Business Department. Since 2000 she has been working as an international project manager in Latvian Technological Center, developing, coordinating and managing innovation, technology transfer and education related projects. For 12 years she has actively worked in Enterprise Europe Network, promoting innovation in the Latvian business community and supporting cooperation between research and industry internationally. In international project activities she has been working with different innovation target groups – researchers, entrepreneurs, educators, and doing research on innovative entrepreneurship development, innovation support and innovation policy in Latvia.

**Lubomir Lengyel**

Lubomir Lengyel is a Regional Quality Manager in Faurecia s.r.o., Leather, Kosice; Slovakia. He is leading a team of Plant Quality managers in Faurecia plants in Slovakia, Czech Republic, Poland and Germany. Previously acting as a New Product Launch Quality Engineer in VW group in Europe and United States. He had achieved a masters degree in the area Industrial Engineering at the Technical University of Kosice. He is certified VDA 6.3 process auditor and qualified ISO 9000 and ISO TS16949, VDA 6.5, FIEV. He is leading and participating in various innovation projects where cooperation between industry and universities is required.

**Borut Likar**

Borut Likar is a full professor and a research counsellor at the University of Primorska, Faculty of Management. He achieved his PhD at the Faculty of Electrical Engineering, University of Ljubljana. He is mainly focused on management of innovation processes, R&D, technology and technology transfer in business organizations as well as in educational system. He is the author
of hundreds of scientific, expert and other publications (more than 500 bibliographic units),
initiator of several international projects and the author of patents, models and copyright
works - many proved to be extremely marketable. He is an innovator and a recipient of many
national and international awards for his innovations and research work. Among numerous
lectures he has given, the talks at the United Nations’ headquarters in Geneva and at the
European Parliament in Brussel were met with a particularly wide response. Likar is also the
amateur photographer, where he is particularly interested in creative and innovative approaches
to photography. He also engages in writing aphorisms, which were published internationally.

HENRY LOPEZ-VEGA

Henry Lopez-Vega, Ph.D. is an Assistant professor at Jönköping International Business School (JIBS),
Jönköping University, Sweden. Before joining JIBS, he was an assistant professor at Linköping University.
He has a Ph.D. from ESADE Business School, Spain. His research contributes to the burgeoning
discussions on the implementation of open innovation and role of foreign R&D subsidiaries in
emerging markets. Broadly, his findings explain how firms design an effective open innovation
strategy, search for external knowledge and integrate valuable solutions. Henry has published in
several international journals such as Research Policy, Journal of Product Innovation Management.

JEAN-BAPTISTE MAILLARD

Jean-Baptiste Maillard is Manager in the International Projects Department at EFMD. He is
involved in EU-funded projects related to innovation, accreditation and quality assurance and the
development of internationalisation strategies. For the project OI-Net, Jean-Baptiste intervened in
the framework of the Quality Assurance part, monitoring the results of the project and evaluating
its impact among students, faculty and companies. He also presented Open Innovation in high-level
events to promote the field amongst management education specialists. Since 2010, Jean-Baptiste
has been involved in the promotion of international education and quality assurance in universities
and business schools. He participated as speaker in information events, seminars and conferences
in Europe and Latin America. Jean-Baptiste Maillard holds a Master degree in International
Relations and a Master degree in European External relations from Sciences-Po Strasbourg.

MARAL MAHDAD

Maral Mahdad is currently Postdoctoral fellow of Innovation management at the department
of Food and Resource Economics at Copenhagen University in Copenhagen, Denmark. She
undertook her Ph.D. in Management at the Management Institute of the Scuola Superiore Sant’Anna (Pisa, Italy). Her research activities focus on innovation management, University-Industry collaboration, open innovation, business model innovation and entrepreneurship. Maral previously worked on various European projects on Open innovation. Her academic experiences accompany with a blend of business consultancy. She previously worked for Toyota Kirloskar Motor (India) as a trainee in the marketing department, where she dealt with technology development and innovative solutions. She has a Master’s degree in Innovation Management from Scuola Superiore Sant’Anna and the University of Trento in Italy. She graduated in Industrial Engineering at Isfahan University of Technology (IUT) in Iran.

**PAVOL PALFY**

Pavol Palfy is an Assoc. Professor at the Department of Integrated Management systems of the Institute of Materials, Faculty of Metallurgy, Technical University of Kosice. He graduated in 1994 at the Faculty of Sciences, Safarik’s University of Kosice, in Biophysics. He defended his dissertation in the field of toxic metals waste stabilisation. He is an author of several scientific articles, textbooks and monograph chapters. His recent research activities include Environmental management; Life cycle assessment; Environmental economics; Quality management systems; Cost of quality; Value management; Capability of measurement processes and Certification issues.

**JOÃO JOSÉ PINTO**

João José Pinto Ferreira got is Licenciatura in Electrical Engineering and Computers at Faculty of Engineering, University of Porto (FEUP) in 1987; MSc Electrical Engineering and Computers at FEUP in 1991; PhD in Electrical Engineering and Computers at FEUP in 1995; Habilitation in Industrial Engineering and Management in April of 2011. Positions Held: 1987-1995, FEUP, Assistant Lecturer; 1995 – 2003: FEUP, Assistant Professor; 2003-today: FEUP, Associate Professor. At FEUP (1997-2000) also he was Member of the Executive Board of the Electrical Engineering Department. Since 2004 founder and Director of the Master in Innovation and Technological Entrepreneurship (<www.fe.up.pt/miete>). From October 2004 to July 2007 assumed a joint coordination of INESC Porto Unit of Information and Communication Systems. Coordinator of several international research projects with industry. In January 2008 moved to the new Department of Industrial Engineering and Management. Published so far close to 140 scientific publications, including papers in Journals, Conferences, Book Chapters with peer review. Guest Editor at the International Journal of Computer Integrated Manufacturing. Editor of book by Kluwer Academic Publisher: “E-Manufacturing: Business Paradigms

DARIA PODMETINA

D.Sc (Tech) Daria Podmetina works at Lappeenranta University of Technology, Finland. She has background in innovation and international management, involving conducting research and teaching of related disciplines, including open innovation. Additionally she teaches courses on research methods for master students. Daria has wide experience in participating and managing large international projects on innovation, open innovation, education, eco-systems, emerging markets, and cross-border cooperation. Her main research focus is on innovation strategies, specifically open and cooperative innovation, internationalisation, emerging markets, international R&D cooperation. She has publications in International Journal of Innovation Management, International Journal of Technology Marketing, Journal of East-West Business, Multinational Business Review and many others.

GER POST

(Dr. Ir.) Ger Post is a research professor of business entrepreneurship at Fontys University of Applied Science and is head of a research group focusing on innovation, entrepreneurship and industrial engineering. His research includes open innovation in SMEs, the design of innovation ecosystems and inter-organisational collaboration, entrepreneurial competences and skills, industry-university collaboration, and operational excellence in industry networks and supply chains. He is an active member of the Fontys Centre of Entrepreneurship and the Fontys Centre of Expertise on High Tech Systems and Materials. He is academic science panel member of ISPIM and involved in various academic and industry networks. Next to his academic work he has extensive experience in consultancy and industry. He has been working for the Dutch Centres of Innovation Syntens and is owner of StepSto Innovation, a company focusing on consulting and business development. He has extensive experience in various international and EU projects.

KLEMEM ŠIROK

Klemen Širok is an assistant professor at the Faculty of Management University of Primorska, lecturing human resource management, sociology of work, organizational behaviour, employee resourcing and career management, business communication, labour market, management of
cross-cultural differences, and quality management in education. His research interests include innovation management and evaluation studies in the field of labour market, quality assurance in education and labour market policies. He has been conducting or participating in many international (Eurofound and European Commission) and national evaluation projects in the field of labour market and education as well as in the projects from the field of innovation. He was also a member of two European Commission expert working groups: ‘Impact Monitoring Working Group of the LLP Committee’ and ‘Expert Group on the Benchmark on Learning Mobility’.

**Klas Eric Soderquist**

Klas Eric Soderquist is an Associate Professor of Innovation and Knowledge Management at the Department of Management Science & Technology, School of Business, Athens University of Economics & Business (AUEB). He is a member of AUEB's Management Science Laboratory, and Head of Academics of the MBA International Program. He has been a faculty member at Grenoble Ecole de Management, France and at the Higher Colleges of Technology, Dubai. He holds a DBA from Brunel University, UK, and a BSc-MSc in Industrial Engineering from the Royal Institute of Technology, Stockholm. Dr. Soderquist's research focuses on Innovation and R&D Management and Policy. He has published in the Journal of Product Innovation Management, Long Range Planning, R&D Management and Omega among other. He has consulted for companies in the manufacturing industry, for the European Commission on innovation policy, and for UNIDO on technology transfer and alliances. He has also worked for the Swedish Office of Science and Technology in Paris.

**Miroslav Špaček**

Associate Professor, dipl. Eng. Miroslav Špaček, Ph.D., MBA. He graduated from the Institute of Chemical Technology in Prague, Prague International Business School and University of Economics in Prague. In the past he held down top management positions in the industrial sector, specifically in chemistry, pharmacy and facility management. For the most part he is specialized in scenario and simulation approaches to investment projects risk analysis, post-audits of investment projects and crisis management. Since 2010 he has been working as academician at Faculty of Business Administration of University of Economics in Prague and College of Economics and Management in Prague. In 2015 he was granted the Associate Professor degree on corporate finance and management. He is the author of four monographs, 16 patents and more than 50 professional and scientific papers aimed at investment decision making, innovation, corporate finance, crisis and strategic management.
HENRIK SPROEDT

Henrik Sproedt obtained a PhD in Product Design and Innovation from the University of Southern Denmark. After several years in innovation practice in a variety of settings, he worked as Assistant Professor at the University of Southern Denmark where he researched how play can foster transformative learning in times of change. Today, Henrik is an independent innovation and design consultant.

WIM STEENBERGEN

MScEE and MBA with 20-year track record in innovation strategy and implementation for high-tech products at global Original Equipment Manufacturers (AT&T, Philips, Ericsson). Has managed profit & loss, product development and marketing programs for both B2B and B2C products in Europe and the USA. Has programmed innovation roadmaps with high caliber organizations, such as Philips Research and AT&T Bell Laboratories. Has successfully implemented or changed supply chains and business models with leading, global partners in Europe, USA and China. Has always delivered by leading highly qualified, multifunctional and mostly international (Europe, the USA, Singapore, Taiwan, China) teams. Has developed a new specialism during the last few years: managing the outsourcing of Development & Life Cycle Management (strategy, business models, competence management, processes). This new specialism will result in a book about outsourcing Development and Life Cycle Management (Steenbergen, 2017), which is expected to be released in early 2017. For more details, refer to: www.wimsteenbergen.com.

PETER ŠTRUKELJ

Peter Strukelj graduated in 2007 at the Faculty of Social Sciences (University of Ljubljana) in the field of international relations. In 2009, he received a Masters degree at the Faculty of Economics (University of Ljubljana) in the field of international economics. In 2014, he received a PhD at the Faculty of Management (University of Primorska) in the field of modelling and assessing technological capability. At the Faculty of Management, he now works as an assistant professor in different management courses, as well as in professional development work of post-graduate students. His fields of research are theory of technology, technological capability, technology assessment, technology transfer, but also economic and political science. He has published several scientific papers in scientific journals and in proceedings of international scientific conferences. He also participates in Slovenian and international projects on open innovation.
Andrea Sütőová

is an Assistant Professor at the Department of Integrated Management systems of the Institute of Materials, Faculty of Metallurgy, Technical University of Kosice. She finished her postgraduate study in the field of Production and Quality Engineering. She is a member of Quality Austria – training, certification and evaluation organization, where she acts as an external lecturer. Her research activities focus on Quality management systems, Simulation and improvement of processes, Performance management and Open innovation. She has published in the Quality Innovation Prosperity Journal, TQM Journal and Procedia – Social and Behavioral Sciences Journal, among the others. She has been a member of various national and international projects oriented mainly to Quality management, Education, Metrology, Quality management tools and methods for improvement of processes.

David Laura Teodora

Graduating from History and Philosophy Faculty of Babeș-Bolyai University from Cluj Napoca, in 1997, worked for six years as clinical psychologist in Pediatric Clinic. Since 2004 she joined academic staff in Transilvania University of Brasov at Faculty of Psychology and Educational Sciences. The teaching activity is related with psychological assessment, child and adolescent psychopathology, psychology of creativity. Author of books in psychological evaluation, computer use as a tool in children development and creativity and more than thirty scientific papers published in the main international scientific stream, continuing involvement and participation in conferences and scientific meetings. Along with teaching activity, she participated in European projects concerning entrepreneurship, quality placements in students, open innovation and university-enterprise cooperation.

Roman Teplov

Roman Teplov M.Sc. (Tech.) is a PhD candidate and at Lappeenranta University of Technology. His dissertation explores various approaches to open innovation perceived in companies of different size. Roman holds a Master's degree in Industrial Management and a Bachelor degree in Mechanical Engineering. He has industrial experience as an R&D specialist and has been involved as a project manager and researcher into several international research projects. He has been conducting research on innovation, social responsibility, ecosystems and cross-cultural aspects. Roman has teaching experience in methodology, project management and innovation courses. His research interests include technology and innovation management, entrepreneurship, open innovation and advanced simulation systems.
**Christophe Terrasse**

Dr. Christophe Terrasse is the Director of the International Projects Department at EFMD. This structure is responsible for and oversees all the EU-funded capacity building projects in the field of Higher Education Management, Quality Assurance and International cooperation with European and non-European institutions. Since he joined EFMD in 2000, he has coordinated and managed more than 30 international projects funded by the EU all over the world. Since 2013, the International Projects Department has been leading the activities on Quality Assurance in the EU project OI-Net – The European Academic Network for Open Innovation, in which EFMD monitors processes and evaluates the impact of the project on its stakeholders. Dr. Terrasse also intervened in other projects linked to quality assurance, among which the AsiaLink and Bistro projects which developed a regional accreditation schemes, respectively in South Asia and Central Asia and the TNA_QA TEMPUS project defining quality norms for transnational education in the Caucasus. He also regularly participates in the peer review of Higher Education Institutions applying for international accreditation schemes. Since 2012, the International Projects Department manages FORGEC, a EU-funded capacity building project involving 8 Cuban universities, in which EFMD oversees the quality assurance processes and he is responsible for the training on internationalisation and international quality accreditation. Dr. Terrasse obtained his Ph.D. in Management Sciences at HEC Paris, and serves as faculty in the international programmes of the institution. His field of research is the evolution of consumer behaviour, and he also publishes articles and presentations in high-level congresses on higher education management, international quality assurance systems and innovation in higher education in Management.

**Marko Torkkeli**

Dr. Marko Torkkeli is a Professor of Technology and Business Innovations at the Lappeenranta University of Technology, Finland. His research interests focus on technology and innovation management, strategic entrepreneurship, growth venturing, and decision support systems. He has published over 200 articles in academic journals. Dr. Torkkeli has also been engaged in numerous international research projects in the USA, Australia, Brazil, Canada, China, India, Japan, Russia and across Europe. He is a Visiting Researcher at INESC Porto, Portugal, a Docent of Technology-based Business at University of Jyväskylä, Finland, a Docent of Technology and Innovation Management at Helsinki University of Technology, Finland and holds an Affiliated Faculty position at Singapore Management University. He has more than 15 years of experience of consulting activities in innovation management and strategy. He serves as the Director of Publications of the International Society for Professional Innovation Management (ISPIM) and is one of the founding editors of the open access, multidisciplinary Journal of Innovation Management. He is the co-editor of a book published by Cambridge Scholars Publishing, entitled “Innovation in financial services: a dual ambiguity”.
Christos S. Tsanos holds a PhD in Supply Chain Management from the Department of Management Science and Technology, School of Business, Athens University of Economics and Business (AUEB), where he is currently a Research Associate. His research interests are focused on supply chain integration and performance assessment, interorganisational relationships in the supply chain, and corporate responsibility, sustainability and innovation in supply chain management. He has extensive research experience through his participation in more than 20 research projects funded by the European Commission and the General Secretariat for Research and Technology of the Hellenic Republic.

Davor Vlajčić holds his B.Sc. degree in Economic Analysis and Development (2008), Master of Business Administration degree (2013) and PhD (2015) from University of Zagreb. Since March 2009, Davor works as a Teaching and research assistant at the University of Zagreb, Faculty of Economics and Business, Department of International Economics. He worked at Raiffeisen Consulting as an Macroeconomic Analyst. She holds classes in International Business, International Entrepreneurship, Technology Transfer and International Economics. He holds tutorials in undergraduate International Business and International Entrepreneurship courses both in class and online, in Croatian and in English. Courses in English are part of the EFMD’s EPAS accredited program. He participated as a research, financial and administrative assistant in several European Commission’s projects: TEMPUS Fostering Entrepreneurship in Higher Education, Leonardo da Vinci’s “Transfer of Innovation – Stimulating Learning Idea-to-Market”, and Erasmus Network “Open Innovation”.

Kristina Zgodavova is a Professor of Quality Engineering at the Department of Integrated Management Systems, Faculty of Metallurgy, Technical University of Kosice (TUKE). She is a member of working group of the Accreditation Commission – advisory body of Slovak Government; member of ASQ; editor in chief of the Quality Innovation Prosperity journal. She has been a vice-rector for strategy and development at the Alexander Dubček University in Trenčín, Slovakia. She attended numerous invited lectures in a speech in University of Vaasa, Finland; CVUT Prague and the University of Hradec Kralove, Czech Republic. She has published in the TQM Journal, Journal of Workplace Learning among other. In the present, she serves as the guarantor of Integrated Management Systems and Quality Engineering
study programs at the TUKE and deals mainly with improving the education quality; healthcare quality; new product development and open innovation. In these areas leads the domestic and foreign projects, PhD. students; courses and cooperation with practice.
PART 1. ENVISIONING THE FUTURE OF INNOVATION EDUCATION: MAKING OPEN INNOVATION MAINSTREAM
INTRODUCTION

BY ANNE-LAURE MENTION AND MARKO TORKKELI

The world is facing unprecedented high levels of interconnectedness, uncertainty, and mobility as it simultaneously embraces globalization and de-globalization phenomena. Undeniably, this affects the skills individuals need to possess, nurture and grow to successfully navigate in varied professional contexts. Knowledge builds on itself, hence repositories of knowledge grow exponentially, and become increasingly available through modern communication channels. Consequently, accumulating and exploiting in-depth knowledge in a narrow area is concurrently easier, as positive externalities of technological progress, and more complex than ever, as the amount of information to process exponentially grows. Breadth of knowledge and the ability to articulate different sources and astutely combine them to capture multifaceted phenomena and sketch effective action is becoming a key capability, if not the prevailing one, in complex environments. Education systems need to accommodate this growing need to concomitantly master high levels of specific knowledge and a reasonable understanding and awareness of a wide array of fields. We argue that elevating Open Innovation to a teaching field is a means to achieve this higher purpose of departing from a mono-disciplinary, silo-driven approach to reach an inclusive and integrative understanding of innovation, which reflects the way innovation happens nowadays.

Promoting Open Innovation as a field of teaching on its own can be analysed through the lens of Aldrich’s view on the emergence of an academic field. According to Aldrich (2012), six forces create the institutional infrastructure to establish a field: social networking, publication opportunities, training and mentoring, funding sources, recognitions and rewards, globalizing forces. We will review the OI-Net initiative, as the largest European network of educators, practitioners and thought leaders with a shared interest on Open Innovation, from the perspective of these forces. Social networking is achieved through the gathering of a wide community of academics and practitioners, from one of the leading worldwide economy, the European Union, thus building a community in itself. The interaction of this community with the wider innovation management community and the natural embeddedness, both at individual and at collective level with innovation management professional associations, leading groups and conferences, demonstrate the synergies between Open Innovation and Innovation Management. Yet, dedicated conferences, such as the World Open Innovation Conference, the Open Innovation Forum, the Open Innovation 2.0 Conference, as well as dedicated tracks during leading innovation events, provide evidence of the need to hold self-alone events revolving around Open Innovation. Second, the number of Special Issues in leading academic journals such as R&D Management, Technovation and Research Policy, dedicated to Open Innovation, has grown drastically over the last decade. The Journal of Innovation Management, an open access multidisciplinary journal promoting the articulation of STEM (Science, Technology,
Part 1. Introduction

Engineering and Mathematics) and HASS (Humanities, Arts and Social Sciences) to fully capture the multifaceted nature of the innovation process, is also supporting the emergence of Open Innovation as an academic field, through the publication of Thematic Issues entirely dedicated to Open Innovation, yet addressed through multiple facets and lenses in line with its multidisciplinary philosophy. The number of books on Open Innovation is also booming, irrespectively of whether these are academically grounded or addressing a managerial audience. Training programmes are the core focus of the OI-Net project, and it complements and supplements other initiatives, such as professional workshops and PhD seminars (e.g. ESADE’s PhD seminars by Henry Chesbrough).

Funding of Open Innovation research certainly deserves further attention, as it currently seems to be included in wider funding schemes. Similarly, regular data collection on Open Innovation practices, through surveys similar to the Global Entrepreneurship Monitor originally funded by the Kauffman Foundation (Aldrich, 2012). Currently, large-scale innovation surveys fail to capture the multifaceted nature of Open Innovation. More specifically, the Community Innovation Survey, which is the harmonized instrument to collect information about innovation inputs, practices, and outcomes, across Europe and most OECD countries, includes a few questions, which reflect inbound Open Innovation practices but disregards the outbound side at this stage. Awards for Open Innovation exist (see e.g. The American Leaders), yet in the eyes of these Authors, much remains to be done in order to nurture the recognition of the research and the achievements in the field. Globalizing forces take various forms for Open Innovation research: it has now significantly departed from its original scope (defining, characterizing and depicting the phenomenon), geographical and sectoral areas for empirical investigations. Nowadays, Open Innovation research covers all industries and adopts a worldwide approach, even if there is a predominance of US and European-based research. Yet, there is no doubt that this will be changing shortly.

This journey of making Open Innovation mainstream is only at its beginning. Current literature is still extensively debating about the relevance, usefulness and applicability of Open Innovation. Numerous scholars have expressed their concerns and criticisms about Open Innovation, have questioned whether it should be considered as a concept, paradigm or simply a (relatively) new managerial fad. By challenging Open Innovation, these criticisms induce new reflections, thoughts and actions, so as to constructively contribute to this vibrant debate on what Open Innovation entails and to what extent it is valuable to depict economic and managerial phenomena. To raise Open Innovation to the status of a discipline, to convince universities and decision-makers to invest into the development of dedicated curricula and trainings will still require lots of effort and dedication, as well as cultural shifts and mindsets. Our conviction is that Open Innovation needs to be debated in different arenas from a multidisciplinary perspective, and most importantly, with insights from thought leaders, policy makers and the civil society. As we conclude in “Open Innovation: a multifaceted perspective” (Mention & Torkkeli, 2015), Open Innovation requires to astutely combine eight O’s, “Openness is central, and embodies the overall philosophy of the innovation process as seen nowadays. Openness entails the ability to listen to different, even
divergent, Opinions, so as to be receptive to other mindsets, cultures, environments and to transform these into Opportunities. Individuals, teams, firms, organizations, nations, societies should capture Opportunities in a meaningful, productive, efficient and effective manner so as to create value. Value creation requires the ability to achieve a perfect Orchestration of capabilities, both individual and collective abilities and capabilities. Such Orchestration may benefit from Observation, conducted by third parties, providing impartial and fair advice, or from Observation of third parties, such as competitors, suppliers, customers and all stakeholders involved in the value constellation. Optimization is the Holy Grail and may, at least partially, rely on the technological progress, which is still booming nowadays. The use of technologies, as well as the reshaping of ecosystems, requires more and more Operability and interoperability between firms and systems. And only Optimism and willingness to engage into an Open Innovation journey can lead to fruitful and mutually rewarding relationships, ensuring that innovation delivers its intrinsic mission of building a better future while achieving societal impact.”

REFERENCES

PART 1 LOADING
INDUSTRY HIGHLIGHTS: HOW NEW INNOVATION ECOSYSTEM LOGICS TRANSFORMED OPEN INNOVATION AT SWAROVSKI

HANNES ERLER
DIRECTOR OPEN INNOVATION NETWORKS
SWAROVSKI KG

THE NEW ECOSYSTEM DYNAMICS

Shortened life cycles of products, speed of technological change and omnipresent availability of information threaten every organization these days. In the area of Innovation Management the year 2016 has brought us a lot of new answers, methods and good practices. But was there any new revolutionary learning? When I met Prof. Bob Cooper, the inventor of Stage Gate, while presenting at the 2016 Stage Gate Summit, he mentioned the transformation of agile methods, such as Scrum and Sprint, proven principles in the area of software development, into the area of physical product innovation. In his opinion probably one of the biggest opportunities to increase speed and drive of physical product innovation, and one of the biggest moves since the introduction of Stage Gate logics in the 1990s. A few month later I met Prof. Henry Chesbrough, known for his work on Open Innovation, in Porto at the EU OI-Net conference. He very much focused on understanding the deep societal change of our days and how to find purpose and meaning for innovating in new ecosystem environments.

Many other innovation methods have been promoted by academics like Design Thinking, the Lean Start up Model from Eric Ries, the “The Business Model Navigator” from Prof. Oliver Gassmann, or “Jobs to be Done” from Clayton Christensen.

When we deeper look into them we find out that industrial experiences have been providing data and management learning, and academics have derived their theories around these success stories and stories of failure, and vice versa. This circle of empirical and theoretical management learning is very important in order to develop new solutions and answers. But industry logics are very different from theoretical ideal settings because they have at times hundreds of people in different organizational settings, encompassing diverse cultural and sub-cultural behaviors. And that’s the reason why these processes cannot simply be transferred 1:1 into an organization.

As practitioners we are forced to choose and train the right methods for the right challenge. The more we go beyond our core businesses towards adjacent and transformative innovation we see that the clever orchestration of methods begs a deeper understanding. What they all have in common is a divergent and a convergent phase that allows to think boldly on the one hand, and to recognize priorities and enable speed on the other hand.

We create environments where all these new methods and dynamics are positioned as drivers in innovation ecosystems. Diversified networks of connections, blurring boundaries, collaboration, and interdependence characterize the logics of ecosystems. Innovation ecosystems in most cases consist of a science ecosystem, producing knowledge and technologies in an exploratory behavior mode and a business ecosystem, producing value for customers and companies in an exploitative mode. The definition of ecosystems is coming from the natural world: communities of living organisms.
interacting within their shared environment, simultaneously competing and collaborating, creating and sharing resources, and adapting together in the face of inevitable external disruptions. The look into these solutions coming from natural systems can provide us with helpful insights as to how innovation could be understood.

**Changing Dynamics**

As a company we have experimented with many of the mentioned processes with different success and outcome. We were a quasi-monopolist of the classical crystal business up till 2008 when we suddenly faced an explosion of competition. The need for more agile processes, robust strategies and new technologies was obvious. After the definition of innovation search fields and must-win battle fields, we saw that we had to significantly open up our mindset and orientation towards the outside world.

Based on both our long tradition of incorporating technologies from other industries into the world of fashion and design, and on the founder’s spirit - who recognized very early in the 20th century that “development never stands still and that an invention in one field inevitably leads to inventions in another fields” - we decided, among other changes, to allocate dedicated resources to the field of Open Innovation and inter-organizational networking.

**The Foundation of OI Networks**

The Open Innovation Networks department was officially established in 2013 in order to implement a foundation for strategic alliances and initiatives with focus on outside-in technical innovation and long-term relationships leading to additional business for both sides.

Our initial mandate was to formally build a network of potential partners who could contribute to any of our innovation categories, with a focus upon outside-in breakthrough technologies for our business-driven search fields, while increasing transparency and culture of openness and trust for all innovation activities both internally and externally. Initially our key stakeholders included all research, innovation and design related internal actors, those responsible for budget & prioritization per innovation category, as well as various internal leading experts, innovators, and department heads depending on the topic or field. Finally, we established an engagement process which tracks all potential partners through our defined stages of engagement. Conclusively, we established a system comparable to the lead generation or conversion process common to traditional sales & marketing functions, and customized a customer relationship management as software support system. With this implementation, our Open Innovation network became an asset in and of itself, allowing for sustainable operation and transparent collaboration, while generating value for multiple business
units, reaching far beyond our initial key stakeholders, and providing interested employees access to the data and networking communities that we manage within our portfolio.

**CREATING CUSTOMER VALUE THROUGH OPEN INNOVATION NETWORKS**

In November 2015, we were awarded with the “Open Innovation Award” from the Zeppelin University in Germany in the category “Best Open Innovation Network”. This helped us a lot in trusting our interpretation of how we see innovation working in future.

Involving external partners was not something new for Swarovski, but to do this on different levels of the organization and to integrate such collaboration into our day-to-day work required - and still requires - both a change in mindset as well as acquiring new skill sets.

We very soon realized the tremendous potential in transforming the results from different R&D efforts of big industry players and research institutes into our markets. However, externally we were not perceived as a technology-oriented company and we have not been present in the global science ecosystems. Three years later, we have now spoken with over hundreds of companies, mainly cross industry, and developed a few dozen opportunities based upon new technology integrations. The analysis of our partner pipe-line surprisingly showed us that their research labs operate in 33 different countries worldwide.

The main source of new contacts was realized through speaker invitations and participation at over two dozen global conferences and networking events. Other indirect sources included referrals from existing partners, or recommendations from networking intermediaries. This widened the ability of the organization to integrate external knowledge in a fast and seamless manner, delivering on our promise to provide access to breakthrough innovation and increased development speed from idea to market.

**ARRIVING IN THE NEW INNOVATION ECOSYSTEMS**

As with many businesses, we are evolving from traditionally providing our customers with new products to transforming our offers into new comprehensive solutions. That means that the ability to efficiently collaborate with external science ecosystems – openly, quickly, and more often than in the past – is even more crucial.

The industries we serve simply do not allow the time to follow linear development models that require years to make a new technology available for the markets. Rather we see processes that start in corporate laboratories and research institutes very early on, which are then quickly
transformed into new product and service concepts by directly involving the customer at the very beginning. Collectively, these participants comprise as what we refer to as the innovation ecosystem, integrating the science and business ecosystems together as shown in the graphic below. Entitled “The Logics of Innovation Ecosystems,” we depict a holistic view of our ecosystem-based approach, a hybrid of the models from Gene Slowinski (Rutgers University) and Katri Valkokari (VTT) in combination with the methodologies we rely upon throughout the various phases of networked innovation development.

**THE LOGICS OF INNOVATION ECOSYSTEMS**

**INNOVATION ECOSYSTEMS**
Integrate exploration (knowledge) and exploitation (business) ecosystems

**BUSINESS ECOSYSTEMS**
Focus on creating customer value

**SCIENCE ECOSYSTEMS**
Focus on generating new knowledge and technologies

1. Work
   - Design Thinking
2. Fund
   - Scouting & Experimental Development
3. Get
   - Collaboration Model & Management
4. Manage
   - Business Model & Relationship Management

Our biggest learnings from our open innovation journey

Another shift that we observe in industries today is the so-called “Fail Fast - Learn Fast” and “Experimentation” culture. This is something we can particularly observe in start-up environments, however this has now also risen to the top of the innovation agendas for large corporate environments as well. Our company recently launched a private equity partnership with the community, leveraging the collaborative networking and experimental spirit that the company has been known for since its founding.
**Industry Highlights: How New Innovation Ecosystem Logics Transformed Open Innovation At Swarovski**

Coming back to the previously mentioned agile methods, we see a big focus on design thinking and sprint methods along with a redefinition of the places where - and the processes how - we innovate.

We know exactly how all these methods work, what benefit they can bring at what phase of the innovation development process, and how they can be used. However, in big organizations they must also be combined with the principles of systematic organizational development.

Schumpeter’s theory on creative destruction then gains new meaning and can be seen as a company asset if your employees are encouraged to adopt these new methods of thinking. There are a few companies showing us how creative destruction can be embraced within a corporation, such as Google, Johnson & Johnson, IBM, and P&G. Open innovation then becomes a foundational cultural mindset and behavior, and not a responsibility of a single department.

We want to be the missing link between the tech and fashion industries, we therefore have to develop new practices in combining data-driven systems and design thinking methods. We believe that values along the levels of customers, organizations, ecosystems and society are the common language that determines the likelihood of success. The better the contribution to these four levels and the meaning of our products and services, the better our footprint on society as a whole will be.

With the role of Open Innovation networks we have shown only one facet of Swarovski’s innovation ecosystems. As innovation leader in our industry we have to guarantee the relevance of our technological expertise, our capabilities around inventiveness, and the ingenuity and motivation to further develop the Swarovski DNA of innovation for the next 120 years to come.
PART 2. WALKING THE TALK: A EUROPEAN INITIATIVE TO SPUR OPEN INNOVATION EDUCATION
INTRODUCTION

Having addressed why Open Innovation should be elevated to the status of a self-contained teaching field, this Part will now further elaborate how the European Academic Network for Open Innovation (OI-Net) contributed to this ambitious aim. Gathering experts from 51 institutions and organizations across Europe and through a coordinated effort, the purpose of the OI-Net project, funded under the Erasmus scheme, is multifold. Firstly, it aims to define a joint framework for curricula on Open Innovation on a European level. Secondly, it aspires to explore how such curricula can complement or supplement existing schemes offered by universities and higher education institutions, including its recognition in terms of educational credits, i.e. the so-called ECTS. Thirdly, it targets the development of customized modules, based on the peculiarities of the different structures of European economies. Fourthly, it addresses the elaboration of an online library of cases embracing all aspects of Open Innovation for educational purposes. Fifthly, its purpose is to build a sustainable community, with a shared interest in the field of Open Innovation, and self-reinforcing the awareness raising both among high education institutions, companies, associations, policy makers and civil society. Ultimately, the purpose of the project is to establish Open Innovation as a self-standing discipline per se. The key outcomes are highlighted below.

In practical terms, the OI-Net project launched a dedicated survey on Open Innovation practices implementation across the main industries of every European country involved. This original survey unveiled the current state of play in terms of Open Innovation awareness, adoption, captured both in terms of diversity of implemented practices and the intensity of their deployment, and intention to further apply Open Innovation across industries and countries. It further explored what skills are specific to Open Innovation implementation, covering explorative, exploitative, transformational categories of skills to name just a few, and led to the definition of the Open Innovation Specialist Competences Profile, consisting of the critical skills and abilities that OI specialists should master.

In parallel, case studies encompassing strategic concerns, i.e. why do firms engage into Open Innovation strategies; organizational questions, i.e. what modes and practices of Open Innovation are selected, how are those implemented, and what are the obstacles and catalysts for doing so; and performance-related issues, such as what is the impact of Open Innovation practices on firm’s performance. This resulted in the development of an online repository of case studies, either descriptive or instructive, reflecting the diversity of experiences - positive and negative - with Open Innovation across Europe. The OI-Net platform provides searchable functionalities to browse across these case studies, accessible at www.oi-net.eu.

Concomitantly, a review of existing curricula, and to what extent they include Open Innovation distinctively, has been performed. Lache et al. present the key findings of this review, highlighting the current lack of standalone study programs despite the scattered existence of courses or course modules across innovation programs at all higher education teaching levels.
In parallel, a team of Open Innovation experts has consensually elaborated a set of learning outcomes, following a multidisciplinary approach. The essence of the project itself is multidisciplinary, thus accommodating the combination, involvement, and integration of several academic disciplines or professional specializations. Further details can be found in Pinto Ferreira and Spacek.

Teaching Open Innovation requires more than a formalized common curriculum. Post et al. elaborate pedagogical guidelines, customized to the specific levels of teaching, and provides valuable recommendations to Open Innovation lecturers and readers. They advocate for a contingent approach, considering student backgrounds, regional peculiarities and industry dynamics. Their recommendations stem from feedbacks from readers involved in the 13 pilot tests which have been run across Europe, and have targeted the whole spectrum of higher education levels.

Along the lines of double loop learning, as well as implementation performance monitoring, key success factors for Open Innovation Curricula design and delivery have been defined. Adopting a needs-driven approach, a set of measurable indicators, allowing for the critical assessment of OI programs design, monitoring, implementation and evaluation, has been elaborated and is reported by Dingli and Landy. Further recommendations on the promotion of Open Innovation programs among Higher Education Institutions, and their governance, are provided by Terrasse and Maillard.

The following figure illustrates the overall dynamics of the project.
INDUSTRIAL NEEDS FOR OPEN INNOVATION EDUCATION

DARIA PODMETINA, KLAS ERIC SODERQUIST, JUSTYNA DĄBROWSKA, JOACHIM HAFKESBRINK, HENRY LOPEZ VEGA

ABSTRACT

The first step in the OI-Net project was to collect information on the industrial needs for open innovation education. For this purpose, the first European Survey on Identification of Industrial Needs for Open Innovation Education was developed and launched. The OI-Net project partners collected over 500 responses from European companies (large, SMEs, and micro firms). This study responds to the challenge of creating a European-wide open innovation policy (Chesbrough, Vanhaverbeke, Lopez-Vega & Bakici, 2011) that attracts qualified and experienced researchers to boost R&D, entrepreneurship and links between industry and society in Europe.

This chapter provides a summary of the key findings derived from the survey, including such indicators as the variety and intensity of open innovation practices adopted by companies, their experience and future ambitions in open innovation adoption, and the key organizational competences defining the open innovation capability of a firm. In addition to analyzing organizational capabilities and open innovation adoption practices on the company level, employees’ individual skills associated with open innovation implementation were studied. This resulted in one of the core findings of the project - the Open Innovation Specialist Competences Profile consisting of the most important skills and abilities that specialists in open innovation should possess. These findings bring new knowledge to companies’ HR and innovation management; to their hiring policy; to employees’ training and education practices; and at the same time, provide Higher Education Institutions (HEIs) with a competence framework, based on which open innovation education can be planned. Thus, the impact of this chapter includes: 1) enhancing academic research, 2) providing new instruments for academic teaching, and 3) guiding companies in the relevant skills for open and collaborative innovation.
Industrial Needs For Open Innovation Education

Lecture Content

Survey on Industrial needs for open innovation education

Over the last decade, open innovation (OI) has been widely accepted and implemented by large multinational corporations (Mortara & Minshall, 2011) and SMEs (Van De Vrande, De Jong, Vanhaverbeke & De Rochemont, 2009) alike. It can be observed that the role of open innovation has become more strategic, leading to the formalization of new open innovation functions and roles in companies (Dabrowska & Podmetina, 2014; Mortara & Minshall, 2014). Not surprisingly, new managerial titles have emerged, for example the title of Vice President for Open Innovation at Unilever; Open Innovation Director at Crown Packaging and Philips (Mortara & Minshall, 2014), and Open Innovation Manager at Nike, PepsiCo, Lenovo, GM, Electrolux, Harman, and other companies.

The adoption of open innovation practices, apart from creating new job positions, has also changed the way companies recruit new staff, and the skills and competences they are seeking (Di Minin, Frawni & Piccaluga, 2010). Once a company decides to open up its innovation process, employees are no longer expected to have technical-scientific or managerial expertise only, but should possess certain ‘softer’ competences and skills as well (Huston & Sakkab, 2006). To succeed in managing innovation, companies depend on universities’ research and training to find appropriately educated new recruits and to prepare their employees for changing professional roles. The OI-Net project embraced the challenge of defining and structuring the skills and knowledge that future open innovation managers should acquire. This was done by launching the first European survey to identify the industry needs for open innovation education.

The questionnaire was developed from a solid theoretical background and covered the following broad topic areas: 1) the current state of open innovation adoption in the industry, 2) the perceived importance of open innovation for multiple industries, 3) the importance of open innovation skills for industry employees, and 4) the needed/desirable set of open innovation skills for university graduates. The data was collected by an online survey, and the key respondents were HR specialists, innovation or R&D managers / directors, or other specialists where open innovation activities can be located. In total, 528 respondents from 35 countries answered the survey. We recommend reading the full version of the report on “Open Innovation in European Industries” available at www.oi-net.eu. In this chapter, the main results are presented in a condensed form.

Large firms (more than 250 employees) and SMEs (10-250 employees) represented the two biggest groups, accounting for 43.2% and 37.5%, respectively (Figure 1). Micro enterprises (less than 10 employees) were relatively underrepresented with 19.3%. The average age of the companies was 33 years, and the majority of companies in the sample were mature ones (11-20 years).
Part 2. Walking the Talk: A European Initiative to Spur Open Innovation

Adoption of open innovation in companies

A majority of the companies (61% of the respondents) perceived themselves as adopting open innovation, and out of this number, 29% were at an early stage of open innovation adoption. Additionally, another 16% of the firms were potential open innovation adopters, who planned to start adopting open innovation in the nearest future. Slightly better penetration of open innovation adoption could be observed in large companies compared to SMEs or micro firms (Figure 2).
At the same time, micro firms were very active in planning to adopt open innovation and had the highest share of firms at the early stage of open innovation adoption.

The research on open innovation usually distinguishes between inbound (outside-in) open innovation (external knowledge flows into the firm), outbound (inside-out) open innovation (knowledge flows out of the firm) and coupled open innovation, which is a combination of the two. From the monetary perspective, the activities are divided into pecuniary (monetary) and non-pecuniary (non-monetary) dimensions, which illustrate direct (or not) financial reward and compensation associated with OI activities (Figure 3). Overall, inbound open innovation activities, such as collaborative innovation, scanning for external ideas, and customer co-creation are more intensively adopted compared to outbound open innovation practices, where participation in standardization is the most frequently adopted activity. Large firms acquire external technologies more intensively, participate in idea and start-up competitions, involve customers in R&D projects,
and quite naturally, participate in standardization. However, they are more reluctant to crowdsourcing and free revealing than SMEs or micro firms.

![Figure 3. Intensity of the adoption of open innovation activities: company size perspective](image)

Out of all open innovation activities, SMEs adopt collaborative innovation with external partners and scanning for external ideas the most. Micro firms use external networks, participate in idea and start-up competition, collaborate on innovation with external partners, and involve customers in the co-creation process as intensively as SMEs and large firms.

Not surprisingly, companies who identified themselves as OI adopters demonstrated a higher intensity of adoption of OI activities compared to those who did not practice OI (Figure 4). On the other hand, many firms planning to adopt OI had already quite high level of engagement in some activities, such as, for example scanning for external ideas and collaborative innovation with external partners. Meanwhile, non-adopters also reported significant intensity in the adoption of
some activities, for example scanning for external ideas and collaborative innovation with external partners, and external technology acquisition.

The results presented above raise the question of whether there is a gap in the understanding of OI by the academia and companies. Perhaps some open innovation practices are applied in companies on an everyday basis and are not considered as ones associated with open innovation. Our latest research (Podmetina, Teplov, Dabrowska & Albats, 2016) shows that some open innovation practices (defined by researchers) are not indeed considered as such by companies.

**Organizational capabilities for open innovation**

It is assumed that companies adopting open innovation have specific organizational capabilities, different from companies who do not have experience in open innovation. We elaborated the set
of organizational capabilities based on previous studies, some of which were directly associated with open innovation and some characterized the knowledge exchange process within the firm and through company borders. After the data was collected, the statistical analysis led us to group organizational capabilities into two sets – a larger set, common to most companies in the sample, and a smaller set of capabilities common mostly for companies adopting open innovation.

The first group of capabilities, common for most companies (Figures 5 and 6), defines the management and organizational behaviors (employees’ attitudes and managerial processes in departments and in the organization as a whole) in knowledge sourcing, acquisition and absorption within the firm, and includes the following capabilities:

• employees’ attitudes towards applying external ideas and technologies and towards other companies using their knowledge and technology (indicating the “not invented here” and “not sold here” syndromes);
• ability to accept and disseminate external ideas inside the company;
• collaboration with external partners and considering it as competitive advantage;
• ability to source knowledge from outside and disseminate it within the organization and integrate it into products and services;
• failure tolerance in external knowledge sourcing;
• sharing knowledge and technologies with others, and cross-functional collaboration in knowledge sourcing and knowledge exchange; and
• porous organizational borders – open for knowledge flows from outside – in and from inside-out.

The second set of capabilities, common mostly for companies adopting open innovation, describes what the management does to organize and facilitate open innovation (Figures 7 and 8):

• fostering open innovation skills and awareness within the organization;
• providing education and training on open innovation for the employees;
• applying interactive collaboration tools and methods to facilitate open innovation;
• top management provides support for open innovation activities (by resource allocation);
• rewarding employees for open innovation activities; and
• designing an open organization structure according to the company’s needs.

As mentioned above, most of the analyzed companies had high capabilities (first group) of defining the management and organizational behavior related to knowledge sourcing, acquisition and absorption within the firm (Figure 5). However, micro firms had the highest capabilities, followed by SMEs and then by large firms. Micro firms and SMEs also reported much stronger capabilities than large firms in sourcing and applying external technologies, disseminating them within the organizations and collaborating with external partners, which can be explain also by their higher capabilities in cross-functional cooperation, facilitating knowledge absorption in the organizations. The employees in large organizations showed a less positive attitude towards having other
companies receiving and using knowledge and technologies compared to the employees in SMEs and micro-sized companies. In addition, the borders of the company were less open and new external ideas were accepted and disseminated less in large firms, compared to SMEs and micro firms.

Figure 5. Organizational capabilities defining the management and organizational behavior related to knowledge sourcing, acquisition and absorption: company size perspective

Comparing the organizational capabilities of companies adopting open innovation (adopter), planning to start adopting OI (planners) and of those who do not adopt open innovation (non-adopters), we observe that “adopters” naturally have higher competence collaboration with external partners and more organizing knowledge flows through organizational borders (Figure 6). The biggest gap between “adopters” and “non-adopters” is in effective cross-functional collaboration and knowledge dissemination within the firm, and in opening organizational borders for knowledge flows. Additionally, “adopters” have lower barriers to open innovation, so called “not invented here” and “not sold here” syndromes measured in the employees’ attitudes toward the use of external knowledge and transferring knowledge produced internally outside, correspondingly. Companies planning open innovation – “planners” have a similar level of capabilities in knowledge sourcing and dissemination, collaborating with external partners and attitude to failures in knowledge sourcing, which practically justifies their readiness for open innovation implementation not only on the strategic planning level, but also in terms of tuning the organizational process to take the in- and out- knowledge flows into account.
The second set of capabilities, which we call “capabilities fostering open innovation” is generally less developed, and common mostly for companies adopting open innovation “adopters what does this mean?”. These capabilities describe what the management does to organize and facilitate open innovation (Figure 7 and 8). As sample average, the highest score of organizational capabilities related to managerial support of open innovation was received by allocating enough resources and by designing an open organizational structure (Figure 7). The management of SMEs and micro firms provide more support for open innovation and develop more open organizational structures than the management of large companies. In the case of building open organizational structures, micro firms also outperform SMEs several times. In addition, they foster open innovation skills better than SMEs and large companies.

In contrast to the companies not adopting (yet) open innovation, “non-adopters” and “planners”, open innovation “adopters” had certain managerial practices in place to foster open innovation in the organization (Figure 8). The analysis of these practices indicated that OI “adopters” had not only consciously identified the necessity of special skills for open innovation, but also identified and implemented practical methodic skills by organizing training for the employees, providing collaboration tools, organizing reward systems, and offered support from the management.
Open innovation skills and awareness are fostered within our organization
We provide education and training on open innovation for our employees
We apply interactive collaboration tools and methods to facilitate open innovation
(Top) management strongly supports open innovation activities (by allocating enough resources)
Open innovation activities by our employees are rewarded
The organizational structure in our company is designed to be open according to our needs

Figure 8. Organizational capabilities fostering open innovation: adopter / non-adopter perspective

Open innovation specialist competences

The aim of the OI-Net project was to study industrial needs for open innovation education. This embraced analyzing organizational capabilities and open innovation adoption practices on the...
company level and exploring employees’ individual skills associated with open innovation adoption. So far, there was no clear understanding of what skills and competences employees in charge of the open innovation function should possess. The list of core competences and skills was elaborated based on 1) the competence profiles of innovation managers, 2) prior academic research on the skills needed by open innovation specialists, and 3) academic and industry expert evaluations. In the framework of the OI-Net survey, the respondents were asked to evaluate skills on a provided list. The criterion set was “how important the mentioned skills are for employees in charge of open innovation in companies”.

The respondents reported high and very high importance of all the suggested skills (Figures 9 and 10). The most important skills were communication, networking, team working, problem solving, and external collaboration. Strong cooperation skills are essential for building competence in open innovation, requiring extensive interaction with external partners and effective cross-functional cooperation. Problem-solving skills are important for open innovation in terms of acting fast in finding optimal decisions for newly emerged tasks. The ability to share knowledge and ideas was perceived as equally important regardless of company size. Cultural awareness was relatively less important for SMEs than for micro and large firms.

Figure 9. Open innovation skills: company size perspective

In general, the differences in evaluating open innovation-related skills by companies adopting OI and companies not adopting it were not significant. It was noticed that all skills were slightly more important for “adopters”, than for “non-adopters” (Figures 11 and 12). The “adopters” stated that cultural awareness is important for open innovation specialists more often than “non-adopters”, due to fact that companies adopting open innovation have to deal with collaboration with external partners (local and international) more often than “non-adopters”. The ability to share knowledge and ideas internally was indicated as the most important skill by all three groups of
Industrial Needs For Open Innovation Education

Figure 10. Open innovation abilities: company size perspective

respondents, followed by creativity, technology and business mindset. As seen earlier in the analysis of organizational capabilities, good cross-functional collaboration and coordination of knowledge flows guarantees better knowledge absorption. The importance of this ability on the individual level shows the management’s awareness of knowledge absorption problems in companies. Open innovation adoption is a process with lies within both business and technology domains. Acknowledging the importance of a “business and technology mindset” for OI by managers explains the effect open innovation bring not only to knowledge transfer processes, but also to human resource management issues in terms of hiring specialists with a specific knowledge.

Figure 11. Open innovation skills: adopter / non-adopter perspective
As there was no significant difference in the reported importance of open innovation skills for companies of different size and level of OI adoption, the provided list of skills and competences was supposed to be universal for companies of any size and open innovation status. This result was the basis to building the Open Innovation Specialist Competences Profile consisting of the most important skills and abilities that specialists in open innovation should possess. These findings bring new knowledge for companies’ HR and innovation managers to their hiring policy and employee training and education practices, and at the same time, provide HEIs with a competence framework, based on which open innovation education can be planned.

The Open Innovation Specialist Competence Profile (Figure 13) – derived from factor analysis - is built on the structure of professional competences, i.e., distinct and transferrable sets of skills and abilities. The OI specialist profile includes 1) explorative open innovation skills (critical skills), 2) exploitative open innovation skills (combination skills), 3) transformational open innovation skills, and 4) interdisciplinary open innovation skills, and additionally, transferrable competences from the collaborative and methodic skill and ability sets.
Critical explorative skills encompass the ability to share knowledge and ideas internally and within an organization, as well as the ability to share knowledge and ideas externally, risk awareness, failure tolerance, a technology and business mindset, and adaptability and flexibility. This results in holistic explorative competence for open innovation.

Interdisciplinary skills, such as managing inter-organizational collaboration processes, ability to work in an interdisciplinary environment, ability to work in internal cross-functional teams, strategic thinking, new media literacy, cultural awareness, and ability to work with different professional communities make up the eclectic open innovation management skills and abilities set.

The following open innovation competences are of relatively lower complexity: Transformational open innovation skills and abilities encompass entrepreneurial, leadership and creativity skills. Exploitative open innovation competence contain the development of IP management skills, negotiation skills and project management skills.

In addition to the distinguished competences, open innovation competence requires transferrable skills, grouped into collaborative and meta–collaborative skills.

Collaborative open innovation skills encompass external collaboration skills, trust skills, communication skills, networking skills, and team-working skills. Methodic open innovation skills encompass multi-tasking skills, problem-solving skills, virtual collaboration skills, and internal collaboration skills.
RECOMMENDATIONS FOR UNIVERSITIES AND EDUCATIONAL INSTITUTIONS

The survey results confirmed the complexity of the competence profile needed for open innovation. Hence, the recommendations for universities to find ways to develop and grow these competencies should be considered at different levels; both regarding the nature of competency-targeted knowledge, skills or attitudes, and the targeted learning audience – undergraduate, postgraduate and vocational.

Knowledge areas particularly important for OI are collaborative innovation, scanning for new ideas, customer co-creation in R&D projects, using external networks, and external technology acquisition. Hence, solid technical and practical knowledge in these areas must be ensured in foundational courses on cooperative innovation and open innovation, with high focus on inbound open innovation activities.

In order to install an innovation focus and develop basic understanding for its multidisciplinary nature, an "innovation component" should be integrated in virtually all foundational courses. One way of operationalizing this could be relying on a cross-disciplinary framework, such as the "Ten Types of Innovation" (Keeley, Walters, H., Pikkol, R., & Quinn, B. (2013),), which highlights the fact that innovation concerns everyone and everything in an organization. For example, "Profit Model" innovation could be the topic of reflection in accounting and finance courses, "Process" and "Product System" innovation in operations management courses, "Customer Engagement" innovation in marketing, etc.

Courses in the later years of undergraduate studies, including electives, specialization tracks, minors and majors, must then aim at bringing together knowledge foundations with more complex OI skills, such as communication, networking, team-working, external collaboration, problem solving, and even attitudes such as a technology and business mindset, ability to share knowledge externally and internally (within the organization), creativity, adaptability and flexibility, and ability to work in cross-functional teams. A simple way of getting started would be for students to discuss the interrelations and try to combine different "innovation components" brought along from the foundational courses. Some gamification of this activity could be easily conceived.

MSc programmes would focus on the deepening of knowledge and the development of more complex skills related to open innovation. The combination of technical and business knowledge is clearly the advantage of the education of open innovation specialists. Additionally, these specialists should not only operate the concept and knowledge of cooperative business models and open innovation aspects freely, but also be able to see the bigger picture in terms of going beyond corporate borders, be able to search and utilize external and internal resources, internal and external innovations, and technologies for the benefit of the company.
In programmes for participants with professional experience (MBAs, executive programmes, vocational training), which can include technical, functional and managerial ones, the focus should be on assigning complex and multi-dimensional projects to the learners that would rely on peer-to-peer learning among heterogeneous groups.

Such learning projects should be strongly linked to practical business challenges, ideally involving direct interaction with concerned managers, e.g., through guest speakers in class, field visits, interviews, etc. Projects could be even directly initiated by business partners, assigning specific challenges to student teams.

Innovation as a common thread throughout educational programmes, from basic understanding of its roots in disciplines to deeper attitude-based and practice-oriented modules in the programmes for graduates, requires clear strategic intent to guide the programme architecture, module design and course curriculum development. Program developers must consider both the learning outcomes at the level of individual courses, and the graduate attributes at the level of programmes /diplomas.

At the foundational level, the learning outcomes of courses should contain OI knowledge components such as collaborative innovation, idea scanning, customer co-creation in R&D projects, use of external networks, external technology acquisition, and technology commercialization, as discussed above. Majors and specialization tracks, as well as specialized Master's programmes, would integrate more advanced and functionally related OI skills, while professional learning outcomes of courses in professional programs (in which we include MBAs) would focus on the OI attributes and behaviours.

Graduate attributes should comprise higher level OI competencies, including theoretical and practical knowledge on technology, business and open innovation, trained abilities to search, integrate and diffuse knowledge, communicating messages and principles of open innovation through the organization, and strong personal communication, social, leadership and managerial skills as an integrated outcome of the combination of learning outcomes developed throughout a program course curriculum.

Privileged learning methods for leveraging innovative behaviour, reflection on knowledge and practice, team and peer-to-peer learning include group projects, flipped classroom, business games, field research assignments, learning labs, and simulations.

Linking training activities with academic research is another means for reinforcing OI competencies. Most academic research in the management and scientific disciplines involve collaboration with industry partners, other universities and institutions. For example, most EU-funded research
projects are virtually OI playgrounds by their structural specifications. Hence, universities have real open innovation labs within their immediate reach, which, however, remain mostly hermetically separated from education, even from master programmes.

Opening up research to education, in the sense of involving students directly in selected project activities is both a cultural and practical challenge, but could bring huge benefits in terms of fostering true innovation competencies at the level required for OI.

Related to this could be the creation and appointment of on-campus roles of «OI Managers», «OI Champions», or «OI Ambassadors» charged with the mission of leveraging and integrating all related activities across teaching levels and research activities.

Furthermore, to embrace the open innovation paradigm further; universities could collaborate with intermediary platforms that offer real company problems, challenges and/or competitions, as for example the Nimblebee design and packaging competition for students by Cognistreamer.

Last but not least, the acquisition, development and refinement of competencies for innovation in general and open innovation in particular can be significantly supported by extracurricular activities such as student associations, student competitions, field and study trips, etc., which already are important parts of the learning experience in most universities and schools cultivating an active student body.

**Recommendations for business and policy makers**

The respondents recognized the particularities of open innovation, and thus there is a clear need to develop the OI skills of employees through a mix of learning approaches and interventions. Businesses need to consider how their OI portfolio (activities and skills) is aligned and fits with their business strategy as well as the industry demands and evolution. Careful analysis and consideration needs to be given by firms in relation to what the OI needs are and how can skills be acquired and deployed that will enhance the firm’s competitive position.

OI practices and activities differ across industries and between adopters. Consequently, management teams need to assess contextually related skill gaps and needs. To fulfil education and training needs, firms need to work with a variety of education providers in order to tailor and address the training needs and to acquire OI skills and competences that benefit the individual and the business.

With the growth of OI practices, new roles for OI management will emerge that will have implications for the organizational structure of firms, reporting relationships and horizon scanning activities, and the ways how firms structure multiple stakeholders.
The industry survey highlighted the real need and demand from different sectors for open innovation skills. Some sectors are more advanced in open innovation management and will require different education and training interventions to support the development of OI skills.

Open innovation needs are different for SMEs and large companies, and therefore policy intervention with respect to education, innovation and firm level needs to be tailored so that it addresses OI skills deficits as well as developing firm level OI management capabilities. Firms realizing open innovation management will experience different challenges and barriers in implementing OI principles. This requires flexibility of policy interventions that address such challenges and barriers.

Open innovation eco-systems should be viewed as learning systems, and hence, policy responses to enhancing OI need collaboration between the education and economic ministries of the Member States. Policy interventions need to address how to increase the number and intensity of firms using OI and how OI practices are shared between early and late adopters.

To raise the visibility and the necessity of firms to embrace OI activities and practices, an EU-wide programme similar to Eurostars should be implemented at the EU level. To increase broader awareness of OI across the society and the key learning groups, different approaches should be used to encourage the development of community-based OI skills through OI challenges, OI bootcamps, etc.

There is a need to fund more research at the EU level on open innovation and to fund the development of OI education material at all levels of education to address the demands and need for OI for the benefits of the economy and the society.

**KEY TAKE-AWAYS**

- There is a universal set of competences for any open innovation specialist regardless the industry or the size of the firm.
- Over 75% of the respondents indicated that they had adopted open innovation or planned to start adopting it in the nearest future. Inbound open innovation activities are adopted much more intensively than outbound modes. Companies adopting open innovation reported better innovation and business performance.
- Companies adopting open innovation reported stronger organizational capabilities, not only in knowledge sourcing outside the firm, but also related to better dissemination of knowledge and fostering open innovation within the company.
- In addition, considering the overall impact of the project, it is worth pointing out that nearly 90% of the respondents believed that the survey was of current importance. Moreover, over 30% of respondents expressed their interest in participating in further in-depth interviews on industrial needs for open innovation education, as well as participating in workshops, roundtables and other events on the related topics.
REFERENCES

HOW IS OPEN INNOVATION ADDRESSED IN UNIVERSITIES TODAY? AN OVERVIEW ON EXISTING CURRICULA IN EUROPE

SIMONA LACHE, DAVID LAURA TEODORA

ABSTRACT

In a dynamic and globalized economy, Innovation, Innovation Management, and Global Innovation Management have become concepts used by the business world and subjects needed to be taught in universities. Derived from them, resulting from practical experience, Open Innovation is becoming an approach with more and more relevance for both academics and businesses. This chapter offers an insight into how widely open innovation is present in the content of academic programs in Europe today, by compiling the results of a recent study developed in a European project.
Lecture Content

The subject of open innovation has started to receive more and more attention in the business field and also by instructional agents at higher education institutions (Busarovs, 2013; Chesbrough, Vanhaverbeke, & West, 2014). A recent study performed in the context of the project the European Academic Network for Open Innovation identified, analyzed and compared the existing curricula on Innovation, Open Innovation, and Global Innovation Management (GIM) across Europe (goo.gl/d6tAUI). The aim was to collect systematic data on whether and how universities make use of the Open Innovation concept in their education programs.

The data collection was performed between February and May 2014 by using an online questionnaire hosted on the IT platform of the project. The target population were academics at public and private universities across Europe. They received the link of the questionnaire via email and were asked to give information on the following main items:

- list of the courses which deal with the topics of Innovation/Innovation Management at different educational levels (Bachelor, Master, PhD);
- details on each course:
  - title of course;
  - type of class (mandatory or optional);
  - number of hours (in total; per week);
  - number of hours within the course specifically dedicated to the teaching of Open Innovation;
  - ECTS credits;
  - average number of students per class;
  - type of qualification (e.g. Economics, Engineering, etc.);
  - year when the course was introduced for the first time;
  - year when Open Innovation was introduced within the course;
  - language(s) used in teaching;
  - background knowledge or prerequisites (if required);
  - learning objectives and course topics;
  - references and readings on Open Innovation used in teaching; and
  - method of instruction (e.g. lectures, cases, on-field training, etc.).

108 institutions from 28 countries participated in the study, providing entries on 272 study programs at Bachelor, Master and PhD levels. Twenty countries were EU members and eight (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Norway, Serbia, Switzerland and Turkey) were not EU members. The questions were mainly answered by university professors or associate professors, who had been the initiators of the curricula on open innovation or taught courses that were related to open innovation. Also, in some cases, the questionnaire was filled in by a person
in a management position of the higher education institution. Another common tendency of the respondents was the field they taught: business, economics, or engineering. Even though the UK is a country with an important contribution regarding higher education, the study received no responses from any UK university.

The results of the study are discussed below by the level of academic programs.

**Bachelor Level**

For the Bachelor level, 97 programs from 51 institutions and 23 countries were surveyed. Of the total number of Bachelor programs reported, 25 programs had Open Innovation as the topic. The 25 Bachelor programs with OI as the topic were taught in 17 institutions from 14 countries. Out of 25 programs, 22 were taught after 2010 and 3 were introduced in 2014, only ten of them in English, the rest in the maternal language. Many of the classes required background knowledge or had prerequisites in areas such as general management, strategic management, quality management, project management, informatics, organization processes, marketing, finance, law, research skills, basics of entrepreneurship, management of industrial production, machine design, automation and robotics, mathematics, operations research, and macroeconomics.

The courses had different objectives, for instance:

- to provide knowledge and understanding about innovation, to develop the skills to search for and assess innovative ideas, as well as to draw up a plan for commercialization;
- to explain the phases, risks and challenges related to the growth of business, especially in the case of highly innovative enterprises;
- to analyze alternative models for organizing innovation strategies and processes within commercial firms;
- to acknowledge the importance and meaning of networks and intellectual property rights in the management of technology and innovation;
- to provide practical and applicable knowledge about innovation management and the new product/service development process till introduction to the market, supported by the evaluation of commercialization, technology transfer and open innovation opportunities for business growth;
- to understand the context in which changes and innovations occur - organizational structure and the influence of culture, politics and leadership on innovation and changes; and
- to apply models for the implementation of innovations and changes in the organization.

As teaching methods, lectures, cases/seminars and practical tasks were used:

- students work in groups on different real product development projects given by start-ups,
R&D institutes or SME’s; tackling a challenge introduced by the industry partner and design thinking methodology to develop relevant interventions;

- scanning of a company, after which a group of students have to improve the innovation process or the enabling processes of the company;
- cooperation with companies, visiting manufacturing companies, presenting scientific circle examples of innovative products/projects in 2D and 3D presentation;
- students work on a real innovation project with a start-up. The ideation phase is combined with a traditional brainstorming session and the use of an open-innovation platform; and
- cooperation in an experiment related to the EU project.

Other findings regarding open innovation classes were grouped as follows:

- the average length of courses was 97.12 hours, with a minimum of 16 hours and a maximum of 800 hours;
- the average length of the OI topic was 13.92 hours, with a minimum of 2 hours and a maximum of 100 hours;
- the average number of ECTS was 5.7, with a minimum of 0 credits and a maximum of 30 credits; from 25 courses only in 2 cases the number of credits was higher than 10; and
- the average number of students/class was 50, with a maximum of 350 students/class and a minimum of 10 students/class.

Open innovation was taken as a subject at Lappeenranta University, Finland for the first time in 2005, as an eight-hour course in a study program centered on innovation and technology management. Fontys University of Applied Sciences from Netherlands seemed to cover the open innovation topic in 100 hours scheduled in the last semester of an innovation management study program for the Bachelor level. Other universities that mentioned great interest in open innovation were Switzerland, Macedonia, Slovenia and Austria.

**Master Level**

157 programs from 80 institutions and 27 countries were surveyed for the Master level. Of the total number of Master programs reported, 50 programs had Open Innovation as a topic. MIP Politecnico di Milano was the first surveyed institution that taught OI as a topic, starting in 1990, integrated in the Innovation Management - MBA course. The first surveyed Master program (non-MBA) had been taught since 2000 by the Silesian University of Technology, as part of the course Managing innovation projects. Most of the Master courses (47 courses) were taught after 2005, with two starting in 2015. Similar to the courses at the Bachelor level, these courses also asked for background knowledge or prerequisites such as: prior business studies, mathematics, operations
research, informatics, macroeconomics, microeconomics, basic management, production and services management, general TIM; minimum years of practical experience; basics in Innovation Management; basic knowledge of economics and project management, and product development.

The objectives stated in the syllabi were:

• to provide comprehensive theoretical knowledge of the methods, approaches and tools used in innovation and knowledge management;
• to present practical examples and case studies;
• to develop the following skills: creative personality, creative thinking skills and methods, creative will and motivation, as well as skills to act as an innovation promoter in open innovation processes;
• to facilitate in-depth understanding of the challenges, mechanisms and approaches for the management of innovation, and of the strategies, structures, processes, and the kind of culture that enhance the innovative capability of firms;
• to identify external sources of innovation;
• to elaborate and specify how firms can benefit from open and user innovation;
• to apply methods of open and user innovation to reflect on how firms need to change their strategies, structures and processes according to more open innovation processes;
• to analyze the innovation needs of a company; and
• to describe all the phases of the innovation process as well as its context on the micro- and macro levels.

The teaching methods were centered on practical approach, including:

• practical skills with real procurement and negotiation services, problem solving;
• examples of innovative products in 2D and 3D presentation;
• case studies; students develop a case in small groups and present it to the class;
• simulations of consulting projects;
• field visits to firms and innovation departments of companies; visit of a Business incubator; development of innovation -related project application in national and EU projects;
• preparation of own business-oriented projects, including innovative project proposal, project documentation and draft application for project funding according to the EU structural funds procedures;
• networking, company side visits, creativity games;
• team of students designing an innovative product (service, toy or other) by means of consulting end-users, experts, the public, and then defending the project in front of a panel of experts (company managers, experts in innovation, state agencies representative etc.), who evaluate the quality of the innovation.
The number of hours specially dedicated to open innovation varied considerably from a minimum of 2 hours to a maximum of 77 hours (average time being 26.42). The numbers of ECTS may also vary from 120 ECTS to none, but in 53 courses in 10 cases the number of credits was higher than 10. The students attending these courses formed groups as large as 120 students/class, with a minimum of 10 students/class. The type of class was mainly mandatory (a were optional). The qualifications offered were mainly in the following fields: Business, Economics and Engineering, and additional qualifications were offered in Health – Nursing, Design engineering, Organizational theory, Project management, Personnel management, and Industrial engineering.

**PhD Level**

For the PhD level, 18 programs, at 18 institutions and in 10 countries, were surveyed. Of the total number of PhD programs reported, three programs had Open Innovation as a topic. As the results for the PhD level were scarce and referred only to the field of Economy, the objectives were tailored: the student will acquire skills and competencies related to theoretical aspects, as well as critical analysis competencies applied to the main concepts related with the economic science and the economic problem under analysis. The student should also understand the innovation economic problem in different contexts and evaluate several public interventions in the innovation process of competitiveness. The student should develop competencies to stimulate territorial innovation systems and the creation of an innovative environment.

**Comments on the survey findings**

Of the 272 programs surveyed (at Bachelor, Master and PhD levels), only 78 (28.6%) had Open Innovation as a topic: i) of the 97 Bachelor programs surveyed, 25 had Open Innovation as a topic (25.77%); ii) of the 157 Master programs surveyed, 50 had Open Innovation as a topic (25.8%); and iii) of the 18 PhD programs surveyed, 3 had Open Innovation as a topic (16.6%). These findings reveal a certain preoccupation for the topic at European universities, which are more and more open to the dialog with enterprises. However, there are still countries in Europe where the subject of Open Innovation is not tackled at all, although different approaches for bringing together actors in higher education, business and industry are in place. In this respect, there is need to promote the concept further for both academics and business partners.

No relationships concerning the geographical region, the size of the country, the size of the university, or the economic power of the country were found in association with the presence or lack of presence of a study program addressing open innovation topics.

Furthermore, there was a large variety of learning objectives and course topics, although the qualifications offered at Bachelor and Master levels were mainly in Economics, Business and
How Is Open Innovation Addresses In Universities Today?
AN OVERVIEW ON EXISTING CURRICULA IN EUROPE

Engineering. Open Innovation was presented as a small section/module of the course, both at Bachelor and Master levels: the average length of the OI topic was 13.92 hours for Bachelors (14.3% of the total number of hours) and 26.42 hours for Masters (21.58% of the total number of hours). These findings were confirmed by some of the stakeholders of open innovation topics. For example, Dr. Marcin Baron from the University of Economics in Katowice recommends a gradual introduction of open innovation in the university: first several hours in a course of innovation management (as an example), and passing slowly from applying open innovation to a specific business situation to the more advanced content on the concept, until it can be implemented as a self-standing area of teaching. Some other ideas are proposing open innovation as a course shared by many study programs, most preferable with transferable ECTS (as Prof. Kristina Zgodovova from the Technical University of Kosice suggested).

The teaching was based mostly on lectures and seminars, at Master level with a higher level of applications, exercises and field work. Another difference between the Bachelor and Master programs concerned the depth of the knowledge taught: at the Bachelor level the objectives were focused mostly on the nature, basics or dynamics of innovation processes, while at the Master level the objectives aimed at revealing the processes, strategies and structures of innovation, and training students to discover, evaluate and implement the sources of innovation. Open innovation should offer what it stays for: field experience, real study cases and collaborative projects, to represent a kind of “knowledge without borders”, as Prof. Marina Dabic from the Faculty of Economics and Business, University of Zagreb, stated. She also noted that even though students can sometimes be reluctant, meaning that in order to understand and to apply open innovation one needs to change his/her mind set to comprehend the novelty. The same idea was mentioned by Elena Caspina, postdoc at Scuola Superiore Sant Anna, Pisa, who mentioned that learning and practicing open innovation means thinking out of the box, and this can be a challenge for both academics and students.

The references included in the curricula usually combined national literature with English bibliographies, being represented for a large majority in books, while articles and papers were fewer in number. Chesbrough’s books (2003, 2006) were used frequently as bibliographic resources, along with the work of Tidd and Bessant (2009).

There was no rule that institutions which had study programs with a topic in Open innovation at the Bachelor level would continue to offer study programs with a topic in Open innovation at the Master level. A possible explanation is that no real penetration in the education policy at the university level regarding open innovation was in place. The large majority of the courses were the results of individual or small teams’ efforts and not of a coherent educational policy. One recommendation for increasing the importance of open innovation in the university curricula is to activate a bottom-up approach, making use of the advantage of the existence of the students’
Part 2. Walking the Talk: A European Initiative to Spur Open Innovation Education

use of technology as digital natives and the existence of a “digitally connected world”, as Assoc. Prof. Sandra Dingli from the University of Malta suggested, and to “remove walls between fields” (Prof. Marina Dabic, University of Zagreb); at the same time, for a successful implementation of an OI course, being aware of the time factor may be important, as well as of the needs of proximity between the participants, or taking into consideration the necessity of incentives, such as being partners in an European projects (postdoc Elena Caspina, Scuola Superiore Santa Ana, Pisa).¹

As a result of the presented research, it can be stated that Open Innovation has begun its development across European higher education institutions. The state of the art of curricula development indicates that a general, unique framework for curriculum design would be beneficial for enhancing the infusion of Open Innovation into higher education at the European level.

KEY TAKE-AWAYS

- Open innovation, as a subject tackled in academic curricula has gradually derived from related concepts: innovation, innovation management and global innovation management.
- Although European universities do not offer stand-alone study programs in this topic, courses or course modules discussing open innovation are present in some of the programs dedicated mainly to students in Business, Economics and Engineering at all levels (Bachelor; Master; Ph.D.).
- Due to the ‘out of the box’ approach open innovation assumes, its implementation needs setting their minds for novelty by all the actors involved: students - future specialists acting as employees or entrepreneurs, professors - teaching innovation and open innovation at universities, and company representatives - benefiting from the added value this concept brings to the business world.

REFERENCES


¹ Videos on Testimonials on Open Innovation Curricula are available on OI-Net platform: http://oi-net.eu/m-oinet-network/videos/display
MULTIDISCIPLINARY APPROACH – LEARNING OUTCOMES

JOÃO JOSÉ PINTO FERREIRA, MIROSLAV SPACEK

Abstract

This section aims at providing readers with guidance on the establishment of new OI programs and courses reflecting a multidisciplinary approach on Open Innovation. By multidisciplinary approach we mean, approaching Open Innovation in a way that allows for the combination, involvement and integration of several academic disciplines or professional specializations.

Taking this to the context of the learning environment we would envisage the need for a training combining courses to address explicitly the topic of Open Innovation and, other topics, typically in line with students’ profiles, allowing them to build more knowledge in their own areas of interest. The whole thing would “close” in capstone project courses where the multidisciplinary approaches would be put into play. From the perspective of the learning outcomes, this approach fosters a “learning-by-doing” process.

The authors’ experience on Multidisciplinary Programs reveals that these programs are a huge opportunity to bring students from a broad range of knowledge areas and this is, in our perspective, a great opportunity for Open Innovation. As a result, the present section builds on this rationale to develop a combination of Learning Outcomes that could be the basis for deploying either isolated courses on OI within existing programs and on deploying new bachelor level (1st Cycle), master level programs (2nd Cycle) or PhD Program on Open Innovation.
## Learning Outcomes

This paragraph comprises a table with a List of learning outcomes from the area of Open Innovation and from other disciplinary areas (other than Open Innovation), that are used/combined with Open Innovation training (inputs from WP2 and D4.1).

The List of Learning Outcomes (LO) was built mainly from D 4.1 and then further reviewed to meet the typical LO structure. Having in mind the deliverable objective, the authors’ concern was to mainly include those LO not related to Open Innovation but lectured along with Open Innovation concepts. This way, we aimed at achieving the desired multi-disciplinary perspectives on the teaching of Open Innovation. As a result of this approach, the initial list had 189 learning outcomes. Several partners reviewed the initial 189 learning outcomes and this led to some changes in the actual list and text of the LO, in order to meet the Bloom’s Taxonomy. This was a slow process that was then followed by a meeting that allowed the reduction of the number of LO by narrowing the areas that would deserve the focused effort in the collection of teaching materials. This has led to the reduction of the number of LO to the final number of 98.

<table>
<thead>
<tr>
<th>LO</th>
<th>Area</th>
<th>LO Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Business Model Innovation</td>
<td>To Recognize, Design And Analyse Innovative Business Models</td>
</tr>
<tr>
<td>#2</td>
<td>Collaborative Innovation</td>
<td>To Explore Concepts Of Collaborative Innovation And Make Them Actionable.</td>
</tr>
<tr>
<td>#3</td>
<td>Creativity</td>
<td>To Recognise And Evaluate The Creative Process In Individuals And Teams And How It Contributes Towards Increased Innovation</td>
</tr>
<tr>
<td>#4</td>
<td>Creativity</td>
<td>To Apply Idea Generation Tools To Add Value To The Product / Process / Service / Business Model In An Organisation</td>
</tr>
<tr>
<td>#5</td>
<td>Creativity</td>
<td>To Know How To Plan And Manage A Creative Process. Apply Creative Thinking Methods In Innovation And Personnel Management</td>
</tr>
<tr>
<td>#6</td>
<td>Creativity</td>
<td>To Evaluate The Level Of Creativity In An Organizational Environment</td>
</tr>
<tr>
<td>#7</td>
<td>Creativity</td>
<td>To Recognize And Assess Creativity In Persons, Products, Processes, Services And The Environment (4Ps)</td>
</tr>
<tr>
<td>LO</td>
<td>Area</td>
<td>LO Description</td>
</tr>
<tr>
<td>----</td>
<td>------</td>
<td>----------------</td>
</tr>
<tr>
<td>#8</td>
<td>Creativity</td>
<td>To Develop Creative Thinking Skills And Methods</td>
</tr>
<tr>
<td>#9</td>
<td>Creativity</td>
<td>To Apply Techniques For Inventive Problem Solving</td>
</tr>
<tr>
<td>#10</td>
<td>Creativity</td>
<td>To Recognise The Role That Creative Ideas Play In The Innovation Process In Organisations</td>
</tr>
<tr>
<td>#11</td>
<td>Creativity</td>
<td>To Explore And Exploit The Role Of Creative Potential In Innovative Entrepreneurship</td>
</tr>
<tr>
<td>#12</td>
<td>Creativity</td>
<td>To Plan And Manage An Idea Generation Session</td>
</tr>
<tr>
<td>#13</td>
<td>Entrepreneurship</td>
<td>To Identify And Understand The Different Innovation Typologies: Advantages And Limitations</td>
</tr>
<tr>
<td>#14</td>
<td>Entrepreneurship</td>
<td>To Recognize Opportunity (Business)</td>
</tr>
<tr>
<td>#15</td>
<td>Area: Entrepreneurship</td>
<td>To Make Responsible Decisions Under Uncertainty</td>
</tr>
<tr>
<td>#16</td>
<td>Entrepreneurship</td>
<td>To Recognize And Judge Different Types Of Innovations</td>
</tr>
<tr>
<td>#17</td>
<td>Entrepreneurship</td>
<td>To Learn To Recognize Source Of Innovation And Operationalization Of These Sources</td>
</tr>
<tr>
<td>#18</td>
<td>Entrepreneurship</td>
<td>To Assess Risks And Challenges Related To Growth Of Businesses</td>
</tr>
<tr>
<td>#19</td>
<td>Entrepreneurship</td>
<td>Conduct Feasibility Studies To Assess The Likelihood That Identified Opportunities Could Be Profitably Exploited</td>
</tr>
<tr>
<td>#20</td>
<td>Entrepreneurship</td>
<td>To Critically Analyse Opportunity Identification, Evaluation And Exploitation For Entrepreneurship</td>
</tr>
<tr>
<td>#21</td>
<td>Entrepreneurship</td>
<td>To Design, Evaluate And Present A Business Plan For Opportunity Exploitation And Enterprise Start-Up</td>
</tr>
<tr>
<td>#22</td>
<td>Entrepreneurship/ Intrapreneurship</td>
<td>To Become Acquainted With Strategies And Institutions For Supporting Innovative Entrepreneurship</td>
</tr>
<tr>
<td>#23</td>
<td>Finance</td>
<td>To Produce A Roadmap And Investment Project For A Venture</td>
</tr>
<tr>
<td>#24</td>
<td>Finance</td>
<td>To Identify And Utilize Economic Characteristics Of Knowledge, Innovation And Intellectual Property</td>
</tr>
<tr>
<td>LO</td>
<td>Area</td>
<td>LO Description</td>
</tr>
<tr>
<td>-----</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>#25</td>
<td>Finance</td>
<td>To Evaluate Investment Selection And Funding Opportunities</td>
</tr>
<tr>
<td>#26</td>
<td>Finance</td>
<td>To Calculate The Financial Aspects Of An Innovation Project As Well As Plan It In Order To Respect Milestones</td>
</tr>
<tr>
<td>#27</td>
<td>Foresight</td>
<td>Recognize The Importance Of Participant Learning As A Key Outcome In Foresight Activities</td>
</tr>
<tr>
<td>#28</td>
<td>Foresight</td>
<td>To Develop And Contrast Future Scenarios And Appropriate Corporate Strategies Based Upon The Application Of Corporate Foresight Methodologies</td>
</tr>
<tr>
<td>#29</td>
<td>Foresight</td>
<td>Appraise The Manner In Which Foresight, Creativity And Innovation Are Interlinked</td>
</tr>
<tr>
<td>#30</td>
<td>Innovation</td>
<td>To Identify And Plan The Phases And Factors Of Innovation Activity In A Firm From A Life-Cycle Viewpoint</td>
</tr>
<tr>
<td>#31</td>
<td>Innovation</td>
<td>To Explain The Benefits Derived From Managing Knowledge</td>
</tr>
<tr>
<td>#32</td>
<td>Innovation</td>
<td>To Describe Systemic Approach To The Solution Of Managerial Problems Tied With Innovation Process</td>
</tr>
<tr>
<td>#33</td>
<td>Innovation</td>
<td>To Execute The Innovation Project Management In An Organisation</td>
</tr>
<tr>
<td>#34</td>
<td>Innovation</td>
<td>To Design Strategies For Sustainable Innovation</td>
</tr>
<tr>
<td>#35</td>
<td>Innovation</td>
<td>To Recognize The Specificities Of Radical Innovations As To Design Favourable Conditions For Its Development</td>
</tr>
<tr>
<td>#36</td>
<td>Innovation</td>
<td>To Identify Opportunities For The Exploitation Of New Digital Technology And Related Platforms For Sourcing New Ideas As Part Of The Organisation’s Open Innovation Strategy</td>
</tr>
<tr>
<td>#37</td>
<td>Innovation</td>
<td>To Create A Proposal Of Business Innovation According To The Blue Ocean Strategy Approach</td>
</tr>
<tr>
<td>#38</td>
<td>Innovation</td>
<td>To Identify The Nature And Characteristics Of The Innovation Process</td>
</tr>
<tr>
<td>#39</td>
<td>Innovation</td>
<td>To Explain Basic Management Tools And Techniques Used In Innovation Management</td>
</tr>
<tr>
<td>#40</td>
<td>Innovation</td>
<td>To Develop An Understanding Of The Role Of Creativity And Innovation For Value Creation And Competitiveness</td>
</tr>
<tr>
<td>LO</td>
<td>Area</td>
<td>LO Description</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>#41</td>
<td>Innovation</td>
<td><strong>To Critically Analyse Case Studies Related To Innovation</strong></td>
</tr>
<tr>
<td>#42</td>
<td>Innovation</td>
<td><strong>To Analyse Innovation Needs Of A Company</strong></td>
</tr>
<tr>
<td>#43</td>
<td>Innovation</td>
<td><strong>To Emphasize The Strategic Perspective Of Innovation Management</strong></td>
</tr>
<tr>
<td>#44</td>
<td>Innovation</td>
<td><strong>To Understand The Innovation Process And How It Can Be Disseminated And Implemented In Companies Active In Different Sectors</strong></td>
</tr>
<tr>
<td>#45</td>
<td>Innovation</td>
<td><strong>To Design A Firm’s Innovation Strategy</strong></td>
</tr>
<tr>
<td>#46</td>
<td>Innovation Management</td>
<td><strong>To Recognize And Exploit Aspects Related To Open Innovation</strong></td>
</tr>
<tr>
<td>#47</td>
<td>Innovation Management</td>
<td><strong>To Assess Retrospectively Effectiveness Of Innovation Process</strong></td>
</tr>
<tr>
<td>#48</td>
<td>Innovation Management</td>
<td><strong>To Design, Evaluate And Apply Models For The Implementation Of Innovations In The Organisation</strong></td>
</tr>
<tr>
<td>#49</td>
<td>Innovation Management</td>
<td><strong>To Recognise And Evaluate Various Types Of Innovations And Innovation Strategies</strong></td>
</tr>
<tr>
<td>#50</td>
<td>Area: Innovation Strategy</td>
<td><strong>To Acquire The Theoretical Knowledge And Practical Know-How To Select The Best Innovative Strategies For Private And Public Institutions</strong></td>
</tr>
<tr>
<td>#51</td>
<td>Innovation Systems</td>
<td><strong>To Understand Innovation As The Result Of The Interaction Among Economical, Technological, Organizational And Social Factors</strong></td>
</tr>
<tr>
<td>#52</td>
<td>Innovation Systems</td>
<td><strong>To Apply Theories Of National And Regional Innovation Systems</strong></td>
</tr>
<tr>
<td>#53</td>
<td>IP Management</td>
<td><strong>To Understand The Role, Benefits And Threats Connected With IP In A Process Of Innovation. To Learn Forms And Process Of Protecting Intellectual Property (Incl. Patents And Trademarks) In A National And International Context (EU And USA). To Characterize The Instruments Of Intellectual Property Rights (Patents And Licences). To Be Able To Manage Intellectual Property Within</strong></td>
</tr>
</tbody>
</table>
### Part 2. Walking the Talk: A European Initiative to Spur Open Innovation Education

<table>
<thead>
<tr>
<th>LO #</th>
<th>Area</th>
<th>LO Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Oi Environment, Including Identifying Ip, Licensing Policy, Ip Economic Valuation And Utilization (Internally And/Or Externally). To Understand Links Between Ip And Company Strategy, In Particular In Oi Context. To Know How To Manage Strategically Ip</td>
</tr>
<tr>
<td>#54</td>
<td>Management</td>
<td>To Understand Innovation In Organizational Context</td>
</tr>
<tr>
<td>#55</td>
<td>Management</td>
<td>To Understand Alternative Models For Organizing Innovation Strategies And Processes</td>
</tr>
<tr>
<td>#56</td>
<td>Management</td>
<td>To Understand The Dynamics Of Alliance Formation</td>
</tr>
<tr>
<td>#57</td>
<td>Marketing</td>
<td>To Understand And Design Pricing Policies</td>
</tr>
<tr>
<td>#58</td>
<td>Management/Organization</td>
<td>To Design, Implement And Assess An Innovation Strategy In The Context Of Innovation Networks</td>
</tr>
<tr>
<td>#59</td>
<td>New Concept Development</td>
<td>To Describe All The Phases Of An Innovation Process As Well As Its Context On Micro- And Macro Level</td>
</tr>
<tr>
<td>#62</td>
<td>New Product Development</td>
<td>To Manage And Assess A Product Innovation Program</td>
</tr>
<tr>
<td>LO</td>
<td>Area</td>
<td>LO Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>#63</td>
<td>New Product Development</td>
<td>To Plan New Product/Services Development, Project Selection And Prototype Validation</td>
</tr>
<tr>
<td>#64</td>
<td>New Product Development</td>
<td>To Describe And Explain Individual Phases Of Stage Gate Control Process (Sgcp)</td>
</tr>
<tr>
<td>#65</td>
<td>New Product Development</td>
<td>To Individually Apply Methods And Techniques Utilized In Stage Gate Or Design Thinking</td>
</tr>
<tr>
<td>#66</td>
<td>Open Innovation</td>
<td>To Identify Causes Of Innovation Processes Failure</td>
</tr>
<tr>
<td>#67</td>
<td>Open Innovation</td>
<td>To Analyse The Relation Between A Company’S Strategic Choices And Application Of Open Innovation; To Explain The Concept Of Open Innovation Through Both Theory And Examples (To E.G. A Company Executive)</td>
</tr>
<tr>
<td>#68</td>
<td>Open Innovation</td>
<td>To Analyse The Pros And Cons Of An Open Approach To Innovation Strategy</td>
</tr>
<tr>
<td>#69</td>
<td>Open Innovation</td>
<td>To Identify External Sources Of Innovation; To Identify Intervention Strategies Leading To Successful Services And Appropriate Responses To The Citizens In General</td>
</tr>
<tr>
<td>#70</td>
<td>Open Innovation</td>
<td>To Elaborate And Specify How Firms Can Benefit From Open And User Innovation</td>
</tr>
<tr>
<td>#71</td>
<td>Open Innovation</td>
<td>To Identify Open Innovation Activities In Real Life Companies. To Appraise The Key Indicators For The Successful Implementation Of The Open Innovation Model In An Organisation. And To Identify The Key Success Factors Related To Open Innovation Strategies In Organisations</td>
</tr>
<tr>
<td>#72</td>
<td>Open Innovation</td>
<td>To Attain A Basic Familiarity With The Scientific Literature On The Theme And The Ability To View Open Innovation In The Context Of Other Innovation Management Theories; To Critically Assess The Motives For Engaging In Open Innovation Activities And The Mechanisms Through Which They Create Value For An Organisation</td>
</tr>
<tr>
<td>#73</td>
<td>Open Innovation</td>
<td>To Recognize And Assess The Interdependencies In The System Of Innovation In An Organisation</td>
</tr>
<tr>
<td>LO</td>
<td>Area</td>
<td>LO Description</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>#74</td>
<td>Open Innovation</td>
<td>To Distinguish Between Modes Of Inbound, Outbound And Coupled Open Innovation</td>
</tr>
<tr>
<td>#75</td>
<td>Open Innovation</td>
<td>To Identify Causes Of Innovation Processes Failure</td>
</tr>
<tr>
<td>#76</td>
<td>Organizational Culture</td>
<td>To Understand The Organizational Structure And The Influence Of Culture, Politics And Leadership On Innovation And Changes</td>
</tr>
<tr>
<td>#77</td>
<td>Organizational Culture</td>
<td>To Reflect On Theory And Develop Initiatives To Achieve Changes In Organizational Culture And Behavior Which Will Enhance Competitiveness And Equip Them For Future Challenges</td>
</tr>
<tr>
<td>#78</td>
<td>Organizational Innovation</td>
<td>To Understand Employee Involvement And Diversity Management</td>
</tr>
<tr>
<td>#79</td>
<td>Organizational Innovation</td>
<td>Define Innovation And Build Structures And Systems That Would Enable Innovation Within A Firm</td>
</tr>
<tr>
<td>#80</td>
<td>Organizational Innovation</td>
<td>To Be Able To Evaluate And Monitor Organizational Innovation</td>
</tr>
<tr>
<td>#81</td>
<td>Organizational Innovation</td>
<td>Build Structures And Systems That Would Enable Innovation Within A Firm</td>
</tr>
<tr>
<td>#82</td>
<td>Organizational Innovation</td>
<td>To Recognize The Role Of Company Age, Size, And Business Sector On Innovation</td>
</tr>
<tr>
<td>#83</td>
<td>Organizational Innovation</td>
<td>To Implement Change And Develop Leadership Skills</td>
</tr>
<tr>
<td>#84</td>
<td>Organizational Innovation</td>
<td>To Implement Communication Skills As A Contributor Factors To Innovation</td>
</tr>
<tr>
<td>#85</td>
<td>Organizational Innovation</td>
<td>To Be Able To Apply Knowledge About The Mediator Factors Of Transformational Leadership And Their Influence On Innovation</td>
</tr>
<tr>
<td>#86</td>
<td>Organizational Innovation</td>
<td>To Be Able Formulate A Critical Understanding Of The Factors That Contribute To Innovation</td>
</tr>
<tr>
<td>#87</td>
<td>Organizational Innovation</td>
<td>To Understand How To Capture Value From Innovation - Appreciate The Challenges And Methods For Designing Innovative Organisations</td>
</tr>
<tr>
<td>LO</td>
<td>Area</td>
<td>LO Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>#88</td>
<td>Organizational Innovation</td>
<td>To Be Able To Separate Disruptive Change By The Change Used As A Starter In Innovation</td>
</tr>
<tr>
<td>#89</td>
<td>Organizational Innovation</td>
<td>To Apply Management Practice In Order To Promote Innovation</td>
</tr>
<tr>
<td>#90</td>
<td>Organizational Innovation</td>
<td>To Understand Leadership Development Strategy That Create Innovation Culture</td>
</tr>
<tr>
<td>#91</td>
<td>Personal Development</td>
<td>To Be Able To Manage Risks</td>
</tr>
<tr>
<td>#92</td>
<td>Product / Service Development</td>
<td>To Understand Product And Service Innovation As Well As Models And Methods For Managing The Product-Service Development Process</td>
</tr>
<tr>
<td>#93</td>
<td>Strategy</td>
<td>To Analyse Firm Endogenous And Exogenous Contexts</td>
</tr>
<tr>
<td>#94</td>
<td>Sustainability</td>
<td>To Understand Sustainability (Corporate Social Responsibility / Cradle To Cradle / Bottom Of The Pyramid And Apply These Concepts In Smes)</td>
</tr>
<tr>
<td>#95</td>
<td>Systems Dynamics (and Business Model Prototyping)</td>
<td>To Interpret A Behaviour Of An Organization Based On A System Dynamics Approach And As A Result Of Cause-And-Effects Relations. To Learn How To Build And Manipulate Of System Dynamics Models. To Learn How To Build And Use Prototypes To Test Business Concepts And Processes</td>
</tr>
<tr>
<td>#96</td>
<td>Technology Management</td>
<td>To Understand The Concept Of Technology Management</td>
</tr>
<tr>
<td>#97</td>
<td>Technology Management</td>
<td>To Understand Relations And A Meaning Of Innovation And Technology Management Issues In A Context Of Open Innovation. To Understand The Concept Of Technology Management And Its Process At The Operational And Strategic Level. To Understand Technology-Related And Service-Related Innovations. To Understand Basic Techniques For Planning And Predicting Technology. To Understand A Context And Tools Of Technology Impact Assessment</td>
</tr>
<tr>
<td>#98</td>
<td>User Innovation</td>
<td>To apply methods of open and user innovation to reflect on how firms need to change their strategies, structures and processes according to more open innovation processes</td>
</tr>
</tbody>
</table>
**Conclusion**

The systematic effort to gather and organize this list of learning outcomes, revealed that Open Innovation has been taught aligned with topics that cross several disciplines. This is, however, an on-going process and new references concerning specific LO are likely to have to be added in the future.

The OI lecturer will find, in this list of learning outcomes some food for thought that may contribute the further development of this topic as a training area for Bachelor, Master or even PhD level. This is why it is desirable that these contents are made freely accessible and an LO Administrator or purposefully established Expert Panel should be responsible for eventually managing a shared public editing area (like Wikipedia) where these contents would be regularly updated and expanded by the community.

Notwithstanding the fact that this manual refers almost exclusively to the OI topic it is expected that cross-disciplinary approaches and techniques which bundle open and close innovation may come into existence.

**KEY TAKE-AWAYS**

- By reading this chapter you become familiar with the key building blocks of multidisciplinary approach to bachelor, magister and doctoral education program aimed at OI.
- You will be also familiarized with the principles of designing tailor-made education program aimed at OI to be suitable for specific HE institutions. In addition the instruction how to present OI topic to be supportive for the lecturing different subjects (marketing, management, law etc.) is also provided.
- Finally the methods of OI knowledge testing applying tests, seminar papers elaboration and case study resolution are suggested.
OPEN INNOVATION CURRICULA: KEY INDICATORS AND SUCCESS FACTORS

SANDRA M. DINGLI, MONIQUE LANDY

ABSTRACT

This article addresses the indicators and success factors characterising Open Innovation (OI), in order to provide a methodology for the analysis of a program on OI in Higher Education curricula. The focus is on indicators that facilitate the open innovation process in organizations and are expected to be useful for the design, development, analysis and implementation of a Higher Education curriculum focusing on open innovation.

Indicators are ‘signs’, ‘processes’ or ‘actions’ that are visible and may be measured. They enable the recognition of OI practices and provide visible evidence of the practices that may be critically assessed. The aim is to provide insights into and an increased understanding of the key indicators which Higher Education curricula need to take into consideration when designing, monitoring, implementing and evaluating OI programs and which are appropriate for the needs of organizations. The approach is needs-driven, taking all the stakeholders involved in the development process into account.

This contribution is a revised version of a report published on the oi-net.eu website http://oi-net.com/m-oinet-network/m-oinet-key-topics/m-wp4-curricula-education-oi/967-indicators-and-progress-markers-for-open-innovation-in-higher-education-curricula.
**INTRODUCTION**

This is a conceptual piece of research based on relevant literature. It addresses the indicators and success factors characterising Open Innovation (OI) in order to provide a methodology for the analysis of a program on OI in higher education curricula. Although it is not specifically directed towards a particular academic degree, it provides an initial framework which has the potential to be developed in line with the level of various degrees, i.e., Diploma, Bachelor’s, Master’s, MBA or PhD (see Figure 1: List of key indicators and relevance for HE Programs at different levels for a suggested distribution of the key indicators related to various program levels).

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Diploma</th>
<th>Bachelor’s</th>
<th>Master’s</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A needs-driven program</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cost evaluation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Quality</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Leadership</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Knowledge creation and knowledge transfer</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Organizational culture</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Organizational climate (including communication)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Resources</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Eternal collaboration</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Human Resources training and development</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Relational issues</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>People involved in the open innovation process – including Director of Innovation, idea scouts, idea champions, idea connectors</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Strategy:</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Strategic Alliances and Alignment of a strategic OI agenda</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Incentives – intrinsic and extrinsic motivation and rewards</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Regular monitoring and regular review</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Post program effects (alumni tracking, etc.)</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Sustainability</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
The main focus is on indicators that facilitate the open innovation process in organizations, which are expected to be useful for the design, development, analysis and implementation of a higher education curriculum focusing on open innovation.

The ideas presented here may also be used in organizational training programs. The main aim is to provide insights into and increased understanding of the key indicators which higher education curricula on Open Innovation need to take into consideration when designing and analysing programs, and which are appropriate for the needs of organizations. The approach is needs-driven, taking all the stakeholders involved in the development process into account.

What are Indicators?

Indicators are ‘signs’, ‘processes’ or ‘actions’ that are visible and that may be measured, e.g., patents registered as a result of collaboration with other individuals or organizations outside the region or territory. The indicators may be assessed by using either qualitative or quantitative research methods. They should enable the recognition of OI practices and provide visible evidence of these practices that may be assessed critically. The OI indicators should be determined and set in place prior to implementing a curriculum in Higher Education or before the innovation process commences in an organization. They should emerge after meaningful discussion with stakeholders and be accepted by all stakeholders involved in the process. The indicators may also act as milestones to assist progression from one stage of development to the next, both with regard to curricula and to the implementation of OI in organizations.

Gajda and Jewiss (2004) distinguish between process indicators and outcome indicators. The former are concerned with the delivery of program activities, while the latter refer to outcomes achieved by a program. In their view, ‘Process indicators help track the progress that your program is making as you work toward achieving the desired outcomes. Process indicators often provide important feedback to program providers long before you can expect to see evidence that outcomes are being achieved. Outcome indicators provide the most compelling evidence that the program is making a difference in the lives of program participants’ (op.cit., 2004, p.2).

Indicators for innovation (and particularly for OI) are not a recent phenomenon. Already Schumpeter (1943) had listed clear vision, strong leadership, and close collaboration as components for cooperative entrepreneurship leading towards innovation. He anticipated the fact that collaboration would move beyond company borders. Chesborough (2003) has later promoted the topic of open innovation with emphasis on external collaboration.

**Key success factors for Open Innovation**

In order to elicit the key indicators for Open Innovation it is first necessary to review briefly some key concepts on which the rest of the article is based. Open innovation involves the transfer
of ideas and knowledge beyond traditional limits. It may operate in two ways, either inside-out (through transfer of expertise or sale of patents) or outside-in (through purchase of patents or use of external expertise). It often involves collaboration amongst individuals and communities that may be located at opposite sides of the world, possibly including the management and leadership of virtual teams. Leadership plays an important role in the process, and it is one of the key factors for successful collaboration and for creating, establishing and sustaining strategic alliances.

Knowledge creation and knowledge transfer, which may be more efficient through engagement with external sources, are crucial for successful open innovation. Knowledge may be acquired as a result of:

- Purchasing (through, for example, knowledge brokers or IP auctions)
- Sales of IP
- Sub-contracting (often allocated to established universities or research institutes)
- Collaboration with external partners (networking, clustering, joint ventures, crowd sourcing)
- Licencing
- Creation of spin-offs
- Venture capital

Some obstacles that inhibit knowledge creation and knowledge transfer include:

- Reluctance to share knowledge (for example, for fear of the competition taking over ideas ripe for innovation),
- The risk of ‘free-riders’
- Strategic problems related to the identification and efficient absorption of relevant knowledge (e.g., not in line with the organizational vision, policy or strategy)

Some caution should be exercised in this regard:

- It is relatively easy to purchase information but this needs to be properly combined with experience, skills etc., in order to generate knowledge.
- Purchasing a license is nothing more than obtaining access to information, which is still far from knowledge.
- Mere chaotic (as opposed to strategic) transfer of information could be an impediment to a smooth innovation process.

Attention should be paid to two enablers of successful OI and successful innovation management – organizational culture (e.g., aspects such as behaviour; rituals, how we do things around here) and organizational climate (e.g., communication practices and other environmental factors that enable collaboration and the exchange of ideas).

Successful OI requires an appropriate and feasible strategy and the cultivation of a climate and culture that enable knowledge transfer and the sharing (and flow) of ideas. In this regard, ‘com-
munication and other interfaces must become as permeable as possible in order for ideas to flow easily and to be directed towards those who have the authority to take action and for knowledge transfer to be effective’ (Goodman and Dingli, 2013, p.197).

Lindegaard (2010) provides a list of elements that need to be put into place before an OI initiative is launched. These include:

• a clear mandate,
• a strategic purpose,
• an ideation theme,
• stakeholder analysis,
• a communication strategy,
• a shared language about innovation within the organization,
• organizational approaches that allow the involvement and commitment of all relevant internal and external actors,
• an attitude that strives for being innovative rather than becoming innovative.

In a paper that provides a systematic review of 29 referred empirical articles on the open innovation process, Durst and Ståhle (2013) describe ‘a simple model’ of the open innovation process as comprising ‘the search for innovation opportunities, the selection of suitable opportunities that organizations want to pursue, the implementation of the projects chosen and the capture of benefits as a consequence of the innovative activities’ (op.cit., p.113).

Durst and Ståhle (2013) give four reasons why external collaboration is difficult to establish and control:

• Establishment of common and fruitful ambitions and aligned incentives.
• Trust (related to information sharing), particularly between remote partners from business and NGOs.
• Resources – including financial, knowledge or learning capabilities.
• Behaviour (between partners, possibly including coordination, discipline, communication, and relationship management).

There are various ways in which resistance could be avoided or overcome, but this goes beyond the scope of this article. In brief, however, Goodman and Dingli (2013) suggest that the following aspects should be considered and implemented strategically to avoid resistance:

• Appointment of a Director of Innovation
• Identification and appointment of idea champions
• Establishment of open communication channels
• Effective dissemination of information [to the right people, internally and externally]
• Appointment of idea connectors and idea scouts
Part 2. Walking the Talk: A European Initiative to Spur Open Innovation Education

• Staff training and development
• Creation of effective strategic alliances and university-enterprise collaboration.

**Indicators for OI in organizations**

After extensive research and exploration of the relevant literature, the following key criteria have been identified and are considered to incorporate the relevant issues related to indicators for open innovation in organizations (adapted from Durst and Ståhle, 2013, pp.123-125).

• Relational aspects - collaboration, shared objectives and effective management of relationships.
• People involved in the process - motivation, willingness to develop new skills, commitment, and diversity (age, gender, education).
• Governance - clear distribution of tasks, a dedicated project team, establishment of mechanisms, structures, objectives and agreements, performance evaluation, and intellectual property issues
• Facilitators - idea champions, idea connectors, idea scouts, innovation brokers, relationship managers, and research centres.
• Resources - human resources, time, equipment, and budget.
• Strategy - awareness of feasibility issues, alignment of open innovation with the overall strategy, environmental scanning, availability of Plan B.
• Leadership - leading the change process, modelling desirable behaviour, and experience in change management.
• Climate - trust and open communication.
• Culture - monitoring elements of organizational culture (mission statement, myths, legends, rituals, how ‘we’ do things around here) and transforming the organizational culture into an open one.

In line with the above indicators, Buerkler (2013, p. 2) provides a list of four key conditions which are necessary for the success of an innovation platform which could also be considered to apply to OI. These key conditions are:

• sufficient common interest in the planned innovations
• trust among the partners involved
• appropriate resources (human and financial)
• behaviour and conduct directed towards achieving outstanding results, i.e., innovation.

**Incentives and Open Innovation**

Incentives play a role in the open innovation process as they may potentially increase motivation related to the generation and sharing of knowledge and ideas. The incentives may involve either intrinsic (e.g., recognition or acknowledgement of contribution) or extrinsic (e.g., financial) rewards.
Incentives may be awarded to either individuals or teams. Buerkler (2013, p. 19) states:

“Incentives in an innovation platform are important and should be streamlined and rationalized, not only for individuals, but also for groups and individual organizations. Incentives guide individuals and institutions when they split or structure their work portfolios. Therefore, expected appreciation, bonuses, and profits from innovation activities are crucial to generate necessary enthusiasm and energy. In order to motivate all partners, incentives must also be fair and based on delivered inputs”.

Research has been conducted on incentive systems for open innovation practices. Schneckenberg (2014) conducted research on incentive systems for open innovation through semi-structured interviews with 10 experts in Germany and the Netherlands. He observes that ‘The key strategic function of incentive systems is to open mind-sets of the workforce and to overcome the mental barriers of the ‘not invented here’ syndrome’ (op. cit., p.70). He concludes that ‘none of the experts has been able to present a comprehensive and strategically aligned framework of specific and measurable objectives for the development and implementation of corporate incentive systems for open innovation practices’ (op. cit., p.70), and therefore he recommends ‘executive decision makers to integrate open innovation into corporate strategies. Strategic alignment is essential for identifying, incentivising and measuring progress in process implementation and long-term achievement of open innovation goals. Alignment is also the basis for developing sustainable incentive systems which foster open innovation practices’ (op. cit., p.70).

Although the discussion in the preceding paragraph applies mainly to organizations that introduce and implement open innovation strategies, it is applicable to HE Institutions that introduce the topic into their curricula. Leadership is essential, as it has the potential to provide behaviour that others could emulate, particularly related to ‘open mind sets’. Incentives (intrinsic or extrinsic) could, moreover, be provided for staff (academic or administrative) who are involved in the introduction of this topic, which is extremely relevant in today’s fast-changing world.

**Methodology for the analysis of OI curricula**

In order to analyse OI curricula, HE institutions should ensure, in a similar manner to organizations, that the following criteria are established:

- top management and faculty support
- a clear business plan with a precise vision
- effective communication, both internal and external to the department or faculty
- a system for monitoring the program
- an evaluation system of performance
- regular review for the purpose of updating the program

The following recommendations provided by Goodman and Dingli (2013, pp. 171-172) should be considered as key factors in the design of a program on OI:
• Information and communication should flow, vertically and horizontally.
• A specific person or department should be allocated to deal with innovation [or OI].
• Networks or links to outside sources should be created to explore collaboration or outsourcing.
• The importance of external sources for idea generation and collaboration should be fostered, with focus on sustaining customer satisfaction, customer retention [and creating new markets / customers / or sources for new external collaboration].
• Awareness that R & I is relevant in all sections of the organization should be fostered.
• All employees regardless of grade should be involved in the innovation process / innovation management [and awareness of scanning environment for new ideas / new sources].
• ‘Agility’ for collaboration and new product development [also service / business model development / innovation] should be fostered.
• There should be fluidity within the organization to avoid creation of ‘silos’.

Taking into consideration the factors listed in the preceding paragraphs, the following action should be taken:

• Develop connections and networks to foster the importance of creating and developing strategic alliances at all levels
  • sectorial and geographical
• Awareness raising
  • communication flows (in and out, vertical and horizontal)
• Integrate stakeholders into programs
  • to generate motivation and enhance recognition
• Develop methodologies, skills and expertise
  • relevant to the implementation of the program
• Seed opportunities and innovation to create strategic directions:
  • involve policy makers, prescriptors
  • create and/or develop public/private cooperation
  • establish/reinforce the links between universities and organizations.

**Methodology**

The proposed methodology to analyse curricula raises the following issues and questions, each of which comprises an indicator to assess the process and outcomes of a program critically:

A needs-driven program:

• Identified level of students (degree?)
• Should students and / or trainees be addressed (continuous education)?
Cost evaluation

- Is there a return on investment?
- Has (co-) funding been identified?
- Should it be expected to be profitable?

Human resources

- Support of all levels of management?
- Qualified personnel?
- Needs for new competencies?

Strategic alliances

- Will the needs be fulfilled / met?
- What are the roles and actions of the companies involved?
- What sort of network links should be established (commitment and geographical scope)?
- Is the identification and use of external resources required?
- Should strategic alliances be created with other HEI? / with other industry departments? With consultants, lawyers, banks? With NGOs? With others?

Communication

- Where should visibility be registered? (Internet, specialized magazines, etc.)
- How can the target market be addressed and accessed?
- Participation at relevant conferences

Quality

- Satisfaction of students/trainees
- Employment rates and career paths
- Course participation, retention and success rates
- Will client organizations sponsor potential students?
- Will the organizations sustain their sponsorship?
- Patents resulting from training

Sustainability

- Profitability?
- Percentage increase of trainees / students?
- Number of spin-off companies created
- Creation of on-site jobs?
- New applications foreseen?
CONCLUSION

This article has provided a discussion on concepts that are relevant to the implementation of OI at University level, some of which could be adapted for in-house training in organizations.

Key issues related to OI have been discussed, drawing attention to a number of focus areas to be included in a curriculum that covers OI, a topic that deserves increased attention, particularly at the University level. The ideas and topics included in this paper provide a starting point for the analysis of an OI curriculum which could be adopted easily by HE Institutions, and possibly by organizations that wish to increase the awareness of their key personnel.

In conclusion, it has to be admitted that change has become more visible and that the OI landscape is in the process of development and adaptation. Therefore, due to the constant presence of change, particularly in the OI landscape, it is strongly recommended that any implemented program should be revised and updated at least every two years in order to keep up to date with the shifting landscape.

KEY TAKE-AWAYS

- Providing an increased understanding of the key indicators which Higher Education curricula need to take into consideration when designing, monitoring, implementing and evaluating OI programs.
- Insights elicited from the literature on indicators and success factors for OI in organizations, and subsequently applied to Higher Education.
- A needs-based approach adopted, taking account of the various stakeholders involved.

REFERENCES

TEACHING SKILLS FOR OPEN INNOVATION

GER POST, MARCIN BARON, ROMAN TEPLOV

ABSTRACT

This chapter describes the overall pedagogical guidelines and methodologies that facilitate the teaching of open innovation in and outside the classroom. It offers guidelines for the development of an OI course or course module and suggestions how to imbed this in an educational programme. The authors describe the main learning outcomes and the structure of the OI-Net Common Curricula Framework. This chapter also describes the preferred teachers’ skills, suitable teaching approaches and tools. Finally the authors offer teaching guidelines for specific levels of teaching.
INTRODUCTION

The research into industry needs and best practices on open innovation (teaching) indicates that the European system for Higher Education could (or should!) invest in developing new programmes and courses on OI and improve existing courses. The main findings of this research have been summarised in the previous chapters.

Based on the outcomes of OI-Net (especially the overview of existing curricula and courses on OI and the identified learning objectives for open innovation,) a so-called ‘Common Curricula Framework’ has been developed. This framework links the identified learning objectives to a (course) structure and teaching materials that can be used to teach open innovation in various educational settings. The Common Curriculum Framework guides teachers as they develop and implement their teaching and learning programmes.

Designing a curriculum, course or module on open innovation is one thing, teaching open innovation ‘in class’ is another. Just thinking over the ‘core elements’ of OI – which are innovation and openness – this teaching has to do with the creation of new things, like products, services, processes and businesses, in collaboration with others and ‘being open’. This might require a specific background, knowledge or skills, and could also require specific teaching approaches or materials.

In order to get the message across to students and to maximize the learning outcomes, teachers need certain teaching competences, expertise and personal characteristics that support the teaching of open innovation. This chapter describes the competencies and teaching strategies that support the teaching of open innovation in higher education. We do not aim to provide novel guidelines for teaching in general. In the OI-Net project and the professional community we focus on teaching skills relevant for teaching open innovation. In this project, we have been collecting data and opinions on the skills, strategies and preferred context for teaching open innovation at various levels. Based on multiple information sources and taking into account the various international teaching conditions, we provide a number of pedagogical guidelines for designing and executing educational programmes on open innovation.

PEDAGOGICAL COMPETENCES

Apelgren and Giertz define pedagogical competences as “the ability and will to regularly apply the attitude, the knowledge, and the skills that promote the learning of the teacher’s students in the best way. This shall be in agreement with the goals that apply, and within the framework available and presupposes continuous development of the teacher’s own competence and instructional design” (in: Ryegard et al., 2010, p. 30).
Effective teaching occurs when students acquire knowledge and skills associated with the content being presented and are able to put the knowledge and skills into practice. As a basis for pedagogical competence, the teacher needs knowledge in the four following areas:

- The goal of the course (and/or educational programme) and the organisation
- The subject of the course
- The attitudes and learning behaviour of students
- The teaching process and methods

In line with the definition of teaching competence described above it is important for the teacher not only to have knowledge of these areas but also to be able to apply this knowledge and to put it into action.

Other research has shown that an effective teaching approach must include: assessing student needs and addressing these specific needs in the teaching environment; founding teaching practices on theory-based and empirically-informed methodologies; understanding, negotiating, and managing student and group processes successfully; and evaluating the teaching experience realistically (Gagné, Briggs, & Wager; 1992; Latham, 2002; Powell & Cassidy, 2007).

The ‘Competency Framework for Teachers’ (2004) lists professional knowledge, skills, and attributes essential for all classroom teachers, operating across three broad phases of competence. The competences are generic and may be applied to specific teaching and learning contexts as defined by students, phases of schooling and learning areas. The framework builds on five generic dimensions. Two of these dimensions are critical in the practice of teaching and concern effective interaction between the teacher and the student: (1) facilitating student learning and (2) assessing and reporting students’ learning outcomes. The other dimensions are related to the professional competences needed to engage in professional learning, curriculum and policy development and developing educational partnerships. In this chapter we focus on the competences needed in the practice of teaching.

Klatter et al. (2016) describe a pedagogical competence model based on the concept of ‘pedagogical content knowledge’. This concept combines content-related knowledge and skills (covering ‘what’ to teach) with pedagogical knowledge and skills (focusing on ‘how’ to teach). The model consists of five main elements relevant for teaching (see Figure 1 and the explaining text below).

Knowledge of student background, orientation and behaviour: According to pedagogical experts it is important to have knowledge of the students (or target group) participating in the course or educational programme and to understand the way that these students (prefer to) learn, behave and respond to specific teaching contents and approaches.
Content knowledge and skills: Teaching a topic like open innovation will require foundational knowledge and skills in the field of business, management and entrepreneurship. In addition to this foundational knowledge, the teacher must have specific knowledge in the domains of innovation, strategic alliances and collaborative business modelling. Both innovation and collaboration will require specific (21st cent.) skills in order to put this knowledge into action.

Context knowledge and expertise: As mentioned above, teaching starts with being aware of what and why needs to be taught. This also applies to open innovation, and therefore it is important for a teacher and an educational manager to know what the industry needs for open innovation are. Once again, knowledge of these needs is not enough, one must be able to adopt teaching (in or outside the classroom) to these industry needs and practices. It might even be helpful for the teacher to have practical expertise in the field of open innovation.

Pedagogical knowledge and expertise: Similar to other teaching domains, OI teachers should build their courses on sound pedagogical expertise and experience in specific teaching methodologies and materials. One might expect that the element of ‘open collaboration’ will require specific teaching approaches in order to develop student skills and behaviour according to the needs expressed by the industry.

Professional identity: Professional identity concerns the beliefs, values and motivation of the teacher and the way that they see themselves and their role in the society. Vloet (2015) describes a conceptual framework of ‘professional identity’ based on both cognitive elements (job motivation, task concept and self-image) and emotional elements (motives, task-experience and self-experience). It is doubtful whether the activity of teaching open innovation will require a different professional identity than teaching other topics in the field of management and entrepreneurship.
Based on the pedagogical model explained above, we will describe the teaching competences and pedagogical guidelines for teaching open innovation. These guidelines and requirements are based on (1) group meetings organised in the OI-Net project, (2) educational pilots at 8 partner universities aimed at the validation of the OI-Net common curricula framework and (3) a survey on open innovation teaching skills. Teachers in several countries across Europe were invited to participate in a dedicated survey on teaching skills concerning OI. Out of 326 entries recorded in years 2015 and 2016, 207 covered the whole survey.

The group of respondents was divided according to the following criteria:

- Innovation management and OI management - experienced teachers (75 records, 36.2%) vs. teachers not experienced in these areas (132 records, 63.8%);
- Teachers who predominantly teach at bachelor level (92 records, 44.4%) vs. teachers who predominantly teach at higher levels (MSc, PhD, executive / LLL programs; 115 records, 55.6%).

In addition to the survey, the OI-Net CCF and pedagogical guidelines have been discussed, tested and evaluated in various teaching settings, including bachelor level, master level, PhD level and executive training settings. The outcomes and lessons learned will be summarised below.

**STUDENT BACKGROUND, ORIENTATION AND BEHAVIOR**

As discussed with educational practitioners in the OI-Net network, the design of a course or a course module on open innovation starts with taking account of the background of the student target group and the overall educational programme hosting the course. Open innovation is to a certain extent the domain of professionals with a managerial, economic and/or policy background. As demonstrated in the OI-Net CCF, the prerequisite knowledge includes generic theories in the fields of management, organisational studies, strategy, and business modelling. This makes the topic of Open Innovation more easy to teach in the context of business studies than in other domains, like engineering.

Also one has to consider the educational level and ‘maturity stage’ of the student target group. OI-Net partners and teaching experts consider open innovation as a topic for ‘higher-year classes’. This also counts for students participating in business-oriented programmes. The students need first to understand business processes in general and the relevant theories that describe and explain the behaviour of and within a company before diving into inter-organisational strategic partnerships and collaborative business models. Therefore, we advise not to teach the core theories of open innovation in (early) undergraduate courses. However, on the skills part of the OI-Net CCF, the teaching of certain skills relevant for open innovation can be taught in earlier stages of the programme.
Teaching open innovation in other domains than management, economy and policy studies – like engineering and other technical studies – requires strong focus on the company perspective. The students will be able to understand open innovation as a means for an individual company to establish goals beyond its own capabilities and to benefit from expertise and facilities available within other organisations. Taking the background of most technical students into account, it does not seem wise to go into much detail on issues like triple helix management, public policy, legal issues, living labs, etcetera.

Also in vocational and executive education, the teacher will have to understand the background, motivation and learning behaviour of the students. In comparison to traditional academic education, the focus of vocational students is much more short-term and their interest is driven more by practical needs. According to Narayandas et al. (1998), students participating in executive education are in search of expertise and skills that will help them to effect change in their organisations. In addition to foundational, conceptual and contextual knowledge of OI, this also calls for specific methodologies, tools and skills that can be used in day-to-day business practice.

**OI Content, Knowledge and Skills**

As explained above, teaching open innovation will require foundational knowledge and skills in the field of business, management and entrepreneurship. In building their course on open innovation, teachers must have specific knowledge in the domains of innovation, strategic alliances and collaborative business modelling.

The OI-Net survey into open innovation teaching competences covered two types of content-related competences: (1) foundational knowledge and (2) open innovation skills. The main findings of this research are summarised in the charts below.

Teachers who were asked for their opinions on areas of expertise foundational for OI education pinpointed especially the role of knowledge in ideation and co-creation, industry-university collaboration, commercialization, and knowledge management.

The teachers in all subgroups (innovation management and OI management - experienced vs. not experienced; predominantly teaching at bachelor level vs. predominantly teaching at higher levels) on average assessed the aspects mentioned above in a similar way. Experienced innovation teachers (bachelor level) stressed the role of IPR more than the other subgroups. Their colleagues teaching predominantly higher level courses considered risk management to be a less important area of expertise.
To what extent are the areas of expertise below less, equally or more important for a teacher to have in OI-education compared to other educational domains?

The results of the OI-Net questionnaire on teaching skills concerning OI showed that the respondents perceived collaboration skills, creativity skills and entrepreneurial attitude as the most important for teaching OI when compared to teaching other subjects. Interestingly, problem solving skills and strategic thinking skills were considered as relatively less important. Anyway, all skills listed in the questionnaire were in general assessed as very much relevant for OI. Detailed results are depicted in Figure 3.

Teachers in all subgroups assessed the aspects mentioned above on average in a similar way. Collaboration skills were valued higher by the experienced innovation teachers predominantly involved in bachelor courses. They also assessed the need for presentation skills to be relatively low.

It is worth mentioning that in general OI teaching skills were perceived as a key factor that needs to be supported across Europe. Teachers who participated in the OI-Net survey were asked “If
you had the opportunity to invest in teaching skills, knowledge, tools and/or conditions in order to improve European teaching in OI, how would you use this budget?” and the highest number of hits received “improving teaching skills”.

To what extent are the skills and attitude below less, equally or more important for a teacher to have in OI-education compared to other educational domains?

Visualization according to the method by N.B. Robbins and R.M. Heiberger (2011)

Figure 3: Skills relevant for OI teaching (Source: Baron & Teplov, OI-Net, 2016)

Context Knowledge and Skills

Context-related knowledge and skills refer to the conditions and processes under which the concept of open innovation has to be adopted in practice. Organising and facilitating open innovation in SMEs will differ from applying the concept in large and multinational companies. Professional expertise of teachers and access to real-life experiences (industry cases) could be beneficial for teaching open innovation in the classroom or in vocational and executive training.

The teachers who responded the OI-Net questionnaire on teaching skills concerning OI claimed that business experience, business intermediary experience, a large business network and cross-
To what extent are the items below less, equally or more important in OI-education for a teacher to have compared to other educational domains?

![Figure 4: Background needed for OI teaching (Source: Baron & Teplov, OI-Net, 2016)](Visualization according to the method by N.B. Robbins and R.M. Heiberger (2011))

Cultural experience are highly supporting factors in teaching OI. For detailed results see Figure 4. The teachers in all subgroups assessed the aspects mentioned above on average in a similar way. Experienced innovation teachers predominantly involved in bachelor courses valued business experience and cross-cultural experience higher compared to the other subgroups.

**Pedagogical Knowledge and Skills**

OI teachers should build their courses on sound pedagogical expertise and experience in specific teaching methodologies and materials. One might expect that the content and context of open innovation will require specific teaching approaches in order to develop student skills and behaviour according to needs expressed by the industry. This section describes the expertise, methodologies and teaching practices that match the needs of teaching open innovation.

When asked for opinions on teaching settings important for OI education, the teachers called for a very practical approach to teaching OI. According to the survey, the priority should be given to field visits, case studies, simulations, practical assignments and guest lectures. For details see Figure 5.

Despite the call for field visits, practical assignments and experience-based learning, traditional teaching approaches like lectures, tutorials and seminars, were considered effective in teaching foundational and specialised knowledge to students. In the design and execution of the educational pilots of the OI-Net CCF, the teachers often used lectures but combined this with extensive use of case materials and in-class exercises. In some cases, this was combined with guest lectures and the use of field visits as well.
To what extent are the teaching settings below less, equally or more important in OI-education compared to other education at the same level?

Visualization according to the method by N.B. Robbins and R.M. Heiberger (2011)

Figure 5: Settings relevant for OI teaching (Source: Baron & Teplov, OI-Net, 2016)

Experienced innovation teachers who teach predominantly bachelor courses valued guest lectures highly, compared to the other respondents. The same subgroup considered seminars, tutorials and academic lab visits less important. The other subgroups had similar opinions.

One approach to stimulate and facilitate experience-based learning in or directly outside the classroom is the use of gamified learning approaches. Similar to other management teaching domains, the use of games in education offers students a ‘controlled’ environment where they can experience the context of open innovation themselves and put their knowledge and skills into practice. A pilot at Eindhoven University of Applied Science adopted a game tailored for open innovation which turned out to be effective in offering such an ‘enriched learning environment’. This game was evaluated by students to be effective as a learning tool and also ‘fun’ to play.

For executive and vocational education, it is important to relate the teaching content, materials and methods directly to the ‘real world’ through the use of practical assignments and high-quality case material and other teaching resources.
Consequently, pinpointing practical assignments as important in OI teaching, the OI-Net survey revealed that reports on practical assignments and group assessments were considered relevant for OI education. The teachers in all subgroups assessed the aspects mentioned above in a similar way. See Figure 6 for detailed results.

**Professional and Personal Identity**

The last two elements of the Klatter model will be treated in combination. In this section we describe to what extent the personal characteristics and values of teachers have an impact on teaching the concept of open innovation in the classroom. Professional identity concerns the beliefs, values and motivation of a teacher and the way that they see themselves and their role in the society. Personal identity is related to beliefs and values in a much broader context outside the professional domain.

The professional characteristics needed for OI teaching were explored and analysed in the quoted OI-Net study. For details see Figure 7. Broad-mindedness and curiosity emerged here as the leading features that differentiate an OI teacher from other teachers. These can be explained as relevant values for open innovation and collaboration. Based on the principle 'practice what you teach', it seems plausible that a teacher involved in OI-teaching should embrace the values of openness, broad-mindedness and also curiosity (and real interest in other persons and organisations).
In order to teach OI effectively, are the following personal characteristics less, equally or more important for a teacher to have compared to other educational domains?

![Personal characteristics relevant for OI teaching](image)

Visualization according to the method by N.B. Robbins and R.M. Heiberger (2011)

**Figure 7: Personal characteristics relevant for OI teaching (Source: Baron & Teplov, OI-Net, 2016)**

Experienced innovation teachers who teach predominantly bachelor courses considered authority, ambition and daring as less important, compared to the other subgroups. Teachers in the other subgroups assessed the aspects mentioned above in a similar way.

Also the personal values needed for OI teaching were scrutinized in the survey. Freedom, followed by honesty and helpfulness were identified by the respondents as most characteristic for OI education. For detailed results see Figure 8.

Experienced innovation teachers who teach predominantly bachelor courses considered tradition as less important, compared to the other subgroups. The other subgroups shared similar opinions.

**Pedagogical guidelines for using the OI-Net CCF**

This section summarizes and describes the overall pedagogical guidelines and methodologies that facilitate the teaching of open innovation. These guidelines, do’s and don’ts and skill requirements are based on existing literature on pedagogy and teaching, the outcomes of the OI-Net survey on
In order to teach OI effectively respect for the following values is less, equally or more important for a teacher to have compared to other educational domains?

**Figure 8: Personal values relevant for OI teaching (Source: Baron & Teplov, OI-Net, 2016)**

Visualisation according to the method by N.B. Robbins and R.M. Heiberger (2011)

Teaching skills, interviews with experienced (open) innovation teachers, and experiences in OI-Net pilot implementations of the Common Curriculum Framework on Open Innovation.

Literature and internet sources offer a rich repository of knowledge, approaches, techniques and guidelines for teaching in general. This pedagogical knowledge base also contains reference books and reports focusing on teaching in certain domains (like technical education) and on various levels. We have no intent to duplicate or review this rich repository, and leave it to the professionals (teachers and educational management) to build their educational programmes and courses on knowledge of this literature. In this chapter – and the OI-Net project as a whole – we focus on the pedagogy for teaching in the specific domain and context of open innovation.

Based on the evaluation of the pilot implementations of the OI-Net we can summarise the following guidelines for teaching open innovation. Teaching guidelines for specific CCF modules and specific teaching materials developed and/or shared within the OI-Net network are left out of consideration in this chapter, but will be included in the OI-Net tool repository.

**Educational Programme and Prerequisite Knowledge**

- An open innovation course is proposed for education in management, business administration, entrepreneurship and policy studies. It can be included in technical studies, providing that a wider special track concerning R&D/innovation management is offered. All participating students are expected to have completed at least a basic course in management or innovation management before joining a course on open innovation.
PART 2. WALKING THE TALK: A EUROPEAN INITIATIVE TO SPUR OPEN INNOVATION

- It is not recommended to teach the core theories of open innovation in (early) undergraduate courses. However, on the skills part of the OI-Net CCF the teaching of certain skills relevant for open innovation can be taught in earlier stages of the programme.
- For an introductory course, the organisers should make sure that the participants have at least basic knowledge in innovation and IPR management. This is necessary to understand and follow the principles of OI.

LEARNING OUTCOMES AND CONTENT MODULES

- Learning outcomes should represent the goals of the learning process as described in Bloom’s taxonomy: remembering, understanding, applying, analysing, evaluating, and creating (Bloom, 1956).
- The CCF describes a limited set of learning outcomes that are the core to teaching open innovation. In designing a course on open innovation, the teacher should incorporate these core learning outcomes and the respective modules included in the ‘basic subjects section’ of the CCF. These basic subjects are:
  - Introduction to the open innovation paradigm
  - The process of open innovation
  - Managing open innovation at the firm level
  - Open innovation at the individual level
  - Fostering open innovation at the industry / social level
- In addition to the core modules – and respective learning outcomes – the OI-Net CCF also describes a number of elective subjects:
  - Open innovation in large organisations
  - Open innovation in SMEs
  - Open innovation in supply chains
  - Collaboration between industry and universities
  - User-led innovation and the We-Economy
- Teaching open innovation in other domains than management, economy and policy studies — like engineering and other technical studies — requires a strong focus on the company perspective. It does not seem wise to go into much detail on issues like triple helix management, public policy, legal issues, living labs, etcetera.

TEACHER’S BACKGROUND AND COMPETENCES

- Due to the complexity of open innovation, it seems wise to involve teachers with sufficient backgrounds in industry (or industry-university collaboration) and with access to real-life experiences (industry cases). This specifically applies to teaching in executive training. Business experience, business intermediary experience, having a large business network, and cross-cultural experience are highly supporting factors in teaching OI.
In building their course on open innovation, teachers must have specific knowledge in the domains of innovation, strategic alliances and collaborative business modelling. Specific experience (knowledge and skills) in ideation, co-creation/co-development, industry-university collaboration, commercialization and knowledge management is beneficial in teaching open innovation.

Differentiating OI from other approaches in innovation management may not be easy. The teacher should always have in mind the background of the group and be able to profile the lecture and exercises to pinpoint unique features of OI. Also, he/she must be ready to challenge a discussion on the issue of ‘old wine in new bottles’. Using the approach of changed business environment [Chesbrough 2006, OECD 2008] helps the participants to understand the economic foundations of OI and to see justification for its implementation.

**Teaching approaches and tools**

- **Lectures, tutorials and seminars** are effective in teaching foundational and specialised knowledge to students. The extensive use of case materials and in-class exercises will help students to understand and apply the concept and basic theories better.

- **Case studies** help to make the concept of open innovation tangible for students in general, but specifically for students that lack adequate background in management, economics or policy studies.

- It is important to have access to and to use case material that is linked to the context of the educational programme. For example, an educational programme on entrepreneurship and small business management should preferably use case material originating from similar firms in industry.

- It seems favourable to use regional or country-specific case material – at least to a certain extent – in order to enhance the adoption by students. Case material from an international context off-course can be helpful as well, but using local case materials may demonstrate that the concept is also applicable in other and also less globally operating industries and regions.

- Teaching open innovation will benefit from the use of field visits, case studies, simulations, practical assignments and guest lectures.

- The use of gamified learning approaches offers students a ‘controlled’ environment where they can experience the context of open innovation themselves and put their knowledge and skills into practice. Currently, the number of educational management games focusing on open innovation is limited but the number of specialised tools is expected to grow in the future. This can be stimulated if educational organisations work together as a consortium of lead-users and challenge game studios to develop such products.

- Consequently, pinpointing practical assignments as important in OI reports on practical assignments and group assessments are considered relevant for OI education. The teachers in all subgroups assessed the aspects mentioned above in a similar way.
Specific guidelines for teaching OI at the bachelor level

- At the bachelor level, the LO should be mainly related to remembering, understanding and applying open innovation concepts.
- At the bachelor level, students may learn a general overview of the role of open innovation at policy level but it is very difficult to really understand how to implement open innovation. It is important that lecturers provide students with concrete examples.

Specific guidelines for teaching OI at the master’s level

- At the master’s level, analysing and evaluating should be the main basis of LOs.
- MSc students cannot learn how to implement open innovation in one lecture. Learning the theory and acquiring the competences to implement it requires at least one week of teaching. The lecturers need to recognize that open innovation is a complex topic to teach and learn. For MSc students open innovation does not seem an alternative form to closed innovation. The lecturers need to provide students with time to study and discuss scientific and practitioner articles.
- At MSc level it important that lecturers provide students with concrete examples.

Specific guidelines for teaching OI at the PhD level

- At the PhD level, creating should be the main basis of LOs, as described in the OI-Net CCF.
- Students enjoy to work on OI-issues in a multidisciplinary group.

Specific guidelines for teaching OI in executive training

- The learning outcomes should represent the goals of the learning process of each level (Bloom, 1956).
- For executive and vocational training, a course on open innovation should include specific methodologies, tools and skills that can be used in day-to-day business practice.
- For executive and vocational education, it is important to relate the teaching content, materials and methods directly to the ‘real world’ through the use of practical assignments and high-quality case material and other teaching resources.
- Providing in depth description about practical cases of companies that have solved (or are solving) open innovation-related problems is useful at this level.
- Providing concrete examples is useful and more appealing for executives than theoretical models and publications. Executives look for providing solutions that can eventually be implemented by the company.
KEY TAKE-AWAYS

• An open innovation course is proposed for education in management, business administration, entrepreneurship and policy studies. It can be included in technical studies, providing that a wider special track concerning R&D/innovation management is offered. Participating students are expected to have completed at least a basic course in management or innovation management before joining a course on open innovation.

• The OI-Net Common Curricula Framework offers a limited set of learning outcomes that are the core to teaching open innovation. In designing a course on open innovation, a teacher should incorporate these core learning outcomes and the respective modules included in the ‘basic subjects section’ of the CCF. In addition to the core modules – and respective learning outcomes – the OI-Net CCF also describes a number of elective subjects to be included in a tailored course.

• It seems favourable to use regional or country-specific case material in order to enhance the adoption by students. Using local case materials may demonstrate that the concept is also applicable in other and also less globally operating industries and regions.

REFERENCES

• Baron, M. & Teplov, R. (2016). Survey to identify generic and specific competences & skills for teaching open innovation, OI-Net.
QUICK TIPS FOR THE PROMOTION OF OPEN INNOVATION AMONG HEI PROGRAMMES

CHRISTOPHE TERRASSE, JEAN-BAPTISTE MAILLARD

HEI Governance

• Develop the cooperation with other technical institutions to create a regional techno-centre focused on open innovation;
• Develop a community of practice, “ambassadors of the cause”, who will be in charge of providing specific advice or guidance or developing one to one interactions;
• Address the open innovation barriers for further development to relevant national authorities to encourage the dissemination of open innovation in the country/region;
• Facilitate the administration process for extra-curriculum activities to encourage students to diversify their professional skills and knowledge;
• Encourage the inclusion of Open Innovation courses in the university programmes.

HEI Faculty

• Develop awareness of the concept among the students by;
• Forecasting seminars and courses at bachelor and master level;
• Using relevant communication channels to attract interest from students from other disciplines to Open Innovation presentations, clearly stating the benefits that can be expected from their participation;
• Inviting students from other departments/faculties to participate to join lectures as discovery modules;
• Provide various learning and teaching methodologies;
• Students expect easy accessible and practical materials. While cases are a prerequisite, they should not be limited to international companies but should also include local actors and environments;
• Forms of the material should be varied. The platform should offer videos, cases, play roles and reference materials and made accessible to the students for further research;
Quick Tips for the Promotion of Open Innovation Among HEI Programmes

- Develop a community of best practices and references at local and national level to facilitate the dissemination of the concept in other universities;
- Most of the efforts to further disseminate Open Innovation should be made to the HEI faculty to ensure maximal impact of Open Innovation; their role should be recognised as essential in the ecosystem building.

HEI Students

- Encourage students to put into practice the knowledge acquired during the courses with study visits and/or internships directly connected to Open Innovation;
- Collect students’ essays and research on the topic of open innovation to get interest from other students;
- Companies and Enterprises;
- Develop the interest of local companies and enterprises by organising presentation seminars in the university and/or student internships;
- Create a community of best practices and references at regional and national level to facilitate the dissemination of the concept to local universities linked with local companies;
- Managers should have access to a platform with dissemination materials, practical guidelines and examples to be directly applied in their companies.
PART 3. TOMORROW’S TEACHING: AN ESSENTIAL GUIDE
INTRODUCTION

The Open Innovation Handbook now unfolds. Part One debated why Open Innovation deserves to be established as a teaching discipline. Part Two conveyed the key messages that can be taken away from the largest European initiative, led by higher education and conducted in close cooperation with industry. Now, the essence of the Open Innovation Handbook unveils: an extensive compendium of resources covering an array of complementary topics, aligned to the learning outcomes collaboratively defined in the framework of the OI-NET consortium. The handbook contains five main sections, meant to reflect the considerations of laying out the definitions and foundations for Open Innovation, of connecting it to multiple theoretical streams, of providing insights on its implementation at various levels of analysis - from individuals to nations - as well as, of supporting its deployment through the offering of tools and methods, and finally, of exploring emerging interconnected themes. Each section includes a set of standalone contributions, with practical insights on how to use the content and guidance from subject matter experts for delivering the lecture. Each contribution is also supplemented by visual materials in the form of slides. Further case studies, either descriptive or instructive, are accessible on the online repository of resources, accessible at www.oi-net.eu.

In «Setting the Scene: Defining Open Innovation», Dabic et al. present the foundations of Open Innovation. The authors review the different generations of innovation models, explain the various modes of Open Innovation, unravel the incentives for firms to engage into Open Innovation strategies, discuss broader theoretical contributions to which Open Innovation relates and conclude with a discussion on the theoretical shortcomings currently unaddressed. Podmetina et al. complement this definitional section by providing further insights and illustrations on the different modes of Open Innovation, motives and rationales for Open Innovation, processes and practices, as well as related governance modes.

«Framing Open Innovation in a Broader Theoretical Landscape» aims to provide insights on a set of concepts and notions that are intrinsically close to Open Innovation, and complement or supplement its understanding. In doing so, it further extends the definitional scope of Open Innovation. Nagel explores strategic alliances, showcasing how these can be leveraged upon to learn and experiment, and stressing how our understanding of strategic alliances, and their role, as evolved over time. Kock reaches out to the network externalities and platform markets literature streams, bridging those topics with Open Innovation and further relying on the platform nature of innovation brokers, as key visible components of Open Innovation, to shed light on those interrelated concepts. Casprini et al. highlight the role of users in the innovation process, and introduce various tools to engage users, namely free revealing through open source software and co-creation process through Living Lab approach. Al Sharieh and Mention argue that the decision to engage into Open Innovation strategies should not be driven by strategic objectives exclusively
but should be congruent to the organization’s intellectual property stance and ownership. They further recommend firms to list their portfolio assets and assess their value as critical steps to undertake in the process of evaluating the complementarities and expected benefits of an open innovation strategy.

«Instantiating Open Innovation: From Individual to Society Level» features a wide range of contributions, covering the different units of analysis. Kurtmollaiev and Hafkesbrink’s extensive and rich contribution features a theoretical overview of individual ambidextrous competences for Open Innovation, categorized into professional, methodical, social and personal competences, and further discusses how these competences can support exploration and exploitation activities respectively. The second part of the contribution provides a teaching case study in design thinking targeting the development of individual innovation competences. Hafkesbrink and Kirkels consider the peculiarities of SMEs, and explore the specific challenges they face in applying and implementing Open Innovation. The authors further present individual competences for Open Innovation implementation based on a recent dedicated survey conducted within the framework of the OI-NET project. Zgodanova et al. provide a rich discussion on quality issues framed in the Open Innovation context. They first address the history and culture of quality, quality engineering and management tools and methods, as well as business excellence models and performance measurement. They then continue on quality management systems models and hint at Open Innovation maturity assessment, defined as a multidimensional concept capturing the overall capacity of an organization to successfully engage in and making use of Open Innovation. Steenbergen follows up on quality management related matters, targeting open supply chains for production and addressing the management of outsourcing and lifecycle management. Along the same lines, Zgodanova et al. draw upon supply chain management, lean production and lean supply, tiered supplier structure, open supply chain and network innovation, specifically considering the early supplier involvement perspective. They further exemplify how supplier involvement relates to Open Innovation and analyze its evolution through the different stages of a product lifecycle. Particular attention is also paid to stakeholder engagement and supplier-buyer relationships for sustaining collaborative innovation. Mahdad and Albats examine university-industry cooperation and introduce various online tools for bridging the gaps between academia and practice, illustrating their considerations with case studies. Post’s contribution features a theoretical discussion on strategic alliances, resonating with Nagel’s insights from a strategy perspective, and extends the debate to interfirm relationships and further on to industrial networks. Baron aims at bridging Open Innovation with regional studies, drawing upon notions such as the innovation milieu, clusters, regional innovation systems, and the triple-, quadruple- and quintuple helix. The author further provides insights on the territorial nature of Open Innovation processes, exemplifying his considerations with smart specialization policies and the Open Innovation 2.0 initiative. In a subsequent contribution, Baron reviews Open Innovation policy approaches and instruments.
and captures the fundamental elements of policy initiative: from setting the right framework conditions to adopting foresight and road-mapping approaches to address future challenges.

«Implementing Open Innovation: Tools, Methods & Processes» contains a set of self-standing contributions aiming at providing a toolkit for Open Innovators. Podmetina et al. delineate Open Innovation and (Open) Business Models, and provide insights into the dynamic nature of business models. Likar et al. uncover the peculiarities of the fuzzy front end of the innovation process, connecting it to its intrinsic openness nature and review methods readily available to support problem identification and idea generation. They further proceed with a detailed description of two specific methods used in the preinvention phase and applied in real organizational settings. Spacek addresses financial considerations in relation to Open Innovation, across the various discrete stages of the company lifecycle and considering both private and public funding sources. Lapina introduces a game, «from Idea to Money» for the assessment of a new product, service or project idea in a company, aiming at sharpening the understanding and use of creative and critical thinking abilities and techniques. Along the same lines, Bogers and Sproedt present how to use a board game to teach Open Innovation and provide reflective thoughts on its implementation in a graduate course. «Sketching the New Frontiers of Open Innovation» broadens the debate to emerging themes. In Civic Open Innovation, Casprini and Di Minin explore how governments use Open Innovation to address societal challenges such as mobility and security. Spacek addresses concerns of the sharing economy, and the recent notion of Weconomy. The author further debates how the Weconomy is closely tied to the development of a new business model that brings value to all parties concerned. This set of contributions reflects the multifaceted nature of Open Innovation, and consistently depicts its broad reach. Yet, it is by no means exhaustive. Knowledge builds on itself, and increased adoption by industry and policy will shed further light on topical issues that should be included in follow up editions. Let the Open Innovation Education journey begin!
3.1 SETTING THE SCENE: DEFINING OPEN INNOVATION

INTRODUCTION TO THE OPEN INNOVATION PARADIGM

MARINA DABIC, MAJA BASIC, DAVOR VLAJCIC

ABSTRACT

This chapter introduces the teacher and the student to the open innovation paradigm. It points out the rationale for open innovation from the historical point of view and describes the differences between closed and open innovation. As open innovation has been observed in numerous contexts, this chapter addresses theories related to open innovation on one side and practical implications on the other. We discuss the incentives for firms to engage in open innovation, as well as the shortcomings from engaging in it.

Competitiveness results from generating value propositions that differ from competitors’ value propositions. Innovation increases the customers’ value propositions and generates revenues for innovators or owners of innovation (Schumpeter, 1934). Innovation also generates value to the society, even if the innovator does not capture the majority of its profits (Teece, 1986). This chapter first defines innovation and then explains how open innovation helps firms to innovate easier and faster.

Section 3.1.1. “Why open innovation?” defines innovation and describes how firms innovate. It augments the historical perspectives on innovation by depicting the differences between linear technology-driven innovation, linear market-driven innovation and the chain link model of innovation, thereby portraying the rationale for the theory of open innovation. Section 3.1.2. “What is open innovation?” defines open innovation by presenting the differences between open and closed innovation on one side, and inbound, coupled and outbound innovation on the other side. Section 3.1.3. “Main incentives for open innovation” explains how firms benefit from engaging in open innovation, as well as the conditions that need to be satisfied for firms to extract value from open innovation. Section 3.1.4. “Open innovation in a broader context” describes theories that adopt or can be associated with open innovation. Section 3.1.5. “Critique to open innovation theory” exemplifies the drawbacks of the open innovation theory by explaining theoretical shortcomings and managerial implications.
3.1.1. WHY OPEN INNOVATION?

ABSTRACT

The changing environmental, economic, political, cultural, and social conditions stress the need for different approaches to innovation. The traditional sequential, linear model is not good enough in the era of an increased level of education, customised customer demands, mass and niche market preferences, dynamic technology, and emerging new organisational forms that allow knowledge to reside within networks, stressing their core competences.

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Generic knowledge of the organisation theory and innovation management.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives of the lecture</td>
<td>This module consists of 3 sub-modules aiming at:</td>
</tr>
<tr>
<td></td>
<td>1. General understanding of innovation;</td>
</tr>
<tr>
<td></td>
<td>2. Gaining an insight into general trends that caused changes in the innovation theory; and</td>
</tr>
<tr>
<td></td>
<td>3. Gaining knowledge about different innovation models.</td>
</tr>
<tr>
<td>Learning objectives</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. To understand the dynamics between innovation and the contextual environment.</td>
</tr>
<tr>
<td></td>
<td>2. To recognise and evaluate various types of innovations and innovation strategies.</td>
</tr>
<tr>
<td></td>
<td>3. To recognize and assess the interdependencies in the system of innovation in an organisation.</td>
</tr>
<tr>
<td></td>
<td>4. To identify and understand the different innovation typologies: advantages and limitations.</td>
</tr>
<tr>
<td>Workload</td>
<td>2-4 h teaching; 3 h self-study (2h/sub-module).</td>
</tr>
<tr>
<td>Learning outcomes</td>
<td>Knowledge</td>
</tr>
<tr>
<td></td>
<td>LO #90: To understand the dynamics between innovation and the contextual environment.</td>
</tr>
<tr>
<td></td>
<td>LO #73: To recognize and assess the interdependencies in the system of innovation in an organisation.</td>
</tr>
</tbody>
</table>
Skills

**LO #13:** To identify and understand the different innovation typologies: advantages and limitations.

Competences

**LO #42:** To recognise and evaluate various types of innovations and innovation strategies.

Reading List


European Qualifications Framework (EQF) Level

| 6, 7 |
LECTURE CONTENT

Definition

“Innovation is the specific tool of entrepreneurship, the means by which they exploit change as an opportunity for different business or different service. It is capable of being presented as a discipline, capable of being learned, capable of being predicted. Entrepreneurs need to search purposefully for the sources of innovation, the changes and their symptoms that indicate opportunities for successful innovation. And they need to know and to apply the principles of successful innovation”.

Drucker (1985, p. 19)

THEORETICAL BACKGROUND

From ancient times till today, technology has shaped the human history. Stone tools, fire, the typewriter, light bulb, train, and the telephone (Utterback, 1994) are only few examples of how technology has changed the course of history and redirected the industry from agriculture and manufacturing to services. The examples mentioned above are inventions. Invention is a creation of something entirely new that did not exist before. Invention is followed by innovation, which is a “new or significantly improved good or service, or production, delivery, marketing and organisational method” (OECD, 2005). Innovation brings transformed products, services or processes to the market.

In modern theoretical studies, Schumpeter (1934) was one of the first scientists to clarify the meaning of innovation. He defined innovation “as the commercial or industrial application of a new product, process, or method of production” (op. cit., p. ?). His notion of creative destruction denotes disruption of the existing production, organisation or distribution methods that diminish a firm’s costs, accumulate capital and obtain abnormal profits. The role of the entrepreneur is crucial here, as the entrepreneur is a person who captures profits that originate from innovation opportunities.

Innovation can be incremental or radical. Incremental change occurs in a stable industry, in which experimentation results in technological discontinuities that occur when a new dominant design emerges (Anderson & Tushman, 1990).

The technology life cycle curve (Figure 1) illustrates the change from existing to new technologies that results from technological discontinuities and innovation. Disruptive innovation occurs when new technology replaces existing technology.
Kondratieff’s waves (1925, 1935) explain how economy develops in cycles shaped by their own particular technologies, organisational forms and industries (Drucker, 1999). The first wave emerged at the beginning of the 19th century with steam power and iron and cotton textile industry in which organisations were driven by the division of labour and standardisation. The second wave followed in the late 19th century with railroads and horizontal integration; the third wave at the beginning of the 20th century was marked with electricity and vertical integration; while the fourth wave included nuclear power and basic electronic appliances such as radio and TV, and in which the rapid growth of telecommunications enabled the emergence of multinational companies (Ayres, 1990a, 1990b; Dator; 1999; Hilmola, 2007; adapted by Torkkeli et al., 2007, LUT Research report 190; Kutvonen, 2015). Multinational companies’ strategies have often been “closed” and followed a linear product and service development (Arora & Gambardella, 2010). Innovations used to take place within corporate systems whose strategy was directed from the top downwards, and which discarded many new product or service developments that were not in line with the company strategy (Chesbrough, 2003). Table 1 depicts innovation models that have been used to describe firms’ innovation processes. Linear technology-push and market-pull models were commonly used in multinational corporations’ closed systems.
### Table 1. Innovation models

<table>
<thead>
<tr>
<th>Generation</th>
<th>Period</th>
<th>Authors of fundamental ideas</th>
<th>Innovation model</th>
<th>Essence of the model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1950-s - late 1960-s</td>
<td>Myers and Marquis, 1969</td>
<td>Technology push</td>
<td>Linear process</td>
</tr>
<tr>
<td>2</td>
<td>Late 1960-s - first half of 1970-s</td>
<td>Mowery and Rosenberg, 1979</td>
<td>Market (Need) pull</td>
<td>R&amp;D on customer wishes</td>
</tr>
<tr>
<td>3</td>
<td>Second half of 1970 - er - end of 1980-s</td>
<td>Rothwell and Zegveld, 1985</td>
<td>Coupling model</td>
<td>Interaction of different functions</td>
</tr>
<tr>
<td>5</td>
<td>1990-s</td>
<td>Rothwell, 1992</td>
<td>Networking-model</td>
<td>System integration and networks (SIN)</td>
</tr>
<tr>
<td>6</td>
<td>2000-s</td>
<td>Chesbrough, 2003</td>
<td>Open innovation</td>
<td>Innovation collaboration and multiple exploitation paths</td>
</tr>
<tr>
<td>7</td>
<td>2010-s</td>
<td>Open innovator</td>
<td>Focus on the individual and framework conditions under which to become innovative</td>
<td></td>
</tr>
</tbody>
</table>


### The Linear Model

A typical linear innovation process incorporates firms’ functions in a linear manner (Figure 2). It starts either in the research department, goes on to the product development and prototype phase, reaches production and is put to the market. This is also known as a technology-push model. Alternatively, innovation can start with the identified market demand which encourages
researchers to develop a product and proceed with its production and marketing, i.e., a market-pull innovation model (Bullinger, 1994).

![Figure 2. Linear model of innovation](source)

**Technology-driven innovation (Technology push)**

Technology-driven innovation processes use internal or external research facilities (Brem & Voigt, 2009), such as R&D departments and centres-of-excellence in which the availability and accessibility of resources are important preconditions for innovation (Ebert, 2007). Multinational corporations used to centralise R&D departments in their home countries, due to “the existence of technology platforms or access to specific specialized testing equipment, the relative proximity of central planning offices, the protection of commercial results in development or synergy effects” (Von Zedtwitz & Gassmann, 2002, p. 8). Here, the demand for products or services containing the innovation does not necessarily exist already (Brem & Voigt, 2009). Hence, it is often considered as a predecessor of major improvements or radical innovations.

**Market-driven innovation (Market pull)**

Demand for a new product occurs when the existing product does not satisfy customers’ needs. The drive for innovation comes from individual customers or groups of customers who are willing to articulate their subjective demands (Brem & Voigt, 2009). Market-driven innovations are enhanced with customer demand in which quality (Ferdinand, 2015) and the nature of the commercialisation environment (Nicholas, 2011) play an important role. Hence, market-driven innovations lack scientific advancement, and are often characterised as innovations with minor improvements, incremental innovations (Von Zedtwitz & Gassmann, 2002). Table 2 summarizes the most important differences between technology-driven and market-driven innovations.

**Non-linear models of innovation**

By the end of the 20th century, the accelerated globalisation increased competition, diminished companies’ control of their most important assets, enabled technological developments, and changed customer behaviours (Kutvonen, 2015), as well as revealed the failures of linear innovation models.
Table 2. Differentiation between technology push and market pull

<table>
<thead>
<tr>
<th>Description/attribute</th>
<th>Technology push</th>
<th>Market pull</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological uncertainty</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>R&amp;D expenses</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>R&amp;D duration</td>
<td>Long</td>
<td>Short</td>
</tr>
<tr>
<td>Sales market-related uncertainty</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Time-to-market</td>
<td>Uncertain/unknown</td>
<td>Certain/known</td>
</tr>
<tr>
<td>R&amp;D customer integration</td>
<td>Difficult</td>
<td>Easy</td>
</tr>
<tr>
<td>Kinds of market research</td>
<td>Qualitative/discovering</td>
<td>Quantitative/verifying</td>
</tr>
<tr>
<td>Need for change of customer behaviour</td>
<td>Extensive</td>
<td>Minimal</td>
</tr>
</tbody>
</table>


Table 3. Number of enterprises by company size

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1000 employees</td>
<td>4.4%</td>
<td>9.2%</td>
<td>22.5%</td>
<td>24.7%</td>
</tr>
<tr>
<td>1000 - 4 999</td>
<td>6.1%</td>
<td>7.6%</td>
<td>13.6%</td>
<td>13.5%</td>
</tr>
<tr>
<td>5 000 - 9 999</td>
<td>5.8%</td>
<td>5.5%</td>
<td>9.0%</td>
<td>8.8%</td>
</tr>
<tr>
<td>10000 - 24 999</td>
<td>13.1%</td>
<td>10.0%</td>
<td>13.6%</td>
<td>13.6%</td>
</tr>
<tr>
<td>25000 +</td>
<td>70.7%</td>
<td>67.7%</td>
<td>41.3%</td>
<td>39.4%</td>
</tr>
</tbody>
</table>


Table 4. Number of enterprises by company size in the EU

<table>
<thead>
<tr>
<th>Company Size</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>92.2%</td>
<td>92.5%</td>
<td>92.7%</td>
</tr>
<tr>
<td>Small</td>
<td>6.4%</td>
<td>6.2%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Medium</td>
<td>1.1%</td>
<td>1.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Large</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

*Note: 2011 and 2012 for the European Union (28 countries), 2010 for the European Union (27 countries) plus Croatia.

By the last decade of the 20th century and at the beginning of the 21st century, markets exhibited more educated workforce and customers who are nowadays more informed about purchased products and have more sophisticated and specialised needs, and have started to exchange information virtually and form virtual online user communities. The trend of conscious preferences (green and social values) demanding mass and simultaneously customised products created a paradox between niche and mass markets, which was tried to be catered with the increasing number of small and medium sized companies (Kutvonen, 2015; see Tables 3 and 4).

The emergence of small high-tech companies emerged with an increase in firms’ market value of intangible assets and was incited by global technological developments (Kutvonen, 2015). Namely, in 1975 only 17% of firms’ assets were intangible, while in 2015 84% of firms’ assets were intangible (Ocean Tomo, 2015) (Figure 3).

![Figure 3. Components of firms’ market value](http://www.oceantomo.com/blog/2015/03-05-oceantomo-2015-intangible-asset-market-value/)

Figure 3. Components of firms’ market value

Technological developments have now incorporated computers, and access to previously specialised resources has become widespread, computational power has increased, rapid and cheap semi-professional prototyping has emerged (CAD, 3D printers), and e-commerce, ICT
communities, as well as electronic data interchange (EDI), Enterprise Resource Planning - ERP and Radio Frequency Identification - RFID are the foundation of conducting modern business, and aviation enables the mobility of personnel and knowledge (Kutvonen, 2015). New organisational forms fueled by interconnections between logistics and supply chain management (co-opetition and alliances and networks), production (licensing and tech-markets), marketing and distribution (external knowledge acquisition, crowdsourcing and user innovation), and finance and accounting, now need new product development input tied to organisations’ absorptive capacity, which was earlier often too small and led to innovation overdrive (Kutvonen, 2015). Hence, a need for a systematic organisation and management support has come into sight.

On the other hand, multinational corporations’ closed innovation principles in the 1980s meant that (1) there was no room for individual entrepreneurs, (2) R&D was tightly coupled and internally focused, and technology was planned and predicted, (3) the role of intellectual property was to prevent knowledge spillovers, (4) unused knowledge was piled up and not monetised upon, and (5) universities distanced themselves from business life (Chesbrough, 2003; Kutvonen, 2015). Although a lot of companies were good at it, the opportunities seized from some companies like Xerox showed how to earn income from unused knowledge. The example of Adobe and other spin-offs add to the Xerox example. Open innovation was also observed in companies such as Philips, Microsoft, Lego, Nokia, Toyota, P&G, Cisco, Apple, IBM, and many others (Kutvonen, 2015).

Information technology has ultimately created the knowledge economy, an environment in which improvements in knowledge are a crucial prerequisite for sustainable competitiveness. Improvements in knowledge occur as a result of inventions and innovations. Herein, individual and organisational core competencies and their interconnections play an important part for innovation. Namely, the mobility of highly skilled workers, increased availability of venture capital, shortened product lifecycles, closer supplier relationships, and improved knowledge markets enabled the distribution of knowledge across actors (in the value chain), geographically (globally) and people (abundance of educated individuals) (Chesbrough, 2003; Dahlander & Gann, 2010; Kutvonen, 2015). Moreover, their interactions created new organisational forms that promoted flexibility in knowledge creation: instant exchange of knowledge, proliferation of ideas, magnification of spillovers, and new business opportunities (Kutvonen, 2015).

All the above meant that the current innovation theory became inadequate in explaining the existing phenomena. Namely, the cycle initiated by increased R&D investment that incited fundamental technology breakthroughs, new products and features, increased sales and profits from existing business models. This was now augmented by new methods of financing innovation (IPOs and acquisitions) and key engineers, encouraging companies to form new start-ups, which was all framed by venture capital and business angels that helped teams build new markets and business models (Kutvonen, 2015).
Hence, a new theoretical approach emerged that focused on resource-based (Barney, 1991) and relational views, incorporated the importance of knowledge and core competences (Prahalad & Hamel, 1990) in managing uncertainty and risk avoidance in new organisational forms (alliances, joint ventures and networks) (Kutvonen, 2015), and made room for interactive and integrated network innovation models that portrayed the effective ways in which science and industry can cooperate.

This section describes two such innovation models: the chain-linked innovation model and the cycle model as predecessors of open innovation, while the next section focuses on open innovation.

The chain-linked model

Herein, the multidimensional nature of innovation is evident (Padmore, Schuetze & Gibson, 1998) in the multiple ways of how innovation can emerge in various feedback links among the steps in product development and sources of knowledge outside the firm. Innovations originate from market demand and not primarily from research, but development follows the identified market opportunity. This way the chain-link model merges processes within a firm or a network on one side, and innovation processes coming from the interaction of a firm with a system or a technology system on the other (Mahdjoubi, 1997) (Figure 4).

Firstly, a feedback system based on links between research and innovation consists of: (a) each product development phase and (b) each phase and potential market demand/opportunity. Secondly, feedbacks occur between firms and external research institutes when the firms’ existing knowledge is not sufficient for new product or service development (Kline & Rosenberg, 1986; Mahdjoubi, 1997). As Kline and Rosenberg’s model (1986) adds to the previous linear models, it contextualises policy measures that strengthen the innovation system in supporting commercialisation activities (Villarreal & Calvo, 2015).

The cycle model

Similarly to the chain-linked innovation model that incorporates the use of linear models in innovation, the cycle model was developed to stress the necessity of the integration of linear innovation processes with market demands (Figure 5).

The cycle innovation model links the firm perspective organized around new product or service development with external innovation system activities. Here a firm can be involved with one or more products and services at various stages, and the arrows point to interactions between the product development and innovation systems (Padmore, Schuetze & Gibson, 1998).

Practical implications

Innovation can be studied from the perspective of an individual, a group/team, a project, an organisation, inter-organisational value networks, industry, innovation systems, or the society (West, Vanhaverbeke & Chesbrough, 2006; Chesbrough & Bogers, 2014). Nowadays not only individuals or organisations, but also countries and regions compete in innovation. The Economist Intelligence Unit’s report on the world’s most innovative countries, the European Commission’s Innovation Union Scoreboard, the Boston Consulting Group’s International Innovation Index, or INSEAD, and the World Intellectual Property Organisation’s Global Innovation Index are a few examples of instances that stress the importance of innovation for competitiveness.
Introduction To The Open Innovation Paradigm: Why Open Innovation?

Each year the Forbes magazine issues a list of the World’s Most Innovative Companies. In 2015 the most innovative company was Tesla Motors, followed by Salesforce.com. Both companies originate from the United States. Tesla Motors’ sales growth increased by 52% in 2015, and included the innovation premium of 84.82%. The innovation premium is the difference between the organisations’ market capitalisation and the net present value of cash flows from existing businesses (Forbes, 2015).

![Figure 5. The cycle model of innovation](image)


Each year the Forbes magazine issues a list of the World’s Most Innovative Companies. In 2015 the most innovative company was Tesla Motors, followed by Salesforce.com. Both companies originate from the United States. Tesla Motors’ sales growth increased by 52% in 2015, and included the innovation premium of 84.82%. The innovation premium is the difference between the organisations’ market capitalisation and the net present value of cash flows from existing businesses (Forbes, 2015).
Innovation is an indispensable part of the business strategy, which requires tentative governance (Igartua, Garrigos, & Hervas-Oliver, 2010). Globalisation has increased interconnectedness between various actors in the field of innovation, thereby requiring organisations’ national and regional presence to extend towards the global marketplace. Here, open innovation emerges as a paradigm that reshapes organisations’ existing portfolios, risk and project management, organisational culture, human resources, and organisational design to facilitate successful global competition (Igartua, Garrigos, & Hervas-Oliver, 2010). Moreover, the interaction between global economic, political, cultural, social, and environmental developments stress the need for firms to adopt a new mindset and together with it, new innovation models.

**KEY TAKE-AWAYS**

- Innovation is a tool of entrepreneurship that is used to exploit market opportunities and seize profits.
- Theoretical views on innovation include linear technology-pull and market-push innovation, and non-linear models, such as the chain-linked model and the cycle model.
- Today it is necessary to integrate internal innovation processes with science and knowledge already available outside the organisation to overcome challenges and changes in the market that include environmental, economic, political, and social conditions.

**REFERENCES**

Introduction To The Open Innovation Paradigm. Why Open Innovation?


Additional reading

### 3.1.2. WHAT IS OPEN INNOVATION?

**Abstract**

The current definition of open innovation has emerged to clarify new events in the innovation theory. This section explains the inbound, coupled and outbound processes in open innovation, and identifies organisational forms typical for each of them.

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Generic knowledge of the organisation theory and innovation management.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives of the lecture</td>
<td>This module consists of 3 sub-modules aiming at:</td>
</tr>
<tr>
<td></td>
<td>1. General understanding of open innovation;</td>
</tr>
<tr>
<td></td>
<td>2. Providing an insight into different open innovation practices:</td>
</tr>
<tr>
<td></td>
<td>inbound, coupled and outbound; and</td>
</tr>
<tr>
<td></td>
<td>3. Gaining knowledge about the various organisational forms an</td>
</tr>
<tr>
<td></td>
<td>organisation can use to profit from the open innovation paradigm.</td>
</tr>
<tr>
<td>Learning objectives:</td>
<td>1. To attain basic familiarity with the scientific literature on the</td>
</tr>
<tr>
<td></td>
<td>theme and the ability to view open innovation in the context</td>
</tr>
<tr>
<td></td>
<td>of other innovation management theories; to critically assess</td>
</tr>
<tr>
<td></td>
<td>the motives for engaging in open innovation activities and the</td>
</tr>
<tr>
<td></td>
<td>mechanisms through which they create value for an organisation</td>
</tr>
<tr>
<td></td>
<td>2. To distinguish between the modes of inbound, outbound and</td>
</tr>
<tr>
<td></td>
<td>coupled open innovation.</td>
</tr>
<tr>
<td></td>
<td>3. To elaborate and specify how firms can benefit from open and</td>
</tr>
<tr>
<td></td>
<td>user innovation.</td>
</tr>
<tr>
<td>Workload</td>
<td>2-4 h teaching; 3 h self-study (2h/sub-module).</td>
</tr>
<tr>
<td>Learning outcomes</td>
<td>Knowledge</td>
</tr>
<tr>
<td>LO #72:</td>
<td>To attain basic familiarity with the scientific literature on the</td>
</tr>
<tr>
<td></td>
<td>theme and the ability to view open innovation in the context</td>
</tr>
<tr>
<td></td>
<td>of other innovation management theories;</td>
</tr>
</tbody>
</table>
LO #74: To distinguish between the modes of inbound, outbound and coupled open innovation.

Skills

LO #70: To elaborate and specify how firms can benefit from open and user innovation.

Competences

LO #72: To critically assess the motives for engaging in open innovation activities and the mechanisms through which they create value for an organisation.

**Reading List**


**European Qualifications Framework (EQF) Level**

6, 7
**Lecture Content**

**Definitions**

“Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. Open Innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model.”

Chesbrough (2003, p. 7)

“Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. [This paradigm] assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology.”

Chesbrough (2006, p. 1)

“Open innovation is a distributed innovation process based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-pecuniary mechanisms in line with each organisation’s business model.”

Chesbrough and Bogers (2014, p. 27)

**Theoretical Background**

When asked about the reasons for Procter & Gamble’s “Connect & Develop” innovation strategy, Neil Sakkab and Larry Huston answered that with 9,000 people employed by Procter & Gamble
and 1.5 million outside the firm, knowing who had become more important than knowing how (Huston & Sakkab, 2007). Collaboration has become crucial for sustainable competitiveness and necessary for successful adjustments to changing market needs (Kim & Pennings, 2009).

Shortened product life cycles and lower costs of production have increased the success risk of new products or services (Dahlander & Gann, 2010). It has become evident that some projects are not valued in one organisation, but could bring value in another organisational setting. So called “false negatives” have led to spillovers in industrial R&D. Some organisations have begun to pick up on the notion and create new business models that view these spillovers as new value-generating possibilities (Chesbrough, 2012). Consequently, organisations have opened their “inter-organisational networks, organisational structures, evaluation processes and knowledge management systems” of innovation to external processes (Chiaroni, Chiesa, & Frattini, 2010, p.? and found new value generating possibilities (Mortara & Minshall, 2011).

By using alternative paths to the market, organisations can become more effective, productive in their utilisation of internal and external resources, bring higher quality products onto the market and reduce delays in the supply and value chains (Chesbrough, 2004, 2006). As they discover and use information, technology and knowledge that are widely dispersed, they increase their competitiveness (Chesbrough, 2011; Bašić, 2015).

**A closed innovation system** | **An open innovation system**
---|---

![Figure 2. A closed and an open innovation system](image)


Figure 2 shows the difference between a closed and an open innovation system. Open innovation complements and sometimes substitutes closed innovation modes (Lakhani & Tushman, 2012.). A closed innovation system is characterised by a linear stage-gate process in which research, development and commercialisation of new products and services occur sequentially within an organisation’s internal system. On the other hand, an open innovation system takes the advantage
of the R&D spillovers in the closed innovation system. Innovation exploration and exploitation strategies (van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009) frame three open innovation dimensions: inbound, coupled and outbound open innovation. Inbound innovation refers to the process of seeking innovation on the market and incorporating it into organisational processes, coupled innovation refers to innovation collaboration, and outbound innovation denotes pecuniary or non-pecuniary externalisation of innovation at least partially developed by an organisation, but which might not fit the current organisational vision or strategy (Chesbrough, 2003; Laursen & Salter, 2006; Mortara & Minshall, 2011, van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009; Bašić, 2015).

Inbound open innovation includes customer involvement, external networking, external participation, R&D outsourcing, inward intellectual property licensing, crowdsourcing, and an open innovation intermediary (Chesbrough et al., 2006; Chesbrough & Crowther, 2006; van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009; Bašić, 2015). Outbound practices comprise employee involvement, intellectual property rights licensing, joint ventures, selling market-ready products, standardization, donations to commons, and spinoffs (Chesbough & Brunswicker, 2014; Bašić, 2015). Coupled innovations are co-development agreements, inventor/designer contracts, marketing alliances, patent licensing, and cross-licensing engagement (Munsch, 2009).

The differences between open and closed innovation units (Herzog & Leker, 2011) are presented in Table 1.

---

**Table 1. Differences between Open and Closed Innovation Units**

<table>
<thead>
<tr>
<th>Open Innovation</th>
<th>Closed Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inbound</strong></td>
<td><strong>Outbound</strong></td>
</tr>
<tr>
<td>IP in-licensing</td>
<td>Joint-venture activities</td>
</tr>
<tr>
<td>Contracted R&amp;D services</td>
<td>Spinoffs</td>
</tr>
<tr>
<td>Specialized OI intermediaries</td>
<td>Corporate incubation</td>
</tr>
<tr>
<td>Idea &amp; start-up competitions</td>
<td>Participation in standardization (public standards)</td>
</tr>
<tr>
<td>Supplier innovation awards</td>
<td>Donations to commons or nonprofits</td>
</tr>
<tr>
<td>University research grants</td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 3. Types of Open Innovation**

## Part 3.1. Setting the scene: Defining Open Innovation

### Table 1. Differences between closed and open innovation

<table>
<thead>
<tr>
<th>Relationship towards external knowledge</th>
<th>Closed innovation</th>
<th>Open innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin of idea</td>
<td>All experts in the area work for the organisation.</td>
<td>Not all experts in the area are employed by the organisation.</td>
</tr>
<tr>
<td></td>
<td>An organisation uses internal R&amp;D, and develops and puts products on the market independently.</td>
<td>Knowledge from external environment is equally important as the organisation’s internal knowledge. An organisation does not need to create the idea to benefit from it. External R&amp;D can create significant value. Internal R&amp;D is necessary in order to preserve the share of that value.</td>
</tr>
<tr>
<td>Treatment of the business model</td>
<td>The innovation process should be controlled in order not to become recognisable.</td>
<td>Creating a better business model by using internal and external ideas is more profitable in the long run. The business model is a cognitive tool which is focused on the evaluation of R&amp;D projects within an organisation. The cognitive approach allows organisations to filter projects which are in accordance with the model and segregate those which are not.</td>
</tr>
<tr>
<td>Intellectual property rights management</td>
<td>Intellectual property is controlled within the organisation to protect ideas from competition.</td>
<td>External usage of organisational intellectual property is evaluated based on costs and benefits, and intellectual property of other organisations is bought in order to enhance the organisation’s business model.</td>
</tr>
<tr>
<td></td>
<td>Intellectual property rights are byproducts of innovation, and they are licensed or exchanged.</td>
<td>Licensing and exchanging innovations are a part of using intellectual property. These are the key elements of innovation because they are freely exchanged within and outside the organisation and facilitate exploitation of the market of idea exchange. They can take the form of publications, donations, etc.</td>
</tr>
<tr>
<td>Relationship towards environmental knowledge and organisational innovation</td>
<td>‘Not invented here’ syndrome</td>
<td>Knowledge and innovation are dispersed and have quality. Even the most capable and sophisticated R&amp;D organisations</td>
</tr>
</tbody>
</table>
## Introduction To The Open Innovation Paradigm. What Is Open Innovation?

<table>
<thead>
<tr>
<th>Closed innovation</th>
<th>Open innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spreading and dissemination of industrial R&amp;D</td>
<td>Business costs</td>
</tr>
<tr>
<td>Intermediary organisations</td>
<td>-</td>
</tr>
<tr>
<td>Measures of innovative performance</td>
<td>Share of sales spent on internal R&amp;D, number of new products, share of sales from new products in total sales, number of patents by monetary unit spent for R&amp;D.</td>
</tr>
</tbody>
</table>


## Practical Implications

Global interconnectedness and the necessity to remain competitive demand new approaches to organisations’ innovation strategies (Witzeman et al., 2006). The Boston Consulting Group publishes a list of the world’s most innovative companies each year. Their 2015 analysis on The Next Level of Product Development states that the classic linear product development process is changing as the speed of technology adoption and the use of big data and technology platforms increases. CEOs are increasingly using incubators, accelerators, partnerships, and corporate venture capital to explore the organisational growth holistically, based on either core or non-core activities in all product or service development stages (The Boston Consulting Group, 2015).

Examples of the closed innovation model are given e.g. by Chesbrough (2012), and include AT&T’s Bell Laboratories, IBM’s Tj Watson Research Center; Xerox PARC, GE’s Schenectady laboratories, Merck, and Microsoft Research. On the other hand, IBM, Intel, Philips, Unilever; and Procter & Gamble are examples of open innovation (Chesbrough, 2012).
Large pharmaceutical firms, such as Roche, collaborate increasingly with biotechnology SMEs to form marketing alliances, co-developments and equity investments (Munsch, 2009). In order to foster inbound open innovation, Roche has developed a four-stage inbound process. Roche’s stages comprise (1) the “Want” stage that defines the desired external resource, (2) the “Find” stage that determines the searching mechanism, (3) the “Get” stage that formulates the inbound process, and (4) the “Manage” stage that refers to tools, metrics and management to determine the success of the project (Witzeman et al., 2006).

KEY TAKE-AWAYS

• Open innovation is a distributed innovation process of purposively managed knowledge flows that can be pecuniary or non-pecuniary, but in line with a particular organisation’s business model.
• The closed innovation process of the 1980s, characterized by a stage-gate model, has been superseded by a new open organisational model.
• Inbound, outbound and coupled open innovation are new ways of how firms can use open innovation to generate profits. Each of them contains various organisational forms.

REFERENCES


**ADDITIONAL READING**

**3.1.3. MAIN INCENTIVES FOR OPEN INNOVATION**

**Abstract**

Harmonization of open innovation activities with motives of diverse business and institutional segments to accept OI practices will determine the successful application of OI. This section emphasizes a more focused approach, addressing the importance of engaging in open innovation from different perspectives: at individual, organisational and policy level. Ranging from reward systems at the individual level, lack in-house experts, cost and time reduction, accessing technology competence at the organisational level, all the way to improving the overall quality of life at the national level, the different levels emphasize different types of motives and obstacles while engaging in open innovation.

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>General knowledge about the difference between open and closed innovation, as well as understanding of the business environment</th>
</tr>
</thead>
</table>
| Objectives of the lecture | This module consists of 3 sub-modules aiming at:  
1. Individual-level incentives for open innovation;  
2. Organizational-level incentives for open innovation; and  
3. Policy-level incentives for open innovation.  
Learning objectives:  
1. To assess critically the motives for engaging in open innovation activities and the mechanisms through which they create value for an organisation.  
2. To analyse firm-endogenous and -exogenous contexts.  
3. To elaborate and specify how firms can benefit from open innovation.  
3. To elaborate and specify how firms can benefit from open and user innovation. |
| Workload | 2-4 h teaching; 3 h self-study (2h/sub-module). |
### Learning outcomes

**Knowledge**

LO #72: To attain basic familiarity with the scientific literature on the theme and the ability to view open innovation in the context of other innovation management theories.

**Skills**

LO #93: To analyse firm-endogenous and -exogenous contexts.

**Competences**

LO #70: To elaborate and specify how firms can benefit from open innovation.

### Reading List


### European Qualifications Framework (EQF) Level

Levels 6, 7.
LECTURE CONTENT

Definitions

Firms’ internal incentives for open innovation include the following:

1. “New ideas can be contributed from a much larger range of parties and from different perspectives than what might be contributed internally.

2. Business and financial risk can be mitigated by the participation of one or more third parties and greater market scale can be achieved by joining forces.

3. Speed to market may be accelerated by particular contributions made by other partners or contributors in the ecosystem”.

Munsch (2009, p. 48)

THEORETICAL BACKGROUND

Organisational strategies and practices must support the open innovation activities in order for open innovation to be successful. Organisational adaptation is often necessary. It takes the forms of sustained senior executive involvement, broad problem statements, open innovation culture, and willingness to implement organisational changes to support open innovation, all of which are prerequisites for successful open innovation. (Nambisan, Bacon & Throckmorton, 2012).

However, the paradox of openness can occur (Laursen & Salter, 2014). The paradox of openness refers to the observance that value creation requires openness, while commercialisation of ideas requires protection. Managerial efforts are necessary to govern the process of patent application, lead market time, secrecy, etc. (Teece, 1986; Laursen and Salter, 2014). These factors can discourage open innovation within an organisation by impacting the way the organisation searches for innovation and organises its innovation processes (Gans & Stern, 2003; Chesbrough, 2006; Somaya, 2012; Laursen & Salter, 2014).

For that purpose, incentives are the key to facilitate open innovation as a profit-maximizing strategy in value creation and value appropriation (Chesbrough & Rosenbloom, 2002; Gambardella & Panico, 2014). The importance of engagement in open innovation activities is not questionable, and numerous authors have discussed it generally (Chesbrough, 2006; Huizingh, 2011; Gassmann, Enkel, & Chesbrough, 2010; etc). However, others have offered a more focused approach, addressing the importance of engaging in open innovation from different perspectives: the individual level (Schneckenberg, 2014), organisational level (Chesbrough & Crowther, 2006; Van de Vrande, De Jong, Vanhaverbeke & De Rochemont, 2009), and policy level (European Commission, 2012).
INTRODUCTION TO THE OPEN INNOVATION PARADIGM. MAIN INCENTIVES OPEN INNOVATION

INDIVIDUAL-LEVEL INCENTIVES

The lack of literature on individual motives for engagement in open innovation activities is evident. However, individual efforts of some researchers, primarily Schneckenberg (2014), fill the obvious research gap. According to Katz and Allen (1982), the not-invented-here syndrome left a trace in external knowledge exploration, by raising employees’ negative attitudes toward exploring knowledge externally. Chesbrough (2003) implies that this kind of employees’ attitude is a product of limited or negative experience with inward knowledge transfer, expressing a need for the correction of incentive systems. An individual’s engagement in open innovation activities presents a complex and ambiguous process, and has been mostly discussed in the context of designing and implementing incentive systems for open innovation (Schneckenberg, 2014). An incentive system represents tangible or intangible (Clark & Wilson, 1961), monetary and non-monetary (Pharr, Stuefen & Wilber, 2011), and extrinsic and intrinsic (Steiner & Ritz, 2002) incentives, whose purpose is to motivate active contributions of individuals. The research of incentive systems in the open innovation context integrates the literature on psychological and human resources and opens a new stream into the open innovation paradigm. Researches have indicated that the success of implementing an open innovation paradigm depends on setting the right incentives to individuals in a company. According to Alexy, George & Salter (2013), Enkel, Gassmann & Chesbrough (2009), Gassmann, Enkel & Chesbrough (2010), and Huizingh (2011), empirical and theoretical findings, and incentive systems present important organisational measures for the development of an open innovation culture. The authors mentioned above emphasize incentive systems as a strategic instrument for “…open mind-sets of the workforce and to overcome the mental barriers of the ‘not invented here’ syndrome” (Schneckenberg, 2014; page 70). However, it is interesting to state that compared to the other fields, individual engagement in open innovation is not conditioned with only material and tangible incentives. On the contrary, research has indicated that individuals emphasize immaterial and intangible incentives as more important. Flexible allocation of time, access to decision makers, taking part in expert conversations, and international networking are rated as more important than financial compensation (Schneckenberg, 2014).

ORGANISATIONAL-LEVEL INCENTIVES

According to Hoffman and Schlosser (2001), companies’ motives for collaboration range from acquiring missing knowledge, risk spreading, growing their social network effect, all the way to more technical reasons, like reducing the company’s costs. Similar findings are presented in the study of Howells, Gagliardi & Malik (2008). In their research, the main reasons for R&D outsourcing were lack of in-house experts, cost and time reduction, accessing technology competence, and sharing risks. Dahlander and Gann (2010) have developed a taxonomy stressing pecuniary and indirect benefits as the two main benefit streams of engaging in open innovation practices. Furthermore, engaging in an outbound open innovation practice may result in getting access to
new markets (Lichtenthaler, 2007). By investigating the reasons for the usage of open innovation activities, Huizingh (2011) offers an applicable taxonomy distinguishing offensive (e.g. stimulating growth) and defensive (e.g. decreasing costs and risks) motives. Previous research has focused intensively on offensive motives as more important for engaging in open innovation activities (Chesbrough & Crowther, 2006; Van de Vrande, De Jong, Vanhaverbeke & De Rochemont, 2009). According to Chesbrough and Crowther (2006), the main motive for engaging in open innovation is to maintain company growth and to increase revenues. Furthermore, market-related motives, such as meeting customer demand and keeping up with competitors are emphasized by Van de Vrande, De Jong, Vanhaverbeke & De Rochemont (2009), as well as EIRMA (2003), as another set of offensive motives. However, defensive motives have not been completely neglected in the literature, which can be seen in the research of Keupp and Gassmann (2009), who emphasize information capabilities and risk as defensive motives strongly related with using open innovation. Van de Vrande, De Jong, Vanhaverbeke & De Rochemont (2009) encourages further discussion about offensive versus defensive motives, depending on the timing of open innovation adoption, comparing early adopters versus late adopters.

Table 1. Review of motives for engaging in open innovation practices

<table>
<thead>
<tr>
<th>Author</th>
<th>Motive for engaging in open innovation practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoffman and Schlosser (2001)</td>
<td>Acquiring missing knowledge, risk spreading, growing the social network effect, all the way to more technical reasons, like reducing the company's costs.</td>
</tr>
<tr>
<td>Howells, Gagliardi &amp; Malik (2008)</td>
<td>Lack of in-house experts, cost and time reduction, accessing technology competence and sharing risks.</td>
</tr>
<tr>
<td>Huizingh (2011)</td>
<td>Offensive (e.g. stimulating growth), defensive (e.g. decreasing costs and risks).</td>
</tr>
</tbody>
</table>

*Source: Author’s source*
Another important issue a company has to consider while discussing the ability of exploring external knowledge is the company's absorptive capacity. “After recognizing an opportunity to exploit retained knowledge, it needs to be reactivated, internalized, and synthesized with additional knowledge” (Lichtenthaler, 2011; page 81). Absorptive capacity reflects the company's ability to maintain knowledge internally, keeping it “alive” and avoiding loss over time (Garud & Nayyar, 1994).

**Policy-level incentives**

A positive trend in innovation indicators (R&D investment data, co-invention patent data and licensing data) confirms companies’ increased cooperation with external partners, which emphasizes the importance of the open innovation concept (De Backer, López-Bassols & Martínez, 2008). Despite being initially developed as a business-driven phenomenon, open innovation concepts co-exist and are intertwined with many other concepts in the innovation ecosystem. Due to this, the open innovation concept holds a high place in national innovation systems and corresponding research and innovation policies (De Backer; López-Bassols & Martínez, 2008).

The idea of including the open innovation paradigm in the development of a national and global innovation strategy was not an isolated effort of a few researchers, but it became soon a mainstream issue supported by numerous studies and public policy incentives. Jaqueline Vallat (2009), in her discussion about open innovation, gives highest importance to the development of innovation ecosystems and frameworks for the alleviation of all processes between open innovation stakeholders. According to Vallat, an open innovation framework incorporates industries, universities and research organisations, public entities, end-users, and end-user communities. Finally, she emphasizes that the framework is pivotal for improving the sharing of experience, information and best practices, as well as for building strategic alliances and cross-disciplinary collaboration. By emphasizing the high role of science, technology, intellectual property (IP), and education within the society, the importance of government intervention and public policy regulation for knowledge creation and knowledge exchange is underlined by Chesbrough and Vanhaverbeke (2011).

Strong globalization processes, accompanied with changes and the appearance of diverse resources has resulted in the creation of new innovation ecosystems which demand participation and active contribution of stakeholders at all levels (European Commission, 2015). Additionally, the changing business and social conditions may result in more than 50% of current jobs becoming obsolete, reflecting especially on knowledge workers (European Commission, 2015). Successful optimisation of above-mentioned resources in changing conditions demands new ways of thinking about stakeholders’ societal inclusion, new ways for framing employability, networking, intellectual property, openness and co-creation, in other words new ways to orchestrate ecosystems. National, regional and global innovation systems, as well as corresponding research and innovation policies
include the open innovation paradigm in their development strategies, as one of the solutions for the challenges described above.

In fact, the inclusion of the open innovation paradigm has become more common in recent European Union policy and strategy documents (EURIS). The emphasis of the European Union on collaboration activities among different stakeholders leads to a higher rate of exploitation of untapped research potential. The open innovation policy results in accelerating the knowledge and technology transfer between research centres and companies, putting the Quadruple Helix innovation model into focus. This approach creates new business opportunities in correspondence with new national/global societal and community needs.

**PRACTICAL IMPLICATIONS**

To increase individual incentives for engaging in open innovation activities, a company has to overcome two fundamental constraints set up for individuals, the not-invented-here syndrome and a de-motivating reward and career development system (Mortara, Napp, Slacik, & Minshall, 2009). To cope with the not-invented-here syndrome, a company has to increase individuals’ involvement in decision-making processes, because making the employees part of a group creates a positive motivation effect. Additional, the company has to do all in its power to persuade individuals on how the technology of others could have real potential and offer practical benefits for them, by introducing examples of others’ success stories. The current reward and development systems are usually compatible with the ‘closed’ innovation paradigm, where people usually get rewarded depending on e.g. the patents they file. This makes an individual less motivated to search for ideas externally, and to spend more time working in the lab. The reward and career development system has to be customised to fit open innovation activities and skills. One of the best examples of increasing individual incentives for engaging in open innovation activity comes from Philips. Philips managers who decide to take part in one of its incubation projects are rewarded for taking failure risk, with gaining share equity, as well as high degree of freedom.

Companies foster open innovation activates through different approaches. Among the best-known examples are British Petroleum (BP), Kodak, Philips, etc. BP has created an innovation ecosystem made of corporate partners, venture capital firms, universities, government institutes, which has resulted in broad access to world-class knowledge and networks. Kodak has set up a research center in Cambridge, aiming at identifying opportunities and partners of strategic importance. Philips finances spin-off business ideas that are not directly connected with their three core sectors. To increase the incentive for open innovation activities, companies should plant an open innovation framework in their corporate culture. Companies need to build trust towards cooperation in innovation activities, by making projects more transparent, which will allow an instant exchange of ideas. Additionally, companies have a variety of other ways, primarily directed at activities of
individuals, which can be used to increase open innovation involvement, such as encouraging open dialogue between employees, stimulating brainstorming sessions, etc.

The European Union (EU) serves as a great example of how incentives for open innovations can be managed at the policy level. In its strategic approach, the EU aims at innovation ecosystems and their key players who are essential for raising awareness for open innovation, the public sector, the financial sector, innovative businesses, the academia, and citizens. Taking into consideration the key players, the European Union ensures the right innovation framework based on three sets of actions - reforming the regulatory environment, boosting private investment in R&D, and maximizing the impact (for details see Table 2). (European Commission, 2016).

Table 2. Actions for ensuring a right open innovation ecosystem

<table>
<thead>
<tr>
<th>Set of actions</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reforming the regulatory environment</td>
<td>Scientific Advice Mechanism</td>
</tr>
<tr>
<td></td>
<td>InnovRefit</td>
</tr>
<tr>
<td></td>
<td>Innovation Deals</td>
</tr>
<tr>
<td></td>
<td>Horizon 2020 Policy Support Facility</td>
</tr>
<tr>
<td>Boosting private investment in R&amp;D</td>
<td>The European Venture Capital Fund of Funds</td>
</tr>
<tr>
<td></td>
<td>Maximising the use of the European Fund for Strategic Investments (EFSI)</td>
</tr>
<tr>
<td>Maximizing impact</td>
<td>Seal of Excellence</td>
</tr>
<tr>
<td></td>
<td>European Innovation Council</td>
</tr>
<tr>
<td></td>
<td>Merging the digital into societal challenges</td>
</tr>
<tr>
<td></td>
<td>A second wave of Horizon 2020 simplification</td>
</tr>
</tbody>
</table>


To sum up, in addition to the abovementioned actions which are already in progress, the European Union should continue keeping open innovation as a strategy priority. The EU should continue with supporting innovative businesses, innovative hubs, and networks. Furthermore, it should include universities and other academic institutions as interactive partners in innovation systems, as well as continue to develop innovation-friendly financial instruments and institutions (Debackere et al., 2014).
KEY TAKE-AWAYS

- The ‘not-invented-here’ syndrome and the reward system are two major constraints that individuals face while practicing OI activities.
- Companies need to build trust toward cooperation in innovation activities.
- The OI concept holds a high place in national innovation systems and corresponding research and innovation policies.

REFERENCES


Part 3.1. Setting the scene: Defining Open Innovation

Research, 6(3), 88-97.

Additional reading
3.1.4. OPEN INNOVATION IN A BROADER CONTEXT
(Including other theories adopting open viewpoints)

Abstract
This section presents theories that are relevant for open innovation, as well as theories which open innovation is relates to, including the resource-based theory, the transaction cost theory, and the relational view from strategic management literature. On the other hand, absorptive capacity, technology transfer, licensing, and technology brokering are only a few theories bound to open innovation. In light of the strategic management literature and open innovation paradigm, the organizational theory provides governance modes that firms can use.

Prerequisite
Generic knowledge of the organisation theory and innovation management.

Objectives of the lecture
This module consists of 3 sub-modules aiming at
1. General understanding of theories connected to open innovation;
2. Gaining knowledge about the various governance modes connected to open innovation.

Learning objectives:
1. To apply methods of open and user innovation to reflect on how firms need to change their strategies, structures and processes according to more open innovation processes.
2. To build structures and systems that would enable innovation within a firm.
3. To be able to manage risks.

Workload
2-4 h teaching; 3 h self-study (2h/sub-module).

Learning outcomes
Knowledge
LO #98: To apply methods of open and user innovation to reflect on how firms need to change their strategies, structures and processes according to more open innovation processes.
# Part 3.1. Setting the Scene: Defining Open Innovation

## Skills

**LO #81**: To build structures and systems that would enable innovation within a firm.

## Competences

**LO #91**: To be able to manage risks.

### Reading List

<table>
<thead>
<tr>
<th>Reading List</th>
</tr>
</thead>
</table>
Introduction To The Open Innovation Paradigm, Open Innovation In A Broader Context

Definitions

“Apart from open innovation, new approaches to value creation include: open networks, open platforms, open business models”.

Munsch (2009, p. 48)

Theoretical background

The previous sections have shown why the open innovation theory emerged, what its definition includes and what the types of open innovation are. In Section 3.1, several innovation models were addressed, such as linear technology-push and market-pull models, as well as non-linear chain-
linked and cycle innovation models. Although some more innovation models that are tied to open innovation model exist, this section reviews several theories from organisational strategy and puts them in the perspective of open innovation.


Additionally, open innovation is closely connected to (Kutvonen, 2015, Bašić, 2015): the lead user theory (von Hippel, 1986; 1988), absorptive capacity (Cohen & Levinthal, 1990; Zahra & George, 2002), technology transfer (Bozeman, 2000), licensing (Arora, 1997; Caves, Crookell & Killing, 1983; Grindley & Teece, 1997), external technology/ knowledge acquisition (Granstrand et al., 1992; Veugelers & Cassiman, 1999), the not-invented-here syndrome (Katz & Allen, 1982), technology marketing (Ford, 1985; Mittag, 1985; Escher, 2001), Hargadon & Sutton’s (1997) theory on technology and knowledge brokering, and open knowledge (Foray, 2004).

These theories help us to understand the advantages and disadvantages of open innovation that are connected to their intra- and inter-organisational knowledge flows. When an organisation needs to decide on the open innovation mode that is the most appropriate for its innovation processes, it needs to take into account the various aspects of open innovation, keeping in mind that selecting the appropriate open innovation governance mode is necessary for successful innovation (Gambardella & Panico, 2014). Williamson’s (1991) transaction cost theory discusses the reasons for the existence of an organisation by examining the opportunity costs associated with transactions being done on the market or within an organisation. In a similar vein, Felin and Zenger (2014) explain different open innovation governance modes by observing problems as a unit of analysis. The four governance modes include: markets (or contracts), partnerships (or alliances), contests (platforms and tournaments), and users (or community innovation) (Felin & Zenger, 2014, p. 919; Table 1).

Organisations access externally owned technology, knowledge and solutions through markets, thereby exchanging pecuniary property rights, i.e. licensing agreements. Pecuniary awards serve as incentives for innovators who willingly solve simple, decomposable problems without deep knowledge sharing, thereby only benefiting focal organisations who can identify relevant knowledge sources (Felin & Zenger, 2014).
Table 1. Open innovation and governance modes

<table>
<thead>
<tr>
<th></th>
<th>Markets (contracts)</th>
<th>Partnerships (alliances)</th>
<th>Contests (platforms and tournaments)</th>
<th>Users (community innovation)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication</strong></td>
<td>Limited, selective invitations</td>
<td>Bilateral, socially embedded</td>
<td>Horizontal, broadcast, IT supported</td>
<td>Horizontal, socially embedded outside the firm</td>
</tr>
<tr>
<td><strong>Incentives</strong></td>
<td>High-powered</td>
<td>Cooperative, high-powered</td>
<td>Moderately powered</td>
<td>Low-powered</td>
</tr>
<tr>
<td><strong>Property rights</strong></td>
<td>Externally owned and exchanged</td>
<td>Negotiated (a priori)</td>
<td>Varied (dispersed or ceded to a focal firm)</td>
<td>None</td>
</tr>
</tbody>
</table>


Problem complexity

<table>
<thead>
<tr>
<th>SIMPLE</th>
<th>COMPLEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decentralized, trial and error search</td>
<td>Theory-guided search</td>
</tr>
</tbody>
</table>

- **LOW**
  - Centralized Selection
  - Contacts
  - RFP / Markets

- **HIGH**
  - Self-Selection
  - Innovation Platforms & Contests
  - User directed innovation

- **Authority based hierarchy**
- **Consensus based hierarchy**
- **Non-equity Alliances**
- **Equity Alliances/CVC**
- **User community - directed innovation**

Figure 1. Open innovation and governance modes

Partnering with other organisations increases a firm’s success through access to resources and capabilities (Van de Vrande, De Jong, Vanhaverbeke & De Rochemont, 2009). Partnerships solve intermediately complex problems in which the focal organisation and its partners solve existing problems together. The focal organisation must identify the relevant knowledge source, but it also engages in deeper knowledge sharing compared to market transactions (Felin & Zenger, 2014).

Contests enable organisations to gather a variety of solutions to existing problems, and they are supported by intermediary organisations. Technology and knowledge brokering was first mentioned by Hargadon and Sutton in their 1997 paper. Organisations can use innovation intermediaries in innovation funding, innovation generation, and innovation commercialisation (Chesbrough, 2003). Innovation intermediaries can be invention capitalists, idea scouts, electronic R&D marketplaces, patent brokers, licensing agents, and venture capitalists (Nambisan & Sawhney, 2007). This kind of companies are for instance Innocentive, YourEncore, Yet2come.com and NineSigma (Slowinski, Hummel, Gupta, & Gilmont, 2009). The problem search rests here on individuals who receive prizes for their solutions, which are often below the actual R&D costs. On the other hand, focal organisations use this mode when they are unaware of solutions that might fit their problem (Felin & Zenger, 2014).

Finally, users’ innovation was firstly noted by Eric von Hippel (1988). Their incentives do not comply to property rights, pecuniary awards nor other incentives, but originate from intrinsic motivation. Moreover, innovations come from non-pecuniary incentives that include passion, intrinsic motivation, hobbies, or a desire to cooperate (Franke & Shah, 2003; Shah and Tripsas, 2007; Felin & Zenger, 2014). However, the focal organisation is here more of a passive actor in innovation, compared to innovation in the other governance modes (Felin & Zenger, 2014).

**Practical Implications**

The example of Android shows how firms can benefit from re-arranging their structures and systems to enable innovation within the firm. Android opened its innovation processes in 2007 (Innovation Tomorrow, 2011). According to Gartner; it sold 6.8 million mobile devices in 2009 and comprised 3.9% share of global smart-phone sales. In 2014, devices using Android software accounted for 85 per cent of global smartphones (MIT Sloan, 2014). The benefits of opening up innovation do not seem to cease.

However, differences exist between the terms “free software” and “open software”. Von Hippel notes that software can be free, and the intellectual property connected to it is superfluous (Chesbrough, 2012). On the other hand, “open software” is used to represent software which cannot be changed without sharing the changes (codes) with the community. Chesbrough (op.cit.) notes that Google has changed codes but has often kept it a secret from the rest of the Linux community.
KEY TAKE-AWAYS

• Open innovation is embraced in various organisational theories, including resource and knowledge-based views, relational views, transaction cost economics, and networks.
• Theories that are closely connected to open innovation include the lead user theory, absorptive capacity, technology transfer, licensing, external knowledge acquisition, knowledge and technology brokering, and others.
• Organisations can employ governance modes to cater for different innovation processes, for which strategic management and the innovation management theory can provide a theoretical and practical framework.

REFERENCES


**ADDITIONAL READING FOR STUDENTS**


3.1.5. CRITIQUE OF THE OPEN INNOVATION THEORY
(Including theoretical shortcomings and managerial problems)

Abstract

The open innovation theory is often criticized for its ambiguity and being related to reinvention of already existing phenomena in the innovation management literature. Moreover, the theoretical shortcomings are related to its inability to be measured effectively, and its highly complex and specialized nature, which suggests that openness is not always a beneficial and profitable strategy. On the other hand, managers still have not grasped the art of managing innovation due to problems with organisations’ absorptive capacities, complementary assets and network externalities, which makes it difficult to manage organisations’ intellectual property coming from their innovation processes.

Prerequisite

Generic knowledge of the organisation theory and innovation management.

Objectives of the lecture

This module consists of 3 sub-modules aiming at:

1. Gaining insight into identification of the main theoretical shortcomings of the open innovation theory; and
2. Providing understanding of the managerial problems in applying open innovation.

Learning objectives:

1. To analyse the pros and cons of an open approach to innovation strategy.
2. To describe the systemic approach to the solution of managerial problems tied with the innovation process.
3. To be able to manage risks.

Workload

2-4 h teaching; 3 h self-study (2 h/sub-module).

Learning outcomes

Knowledge

LO #68: To analyse the pros and cons of an open approach to innovation strategy.
Skills
LO #32: To describe the systemic approach to the solution of managerial problems tied with the innovation process.

Competences
LO #91: To be able to manage risks.

Reading List

European Qualifications Framework (EQF) Level
Levels 6, 7.

LECTURE CONTENT

Statement
Complementary assets, protection of intellectual property rights, and network externalities are some of the theoretical and managerial shortcomings that will need to be addressed in the open innovation theory in the future.

THEORETICAL BACKGROUND

The critique to the open innovation theory comes from theoretical and managerial viewpoints. The theoretical shortcomings of the open innovation theory are related to its differences from other innovation theories and whether it can be approached with appropriate academic rigour (Kutvonen, 2015, Järvi et al., 2010). Hence, after the "period of fascination" (Fredberg, Elmquist
The open innovation theory has been criticized increasingly by claiming e.g. that (a) firms were never closed innovators, (b) open innovation includes “the repackaging and representation of concepts and findings presented over the past 40 years” (Trott & Hartmann, 2009, p. ?), (c) open innovation is implicitly linear, (d) open innovation is a marketing concept, (e) there is a problem with its definition that is ambiguous and changing continuously, (f) it is difficult to measure open innovation and there is a question of the appropriability of the defined measures, and (g) some researchers have proposed to integrate open innovation with supply chain management (Kutvonen, 2015).

The managerial shortcomings are related to the balance of open and closed innovation, as openness is not always the best choice an organisation can make. Hence, organisations must set boundaries (Torkkeli, Kock & Salmi, 2009) in which contract-bound ownership rights, governance modes, exclusivity, resource commitments, intellectual property, termination conditions, and market separation (Munsch, 2009) shape the innovation collaboration.

Bound by uncertainty, organisations make contracts that might seem superfluous, but address the risks that concern the fuzziness of the entire process. As explained above, even though some innovators reveal innovations freely (von Hippel, 2005), intellectual property rights have the purpose to attract investors, enhance allocation of resources, reduce risk of duplication, and facilitate trade in information (Foray, 2004, p. 103; Chesbrough, 2012). They enable positive externalities of open innovation (Chesbrough, 2012; West, Salter, Vanhaverbeke & Chesbrough, 2014) to organisations to whom the property rights were ceded either from their employees or from other individuals or external organisations (Coase, 1937). In these cases, positive network externalities reduce the uncertainty of innovation success, and enable innovation diffusion (Stoneman, 2007).

If the property rights are easily replicated, secrecy is more efficient but might result in restrictions on organisations’ collaboration possibilities (Teece, 1986; Wolper, 2002; Belderbos, Carree, Lokshin & Fernandez, 2014). When partners have divergent goals, today’s collaborators must keep in mind that they might be direct or indirect competitors tomorrow (Munsh, 2009). The collaborators’ goals might diverge at any point in the innovation process, thereby causing important decisions to be made on the potential innovation benefits and costs of breaking off the collaboration (Almirall & Casadesus-Masanell, 2010). Both have implications on organisations’ innovation success.

Additional managerial problems occur with asset complementarity (Teece, 1986); absorptive capacity in which internal R&D must exist for knowledge transfer to occur effectively (Cohen & Levinthal, 1990 Chesbrough, 2012); game theoretic issues (Nash, 1950; 1953); scale and learning effects (Sakakibara, 2003); network externalities in which workforce mobility plays an important role, as it enables more efficient knowledge transfer (Chesbrough, 2012); and learning strategy (March, 1991).
PRACTICAL IMPLICATIONS

A survey of 669 global executives conducted by Arthur D. Little in the late 1990s concluded that “fewer than one in four managers believe they have fully mastered the art of deriving business value from innovation” (Igartua, Garrigos & Hervas-Oliver, 2010, p. 11). Hence, there is room for improvement in open innovation practices and their applications in the organisational context, both from the top-down and bottom-up perspectives.

However, organisational factors seem to be indicative but not sufficient for success (Christiansen, Gasparin & Varnes, 2013).

KEY TAKE-AWAYS

- The main theoretical shortcomings of the open innovation theory are related to the ambiguity of its definition and fundamental differences from other innovation management theories.
- The inability to measure open innovation effectively and its highly individual appropriability make it difficult to frame open innovation into a simplified theoretical concept.
- The managerial problems in applying open innovation are related to the management of intellectual property rights, complementary assets, absorptive capacity, game theoretic issues, scale and learning effects, and network externalities.

REFERENCES

Part 3.1. Setting the scene: Defining Open Innovation

http://dx.doi.org/10.2139/ssrn.2407399 (30 May 2016).


Additional reading

3.1 Setting the scene: Defining Open Innovation

OPEN INNOVATION PROCESS

DARIA PODMETINA, ANTERO KUTVONEN, EKATERINA ALBATS, JUSTYNA DĄBROWSKA

ABSTRACT

This chapter introduces the teacher and the student to the content of the open innovation process, discusses the inbound and outbound innovation processes and the combination of them. We recommend to split the material into three lectures (3.1.1, 3.1.2 and 3.1.3 correspondingly), as it is presented in this chapter. The examples of classroom exercises and cases provided in this chapter aim to improve the understanding of open innovation activities and develop skills required for open innovation adoption in company.

The 3.1.1 section introduces the concept of open innovation process and its application on the companies’ innovation process main stages: idea generation, research and development, commercialisation. We also discuss how a company can use open innovation to optimise their technology portfolio and present the existing classifications of open innovation activities in the dimensions of inbound-outbound and pecuniary – non-pecuniary framework.

The section 3.1.2 and the section 3.1.3 present inbound and outbound open innovation correspondingly based on motives for conducting open innovation, different governance modes and practices (implementation types and differences between modes), description of the generic process, and typical challenges related to inbound and outbound open innovation.
### Prerequisite

Basic knowledge of open innovation (chapter 3.1.) and modern innovation management trends. Understanding the basics of the open innovation concept, differences between the open and closed innovation process.

### Objectives of the lecture

- To introduce the open innovation process and its main stages in general (idea generation; research and development; commercialisation) and to discuss the existing classification of open innovation.
- To identify open innovation activities and the motives for open innovation adoption in companies and to discuss how open innovation adoption create value for the company.
- To distinguish between modes of inbound and outbound open innovation.
- To present the inbound open innovation based on 1) motives for conducting inbound open innovation 2) different inbound governance modes (Implementation types and differences between modes), 3) description of the generic inbound process, 4) typical challenges related to inbound open innovation.
- To present the outbound open innovation based on 1) motives for conducting outbound open innovation 2) different outbound governance modes (implementation types and differences between modes), 3) description of the generic outbound process, and 4) typical related challenges.

### Workload

3 lectures x 8 hours. Total 24 h teaching; 48 h self-study (papers reading and discussion, group work assignments).

### Learning outcomes

- **LO #44** Area: Innovation. To understand the innovation process and how it can be disseminated and implemented in companies active in different sectors.
- **LO #46** Area: Innovation Management. To recognize and exploit aspects related to Open Innovation.
- **LO #49** Area: Innovation Management. To recognise and evaluate various types of innovations and innovation strategies.
- **LO #55** Area: Management. To understand alternative models for organizing innovation strategies and processes.
- **LO #71** Area: Open Innovation. To identify Open Innovation
activities in real life companies. To appraise the key indicators for the successful implementation of the Open Innovation Model in an organisation. And to identify the key success factors related to Open Innovation strategies in organisations.

**LO #72** Area: Open Innovation. To attain a basic familiarity with the scientific literature on the theme and the ability to view Open Innovation in the context of other Innovation Management theories; to critically assess the motives for engaging in Open Innovation activities and the mechanisms through which they create value for an organisation.

**LO #74**: To distinguish between the modes of inbound, outbound and coupled open innovation.

**LO #70**: To elaborate and specify how firms can benefit from open innovation.

**Knowledge**

Open innovation process, stages, classification; Inbound and outbound open innovation practices in theory and practice.

**Skills**

Recognizing the open innovation process (inbound, outbound, coupled) in real business life, analysing and improving; Recognizing open innovation practices and their place in the innovation strategy of the firm.

**Competences**

Implementing recommendations on the open innovation process (inbound, outbound, coupled) in practice;

---

**Reading List**


3.1.1. OPEN INNOVATION PROCESS

Abstract

The lecture introduces the open innovation process on the main stages in general (idea generation; research and development; commercialisation) and explains how a company can use open innovation to optimise its R&D, technology or innovation portfolio. The existing classifications of open innovation activities are discussed in the dimensions of inbound-outbound and pecuniary – non-pecuniary frameworks.

LECTURE CONTENT

Definitions

The definitions are elaborated by authors based on the Gassman & Enkel (2004) and Chesbrough, Vanhaverbeke & West (2006).

- Open innovation process is a process enabling in- and outflow of ideas, knowledge, innovation, technologies through “porous” borders of organisation on all stages of innovation process. Often presented as open innovation funnel. Consists of inbound open innovation and outbound parts.
- Inbound open innovation process is a process of inflow of ideas, knowledge, innovation, technologies through “porous” borders of organisation on all stages of innovation process.
- Outbound open innovation process is a process of outflow of ideas, knowledge, innovation, technologies through “porous” borders of organisation on all stages of innovation process.

THEORETICAL BACKGROUND

Initially, open Innovation was defined as follows: “Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. Open Innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model.”
Open Innovation Process (Chesbrough 2003, p.24). Thus, the open innovation process could be defined as using external and internal ideas for innovation as well as the internal and external commercialisation channels.

In 2006, Chesbrough (2006, p.1) has revised the definition by specifying the purposiveness of the knowledge flows: “Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively.”

When a company follows the closed innovation approach (see chapter 3.1.), it relies its R&D and innovation only on internal resources. With the adoption of open innovation, the company’s borders will become porous, enabling the flow of knowledge and/or technology in both directions, as well as fostering collaboration with external partners at different stages of the innovation process. Open innovation is not only about R&D and the innovation process, it involves all functions/departments of the company at all stages of the innovation process. The open innovation process is traditionally visualised by the funnel presented in Figure 1.

![Figure 1. Open Innovation Process](https://example.com/image)

*Figure 1. Open Innovation Process*

*Sources: Mortara, et al. (2009, p. 12); adopted from Chesbrough, H. (2003)*

Based on the Figure 1 Open Innovation Process, teacher may ask the students how they interpret the picture and let them elaborate on the process of open innovation in own words.

Figure 1 shows a number of activities companies conduct during the innovation process involving “inside-out” and “outside-in” processes. At the development stage, ideas are transformed into
R&D projects. Open innovators also see benefit in purchasing innovations developed outside via IP (intellectual property) in the licensing process. At the same time, IP licensees for internally developed innovation can be sold to outside companies, if they no longer fit the company’s technology portfolio, or if the company has no sufficient resources to develop them. As an option, the company may establish spin-out firms to continue developing some of its technologies. At the commercialisation stage, the company may have different products in its portfolio: some of them developed from the idea to product stage inside the firm, some can involve collaboration and co-creation with external partners at different stages, some can be developed based on a license purchased from outside, etc. Even at this stage, the company can buy a ready product from outside by using for example co-branding.

As seen in the open innovation funnel, open innovation processes can happen from outside into the company and from inside to outside. A company can adopt practises related to each of these processes or combine them. Related to the open innovation process, two main classifications have appeared in the academic literature, illustrating the ways companies adopt open innovation.

First, based on an empirical database of 124 companies, Gassmann & Enkel (2004) describe the open innovation approach in terms of three innovation processes: the outside-in process (ideas brought from outside in order to complement internal R&D), the inside-out process (commercialisation of surplus internally developed ideas or technologies), and the coupled process (combination of outside-in and inside-out) (Figure 2). This classification has been later applied in the research papers of Enkel, Gassmann & Chesbrough (2009), Van de Vrande, De Jong, Vanhaverbeke & De Rochemont (2009), Rohrbeck, Hölzle & Gemünden (2009), Dahlander, & Gann (2010), and others.

![Figure 2. Outside-in, inside-out and coupled open innovation process](Source: Gassman & Enkel, 2004)
The second classification was introduced by Chesbrough, Vanhaverbeke, and West in 2006. They presented the terms of inbound and outbound open innovation, where inbound OI reflects the outside-in process, and outbound OI corresponds to the inside-out process. In the academic literature, both streams of terminology are applied similarly and mean the same. The use of external knowledge, or, in other words, inbound open innovation is more often practiced by the business (e.g. Procter & Gamble’s Connect and Develop case (see Chesbrough, Vanhaverbeke, & West 2006), and is widely studied in the academia (Granstrand, Bohlin, Oskarsson & Sjöberg, 1992; Kurokawa 1997; Veuglers & Cassiman 1999). While the use of technologies and intellectual property outside the company (outbound open innovation as defined by Chesbrough Vanhaverbeke, and West (2006)) is still rather rare (Athreye & Cantwell 2007; Mendi 2007).

Inbound open innovation is most commonly measured with external knowledge breadth (combination of the 16 sources of knowledge or information for innovation) and depth (the extent to which firms draw intensively from different search channels or sources of innovative ideas) (Laursen & Salter, 2006). This measurement was further applied in the studies of Ebersberger et al., (2012), Tether and Abdelouahid (2008), Sofka and Grimpe (2010), Köhler et al., (2012), Spithoven (2013), and others. The general logic is that companies search for and acquire technologies and knowledge from outside (Laursen & Salter, 2006) in order to compliment internally developed R&D and achieve better competitiveness on the market.

Outbound open innovation (inside-out process or external knowledge exploitation) process has been thoroughly studied and measured by Lichthenthaler both at operational and strategic levels (2005, 2007, 2008a, 2008b). The inside-out process is associated with outbound technology transfer capabilities, and hence often studied within the knowledge transfer framework (e.g. Granstrand et al. 1992). This approach to open innovation has been successfully deployed by such companies as IBM, Novartis etc., aiming at decreasing the fixed costs of their R&D, sharing the risks, and gaining access to distribution channels and brands, as done by Ascom (Gassmann and Enkel 2004).

The processes lying behind the open innovation, has been analysed within technology marketing concepts before the open innovation was introduced. The integrated model of “technology marketing” (Escher 2001) (Figure 3) presents an abstraction of the external acquisition and exploitation sides of the process, and assumes synergies between the two processes. The phases of the inbound open innovation process can be summarized as stages (Figure 3):

1. Strategic considerations and technological evaluation – the company has to evaluate its objectives related to technologies and the existing and planned technologies in its portfolio;

2. Make-or-buy decision, followed by the identification of the provider and negotiations – the company decides if it wants to produce technology internally (internal R&D) or buy it from outside. The company conducts the analysis of potential technology providers, negotiate with them and finalizes the deal;
3. Technology transfer – technology transferred and included in the company’s technology portfolio. On the outbound side, the company has to make the decision to keep the technology in its own portfolio for its own needs, or sell (or reveal free) the unutilized technology. This process includes five stages of exploitation strategy: identification of exploitation opportunities, strategic evaluation, identification of communication channels, negotiation with technology customers, and technology transfer.

In 2014, the definition of open innovation was refined to “Open innovation is a distributed innovation process based on purposively managed flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model.” (Chesbrough & Bogers 2014, p.27). This new definition brought the monetary dimension to the discussion of the open innovation process - monetary (pecuniary) and non-monetary (non-pecuniary), proposed by Dahlander and Gann (2010). To best illustrate the various activities in the respect to monetary and non-monetary dimensions the Chesbrough and Brunswicker (2014) framework can be presented (Figure 4).

Based on this matrix, the open innovation practices are classified as acquiring, selling, sourcing and revealing (the full list of practices presented in the table 1).

- Acquiring (pecuniary inbound innovation) – a company acquires new ideas / innovation projects / technologies from external partners through licensing or other operations with monetary reward for externally purchased ideas.
Figure 4. Inbound-outbound-pecuniary-non-pecuniary framework
Source: Chesbrough and Brunswicker, 2014

- Selling (pecuniary outbound innovation) - a company commercialises its ideas / innovation projects / technology by selling or licensing them to a third party.

- Sourcing (non-pecuniary inbound innovation) - a company searches for and uses freely available external ideas or knowledge and applies them in their own R&D process. It is expected that before investing in an R&D project, the company analyses externally available knowledge and solutions and searches for available free knowledge, after which it is easier to absorb the found external knowledge, or makes the decision to start an internal R&D process if the knowledge is not available.

- Revealing (non-pecuniary outbound innovation) - a company shares not-needed resources / surplus technology with external partners for free, without a monetary reward.
### Table 1. Open innovation practices (source: Chesbrough and Brunswicker, 2014)

<table>
<thead>
<tr>
<th>Inbound Practices</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer and customer co-creation</td>
<td>Involvement of consumers or customers in the generation, evaluation, and testing of novel ideas for products, services, processes, or even business models</td>
</tr>
<tr>
<td>Information networking</td>
<td>Networking with other organizations without a formal contractual relationship, e.g., at conferences or events, to access external knowledge</td>
</tr>
<tr>
<td>University research grants</td>
<td>Funding of external research projects by researchers and scientists in universities (faculty, PhD students, or postdoctoral fellows) to access external knowledge</td>
</tr>
<tr>
<td>Publicly funded R&amp;D consortia</td>
<td>Participation in R&amp;D consortia with other public or private organizations in which R&amp;D activities are fully or partly funded by governmental organizations (e.g., European Commission or National Science Foundation)</td>
</tr>
<tr>
<td>Contracting with external R&amp;D service providers</td>
<td>Contracting with external service providers for specialized R&amp;D services, including technology scouting, virtual prototyping, etc.</td>
</tr>
<tr>
<td>Idea and start-up competitions</td>
<td>Invitation to entrepreneurial teams and start-ups to submit business ideas via open competitive calls, with collaboration and venture support to winning teams</td>
</tr>
<tr>
<td>IP in-licensing</td>
<td>Licensing of external intellectual property rights (e.g., trademarks, patents, etc.) via formal licensing agreements</td>
</tr>
<tr>
<td>Supplier innovation awards</td>
<td>Invitation of existing suppliers to participate in innovation and submit innovative ideas</td>
</tr>
<tr>
<td>Crowdsourcing</td>
<td>Outsourcing innovation problem solving (including scientific problems) via an open call to external organizations and individuals to submit ideas</td>
</tr>
<tr>
<td>Specialized services from OI intermediaries</td>
<td>Contracting services of intermediary organizations specialized in open innovation to act as intermediary between a “searcher”-an organization with an open innovation problem-and “solvers”-a network of organizations and individuals with potential solutions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outbound Practices</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint venture activities with external partners</td>
<td>Strategic and financial investment in independent joint ventures jointly with external partners</td>
</tr>
<tr>
<td>Open Innovation Process</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Selling of market-ready products</td>
<td>Sale of market-ready novel product idea to a third party for sale to its customers</td>
</tr>
<tr>
<td>Participation in public standardization</td>
<td>Participation in standardization activities via formal standardization agencies (e.g., ISO) or informal standardization consortia (e.g., OASIS)</td>
</tr>
<tr>
<td>Corporate business incubation and venturing</td>
<td>Corporate incubators or accelerators developing potentially profitable ideas and offering supportive environments for entrepreneurs inside the organization to identify novel paths to market</td>
</tr>
<tr>
<td>IP out-licensing and patient selling</td>
<td>Licensing of internal IP to external organizations via licensing agreements or selling via single payment</td>
</tr>
<tr>
<td>Donations to commons or nonprofits</td>
<td>Donations to commons or nonprofits (e.g., open-source communities) to support external R&amp;D</td>
</tr>
<tr>
<td>Spinoffs</td>
<td>Investment in new ventures founded by firm’s employees outside organizational boundaries</td>
</tr>
</tbody>
</table>

Within the data collection conducted within OI-NET project (Part 2), we can present our results as activities divided into pecuniary (monetary) and non-pecuniary (non-monetary) dimensions (Figure 5). Overall, inbound open innovation activities, such as collaborative innovation, scanning for external ideas, and customer co-creation are more intensively adopted compared to outbound open innovation practices, where participation in standardization is the most frequently adopted activity. Large firms acquire external technologies more intensively, participate in idea and start-up competitions, involve customers in R&D projects, and quite naturally, participate in standardization. However, they are more reluctant to crowdsourcing and free revealing than SMEs or micro firms.

Out of all open innovation activities, SMEs adopt collaborative innovation with external partners and scanning for external ideas the most. Micro firms use external networks, participate in idea and start-up competition, collaborate on innovation with external partners, and involve customers in the co-creation process as intensively as SMEs and large firms.
Content-related materials and Pedagogical guidelines

To make the lesson more interactive with students and to encourage active participation and group discussion, it is recommended that the course participants will be assigned with compulsory reading before the class starts.

The core reading list is the following:
Open Innovation Process

- Chesbrough, H. and Brunswicker, S. (2014), A fad or a phenomenon?: The adoption of open innovation practices in large firms, Research-Technology Management, 57(2), 16-25

Depending on the hours available, the list may be extended to additional articles. For example, the course participants may be divided into groups. Each group receives one additional article with the task to prepare a 15-20 minute PowerPoint presentation summarizing the article content and its key take-aways, and present it to the class.

An additional reading list for the group assignment:
Part 3.1. Setting the scene: Defining Open Innovation

Case studies

Additionally, within this topic we recommend to analyse in the class the Procter & Gamble Case. This case is very popular and has been discussed in the H. Chesbrough books and in articles. For example:


Additional materials can be found on the company’s web pages [http://www.pgconnectdevelop.com/](http://www.pgconnectdevelop.com/), in the online publication “Procter & Gamble – Using Open Innovation to Become a World Class Innovator” by Tim Kastelle [http://timkastelle.org/blog/2012/05/procter-gamble-using-open-innovation-to-become-a-world-class-innovator/](http://timkastelle.org/blog/2012/05/procter-gamble-using-open-innovation-to-become-a-world-class-innovator/) and in the open access publications:


Learning exercises and examples of group work

**Activity 1.** The teacher may start the lecture with questions: What is an open innovation process? What role does it play in company strategy?

**Activity 2.** Based on the Figure 1 Open Innovation Process, teacher may ask the students how they interpret the picture and let them elaborate on the process of open innovation in own words.

**Activity 3.** Based on the pre-assigned readings, students make a 15-20 minute presentation summarizing the articles.

**Activity 4.**

**Exercise:** Open Innovation process in companies

**Description:** Depending on the amount of students and the amount of time for in-class exercises, following exercise could be used. This exercise verifies how students understood the topic and can identify it in practice. Also, it creates the possibility to develop collaboration, communication skills, emphasized to be important in open innovation context. It is developed and incorporated to the Open Innovation course taught at Master level at Lappeenranta University of Technology.
Materials list: None. However, students need to have access to the Internet during the exercise.
Pre-work required by students: none (lectures can modify it based on their preferences):

Time Plan: 5 minutes for instructions and forming groups; 60 minutes group work; 30 minutes presentations and discussion (depending on the amount of groups).

Instructions: Students need to form XX number of groups. Once the groups are formed, students have one (1) hour to collect information from different internet sources on specific company and their open innovation activities. They need to prepare a short PowerPoint presentation (3-5 slides) on company Open Innovation activities with focus on: identification of OI activities and their knowledge flow; and examples.

The list of companies can be chosen based on the different of aspects (i.e. country, industry; etc). However, it is important to make sure there is available content on the Internet for chosen company. As a starting point, it is recommended to provide one internet source to each selected company. For example, in case there are six groups, each group needs to analyse one company from the list below:


Evaluation questions

The participants may be evaluated on the basis of class participation, group discussion, group presentation, and an essay on lessons learnt.

KEY TAKE-AWAYS

- Open Innovation practices can be introduced at every stage of the innovation process, from idea generation and R&D to commercialisation of a finished product and services;
- The existing classifications of open innovation practices distinguish between the outside-in practices (inbound), the inside-out process (outbound), and the coupled practices;
- Open innovation practices can be pecuniary (monetary) and non-pecuniary (non-monetary).
REFERENCES

• Chesbrough, H. and Brunswicker, S. (2014), A fad or a phenomenon?: The adoption of open innovation practices in large firms, Research-Technology Management, 57(2), 16-25
3.1.2. INBOUND OPEN INNOVATION

Abstract

The lecture presents inbound open innovation based on 1) motives for conducting inbound open innovation, 2) different inbound governance modes (Implementation types and Differences between modes), 3) description of the generic inbound process, and 4) typical challenges related to inbound open innovation.

Lecture Content

Definitions

Inbound open innovation reflects the outside-in process of knowledge sourcing or acquisition from outside, aiming at improving or complementing a company’s internal R&D process. Definitions of Inbound Open Innovation Practices (source: Chesbrough and Brunswicker, 2014):

• Consumer and customer co-creation - involvement of consumers or customers in the generation, evaluation, and testing of novel ideas for products, services, processes, or even business models;
• Information networking - networking with other organizations without a formal contractual relationship, e.g., at conferences or events, to access external knowledge;
• University research grants - funding of external research projects by researchers and scientists in universities (faculty, PhD students, or postdoctoral fellows) to access external knowledge;
• Publicly funded R&D consortia - participation in R&D consortia with other public or private organizations in which R&D activities are fully or partly funded by governmental organizations (e.g., European Commission or National Science Foundation);
• Contracting with external R&D service providers - contracting with external service providers for specialized R&D services, including technology scouting, virtual prototyping, etc.;
• Idea and start-up competitions - invitation to entrepreneurial teams and start-ups to submit business ideas via open competitive calls, with collaboration and venture support to winning teams;
• IP in-licensing - licensing of external intellectual property rights (e.g., trademarks, patents, etc.) via formal licensing agreements;
• Supplier innovation awards - invitation of existing suppliers to participate in innovation and submit innovative ideas;
• Crowdsourcing - outsourcing innovation problem solving (including scientific problems) via an open call to external organizations and individuals to submit ideas;
• Specialized services from OI intermediaries - contracting services of intermediary organizations specialized in open innovation to act as intermediary between a “searcher”-an organization with an
open innovation problem-and “solvers”-a network of organizations and individuals with potential solutions.

THEORETICAL BACKGROUND

Inbound open innovation reflects the outside-in process of knowledge sourcing or acquisition from outside, aiming at improving or complementing a company’s internal R&D process.

I. Inbound open innovation practices

A company aiming at implementing inbound open innovation do it for a number of reasons. We can group them into two main sets of motives. First, companies aim at reaching better effectiveness of their R&D by bringing more viable innovation into the company from outside, making more viable innovations of their own by using co-creation and collaboration with external partners, increasing the degree of novelty of their own products and services, achieving higher ability to get into new markets, and having a wider pool of ideas for their new products and services. Second, companies aim at making their R&D process more efficient in terms of saving costs by utilizing external knowledge and time savings by avoiding “reinventing the wheel”.

Inbound open innovation practices are presented on Figure 6. The most commonly adopted forms in companies are external knowledge acquisition, cooperative R&D practices and collaborative creation of new knowledge. From the knowledge perspective, the inbound open innovation practices could be classified into two major groups – (1) acquiring existing knowledge and (2) collaborative creation of new knowledge.

Acquiring existing knowledge

Companies have different operational modes for acquiring existing knowledge externally, for example by mergers and acquisitions (acquiring the whole or part of existing business), in-licensing (or inbound licensing), or by means of corporate venture capital.

Within this topic, we recommend to discuss the Case Cisco Systems (see comments in the pedagogical guidelines).

• Mergers and acquisitions

From the open innovation standpoint, mergers and acquisitions are applied in a traditional context. In the high-tech environment, acquisitions are done to access unique or scarce intellectual assets. Thus, for example, “Cisco routinely employs acquisitions to capture intellectual assets and next-generation products”. «Most people forget that in a high-tech acquisition, you really are acquiring
only people,» says Chambers (CEO of Cisco). «That’s why so many of them fail. At what we pay, at $500,000 to $2 million an employee, we are not acquiring current market share. We are acquiring futures.» (www.bloomberg.com/news/articles/1998-08-30/the-corporation-of-the-future).

• Inbound licencing

Traditionally licensing is the process of granting rights to utilize proprietary knowledge or technology by another party. The process involves different contractual terms on the duration of use, exclusivity and presentation on the market, commercialisation and further development, etc. We have to note here that not only patents can be licensed, also other forms of IP. Typically, larger firms have a better “ability to utilize” technologies, i.e. complementary assets (Arora & Gambardella, 2009). In-licensing is probably the most common form of inbound open innovation (Ford & Saren, 2001).

• Corporate venture capital

Corporate venture capital (CVC) is the investment of corporate funds directly in external start-up companies. In this case, the investment is directly managed by the company and is targeted to an external start-up (not equivalent to corporate venturing). CVC has usually both financial and strategic motives, e.g. cultivating downstream markets or the ecosystem. Types of corporate
venture capital within the dimensions of corporate investment objectives, and a link to operational capability are presented on Figure 7. CVC as an open innovation method is utilized by e.g. Intel Capital, Dell Ventures, Microsoft, GSK, and Siemens.

**Collaborative creation of new knowledge**

Collaborative inbound open innovation involves traditionally collaborative R&D co-creation practices based on collaborative agreements (joint R&D projects, R&D collaboration, joint ventures, strategic alliances, innovation networks and consortia, and co-patenting) and other collaborative forms of knowledge creation (university-industry collaboration, supplier integration to the innovation process, and user / customer involvement modes).

- **Collaborative R&D projects**

  Collaborative R&D projects are conducted when two or more companies join their R&D efforts for a fixed duration of time (on a contractual or non-contractual base) aiming at innovation and developing new products or services. This type of cooperation also happens sometimes between direct competitors and is then called co-petition. R&D collaboration is motivated by e.g. risk and cost sharing, synergy (getting benefit from combining the resources of two or more partners) and accessing the counterpart’s knowledge. R&D collaboration provides partners with a relative level of safety and flexibility, and requires less commitment than strategic alliances.
• Joint ventures

A joint venture (JV) is an arrangement where two or more owners (firms) pool their resources to create a separate legal entity for executing a particular business project. Joint ventures are effective means for transferring also tacit knowledge beyond firm boundaries (Kogut, 1988). Creating joint ventures is a collaborative mode that is prone to issues of strategic drift and cultural mismatch (Tidd et al., 2005).

• Strategic alliances

Strategic alliances are voluntary (long-term) agreements between firms, involving exchange, sharing or co-development of products, technologies and services (Gulati, 1998). As an R&D collaboration mode, strategic alliances are vulnerable to opportunistic “learning races” (Khanna, Gulati & Nohria, 1998) and appropriation concerns (Gulati & Singh, 1998). Strategic alliances incur costs from coordination and trust building, also characterised by interdependency between the partners, relational rents (Dyer & Singh, 1998) and co-specialisation (Teece, 1986).

• Innovation networks

Networks and consortia refer to collaboration between multiple industrial, research and/or public actors. Collaborative R&D (innovation) networks have a distinct role in developing technology for establishing standards or tackling problems that are too big for one company (e.g. the human genome). Public sector programmes, such as EU Framework Programme funding, facilitate cooperation in networks. Networks are also important for ecosystems (Figure 8), where all the actors need to work to get value.

• University-industry collaboration

University-industry collaboration (UIC) in innovation or R&D co-creation is studied as a type of open innovation activity, where both the university and the company benefit from the collaboration (Perkmann & Walsh, 2007; Howells, Ramlogan, & Cheng, 2012). As a “distributed innovation process based on purposively managed knowledge flows across organizational boundaries” (Chesbrough & Bogers, 2014: 17), open innovation focuses on knowledge that can flowing into or out of the organization. The university-industry interface becomes an important boundary, which needs to be managed as a part of a company’s search strategy (Laursen & Salter, 2004).

Comparison of the basic rationale between universities and industries (Parker, 1992) shows differences in their focus and structure (Quinn & Rohrbaugh, 1983) – universities focus on basic
Figure 8. Cooperation in an Ecosystem
Sources: Adner & Kapoor, 2010

research (upstream), have the traditions of open science and wide dissemination and reputation-based incentive structures, and they generally lack complementary assets. At the same time, UIC collaboration reflects the complementarity of the partners in human resources and contribution to labour markets: educating students vs hiring young specialists; and the R&D and innovation process: research, scientific discoveries, inventions from the university side (Chesbrough, 2006) and additional funding, equipment, industrial experience, and field-testing opportunities from the industry side (Perkmann, et al., 2013). The success of collaboration between the industry and university depends on the mode of collaboration, the prior experience of academic collaborators (Yoneyama & Watanabe, 2012), and commitment, communication and connections developed in the partners’ strategy (Greitzer, Pertuze, Calder, & Lucas, 2010). The statistics show that 50% of UIC produces major outcomes, while 40% of the outcomes are successfully commercialised (Greitzer, Pertuze, Calder, & Lucas, 2010). One of the key changes in the field of UIC was the 1980 Bayh-Dole act in US, followed by a number of similar initiatives in Europe, which on one hand enabled and facilitated commercial IP transfer between universities and companies, but on the other hand limited the access to knowledge.

- Integrating suppliers to the innovation process

Innovating together with suppliers is an established form of innovative collaboration, stimulating R&D co-creation. Integrating the suppliers to the innovation process is more often reported in the case of on process innovation. Suppliers’ involvement introduces significant competitive risk due to suppliers acting as a spillover channel to the rivals. The risk can be decreased by controlling the trust mechanisms, establishing deeper ties to the suppliers, and careful contracting practices.
• Customer and user participation

Involving customers in a company’s innovation process has roots in the lead user methodologies (von Hippel, 1986), elaborating on the fact that the lead (main) users face needs in product features or services that will be general at a marketplace. Gaining knowledge on these lead users’ needs and preferences is believed to bring competitive benefit to companies, as they would get the ideas and information months or years before their rivals. Users are eager to participate in generating the content or design of products, e.g. Little Big Planet (PS3 game) and Threadless.com.

Companies apply different modes to involve the users in co-creation and co-design processes, for example provision of toolkits for users to participate (Franke, Keinz & Schreier 2008; Thomke & von Hippel 2002; von Hippel & Katz 2002), user idea contests (Piller & Walcher, 2006), and co-creation communities (Franke & Shah, 2003).

• Crowdsourcing

Crowdsourcing is different form of users’ and suppliers’ involvement in the innovation process, as everyone can participate in problem-solving via an open call announced by companies. There are perceived benefits of crowdsourcing for companies, e.g. problems can be explored at little cost and quickly; payment is by results or even omitted; the organization can tap a wide range of talent; by listening to the crowd, organizations gain first-hand insight into their customers’ desires; and the community may feel a brand-building kinship or ownership through contribution and collaboration.

2. Inbound open innovation – process and challenges

The inbound open innovation process includes a number of activities (some of which were discussed above) and practical tools. To simplify a company’s decision making process in adopting/not adopting a specific open innovation activity, the process may be simplified to a general description.

The inbound open innovation process involves some challenges for companies. First, a company can face negative attitudes of employees towards the technology acquired externally (or technology developed elsewhere). This phenomenon is referred to as the “not invented here” syndrome (Katz & Allen, 1985) and has to be treated by increasing awareness in the open innovation policy and vision among the employees, by providing training and educating the employees and popularising the idea and benefits of bringing ideas and technologies from outside the firm.

Second, a company may feel uncomfortable and experience higher risks in being dependent on a specific partner or network in their innovation process. Also, the innovation process can suffer from cooperation with long-term partners only. There is a probability that the innovation potential
will decrease when the same partners work together for a long time, and there is no flow of new ideas from outside.

There is also the risk that the acquired asset / technology will not be used to its full potential as the company may lack the ability to explore fully the technology they have not developed themselves. To managerial challenges can be added the ability to manage a great number of inputs (Alexy & Reitzig, 2012).

The first significant empirical work (on a large sample) to support open innovation was written by Laursen and Salter in 2006, titled “Open for Innovation: The role of openness in explaining innovation performance among UK manufacturing firms”. In the paper, which focuses on search channels utilized by organizations, the authors claim that “Those organizations that invest in broader and deeper search may have a greater ability to adapt to change and therefore to innovate.” (Laursen & Salter, 2006, p.134). They introduce two dimensions: breadth: how many different types of channels (0-16) are used in all, and depth: how many different types of channels (0-16) are “drawn from deeply” (Figure 9). The authors also measured innovative performance on three levels, based on the product novelty: new to the world, new to the firm, and improvement on the product.

<table>
<thead>
<tr>
<th>Searching broadly</th>
<th>Searching deeply</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Availability of opportunities, turbulence and other's strategies</td>
<td>• Radical innovation requires close and continued interaction</td>
</tr>
<tr>
<td>• Search processes partly rooted in previous experience</td>
<td>• When specialist knowledge is scarce (very new technology)</td>
</tr>
<tr>
<td>• Ex ante difficult know value of a certain channel</td>
<td>• Best for incremental innovation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Searching too much?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cost of external search (adjusting to new sources)</td>
</tr>
<tr>
<td>• Overloading the absorptive capacity of the firm</td>
</tr>
<tr>
<td>• Problem of timing the idea inputs</td>
</tr>
<tr>
<td>• (Managerial) Attention allocation problem</td>
</tr>
<tr>
<td>• Not Invented Here (NIH) induces substitution to internal R&amp;D</td>
</tr>
</tbody>
</table>

Figure 9. Channels for technology search externally
Source: Laursen & Salter, 2006
The success of inbound open innovation operations depends on the balancing of several issues. Laursen and Salter (ibid.) found a curvilinear relation between the breadth of the search and innovative performance (average sources 7, max 11) and between the depth of the search and innovative performance (average sources 1, max 3).

**CONTENT-RELATED MATERIALS AND PEDAGOGICAL GUIDELINES**

To make the lesson more interactive with students and to encourage active participation and group discussion, it is recommended that the course participants will read some additional papers. The course participants may be divided into groups. Each group receives one additional article with the task to prepare a 15-20 minutes PowerPoint presentation summarizing the article content and its key take-aways, and present it to the class. The reading list is the following:

Case Studies

Case 1. Cisco

Within this topic we recommend to analyse in the class the Cisco Case. This case is very popular and has been discussed in many academic articles on open innovation. Materials can be found here:

- [http://openinnovation.net/featured/case-4-open-innovation-through-acquisition-at-cisco/](http://openinnovation.net/featured/case-4-open-innovation-through-acquisition-at-cisco/)

Students task will be to analyse the Cisco acquisition history and their success built on a superb acquisition process. Think from the open innovation standpoint, how traditional mergers and acquisitions tools repurposed? Discuss the fact that in a high-tech environment acquisitions are done to access unique or scarce intellectual assets.

Case 2. Intel Capital investment in Berkeley Networks

The information on the case can be found in the following publications.

Case 3. Lego

The information on the case can be found in the following publications.

- Shih, Willy C., and Sen Chai. «The LEGO Group: Publish or Protect?» Harvard Business School Case 613-079, February 2013. (Revised March 2015.)
- http://www.thelegocasestudy.com/
- http://www.15inno.com/2014/11/15/3successfuloicases/

Questions to students

1. How Lego keeps the world working for them?
2. What is Lego’s eco-system for inbound open innovation?

Learning exercises and examples of group work

Activity 1. The teacher may start the lecture with questions: What is an inbound open innovation? What role does it play in company strategy? What kind of inbound open innovation practices students know?

Activity 2. Based on the pre-assigned readings, students make a 15-20 minutes presentation summarizing the articles.

Activity 3 Exercise: Talk to the CEO
Before the exercise, split students into pairs, and assign them roles of CEO and employees. You can modify tasks to adding more roles. Present the next task to students.

Ideas for the exercise:

- You are a junior employee in the established technology company X
- After one month, you get a rare chance to talk to the CEO of X to present your idea: to start the company on the path of Open Innovation
  - The CEO is extremely busy and focused on action: the time you have depends on his interest
  - He is not familiar with Open Innovation beyond some mentions of the term in general business media.

After exercise collect feedback from students: How did you feel about the exercise?
Open Innovation Process

Evaluation questions

The participants may be evaluated on the basis of class participation, group discussion, group presentation, and an essay on lessons learnt. Additionally, group exam can be applied. For example, a group exam can be organized on the materials of this lecture and should be conducted in the beginning of the next lecture.

KEY TAKE-AWAYS

• Inbound open innovation is motivated by seeking for higher effectiveness and efficiency in R&D;
• The implementation modes are divided to acquiring existing knowledge and creating new knowledge;
• The generic process has 5 actual steps: focus, evaluation, make-or-buy, negotiation, and transfer;
• Challenges are driven by market imperfections

REFERENCES

3.1.3. OUTBOUND OPEN INNOVATION

Abstract

The lecture presents outbound open innovation based on 1) motives for conducting outbound open innovation, 2) different outbound governance modes (implementation types and differences between modes), 3) description of the generic outbound process, and 4) typical related challenges.

LECTURE CONTENT

Definitions

Outbound open innovation reflects the inside-out process of knowledge flow in the form of technology transfer or forming new ventures, aiming at improving the innovation performance of the firm and optimising the technology / innovation portfolio. The definitions of Outbound Open Innovation Practices (source: Chesbrough and Brunswicker, 2014):

• Joint venture activities with external partners - Strategic and financial investment in independent joint ventures jointly with external partners;
• Selling of market-ready products - Sale of market-ready novel product idea to a third party for sale to its customers;
• Participation in public standardization - Participation in standardization activities via formal standardization agencies (e.g., ISO) or informal standardization consortia (e.g., OASIS);
• Corporate business incubation and venturing - Corporate incubators or accelerators developing potentially profitable ideas and offering supportive environments for entrepreneurs inside the organization to identify novel paths to market;
• IP out-licensing and patient selling - Licensing of internal IP to external organizations via licensing agreements or selling via single payment;
• Donations to commons or non-profits - Donations to commons or non-profits (e.g., open-source communities) to support external R&D;
• Spinoffs - Investment in new ventures founded by firm’s employees outside organizational boundaries.

THEORETICAL BACKGROUND

Outbound open innovation reflects the inside-out process of knowledge flow in the form of technology transfer or forming new ventures, aiming at improving the innovation performance of the firm and optimising the technology / innovation portfolio.
I. Motives for conducting outbound open innovation

Three strategic levels to outbound open innovation have been identified (Kutvonen, 2012, p. 44-45):

1. Keep-or-sell decision: the company has to find out when it is beneficial to release the proprietary knowledge assets / technology outside or keep them in the company.
2. If the strategic fit is high enough, profits may be realized in an optimal keep-and-sell scenario.
3. Beyond fit, outbound open innovation can enable/drive the strategy of the firm.

The primary motivation for conducting outbound open innovation is monetary, strategic and compulsory (Lichtenthaler, 2007). Lichtenthaler found that freedom to operate is the most important motive for companies to conduct outbound OI, followed by access to knowledge and new markets, selling additional products, getting technology leadership, and generating revenues (Figure 10).

Depending on the importance of strategic and monetary objectives, four types of External Technology Commercialisation (ETC) projects were identified by Lichtenthaler (2008) (Figure 11). When both strategic and monetary objectives are high, companies conduct ETC as business-driving projects.
When both strategic and monetary objectives are low, companies aim to optimize their technology portfolio. In the case of high strategic objectives, a firm pursues opportunities and high monetary objectives – cash-generating projects.

The strategic incentives for outbound open innovation activities (external exploitation) can be classified into six groups (Kutvonen, 2011):

1. Gaining access to new knowledge in the form of boosting external acquisition by e.g. cross-licensing, gaining entry to knowledge networks and partnerships, or setting up listening posts for weak signals.
2. Multiplication of own technologies by profiting from the network effect, geographical / product market expansion.
3. Learning from knowledge transfer aiming at improving dynamic capabilities and building reputation.
4. Controlling technological trajectories by bringing more control to strategic technology planning and exploring technological path dependency.
5. External exploitation as a core business model. These firms are characterised by high R&D and low commercialization capability, and have traditionally 50 % of sales generated by external exploitation.
6. Exerting control over the market environment, aiming at maintaining technological leadership, applying defensive out-licensing strategies, feeding entry barriers, and creating market ecosystems.

Figure 11. Four types of External Technology Commercialisation (ETC) projects
Source: Lichtenthaler, 2008
The evolution of the commercialization motives for external technology through the stages of ideation, development, testing and commercialisation in innovation process is presented in Table 2. The ideation and development stages are characterised with higher uncertainty, technology fuzziness and not obvious markets. The IPR issues are undefined here, and the valuation of the idea / concept is difficult. The uncertainty decreases with the commercialization stage, technology is brought to a codified shape, and the business forecasts can be more accurate. The value of technology is defined at this stage.

**Table 2. Evolution of commercialization motives of external technology**

<table>
<thead>
<tr>
<th>Process phase</th>
<th>Typical modes</th>
<th>Typical motives</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideation</td>
<td>External concept exploitation / donation</td>
<td>Strategic, network / reputation building, creating ecosystems</td>
<td>Uncertainty is high; technology fuzzy and market potential (or even suitable markets (not apparent; IPR undefined; valuation difficult</td>
</tr>
<tr>
<td>Development</td>
<td>Joint development, collaborative arrangements</td>
<td>Learning from knowledge transfer; control over environment, access to knowledge</td>
<td></td>
</tr>
<tr>
<td>Testing</td>
<td>Cross-licensing, out-licensing</td>
<td>Multiplication of own technology, freedom to operate</td>
<td></td>
</tr>
<tr>
<td>Commercialization</td>
<td>Sell-off, out-licensing</td>
<td>Extra revenue</td>
<td>Uncertainty is very low; technology highly codified and business forecasts highly accurate; valuation easy</td>
</tr>
</tbody>
</table>

Source: Kutvonen, Savitskaya & Salmi, 2010

In this topic, we recommend to discuss the case Epic Games.

2. **Outbound open innovation practices**

Outbound open innovation practices are presented on Figure 12. The most commonly adopted ones in companies are technology transfer practices (open source approaches, out-licensing, selling
intellectual property, donation of intellectual property) and forming new organizations in the form of spin-offs and venturing.

Figure 12. Outbound open innovation practices
Source: Torkkeli et al., 2007

Technology transfer outbound open innovation practices

• The special case of open source

Open source software has curiously elements of both inbound and outbound OI activities in the form of collaborative development (inbound) and shared technology (outbound). Companies practicing open source build their business models around the technology by including the commercial complements to OS software, using the OSs as complementary to their own core product and / or mixing OS and proprietary components. The open source, on the large scale, is a community-driven method bringing together the mass of developers and users.

• Out-licensing

Out-licensing is the most common form of outbound open innovation, which includes also the special case of cross-licensing for ‘freedom to operate’ (Grindley & Teece, 1997), characteristic of e.g. semiconductors, biotech and ICT sectors. Open innovation is often realized as proactive out-
licensing strategies. Licensing is also highly complex and enables a wide variety of strategies (e.g. deterring entry, manipulation).

• Selling intellectual property

Outright selling of intellectual property (mainly patents) is usually done in cases of shelved (unutilised) assets with a specific purpose (low strategic value). The advantages of external technology and IP commercialisation are that it is easier to manage the process and receive instant income, but they do not enable strategic interaction, as control is lost.

• Donation of intellectual property

Donation of intellectual property (free revealing) is dominantly motivated by a system of tax breaks designed to induce more knowledge transfer, and secondly by the possibility of generating goodwill. Further motives include relinquishing IP to reduce the cost of managing non-essential patents, and special cases of donating to open source. E.g. IBM and Nokia Technopolis Innovation Mill have revealed their technology for free.

**Forming new organizations**

• Spin-outs

The common definition of a spin-out is a division of a company or organization becoming an independent business. The «spin-out» company takes assets, intellectual property, technology, and/or existing products from the parent; the parent may take further action to facilitate the growth of the spin-out. A rivaling definition refers to start-ups formed by one or more employees of the parent organization. Spin-out firms often retain business relations with the parent.

• Ventures

New ventures are used to seek radical directions or breakout from current business models, allowing exploring new technologies and businesses with contained risk. The advantages of new ventures include the ability to maintain information flow from the parent, control the business through equity and provide opportunities for entrepreneurial employees. At its most successful a new venture may even outgrow the parent, signalling a shift in strategy.

Within this topic, we recommend to conduct the exercise Visual innovation. The word list can include both inbound and outbound open innovation practices, and other OI related terms.

**3. Outbound open innovation: processes, challenges and tools**

Based on the article of Lichtenthaler (2007), the five-stage process of external technology commercialization can be elaborated (Figure 13). The process starts with planning – evaluation
technologies and setting the target, allocating resources, and pre-selecting customers. The second stage includes evaluating the needed information, scanning and monitoring the environment, focusing on the markets for the technology, and communicating with customers. Next, companies start negotiation with customers and set a collaboration agreement. Then, at the realization stage, companies plan the technology transfer and map the process, and conduct the realization of the transfer. At the control stage, the decision to terminate the transfer can be made or to conduct post-transfer cooperation.

Figure 13. Five-stage process of external technology commercialization
Adopted from Lichtenthaler, 2007

The five steps of outbound open innovation should be supplemented with pre-commercialization activities (Lichtenthaler, 2007 & Kutvonen, Torkkeli & Lin, 2010), including activities which are the responsibility of the developer of technology and aim at successful commercialization of a technology or knowledge asset, either internally or externally, and are performed prior to the actual active commercialization stage (Figure 14).

Similarly, to inbound open innovation, the outbound process has its challenges and limitations (Enkel, Gassman & Chesbrough, 2009), such as 1) challenges of external exploitation of technology: knowledge is an idiosyncratic and tacit good, appropriability issues and high transaction costs, identification of potential customers, valuation of technology (or knowledge), sufficient communication and actual transfer; and the “not sold here” syndrome (Chesbrough, 2003).
Part 3.1. Setting the scene: Defining Open Innovation

Process
- Planning
- Intelligence
- Negotiation
- Realization
- Control

Precommercialization activities
- Activities aiming towards the successful commercialization of a technology or knowledge asset, either internally or externally, that are performed prior to the actual active commercialization phase.
- The responsibility of the developer of the technology.

Figure 14. The five steps of outbound OI and pre-commercialization activities
Sources: Lichtenthaler, 2007; Kutvonen, Torkkeli & Lin, 2010

The “not sold here” syndrome refers to the phenomenon where employees oppose or have a negative attitude towards the selling or free revealing to external partners technologies produced by them internally. This syndrome can be overcome by education and training, increasing the awareness of the employees in the corporate policy on open innovation and collaboration with external partners; 2) limits of open innovation (Kock & Torkkeli, 2008); 3) internal barriers - difficulties in finding the right partner (43%) unbalance between OI and daily business (36%), and insufficient time and financial resources; and 4) company’s fear for loss of knowledge (48%), high coordination costs (48%), loss of control (41%), and high complexity (41%) (Enkel, Gassman & Chesbrough, 2009).

When addressing the challenges of the pre-commercialization phase (Kutvonen, Torkkeli & Lin, 2010) we need to address the determinants of performance: planning, negotiation and control, and consider that firms are weak in planning, intelligence and control. The identified challenges here are the strategic connection of external exploitation and corporate business strategy (planning), knowledge brokerage (intelligence), valuation of technology (planning and negotiation), and dynamic capabilities (realization and control).

Companies adopting outbound open innovation tools are supplied with some managerial tools, such as 1) an integrated technology commercialization roadmap (Lichtenthaler, 2008) (Figure 15), describing the alternative strategies for internal development and use and external commercialisation; 2) functional market perspective is a tool that allows considering opportunities outside traditional cognitive boundaries (e.g. space); and 3) external concept exploitation (Kutvonen & Torkkeli, 2010) refers to a practice similar to technology exploitation, but taking place already in the fuzzy front end.
Figure 15. Integrated technology commercialization roadmap

Source: Lichtenthaler, 2008

**CONTENT-RELATED MATERIALS AND PEDAGOGICAL GUIDELINES**

To make the lesson more interactive with students and to encourage active participation and group discussion, it is recommended that the course participants will read some additional papers. The course participants may be divided into groups. Each group receives one additional article with the task to prepare a 15-20 minutes Power Point presentation summarizing the article content and its key take-aways, and present it to the class. The reading list is the following:


Recommended Cases

Case 1. Epic Games

In 2010 Epic Games announced that it will open its proprietary Unreal game engine technology, which is a key resource for Epic Games. They announced that using the Unreal Development Kit (UDK) is free of charge, except when used to produce commercial games (in which case licenses are granted). It is widely used in teaching and hobby game devices. Epic games also announced a game development competition with the main price of a free license to the best game.

The information on the case can be found here:
• https://www.incredibuild.com/epic-games.html

Case 2. The Demola method

Demola is an Open innovation platform for universities, students and companies collecting the project ideas (concepts) from companies and all IPR generated given to student teams. The company retains the right to in-license the results, no other compensation to the student teams is proposed. Further information can be found in the following sources: Kutvonen, A. and Havukainen, K. (2011) Extending the Fuzzy Front End Beyond Firm Boundaries: Case Demola, Proceedings of 4th ISPIM Innovation Symposium, 29 November - 2 December 2011, Wellington, New Zealand.

Learning exercises and examples of group work

Activity 1. The lecture can start with the group discussion on topic “What goals, other than additional short-term revenue, can motivate a company to do outbound open innovation?”

Activity 2. The teacher may start the outbound OI practices part of the lecture with questions: What is an outbound open innovation? What role does it play in company strategy? What kind of inbound open innovation practices students know?

Activity 3. Based on the pre-assigned readings, students make a 15-20 minute presentation summarizing the articles.

Activity 4. Exercise: Visual innovation
Ideas of the exercise

• Process open innovation in a different way (fortifying cognition and learning by a divergent method);
• Display your skill and level of comprehension of OI;
• You will get a (secret) randomized word, concept, phrase or theory to explain;
• Draw a picture to explain the word and show it to your partner;
• You are not allowed to use any words or letters;
• If your partner understands, it is a success!

After exercise, collect the feedback from students. How do you feel about exercise? Feedback, questions and comments.

Evaluation questions

The participants may be evaluated on the basis of class participation, group discussion, group presentation, and an essay on lessons learnt. Additionally, group exam can be applied. For example, a group exam can be organized on the materials of this lecture and should be conducted in the beginning of the next lecture. Students are requested to provide the article summaries in case of absence on the group exam.

KEY TAKE-AWAYS

• Outbound OI is the exploitation of knowledge assets beyond a firm’s boundaries
• Motivated by monetary, strategic or compulsory issues
• Involves either technology transfer or even creation of new organizations
• In practice less common and more challenging, both cognitively and managerially than inbound OI
• Well-functioning systematic outbound structures are still rare, but steadily increasing.

REFERENCES


3.2 FRAMING OPEN INNOVATION IN A BROADER THEORETICAL LANDSCAPE

OPEN INNOVATION AND STRATEGY, STRATEGIC ALLIANCES AS AN EXAMPLE

ARIE NAGEL

ABSTRACT

Strategic Alliances (SAs) form an excellent opportunity for inbound or outbound Open Innovation. SAs were originally seen as a better alternative for acquisitions, mergers or joint ventures for improving turnover and profits. Nowadays, they are seen as a domain for learning and experimenting. In this section we will explore our knowledge on and experience with SAs and how these insights have changed drastically over time.
<table>
<thead>
<tr>
<th><strong>Prerequisite</strong></th>
<th>Basic knowledge of Strategic Management, Technology Management and Open Innovation.</th>
</tr>
</thead>
</table>
| **Objective of the lecture** | Understand and analyse:  
- Which options the company has for in-bound and Open Innovation.  
- Why Strategic Alliances are important and yet so difficult.  
- What steps to take in alliance forming and alliance management.  
- What mistakes should be avoided in allying. |
| **Workload** | Teaching 4h and self-study 10h |
| **Learning outcomes** | Understanding: see above |
| **Knowledge** | LO #56: To Understand the Dynamics of Alliance Formation. |
| **Skills** | LO #49: To Recognise and Evaluate Various Types of Innovations and Innovation Strategies.  
LO #67: To Analyse the Relation between a Company's Strategic Choices and Application of Open Innovation; To Explain the Concept of Open Innovation through Both Theory and Examples (To e.g. a Company Executive).  
LO #68: To Analyse the Pros and Cons of an Open Approach to Innovation Strategy. |
| **Competence** | LO #58: To Design, Implement and Assess an Innovation Strategy in the Context of Innovation Networks. |
| **Reading List** | None; references and suggestions for further reading enclosed. |
| **European Qualifications Framework (EQF) Level** | Level 7. |
OPEN INNOVATION AND STRATEGY, STRATEGIC ALLIANCES AS AN EXAMPLE

LECTURE CONTENT

Definition: A strategic alliance is co-operation between two or more companies, where every company preserves their separate identity. We exclude routine transactions here. Also, we will not deal with operational SAs, like logistics, in this section.

INTRODUCTION

In dealing with Strategy, a conventional portfolio of strategies for a company are:
Before reading further, ask the students what choices a company has in the market place.

1. Directional strategies; what is the direction of our activities, growth, consolidation, shrinking?
2. Competitive strategies; how do we behave in view of the competitors?
3. Potential strategies; what kind of success potentials can we mobilize?
4. Allocation strategies; where do we allocate our scarce resources in the long term?
5. Configuration strategies; how do we design our value-added and supply chain?
6. Timing strategies; how do we use the factor timing in our strategies?
7. Leadership strategy; what should be the principal approach of leadership, transactional, transformational, evolutionary…?
8. Organizational development strategy; should we use top-down, bottom-up, evolutionary or revolutionary approaches for developing our organization?

In which strategy is OI most dominant?

In each strategy we can discover elements of Open Innovation, but we assume OI is most dominant in the choice of allying (or not), thus it is primarily a question of item number 5 [Configuration] in the list above. Therefore, in this chapter we confine ourselves to dealing with Strategic Alliances, also because SAs are — beyond changing the configuration - an important element of all the above mentioned strategies. Furthermore, it succeeded in one of the previous European projects nicely.

The European project on Strategic Alliances: ‘smart’

Between 2000 and 2003, an extensive European project with the acronym ‘smart’ was carried out for DG XIII. Its full name was System for the development, MAnagement and suppoRT of strategic alliances. The aim of this project was to increase the competitiveness of European companies through the formation of Strategic Alliances (SA). Open Innovation was not a wide-spread notion, but the commission felt that companies could gain enormously from outside skills and knowledge, while it was recognised that the risks were high. Hereafter we will add recent insights on SA and OI after 2003 into this curriculum, as long as they differ from earlier ones.
The ‘smart’ project

The goal of the smart Methodology (as detailed in the above diagram) is to support the inception, design, implementation, and management of strategic alliances (SA) based on best practice, available research and case studies. The methodology is to be embedded into the smart software, thus providing effective guidance and support to users in utilising each of the three smart modules addressed by the methodology – the Business Strategy Module, Alliance Formation Module, and Alliance Management Module, as described in the smart Methodology diagram above. Each one of these three modules consists of a unique list of questions, stakeholders and success factors that must be addressed. Thus, the integrated smart methodology comprises three module-specific “sub-methodologies” that are embedded in the modules and serve to guide the users and drive the process of each module.

The end product is a computerised expert system where all relevant characteristics of a future strategic alliance are taken into account. Thus, the alliance to be formed can be assessed. This model has been derived from the existing knowledge on strategic alliances: the reasons for allying, success and failure rates in specific settings, and the reasons for success and failure, the type of alliance, experience with alliances, proper preparation, frequent mistakes, network constellation, etc. After the success has been estimated, the input variables can be changed to see whether this
has influenced the estimated rate of success. The system has been used successfully in a number of cases in Europe.

As with most behavioural simulation models, the system should not be treated as the truth or final guidelines, but rather as a third party’s opinion, to be taken into consideration as a source of new questions and viewpoints. Altogether it should lead to better decisions.

Which are the options for a company in dealing with product and process development/innovation?

In the Strategy Module the company (or a division of a larger company) management faces three options, when it wants to innovate and to grow:

1. Internal growth and internal knowledge building (stand-alone)
2. Acquire a company or merge a company
3. Alliance with another company or other companies

Before reading further, think of the possible advantages and disadvantages of the three options.

In short, these are the pros and cons of the options:

With internal growth the company keeps its independence and controls its internal capabilities without interference of others. It keeps its control over central assets and technology. The company maintains its unique identity and keeps its (core) competencies in-house. Likewise, knowledge transfer is not very much an issue.

However, internal development can be time-consuming and limits expansion through limiting the knowhow and financial resources. It is expensive and there is high risk of lagging behind. A merger or acquisition provides a quick entry into other markets and other technology. The company is seemingly in control in the case of an acquisition. A merger evolves in many cases into an acquisition by the larger or more sophisticated company. Next to complex negotiations, a merger involves large investments and integration problems that can last decades. The companies are stuck together forever, since a demerger is even harder to arrange than a merger. It is therefore very risky to undertake. The third possibility, a non-equity alliance has become very popular recently. It has the advantages of an equity arrangement, but the governance is more intricate, because the company is not in full control. However, it is as risky as a merger or acquisition. The big difference here is that the companies are not stuck together and can form alliances with several companies.

Strategic Alliances

The purpose of SAs has changed with time:

1. From making turnover and profit towards learning and acquiring knowledge, technology and
skills, where more profit is not a must, only a bonus; so today allying is often closely related to open innovation; Piller and West (1) give some guidance on how to define collaboration in open innovation, to find a partner and collaborate with the partner;

2. From SAs in the core business to SAs in the non-core where the market is more uncertain;

3. From dyadic SAs to larger networks; access to markets remains important, but even more important is the place in the network.

In SAs we deal with the combination of businesses from different, often previously alien firms. This has proved to be a risky matter and more than often it is doomed to fail, as most studies report that 2/3 will fail. The benefits of such an undertaking, more profit and faster innovation, must be great to take this risk.

Think of why companies would like to ally, although the success rate is not more than 50%.

The reasons for co-operating between firms are many. To mention just a few:

1. Access to knowledge: This can be achieved by shared know how, shared R&D and exchanging complementary technology.

2. Access to new markets: to enter a new market, local market knowledge and experience is needed.

3. Higher efficiency: a specialised partner might develop and produce products cheaper. Also in some cases ‘economies of scale’ will offer lower costs.

4. Clients do not want products, but solutions, tailored to their needs: a company has to satisfy a need and this might involve more than one company.

The early forms of co-operation between firms were joint ventures or even mergers, and equity-based by nature. The reasoning was that if you wanted it to be a success, you should ‘go for it’. The general idea was that costs could be cut by joining businesses. However, the economies of scale were rather disappointing and as we realise nowadays, one could have economies of scale, but they were compensated at the cost of control. Mergers in the true sense did not exist; almost all turned out to be take-overs. This did not certainly depend only on the size of the original corporations, but also on the management style and know how. Sharing information leads to more power to the one that can understand and process this information in a cleverer way, hence power play and politics, the more so if the businesses were alien to each other before the venture.

As joint ventures and mergers were risky and could lead to losing all the equity, the industry started non-equity-based ventures, more commonly referred to as Strategic Alliances. This way co-operation between firms, without setting up a separate entity, involving buildings, replacing personnel, heavy investments or exchanging a great amount of shares became more popular. It
was also realised that more profit would be a bonus, but that exchanging knowledge and skills, hence open innovation, became far more important in the competitive world. Also full mergers should be avoided: joint efforts where possible or necessary, and competing where joint efforts were virtually unthinkable. So it happened that e.g. large corporations developing and marketing electronic products for consumers joined efforts in research, engineering and development, and competed fiercely in the market with the end products.

Think of problems and opportunities that arise from competing in the market place and co-operating in research, engineering and development. What about production? Should companies compete or work together?

True, strategic alliances were no greater success than the joint ventures, but at least they did not lose much money in it and the companies were not ‘stuck forever’. And probably even more important: the purpose of joint efforts shifted from making money to learning and open innovation. Likewise, the reward system shifted from making profit to learning.

Equity alliances decreased rapidly in popularity, from 90% of alliances to a few percent. From this, it could be concluded that joint ventures are extinct now. This is a wrong conclusion, since strategic alliances were also seen as ‘courtship before marriage’. Once the strategic alliance was a success on both sides, there was trust, and an equity-based alliance could be formed, not as an adventure, not as a probe in the beginning, but as a final stage of a successful co-operation. So, joint ventures are still here and larger on average. Their importance is greater than can be derived from the given percentages.

By the way, a co-operation as indicated above is sometimes compared with a marriage.

Discuss the differences between an alliance and a marriage and the consequences for both.

There is, however, one important difference. A marriage between a man and a woman is intended to be eternal. As we will see later, this should not be the case with SAs.

Co-operation and exchange of knowledge and skills and own experience are the key to growth, innovation and success. This, of course, is not a Western invention, but also applied in various other parts of the world. At one time, managers of an electronic printing factory were forbidden to enter the competing identical factory within Philips Electronics - they might have benefitted from insights gained.

On the other hand, the government of Korea dictated a strategic plan in 1962 to the seven conglomerates that were producing low-end products like hair combs, wigs and electronic
equipment. The conglomerates were forced to learn from each other and to set up a large-scale research and development site. As a result, innovation flourished in Korea and new and improved products were produced. A few decades later, Korea exported cars to the world and even to Japan. It also produced much better electronic equipment, and the first large ships were sold to the Greek ship owner Onassis, who made a deal: if not built on time, he would get the two ships for free. To us this is a superb example of what a joint effort can achieve with careful strategic planning and sharing of knowledge and skills. (2)

**How did a small country (42 million people in 1962) like South Korea win the world market in e.g. electronic consumer goods, cars and ship building in a few decades? Would the same be possible in your country?**

The initial purpose in strategic alliances was to increase sales and profit by equity alliances. Equity alliances were substituted by non-equity alliances, eventually not aimed towards sales and profit per se, but to mutual learning, first in dual alliances, but gradually these alliances grew to networks, like the outdated example beneath. Up-to-date examples are not publishable as they are the product of specialists, who make their living out of it. For our purposes, the illustration below shows that Intel, Motorola, Alcatel and Cisco had a strong position in the network at the time. However, it is not just the number of alliances that matters. Also the quality is important. Thus, only an expert can come to a justified conclusion from the graph.
A similar way of using networks can be seen with airlines. An American airliner that wants to have a foothold in London, is not just interested in London, but also in offering the network around London to its customers.

Why would a European airliner be interested in allying with an American or Asian airliner? And of course vice versa.

The next step in alliances was positioning strategically within the networks, basically to have as many ties as possible with important players in the network. Likewise, the management of the various strategic alliances without a corporation became important, and strategic alliance (network) managers were appointed. Clearly the rules of the games shifted from competing with products or even systems to positioning in the network. Another interesting development in strategic alliances was that the initial strategic alliances were in the core business, while the trend today is that cooperation is sought in the non-core business. In the non-core, uncertainty is the highest, so learning and spreading the risk are the key here.

Think of businesses like the automotive, banking, ship building, medical equipment, pharmacy, defence industries, consumer electronics, and gaming software industries (or whatever other industries you might like to review) and compare these industries in dynamics in the core and in the non-core, and where they would like to ally with their competitors.

The same as above, but now for co-operation with non-competing companies, like a coffee brand with a manufacturer of coffee machines.

Definitely the rules of the game are changing, and strategic alliances are part of the answer. Strategic alliances can no longer be considered as second best options to stand-alone alternatives or mergers and acquisitions. (3)

It was already mentioned that most alliances are doomed to fail, and mostly by the ‘soft factors’, relationship issues like chemistry, commitment and culture. Even differences in working methods can cause huge problems. Structural issues like complementarity, size and positions are ticked away in the strategic considerations and therefore cause less problems in general. It is important to note, however, that a combined effort should be complementary, rather than ‘more of the same’.

Discuss the advantages and disadvantages of ‘more of the same’ and ‘complementary’.

The success of alliances depends on various factors. The following factors are derived from or confirmed by the smart project.
Before reading the success factors, discuss in a group what you think are success factors.

1. Earlier positive experience with the partner; in fact this is the most important factor for success. Also experience with other partners is of great importance, positive as well as negative.
2. Strategic fit:
   - Are the (corporate) strategies compatible or do they conflict: is it more of the same or are the goals complementary?
   - Is the alliance of strategic interest to the respective partners? A company that has e.g. 1% of its sales in the alliance has less interest in the alliance than its partner that has 50% at stake.
   - Are the partners mutually dependent for realising their strategic objectives?
   - Do the partners have a common strategic vision on the developments in their environment?
   - Does the collective activity add value for them and the partners and their customers?
   - Are the resources, profits and risks shared?
3. Human fit: is commitment equally shared, is there chemistry and trust?
4. Equal power: are the companies of a similar size and are they similarly sophisticated?
5. Realistic expectations of the performance of the alliance.
6. Win-win between the partners.
7. Cultural fit.
8. Operational fit: are the working methods compatible?
9. Network fit: what is the fit between the partners of our partner.
10. The established alliance should be managed properly, and unlike a marriage should be revised every, say 2-3 years. Will the goals of the alliance be still the same, aligned and will they be met?

Once the alliance partner has been selected, the appropriate form of alliance has been chosen, and the alliance has been established, it should be managed, monitored and reviewed periodically on preselected measurements, rather than left unattended. Does the alliance follow the line as set out in the joined strategy? If not, the strategy and execution should be adapted to cope with problems or to seize new opportunities. This can also be be reason to de-alliance the SA.

Set up the stages of ally-preparation and organising an alliance. Think of possible mistakes to be avoided in each stage.

The dos and don’ts experienced in the smart project can be summarised as:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Frequent mistakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real understanding of the intentions</td>
<td>No clear objectives, no WIN-WIN</td>
</tr>
<tr>
<td>Development of strategy</td>
<td>Rushing to partner choice</td>
</tr>
<tr>
<td>Phase</td>
<td>Frequent mistakes</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Organising the alliance</td>
<td>Lack of trust</td>
</tr>
<tr>
<td></td>
<td>No alignment of objectives</td>
</tr>
<tr>
<td></td>
<td>No shared vision</td>
</tr>
<tr>
<td>Negotiating</td>
<td>No preparation</td>
</tr>
<tr>
<td></td>
<td>Postponement of issues</td>
</tr>
<tr>
<td>Managing the alliance</td>
<td>Lack of rules</td>
</tr>
<tr>
<td></td>
<td>Lack of open communication</td>
</tr>
<tr>
<td></td>
<td>Lack of flexibility</td>
</tr>
<tr>
<td>Review process</td>
<td>No clear objectives</td>
</tr>
</tbody>
</table>

The table above is rather self-explanatory. The first point has to do with the fact that a company has to have a clear, agreed strategy before it can ally with another company. Also both companies should win with the alliance. The second point can lead to rushing into a ‘sympathetic’ partner. It even happens that the partner appears first, before the company has ever thought of allying.

Organising the alliance and negotiating is puzzling for most companies: how open should you be? Will we bring in a bunch of lawyers to settle the alliance, resulting in a thick document, or settle for a gentlemen’s agreement over a dinner? This is also, and possibly solely, a matter of culture. Anyway, it is possible that the success of an alliance is negatively related to the number of pages in the agreement, as a manager remarked. Once a company gets experience with allying, the success rate increases. We have already stressed the importance of managing the alliance and the review process.

Think of research questions for future research, not covered in the above.

Recent research

It was mentioned already that the intention has shifted towards ‘learning in alliance’. In fact an alliance has become a form of open innovation. Also research is going on in ‘alliance capabilities’ and ‘how to manage an alliance portfolio’, but the results are too premature and non-conclusive to include in this open innovation curriculum. For instance, there is not yet a clear idea about the relation between alliance capabilities and the performance of a company.
Part 3.2. Framing Open Innovation in a Broader Theoretical Landscape

KEY TAKE-AWAYS

• In innovation a company has the choice to rely on its own resources, ‘buy innovation’ or cooperate with another innovative company. We have discussed all three possibilities briefly.
• We have discussed the findings of an earlier European project, ‘smart’ on SAs.
• Strategic Alliances seem to be a fast, yet risky, possibility to benefit from Open Innovation. We have discussed the way of establishing and maintaining an SA, to be successful and to avoid the most frequent mistakes.

PEDAGOGICAL GUIDELINES

Learning exercises: Divide the group to 3 to 4 students. The task of each group is to do the following:
• Make a set of criteria why a company should stay solo, merge or form an alliance.
• Make a checklist (or even a quick scan) for a company that wants to ally with a competitor on the market.
• Apply this checklist to a local alliance and discuss what went right and what went wrong.
• Set up a workflow what should be done in deciding what to do (ally, merge or not), make the alliance happen and how to manage the alliance.
• Make a checklist (or scan) for when it is time to de-ally.

TEACHING TIPS

Subjects like Strategic Management are not subjects that should be lectured in the one-way direction, since then it is misleadingly logical and easy. Let the students discover the difficulties for themselves first. This can be done in a game of ‘questions and answers’, discussion, or doing little projects like the ones above.

Suggestions for exercises for students are in bold and italics, to be done individually or in small groups (2-4 persons).

REFERENCES

ADDITIONAL READING

NETWORK EXTERNALITIES AND OPEN INNOVATION

CARL JOACHIM KOCK

ABSTRACT

The purpose of this class segment is to introduce the concept of Open Innovation (OI) to students in a strategy class in an MBA or Master’s Program. In order to integrate this material in a typical Strategy curriculum, it is combined with another core topic, i.e., Network Externalities and Platform Markets. The latter should be part of any modern strategy syllabus already, and thus serve as a convenient bridge to introduce Open Innovation concepts that by their very nature are extremely closely related to externalities and platforms. More specifically, the platform nature of innovation brokers, as a particularly visible and important element of OI, is utilized to develop insights into both topics simultaneously.
<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>None – should be part of a capstone Strategy Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives of the lecture</td>
<td>This lecture combines the logics of network externalities and open innovation. It proceeds by: 1. Developing the logic of network externalities and especially platform markets, 2. Develops the basic logic of open innovation and helps students to understand that an open innovation approach essentially turns the innovating firm into a 'platform' with all the implications developed in the first part of the lecture, 3. Finally, Innocentive and other innovation brokers are examined as clear examples of institutionalized platforms for open innovation and strategic implications are drawn.</td>
</tr>
<tr>
<td>Workload</td>
<td>160 -180 minutes teaching; 2 h self-study.</td>
</tr>
<tr>
<td>Learning outcomes</td>
<td>Knowledge</td>
</tr>
<tr>
<td></td>
<td>LO #115: To remember and understand basic concepts of OI and their relationships.</td>
</tr>
<tr>
<td></td>
<td>LO #51: To Understand Innovation As The Result Of The Interaction Among Economical, Technological, Organizational And Social Factors.</td>
</tr>
<tr>
<td></td>
<td>Skills</td>
</tr>
<tr>
<td></td>
<td>LO #99: To understand and assess networks and collaboration networks.</td>
</tr>
<tr>
<td></td>
<td>LO #70: To Elaborate And Specify How Firms Can Benefit From Open And User Innovation.</td>
</tr>
<tr>
<td></td>
<td>Competences</td>
</tr>
<tr>
<td></td>
<td>LO #86: To Be Able Formulate A Critical Understanding Of The Factors That Contribute To Innovation.</td>
</tr>
<tr>
<td></td>
<td>LO #64: To apply, analyze, evaluate and design strategic decision making with regard to the implementation of relevant open innovations mechanisms in the organization.</td>
</tr>
</tbody>
</table>
Lecture Content

Organization

The lecture as described in this teaching note is based on a double-session (2x80 or 90 minutes) format that can be taught together or on separate days. The following two readings should be assigned ahead of class:

- An excerpt from “Open Business Models: How to Thrive in the New Innovation Landscape” by Henry Chesbrough; specifically, the chapter “Innovation Intermediaries”.
Furthermore, one workgroup should be tasked beforehand with preparing a short presentation (for the beginning of the second session). The task formulation should be along these lines: “Please read the excerpt from the Chesbrough book with particular attention to the description of ‘Inno-Centive’; after that, please check out innocentive.com and do whatever additional research you can to derive information about the current state of that firm. Prepare a short presentation (5 minutes) that provides an introduction of this firm, its business model and current state of the business to the rest of the class”.

The rest of this note makes a proposal of how to structure the interactive lecture based on the attached slide set.

Overview

In the initial session, the lecture first develops a basic understanding of the topic of network externalities and platform markets, illustrating the concept and key issues with a number of small examples. After the class has reached an understanding of these issues, the teacher should introduce the notion and key rationales for OI with the implication that the need to bring together sources and seekers of innovation naturally connects this with the externality/platform logic.

Once the class has understood the basic premises, the assigned workgroup will make a presentation on InnoCentive that gives the class the idea of immediacy and actuality and a starting point for a detailed examination of the network/platform issues that an innovation broker like InnoCentive faces. Besides exploring how this firm promotes OI on one hand and is related to platform markets on the other, a practical and broader implication will be developed by applying the logic of network externalities to examine the future prospects of InnoCentive. In particular, the question is whether this firm might be able to generate a ‘lock-in’ and become the only Innovation Broker by leveraging network externalities to marginalize other existing or prospective brokers, or not.

**NETWORK EXTERNALITIES AND PLATFORMS**

I typically start a lecture on network externalities and platforms by showing Slide #2 and simply stating that there are some products or technologies that become MORE valuable to each user the more users there are. With the slide still up I then explain the basic intuition by the example of the phone (simply raising your mobile phone in the air neatly underscores that…).

- I simply ask: if that was the only phone in the world, how much would it be worth?

The correct answer is, of course, ZERO – since the value of the phone does not come from consuming it (like a candy bar), but from connecting people. The phone only starts being of value to its
owner if there are others with a compatible technology that can receive calls. Obviously, the more others, the more valuable the phone becomes! This discussion should proceed relatively fast if the students have read the assigned technical note on platform markets – yet, it is vital to go through the next steps to ensure that they really understand how the different issues are linked together.

I continue by identifying this effect in the phone industry as a ‘direct’ (or ‘same side’) network externality (NE) and push the students to consider if there are other types. If it does not come up naturally, I prompt:

- Think of something like a videogame system (Nintendo, Sony…) – are there NEs in that system?

This discussion should uncover a couple of key concepts:

- NEs in the case of videogames are primarily ‘indirect’ (or ‘cross market sides’) – the more gamers, the more incentive for a third party (game developers) to create good games, which creates value for the gamers, incentivizing more gamers to join the system, prompting more developers to come in, etc. – a ‘virtuous cycle’ emerges!
- Also, in the case of video games we can identify 2 separate products associated with distinct players: hardware (the game base station required to play game cartridges/software) and software (the actual games).
- Hard and software are strong ‘complements’ – you need to have BOTH to create value for the customer!
- The hardware, in this case, essentially becomes a platform that mediates between gamers and game developers (I mention this, but do not push the point at this time).

The slide ‘Types of NE’ makes some of the technical distinctions apparent, while the two following slides help to make the distinction between traditional value chains and platform markets.

I then force the students to consider the implications of ‘increasing returns’ / NE:

- What happens if you have two incompatible technologies (networks) and strong increasing returns?

The discussion should lead the students to identify that strong externalities lead essentially to a monopoly position – the larger network (whether based on direct or indirect externalities) becomes ever more a centre of attraction for, e.g., gamers and developers alike, starving the other network to extinction.

Moving to the slide ‘Network Races…’ I continue this thread by suggesting that this feature of NE might make for some pretty heated competition. To illustrate these dynamics, I bring up the case of
VHS vs. Beta, which students will recognize as those ‘old videocassette technologies’ (the choice of an old system is intentional – it illustrates that NEs have been around for a while, shaping competition in various markets; also, students will typically bring up the successor technologies – DVD, Blue Ray, which have gone through similar cycles again!).

- I ask: do you remember those old VCRs – which technology, VHS or Beta was considered ‘better’?

Several students will typically immediately recollect that Beta was considered technically superior to VHS. I ask:

- Which one won?

Well, VHS, even though it was inferior! I illustrate that on the blackboard by drawing a small (VHS) and a larger (Beta) rectangle next to each other to signify the value of the ‘base station’ (the actual video cassette recorder).

- So, why did the inferior technology carry the day?

This discussion should connect to the logic of NE and uncover a number of key points:

- VCR technologies had indirect (cross side) NE – the hardware becomes more valuable if software, in this case content in the form of movies etc., is available (you could, of course, also record content from your own TV, but how many VCR users did that? I recall the joke of the VCR still blinking ‘12:00’ after many years – because the user never read the instructions or did anything but put in a tape….).
- Thus, movie studios were ‘complementors’ in this industry.
- If you (a hardware maker, e.g. Sony who promoted the Betamax system) can get lots of movie studios to make their movies available for your system, you add a large amount of value to your system – I signify that by drawing additional rectangles on top of the first (just now the total height of the rectangle for VHS is much larger than that for Beta).
- If your system offers more value overall – you win! Competition with NE is not decided on the value of the ‘base’ product alone, but on the combined value of that base and the available complementary products.

If this does not come up during the discussion I then prompt:

- That is great – if you get the most complements you win the competition – but which firm will win? How do you get to the position where you offer all the content and therefore attract all the customers?
The ensuing discussion should uncover the ‘chicken and egg problem’ of platform markets – once you have all customers, all complementors have NO choice but to work with you, and once you have all the content there is NO point for a customer to go elsewhere. So, one side of the market is with you because the other one is with you as well, and that other side is with you because the first one is with you…

- Again, great, but how do you get there if one (or both) sides are missing?

The ensuing discussion should at least touch on the following:

- You (a base station or ‘platform’ owner) need to ‘invest’ to get the self-reinforcing cycle going; once you have some customers you might get some complementors, which will attract more customers (or vice versa.).
- These investments may include subsidizing one side of the market (examples: videogame systems typically sell the base station at or below costs, Google, Facebook and many other firms give their basic service ‘away’), advertising, subsidizing the distribution chain, paying licensing fees for initial content (subsidize the software side…) etc.
- The NE self-reinforcing cycle starts when at least ‘some’ elements of one side are ‘on board’.
- Once you get to a ‘critical market share’ the NE may become so strong that your system ‘locks-in’ the market, and the other system(s) dies away.

At this point I explain that market share in an NE race is indeed critical, as after all, if you are the largest network already, the self-reinforcing cycle should lock YOU in and others out – yet, what counts is NOT ‘current share’; rather, the key is the share that a system commands when the market matures (use the animated life cycle graph for this). The example that brings this to life is the fate of Netscape: this early Internet browser had an absolutely commanding lead of over 90% of the browser market in the late 1990s (see e.g. Wikipedia); yet, within a few short years Microsoft managed to reverse this trend completely to >90% share for itself by 2000 (read the story here: http://www.theguardian.com/global/2015/mar/22/web-browser-came-back-haunt-microsoft) and essentially lock-in its own browser; the Internet Explorer. The explanation for this lies in the fact that Netscape might have had >90% share of the market at the time – but this represented only a tiny fraction of the potential market, which was just developing as the number of people joining the Internet skyrocketed. In other words, Netscape dominated the early adopters of the Internet (90% of, say, 5%…), but as the Internet use itself moved into the fast growth phase, this early lead meant nothing! During the fast growth phase, millions of people entered the Internet for the first time, often buying new computers with a Microsoft operating system and a pre-installed Internet Explorer. Having no prior experience or loyalty (switching costs…) with Netscape, these people simply clicked the Explorer button, and the rest is history.
A similar story can be told for Apple’s success with iTunes – while the music industry was near-paralyzed by Napster & Co’s facilitation of Music piracy, Apple recognized that music piracy was most likely committed by a rather small group – teenagers/twenties with no money, but ample time, technical knowledge and early Internet access (in schools, universities). However, the large majority of the ‘rest of us’ was not part of that ‘early adopter’ (of ‘music over the internet’) group, for pretty much the exactly same reasons (have money, but no time, no technical knowledge, no Internet connection yet – but a healthy respect for authority and no desire to risk a job for a 99c song…). It was that latter large market that the legal, easy-to-use, efficient iTunes software and store addressed…

I then twist the story back to VHS vs. Beta – these technologies had a large potential market; if millions of households had a VCR, the complementors (movie studios) might see this as a rather lucrative way to sell more movies. That is the lure – the large potential FUTURE market!

- Yet, when VCR technologies were introduced in the late 1970s did movie studios immediately embrace that new technology as an opportunity or did they see that as a threat?

Prompted like that, students will most likely realize that most movie studios perceived VCRs more as an extension of the threat that the TV already posed; movie studios typically gross a lot more per viewer in movie theatres – the proliferation of TVs had already undermined the movie studios’ business model significantly as people shunned the cinemas. Arguably, being able to choose freely the content at home would exacerbate that trend!

Hence, the firms promoting either Beta (Sony) or VHS (JVC, Matsushita/Panasonic, etc.) could not count on the open reception and high willingness of complementors to participate (parallels to Apple and iTunes should be obvious) and rather had to work hard to convince movie studios to provide content for their budding new hardware technologies. This was likely to require some investments (hard/long negotiations, advertising, licensing fees, maybe even acquiring studios – think of Sony Pictures…) to get them aboard one of the VCR technologies.

- Ok, so each hardware sponsor tries to get movie studios to sign up. Now, if a movie studio actually starts to see VCRs as an opportunity to sell more movies, can they now just start making movie cassettes for both systems or do they have to focus on one?

This questions probes into the logic of ‘multi-homing costs’ – i.e., the question of whether a certain market-side can easily move/switch between different networks or platforms. In this case, the discussion should reveal that multi-homing costs are fairly high, as converting large libraries of movie titles into physical ‘cartridges’, warehousing them, pushing them into the supply chain etc. involves high costs. Doing so for two incompatible systems is essentially prohibitive.
The implication is that movie studios need to pick a side and have then relatively high switching costs to leave that side again. Naturally, this implies further that each studio would like to pick the side that offers it the biggest potential return – in other words, each studio wants to bet on the eventual winner, the company that dominates the market at maturity. Yet, it is not clear at all which hardware would-be standard will be the winner -- and this is precisely what triggers the network race (slide; note: these are not real numbers, the slide is just for the purpose of illustrating the process of the race): each firm or consortium behind one of the technologies tries to sign up as many studios as possible, which would then lead to a self-reinforcing cycle with more customers buying the respective VCR, creating more incentives for the next studio and so on; yet, as one system starts to lead, the backers of the other system will re-double their efforts and thus draw out the competition until a ‘critical share’ or ‘tipping point’ is reached. While difficult to predict ex-ante, with hindsight it is pretty clear where this tipping point lies – it is essentially the point at which everybody becomes convinced that one technology will, in fact, win! VHS will carry the day! Once that is clear, even those complementors that have bet on the ‘wrong’ technology might jump horses mid-race, thereby increasing the virtuous cycle for the winning system and creating a vicious cycle for the losing one. The result is monopolization of the market by one system. To the extent that the firms behind the winning platform have managed to maintain ‘ownership’ of the platform (Nintendo, e.g., installed a security chip in its consoles, which allowed the firm to decide later on who could create compatible software and who would be excluded), that is the period of monetarization, while the preceding race to the tipping point is often characterized by high investments and low/negative returns (the heated race between Sony, Nintendo and Microsoft in modern game stations comes to mind).

Before summarizing the NE discussion, I ask one more question:

- Having a monopoly position is of course great for the platform owner – but are they at risk of being replaced by another platform?

Some students will mention the aforementioned situation of being early in a life cycle and therefore having lots of uncommitted customers entering the market; yet, apart from this special situation, the whole logic of NE is that all the value for either side of the market is WITH the dominant platform; customers do not stand to gain from trying out other platforms (especially if that would incur additional costs – e.g., buying a new base station – which serve as potent switching costs), while also the complementors have little to gain in supporting a new platform that serves a comparatively tiny fraction of the market (i.e., low potential sales). Hence, entry at a similar technological level is essentially impossible at this point. On the other hand, if a new entrant could, from the very beginning, provide so much more value with a new technology that the combined value of existing hardware and software libraries is checked, entry might become feasible again. I illustrate this by going back to the rectangles from earlier and draw a third one that is taller than the earlier ‘winner’
technology. In the early videogame industry, for instance, Sega surpassed Nintendo’s 8-bit system with a 16-bit system that provided such superior graphics that customers saw more value in Sega’s system even with only a small game library; likewise, Blue Ray players offered such an advancement in video resolution that a small initial library was enough to lead people to switch from DVD (or VCR) technologies.

To conclude this part, I summarize the ‘key logics of NE’ (slide) and platform markets.

Ideally, the class takes a break at this point.

OPEN INNOVATION AND INNOVATION PLATFORMS

Transitioning from the basic NE logic to Open Innovation I ask:

- What is an innovation?

I condense the ensuing discussion into the traditional definition by Schumpeter (slide) as a ‘new combination of existing and new resources…’ and then ask:

- Well, do YOU, or your firm, have all those resources in-house?

In the resulting discussion, I make sure that at least the following points are covered:

- Even the largest firms do NOT have even a fraction of the brainpower of their industry (here, the example of P&G – a couple of thousand in-house R&D scientists vs. >1 million outside – is nicely illustrative). Thus, what are the chances of coming up with the BEST ideas consistently?
- Also, innovation is about ‘combining’ – besides your core business, there might be inspiration from various other, related areas – most of them are likely outside your firm…
- Related to the last point: trying to innovate outside your core competence likely lacks in scale economies.
- Many students will also tie this in with the logic of exploitation/exploration and incremental vs. radical or disruptive innovations (especially if these topics were covered in earlier classes) – relying on your own experience sounds like the definition of exploitation…

- What is the typical process of innovation in a firm?

This question expands the previous discussion by considering the ‘regular’ R&D process (which allows us to draw the regular in-house process as a baseline on the blackboard): Scientists ‘R’esearch
Part 3.2. Framing Open Innovation in a Broader Theoretical Landscape

Scientists, production people and marketing ‘Develop’ – Marketing ‘Commercializes’ - RDC. A process that is mainly in-house, but may involve, e.g., supplier or customer input (focus groups, requests, etc. – a simple version of ‘openness’…) (see also Chao, 2013).

- Do firms use ALL of their good ideas?

This question should elicit a discussion on what happens with ideas that are not turned into products or services:

• they could be sold or licensed to someone else;
• they are often neglected;
• sometimes they might be intentionally held back (fear of cannibalizing own products – Kodak and digital cameras come to mind; they were at the forefront of developing these, but held back, in part, in fear of cannibalizing their razor-and-blade business model around film. A neat way to prompt discussion on this is ‘why is iTunes run by a tech firm and not one of the music companies themselves…?’);
• similarly, fear of giving up a ‘great market’ (thus, rather not commercializing the idea to begin with – see the Chesbrough chapter).

If the last point does not come up naturally, I prompt:

- What might be the reasons for firms seeming to waste so many good ideas?

Besides fear of cannibalization, students typically mention issues that are related to organizational inertia, such as:

• the market is judged as unattractive;
• the current customers are not interested;
• the new products are initially inferior to what is already on the market
• etc.

These issues mirror the work of Christensen and Bower on Disruptive Innovation (1996) – the pertinent example is the disc drive industry, where leading firms developed new generations of hard drives, but found that the current customers were not interested; shelving those innovations, the firms concentrated on developing their existing products further, thereby allowing new firms (especially those started by disgruntled engineers, formerly of the incumbent firms, whose innovation had been passed over) to develop the next generation products and eventually taking over market leadership… – more recent examples include the music industry and iTunes, Kodak/Polaroid and the digital revolution, or Nokia and the touch screen phone…
So, on one hand, there are lots of good ideas outside the firm that we typically don’t consider, and on the other hand, there’s great stuff inside our own walls that we often neglect – what shall we do?

Open up!

- Well, what, exactly, does that mean?

This is a broad question regarding the content of the innovation process as well as its organization. Make sure that at least the following issues are covered:

- making the boundaries of the firm more permeable
- bring in MORE customer input
- bring in MORE supplier input
- NEW: bring in inventors
- partner with other firms
- allow your own intellectual property (IP) to be offered to others
- accordingly: change the organization from the internal R, D and C, to an internal & external R & D, and facilitate ‘other’ firms to do the same!

- What are the potential advantages and disadvantages or ‘problems’ of ‘opening up’?

Put the following two categories on the board – you will need them later! For more background, please see Kock, Salmi and Torkkeli, 2009.

Key potential advantages:

- More ideas
- Faster development
- Integration of new perspectives
- Better customer reception
- Better coordination with suppliers
- Less waste of great ideas (related to that: fewer disappointed members own staff who had worked at ideas that were shelved…)

Key potential DISadvantages:

- More nodes/interactions may actually slow down things.
- More actors/external actors may lead to inefficiencies as there are less established routines of working together, incompatible systems etc.
- Requires a high level of existing absorptive capacity (i.e., the ability to recognize, make sense and
act on knowledge outside the firm (Cohen & Levinthal, 1990)) from the focal firm – otherwise absorbing knowledge might not work.

- Problems of accessing (or offering) key pieces of IP – the Arrow Information Paradox discussed in the Chesbrough chapter (i.e., to decide whether a piece of IP is worth anything for the buyer, the seller must demonstrate it, thereby essentially giving the information away for free… The example of Steve Jobs’s visit at Xerox’ Palo Alto Research Center (PARC) comes to mind, where Jobs got the inspiration for the graphical user interface and the mouse (e.g: http://fortune.com/2014/08/24/raw-footage-larry-tesler-on-steve-jobs-visit-to-xerox-parc/).

- If the actors expect this, they will not offer their IP in the first place ► Market failure!

- Related to the last point: Potential leakage of key capabilities from interacting with others for ‘own’ innovation or simply from selling IP.

- **Do you see parallels with the discussion we just had on platform markets?**

► ideally, the firm becomes a platform between idea generators and customers; self-reinforcing NE would ensue – the more ideas ► the more customers ► the more ideas…

In fact, the platforms we discussed earlier – VCRs, iTunes – or App stores – are extreme examples of just this: a firm creates a way for many other actors to come together and create new sources of value for clients that they reach through the platform; when Procter & Gamble uses a system called connect + develop (www.pgconnectdevelop.com/) to crowdsource innovation that it then includes in its products, it does essentially the same, save for actually producing the products itself, while in the aforementioned platforms the production task is typically performed by the complementors themselves. The instructor may wish to probe these similarities and differences a bit deeper with the students.

- **At this point I call up the student work group that has prepared the presentation on InnoCentive.**

This approx. 5 min presentation should provide a good overview of the current state of affairs of this Innovation Broker and will most likely highlight the current numbers of idea sources and seekers.

Once the presentation concludes, I continue:

- **Many thanks to the group for their insights on InnoCentive! Let’s connect the dots a bit – to what extent does InnoCentive create a ‘solution’ to the ‘problems’ that Open Innovation poses?**

The discussion should identify the logic of an innovation broker as a platform approach (tying in with the discussion in the first session) to make OI feasible on a larger scale. Specifically, the follow-
ing points should be touched (probe with additional questions if necessary):

**Arrow Information Problem**

- As described in the Chesbrough chapter, the broker provides a solution to the Arrow information paradox by serving as a reliable intermediary that both parties can trust. By tying each side (seeker, source) elaborately into legal agreements and only disclosing just enough to each side, the broker can assure that payments are made – *and that the market comes to exist in the first place!*
- The broker also provides a way to get to a ‘critical mass’ – few firms are big enough to attract a large amount of innovation sources all on their own (P&G is a rare positive example...); thus, by creating a separate market place that brings together sources and MANY seekers (many different firms), the broker logic allows for a more attractive situation for both sides.
- This is a result of cross-side network externalities - the more seekers, the more interesting the market becomes for a source and vice versa.
- Note: there are no or even negative ‘same side’ externalities – which firm wants its competitor to have access to the same IP it does?

**Complexity/missing knowledge of how to work with external actors/absorptive capacity**

- InnoCentive developed capabilities of its own that helped to streamline the process and connect the actors – note how the Chesbrough chapter describes how InnoCentive created ways to help firms define challenges etc.

**Leakage of information or capabilities during the process**

- InnoCentive’s use of ‘private rooms’ and supervision helps to alleviate fears of IP leakage (this is related to, but on top of overcoming the basic market failure of the Arrow paradox – even if an innovation source feels comfortable working with a firm, the firm might now be exposed to information leakage as well, as the would-be innovator gains access to privileged information potentially beyond the innovation challenge in question – InnoCentive’s safeguards help, as do the various safeguards described for the InnovationXchange model described in the latter part of the Chesbrough chapter)

- So, InnoCentive thus solves many of the problems we have identified by establishing a platform beyond any individual firm so that it can draw in more elements of each market side. Yet, how did InnoCentive overcome the usual chicken&egg problem discussed earlier?

Students will likely recall that InnoCentive was basically boosted by their parental relationship with Eli Lilly, who served as the ‘seed’ on the ‘seeker’ side of the new market. This, in turn, drove an influx
on the solver side, thereby making the market more attractive for additional firms as well.

Now we enter the final round where we bring together the OI and NE logic even more explicitly:

- How sustainable is this OI facilitation logic? Specifically, will InnoCentive become a monopoly – or will another Innovation Broker take such a position and end it for this one?

The ensuing discussion should revolve around the three basic issues that the “Strategies for Two-Sided Markets” reading identifies as key for a ‘lock-in’ (use the animated slides ‘Winner takes all’ for this).

**Network Externalities**

- Here, the students should reflect on how, exactly, seekers and sources gain from each other. Much of that issue should have been discussed earlier – the class should come to the conclusion that the whole logic of OI is that bringing together these two sides creates additional value, so, strong NE!

**Multi-homing costs**

- Students will likely argue that the various services that InnoCentive provides and that strongly facilitate the generation of OI also act as deterrents/switching costs for seekers and sources to go with another provider.
- Probing more deeply, it appears to be the seeker side (firms) that is most involved here and requires assistance in framing their needs correctly. Thus, this side should be relatively ‘sticky’, once they tried it.
- Yet, the fact that repeat business – even from Lilly – was not very strong initially, dampens this idea!
- Also, some students will argue that once InnoCentive taught a firm successfully how to do OI on a platform, that firm could now easily use other platforms as well (that may have similar safeguards regarding IP leakage, but perhaps offer fewer services – like e.g. no coaching on how to phrase offers… - and, as a result, lower fees! Note that the Chesbrough chapter implies that InnoCentive charges about 29% on top of the awards firms have to pay for successful sources – see p. 10: the awards totaled $333,500, and the total amount of awards and fees was $430,000 – thus, as a nice aside, the teacher could ask the students to calculate the number: how much does InnoCentive actually charge?)
- For the source side, since they apparently do not need much advice and can rather simply sign up, the switching costs are probably lower.
• Interestingly, the higher switching costs for the seekers seem to come at the expense of a lower penetration on this side of the market (the chapter suggests that InnoCentive had a much larger number of sources than seekers – illustrating the double-edged sword of platforms; make it easy and they come in large numbers, but may leave just as fast; make it more ‘involved’, require more of an investment, the numbers will grow slower; but be more sticky).

• In conclusion, there seem to be switching costs, but primarily on the seeker side, and not very high…

Special needs and tastes

• Generally, if the whole market is relatively undifferentiated in needs and preferences, then, given strong NE, one should expect a lock-in to just one network; if there are, however; special needs and thus groups that do not really benefit ‘each other’ by being in the same network, multiple platforms might co-exist (or perhaps lock-in to smaller sub-segments of the industry). To drive this point home, ask a trick question:

  • Did Facebook lock-in the total market of online social interactions?
  • The answer is ‘no’ – while they are pretty pervasive, there is at least one rather large network that they split the market with: LinkedIn; the reason being that people like to separate private and business lives (in fact, many people will be on both networks).

  • Another illustration is the survival of Apple during the PC era – despite the extreme appeal of the open MS-DOS platform, Apple managed to scrape by with a few percentage market share, as the design community (separate, very specific need) preferred the Mac… (By the way, offering an operating system and inviting complementors to add software is certainly one version of OI – the overall value of the ‘system’ is co-created by many actors!)

  • For InnoCentive, students will point out that their strength seems to be Chemicals – and that both the seekers and sources are fairly specialized in this area.

  • Accordingly, while it is likely that InnoCentive will lock-up the OI platform spot in this particular industry, it is much less likely that it can expand the OI-platform to other industries as well.

  • If it did, the question would be whether the existing seekers or sources would contribute (i.e., jumpstart) NE in a new industry, or whether InnoCentive would have to literally start from scratch (chicken&eggs all over again…), in which case its current lead would be meaningless and another platform would have an even chance of dominating the OI-platform of that industry.

  • Students might discuss which industries might be close enough to have a synergetic link; in those industries InnoCentive could leverage its existing network to overcome the chicken&egg problem before others get the idea… (this can be linked to the example of BIG that seems to be focused on just one industry and is only expanding in small steps to a related one).

  • A risk for InnoCentive would be if another platform ‘enveloped’ its own approach. Yet, the spe-
specific, rather deep technological needs of seekers and sources in the Chemical industry makes that seem less likely.

In conclusion, InnoCentive is on a good path to dominate the OI-platform in chemical industry (and maybe related ones) for the foreseeable future, but its lead is not unassailable – ironically, by teaching seekers how to do it, it makes itself vulnerable to 2nd movers that economize on such expenses and offer a budget OI-platform – the Arrow Information Paradox at work again!

**KEY TAKE-AWAYS**

I then sum-up the whole class with the aid of the last content slide:

- Network externalities are extremely potent and key to many modern business models.
- OI is a way to hypercharge your business by moving into an externality world.
- InnoCentive provides a platform to institutionalize that externality world and involve enough actors to make this whole thing feasible.

**REFERENCES**

This chapter features the important role of users in the process of innovation. In the innovation process users can be sources of ideas, products and services as they are able to assess to their problems and needs. Moreover, this chapter introduces various tools for involving users in innovation process: free revealing through open source software and co-creation process through Living Lab methodology. The chapter is complemented by additional sources for readings, pedagogical guidelines, evaluation questions and teaching tips.
### Prerequisite
Generic knowledge of organizational theory and innovation management.

### Objective of the lecture
This module consists of 3 sub-modules aiming at:
1. General understanding of user-led innovation;
2. Providing insights into free revealing and open source software;
3. Providing knowledge on industrial networks and practical examples of innovation-driven collaboration within (or between) these networks.

### Workload
4-6h teaching; 4 h self-study (2h/sub-module).

### Learning outcomes

#### Knowledge
- **LO #2:** To explore concepts of collaborative innovation and apply them.
- **LO #115:** To remember and understand the basic concepts of OI and their relationships.
- **LO #90:** To understand the dynamics between innovation and the contextual environment.
- **LO #117:** To remember and understand how firms can benefit from user/supplier/customer innovation.

#### Skills
- **LO #99:** To understand and assess networks and collaboration networks.

#### Competences
- **LO #64:** To apply, analyse, evaluate and design strategic decision making with regard to the implementation of relevant open innovation mechanisms in the organisation.

### Reading List
- Users as sources of new ideas (von Hippel 1988, DIUS 2008)
- Users’ involvement in changing services (von Hippel 2005, NESTA 2007a)
- Users’ involvement in changing processes (von Hippel 1988, 2005, NESTA 2007a)
- Users’ involvement in changing systems (von Hippel 2007)
User-led innovation

User-led innovation is a concept used in creating various innovative products and services through user involvement within different industries. Involving users in the innovation process in order to assess to their problems and needs can help develop potential and successful future products. This goes for SMEs as well as large companies. The sophisticated and expensive innovation process makes it almost impossible for firms to innovate independently and alone. Therefore, including users in the innovation process enables firms to bring ideas and knowledge from outside into the firm (Bisgaard & Høgenhaven 2010).

To date, firms have become more dependent on the consumers, and user-led innovation increasingly become popular among firms. For example, Linux has created a path to connect individuals from all around the world to engage in projects of interest to them.

The users may have different roles in the innovation process. For example, Gristock (2008) has identified the following categories (definitions will follow):

• Users as sources of ideas:
The ability of firms to engage users in the initial phases of idea generation. Example: idea bank.

• Users changing products:
Firms utilize user experiences to extend the range of products or incrementally to innovate a product to satisfy consumers’ needs.

• Users changing services:
Firms utilize user experiences to extend the range of services or add an innovate service to satisfy consumers’ needs.

• Users interacting via open systems:
In the open systems, the users interact and share perspectives, and organisations can benefit from the users’ insights and feedback in order to serve them with relevant outcomes.
• The roles of users and open systems in democratic innovation systems:
Users of products and services – both firms and individual consumers – are increasingly able to innovate for themselves. User-centered innovation processes through democratized innovation systems occur at two levels: 1) steadily improving design capabilities (innovation toolkits); and (2) steadily improving ability of individual users to combine and coordinate their innovation-related efforts via new communication media, such as the Internet (von Hippel, 2005).

Free revealing and Open Source Software

Among the tenants of Open Innovation there is free revealing (von Hippel & von Krogh 2006; Henkel, 2006). With free revealing we mean that “all intellectual property rights to [proprietary] information are voluntarily given up by that innovator and all parties are given equal access to it – the information becomes a public good” (von Hippel & von Krogh, 2006: 295). The key questions in free revealing are about “why do people free-reveal” and “who benefits from free revealing”. For example, users who free-reveal may be motivated by obtaining support from a user community or a manufacturer and building reputation (Henkel, 2006).

An example of free revealing can be seen in the Open Source Software projects. Open Source Software (OSS) is “software that comes with source code and a usage license that allows for modification and further redistribution of the source code by any user” (von Krogh, Spaeth & Lakhani, 2003: 1217).

An introduction on OSS may be based upon von Krogh and von Hippel (2006), who distinguish between three main areas: (1) motivation; (2) governance, organisation and the process of innovation; and (3) competitive dynamics. We suggest a cycle of lessons divided accordingly. See von Krogh and von Hippel (2006), for a broad list of contributions on each of the three topics.

Finally, we can move a step further via looking at why commercial firms take part in public OSS development (Henkel, 2006; 2008), via exploring the role of open source developers in commercial firms (Henkel, 2008) and via analysing the heterogeneity of firms when they reveal information (Henkel, 2006).

Activity 1. Find examples of OSS and compare them. We suggest comparing successful and not successful examples in order to understand why some OSSs have been successful and others have not.

Activity 2. Brainstorming about why and when to use free revealing. The teacher may ask the students to list the pros and cons of free revealing to understand under which conditions it may be worthy to free-reveal or not.

Living Labs

Several definitions have been provided for living labs. Among the most commonly used, we can cite the definition of Westerlund and Leminen (2011), who define living labs as: “physical regions or vir-
tual realities, or interaction spaces, in which stakeholders form public-private-people partnerships (4Ps) of companies, public agencies, universities, users, and other stakeholders, all collaborating for creation, prototyping, validating, and testing of new technologies, services, products, and systems in real-life contexts”. Others have defined a living lab as an organised approach to innovation, consisting of real-life experimentation and active user involvement (Schuurman, 2015).

An overview of living lab definitions found in the literature and used in practice is offered by Dell’Era and Landoni (2014). The main elements of these definitions are the living lab methodology (and tools) and the infrastructure (or ecosystem) to put this methodology into action. Hence they define a living lab as a design research methodology aimed at co-creating innovation through the involvement of aware users in a real-life setting.

Living labs can be seen as a collaborative constellation and methodology for cooperative and participative research and design. The tradition of participative research and design goes back to the middle of the 20th century when end-users took a part in trials of novel products and technology. In the following decades, various approaches have been developed to involve users in research and design, in some cases in real-life settings and using multiple approaches. Robles, Hirvikoski, Schuurman, & Stokes (2015) describe four former approaches of the living lab methodology and their main characteristics.

<table>
<thead>
<tr>
<th>Cooperative design 1970’s</th>
<th>Social experiments 1980’s</th>
<th>Digital cities 1990’s</th>
<th>Home labs 2000’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active user involvement</td>
<td>+</td>
<td>+/-</td>
<td>-</td>
</tr>
<tr>
<td>Real-life setting</td>
<td>+</td>
<td>+</td>
<td>+/-</td>
</tr>
<tr>
<td>Multi-stakeholder</td>
<td>+/-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Multi-method approach</td>
<td>+/-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Co-creation</td>
<td>+</td>
<td>+/-</td>
<td>-</td>
</tr>
</tbody>
</table>

Figure 1. History of participative research and design (Robles, Hirvikoski, Schuurman, & Stokes, 2015)

Schuurman (2015) has developed a three-layer model for living labs describing three levels of analysis: macro-level (the living lab constellation or infrastructure), meso-level (the living lab innovation project) and micro-level (dealing with the methodology and process within a specific project).

- openness of interaction with users (open or closed);
- role of the methodology/platform technology (value creation or value capturing).

The configuration of open and explorative living labs is most suited for the opportunity identification phase. In this type of living lab, new research and design tools and technologies are introduced
Dell’Era and Landoni (2014) describe a living lab as a methodology between user-centred design and participatory design, and identify four different specifications for this methodology based on the combination of two dimensions:

<table>
<thead>
<tr>
<th>Level</th>
<th>Definition</th>
<th>Research paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro</td>
<td>Living Lab constellation consisting of organized stakeholders (PPP-partnership)</td>
<td>Open Innovation: knowledge transfers between organizations</td>
</tr>
<tr>
<td>Meso</td>
<td>Living Lab innovation project with Living Lab methodology</td>
<td>Open &amp; User Innovation: real life experimentation, active user involvement, multi-method and multi-stakeholder</td>
</tr>
<tr>
<td>Micro</td>
<td>Individual research steps and activities, linked to the stakeholders’ assets and capabilities</td>
<td>User Innovation: user involvement &amp; contribution for innovation</td>
</tr>
</tbody>
</table>

Figure 2. Three levels of analysis (Schuurman, 2015)

to a diverse and non-moderated pool of users who provide feedback on the research questions and input for the design stage. The type of open and exploitative living lab focuses on the concept generation phase.

The more closed configurations of living labs (both explorative and exploitative) are based on collaboration with a group of pre-selected users and other stakeholders and offer conditions that facilitate concept design and market testing. These processes, aiming at convergence instead of divergence carry higher costs in selecting users and require limited access to the experimental setting of the lab.

Schuurman, De Marez and Ballon (2016) stress the need for both open and closed innovation approaches and balancing these approaches in living lab practices.

The living lab methodology implies triangulation of different methods and information sources in combination with a real-life context. Pierson and Lievens (2005) describe five different stages of the living lab methodology: (1) contextualisation, (2) selection, (3) concretisation, (4) implementation, and (5) feedback. Ståhlbröst and Holst (2012) describe FormIT as a specific method to support living labs. This method is based on three iterative cycles: (1) concept design, (2) prototype design, and (3) innovation design.

Bergvall-Kåreborn, Ihlström Eriksson, Ståhlbröst, and Svensson, (2009) describe five principles that are the key for living labs. These principles are openness, continuity, empowerment of users, realism, and spontaneity. These principles should be taken into account in the design and organisation of a living lab and the innovation process. The key principle of openness regards the involvement of
stakeholders that possess varying perspectives, knowledge and expertise. The partners bringing different skills and competences are expected to strengthen the knowledge base of the living lab, hereby enabling rapid progress in the innovation process. Practicing openness, living labs aim at enhancing the pace and time to market of the innovation process. Therefore, collaboration in living labs should involve stakeholders that have diverse perspectives and expertise.

**KEY TAKE-AWAYS**

- User-centric innovation helps companies to bring ideas and knowledge from outside into the firm.
- The involvement of users can be stretched beyond activities focused on need assessment and test panels. The Living Lab methodology is aimed at co-creating innovation through the involvement of aware users in a real-life setting.
- An example of free revealing can be seen in the Open Source Software.

**PRACTICAL IMPLICATIONS**

The methodology and infrastructure of living labs can support the identification of the (latent) needs and values of relevant users and stakeholders and facilitate collaboration between these stakeholders in the design, prototyping, evaluation and commercialisation of innovative products and services.

Despite the benefits and positive outcomes of the living lab approach, involving users and other relevant stakeholders in open innovation is not easy and will require an additional budget. It requires extensive preparations and continuous attention to the leading principles of living labs: openness, continuity, empowerment of users, realism, and spontaneity. Involving multiple stakeholders will in many cases require investments in physical and/or virtual meeting places and IT-supported communities. In addition to the initial investments in IT, the living lab communities will require close moderation, resulting in additional costs. The empowerment of users can be established by various ‘appraisal and reward systems’ that in some cases require additional funding.

Various organisations offer services and tools that facilitate the design and exploitation of living labs. These services and tools vary from generic guidelines and practical do’s and don’ts to advanced IT-platforms and toolkits to facilitate multi-stakeholder collaboration.

The European Network of Living Labs (ENoLL) offers a wide range of publications and case studies that describe how the concept of living labs has been put into practice in various contexts.
PART 3.2. FRAMING OPEN INNOVATION IN A BROADER THEORETICAL LANDSCAPE

ADDITIONAL READING MATERIALS FOR STUDENTS

Examples of Open Source Software

• Apache (Lakhani & von Hippel, 2003)
• Freenet project (von Krogh, Spaeth & Lakhani, 2003)
• Toolkits (von Hippel & Katz, 2002)
• Pyramiding and screening (Schuurman, De Marez & Ballon, 2016)

Examples of Living Labs

• The Technology Innovation Management Review (TIM Review) provides insightful content about the concept of living labs. The journal offers both theoretical contributions and case studies describing innovation projects in practice.

PEDAGOGICAL GUIDELINES

The lecture consists of a frontal lecture and interactive activities. After 2 hours of frontal teaching for each sub topic, the participants will be divided into groups in order to find examples of user-led innovations in their network. They should analyse and evaluate those innovations and present their cases and analysis to other groups.

The concept of Living Labs is difficult to understand for bachelor business students and for technology students in general. Their understanding of industry is primarily based on and driven by the perspective of the individual firm.

Teaching the concept of Living Labs requires the use of (in depth) case study materials. Master’s and PhD students should be able to deal with the suggested reading materials by themselves but could use additional frontal teaching and case materials.

EVALUATION QUESTIONS

Individual work examples

• Could you find examples of user-led innovation around you? What was the process of users’ engagement? What possible challenges did you observe? What can be done better? Do you know any famous company that innovates by users’ ideas? What are the different ways of users’ engagement?

• What is a living lab? How does this relate to other research and design methodologies? What are the core elements and principles of the living lab methodology? How can an individual company benefit from the living lab methodology?
**Group work examples**

- Why did you choose this case? Can you present a summary of the evaluation? Do you think this is a success story? How can users make this even better?
- Select a living lab and collect data on the infrastructure and multi-stakeholder collaboration. Prepare a report that deals with the questions described above and how open innovation in this network could be improved.

**TEACHING TIPS**

**Links to teaching material**

- Part of the materials provided by Antero Kutvonen (LUT) on the OI-Net platform could be used
- Link to the European Network of Living Labs: [www.openlivinglabs.eu](http://www.openlivinglabs.eu)

**Supporting case materials**

- Various case studies and best practices can be found at: [www.openlivinglabs.eu](http://www.openlivinglabs.eu)
- Additional case material (videos) can be found at [https://vimeo.com/openlivinglabs](https://vimeo.com/openlivinglabs)

**ADDITIONAL READING**

REFERENCES

• Schuurman, D. (2015). Bridging the gap between Open and User Innovation?: exploring the value of Living Labs as a means to structure user contribution and manage distributed innovation (Doctoral dissertation, Ghent University).
THE LAW AND MANAGEMENT OF INTELLECTUAL PROPERTY IN OPEN INNOVATION ECOSYSTEMS

SALEH AL-SHARIEH, ANNE-LAURE MENTION

ABSTRACT

Intellectual property (IP) protection is important for the success of open innovation. The strategies of IP licensing and acquisition are the legal channels through which open innovation can occur. Yet, these strategies are subject to a complicated IP law framework the understanding of which by open innovation firms is essential to prevent any negative impact on their ability to protect their IP and avoid liability. Further, the decision to engage in an open innovation process should be driven not only by the strategic objectives of the firms but also by their current situation with respect to IP ownership. Listing their portfolio of assets and assessing their value are critical steps that firms should undertake to evaluate the complementarities and expected benefits of an open innovation strategy.

This chapter is based on the preprint “The Role and Management of Intellectual Property in Open Innovation” in Bing Ran, ed, The Dark Side of Technological Innovation (Charlotte, NC: Information Age Publishing, 2013).
<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Open innovation ecosystems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives of the lecture</td>
<td>This lecture aims at providing practical examples of the intellectual property law challenges associated with open innovation activities, such as intellectual property acquisition and licensing.</td>
</tr>
<tr>
<td>Workload</td>
<td>2h teaching; 6h homework</td>
</tr>
<tr>
<td>Learning outcomes</td>
<td>LO #15: To make responsible decisions under uncertainty.</td>
</tr>
<tr>
<td></td>
<td>LO #18: To assess risks and challenges related to growth of businesses.</td>
</tr>
<tr>
<td></td>
<td>LO #31: To explain the benefits derived from managing knowledge.</td>
</tr>
<tr>
<td></td>
<td>LO #46: To recognize and exploit aspects related to open innovation.</td>
</tr>
<tr>
<td></td>
<td>LO #53: To understand the role, benefits and threats connected with IP in a process of innovation. To learn forms and process of protecting intellectual property (incl. patents and trademarks) in a national and international context (EU and USA). To characterize the instruments of intellectual property rights (patents and licences). To be able to manage intellectual property within OI environment, including identifying IP, licensing policy, IP economic valuation and utilization (internally and/or externally). To understand links between IP and company strategy, in particular in OI context. To know how to manage strategically IP.</td>
</tr>
<tr>
<td></td>
<td>LO# 53: To be able to manage risks.</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Basics of OI</td>
</tr>
<tr>
<td>Skills</td>
<td>Analytical thinking, logical reasoning and problem-solving</td>
</tr>
<tr>
<td>Competences</td>
<td>Case evaluation</td>
</tr>
<tr>
<td>Reading List</td>
<td>Intellectual property and licensing strategies in open collaborative innovation (Bogers, Bekkers, &amp; Granstrand, 2012).</td>
</tr>
</tbody>
</table>
The logic of open innovation: managing intellectual property (Chesbrough, 2003).
The economic structure of intellectual property law (Posner; & Landes, 2009).
Intellectual property and open innovation: an empirical analysis (Lichtenthaler; 2010).

| European Qualifications Framework (EQF) Level | Level 5. |

**INTRODUCTION**

The Oslo Manual (2005, p. 46) defines innovation as “the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.” Accordingly, innovation may take a number of forms, namely product and service innovation, process innovation, marketing innovation, and organizational innovation (OECD, 2007). Firms innovate to serve two main purposes: to better serve the needs of their customers and to win a competitive advantage over their business rivals. The definition of innovation, its forms and the purposes it aims to achieve are relevant to intellectual property (IP), defined by the World Intellectual Property Organization (WIPO) as “creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce.”

Classified according to its subject matter, IP includes industrial property and copyright. Industrial property covers inventions, industrial designs, integrated circuit topographies, trademarks and geographical indications. And, copyright covers literary, dramatic musical and artistic works. IP innovation covers a wide spectrum of innovations including drugs, machines, processes, business methods, software, maps, designs, computer chips, etc.

One of the distinguishing features of IP is its characteristic as a public good (Posner, 2005). It is non-rivalrous, non-exhaustible and non-excludable. One’s use of IP does not (and cannot) prevent another from using it concurrently, and one’s use of it does not deteriorate the quality of its use by another. These traits render it susceptible to “free riding” (Lemley, 2005), a circumstance

that leads to “market failure” (Dutfield & Suthersanen, 2008). To overcome knowledge market failure, law provides IP with artificial scarcity through granting its owners a bundle of temporary exclusive rights—IP rights—enforced by law (Sherman & Bently, 1999). The importance of IP and its protection increased over the time and States realized the importance of protecting their citizens’ IP rights not only within their territories but also abroad. As a result, States concluded multilateral IP law instruments establishing an international minimum level of IP protection.2

The digital revolution in the last decade of the twentieth century contributed to the creation of the knowledge economy in which IP is the main asset. Therefore, the protection of IP was one of the main topics negotiated in the Uruguay Round that reformed the international trading system and resulted in the creation of the World Trade Organization (WTO) along with a number of international trade agreements including the Agreement on Trade Related Aspects of Intellectual Property (TRIPS).3 TRIPS has globalized IP protection. All WTO Member States are obliged to implement its minimum levels of IP protection and enforcement.4 And, a Member State that does not comply with its TRIPS obligations may be complained against by another Member State and, consequently, face international trade sanctions through the WTO dispute settlement procedures.5

The special importance given to the national and international protection of IP is based on the premise that IP protection is an important stimulus of innovation that is a key driver of competitiveness, economic growth and welfare (Griffith et al., 2006; Lööf & Heshmati, 2002; Crépon et al., 1998; Schumpeter, 1934). However, the open innovation paradigm—“a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology” (Chesbrough, 2003a, p. xxiv)—has triggered the question of whether or not IP as a monopoly is suitable for open innovation environments and, if it is, how IP should be managed to foster open innovation. This chapter contributes to the answer of this question by identifying and analysing the IP law challenges that could be associated with some aspects of inbound and outbound open innovation specifically IP assignment (or acquisition) and IP licensing.

For this purpose, the chapter is divided into five parts. Following this part, Part II discusses the relationship between IP law protection and innovation in general. Part III discusses the relationship

4 See TRIPS, supra note 3, art.1(1).
between IP law protection and open innovation. Part IV analyses IP assignment/acquisition and licensing as the main channels for inbound and outbound innovation and highlights their legal challenges that should influence decision making in open innovation firms. Finally, Part V concludes the chapter with a summary and recommendations.

IP Law Protection and Innovation

The issue of justifying the protection of IP has engaged legislators, courts and philosophers for centuries (Drahos, 1996; Hughes, 1988). The first category of arguments justifying IP is based on natural law that is influenced by the thoughts of John Locke, Immanuel Kant and Georg Wilhelm Friedrich Hegel. The Lockean argument justifying IP provides that creators of intellectual works are entitled to property rights over the outcome resulting from mixing their intellectual labour with an un-owned or held in common object (Hughes, 1988). Labour is the cornerstone of all the interpretations given to Locke's theory of property when applied to IP (Hughes, 1988). Hence, IP is a reward to and a stimulus of labour (Hughes, 1988). On the other hand, the natural law justification IP based on Hegel's and Kant's thoughts frames intellectual works as embodiments of their creators' (e.g. authors and inventors) personalities (Hughes, 1988).

The natural law argument has mainly influenced copyright—specifically moral rights. However, the utilitarian justification of IP is more prevalent. IP law stimulates innovation (Posner, 2005; Takalo, 2001; Nordhaus, 1969). Arrow (1962) contends that since research and development (R&D) is an inherently risky activity and because appropriating its results is limited, it is expected that the free market economy will underinvest in it. Without IP protection further innovation will be inhibited since innovators would be less tempted to invest money and efforts to produce (or improve) inventions and, if they did, they would be inclined to keep their innovation in a box of secrecy to protect it against imitation (Friedman, Landes & Posner, 1991). IP protection deters unauthorized imitation of innovation and, by the same token, allows the legitimate appropriation of innovation results. Therefore, it can help States overcome underinvestment in research activities and encourage disclosure of innovations (Kanwar & Evenson, 2003; Arrow, 1962).

The argument that IP, such as patent and copyright, stimulates innovation has empirical support. Etro (2007) and Carpentier & Kultti (2006) show that the patent system stimulates further innovation in the cumulative innovation industry (e.g. the software industry). Ginarte & Park (1997) examine the index of patents in 110 countries for the period 1960–1990 to determine the factors influencing the level of patent protection that a given economy provides. They find evidence that patent protection stimulates innovation and this impact is one of the factors that influences the policymakers' choice with respect to the level of patent protection they establish in the patent system. Moreover, the Organisation for Economic Co-operation and Development (OECD) (2004)
and the U.S. International Trade Commission (2008) conclude that patenting fosters innovation and economic performance generally and encourages innovation in the biotechnology sector specifically. Furthermore, Mansfield (1986) finds evidence that patents have a positive influence in the pharmaceutical industry. With respect to the important role of copyright in the economy in general, a study on the economics of copyright in the United Kingdom (PwC, 2011, p.27) concludes that “free riding (consuming goods without paying) may threaten the sustainability of copyright dependent industries without some form of framework in place to maintain incentives to produce creative content.”

Research has also highlighted the positive impact of IP protection on service innovation. Several scholars identify a positive correlation between allowing patenting in a certain domain of inventions, such as business methods, and the number of patents granted in the system (Lerner, 2002; Gallini, 2002; Hall, 2009). Lerner (2006, p. 228) acknowledges that some theoretical research has argued that even without patents banks will have enough incentives to develop new financial innovation, but argues that the absence of patent protection “would shape the incentives to innovate”. Kumar and Turnbull (2008) argue that patenting is not optimal for all forms of financial innovation but identify three categories of financial innovation for which patenting is optimal. Under these categories a business method may be relevant to the performance of some administrative tasks of a financial firm, may be intended to facilitate some of the services provided to the financial firm’s customers, or may resemble an improvement of an existing process to perform a certain function (Ibid.). The rationality of patenting here is that these forms of innovation may be vulnerable to imitation by competitors (Ibid.). On the other hand, they argue that some forms of financial innovation do not need patenting: this includes forms of financial innovation that need the help of market makers to develop their market (Ibid.). The rational for not patenting here is the claim that patents will hinder the involvement of market makers (Ibid.).

The drafters of the Constitution of the United Stated recognised the utilitarian role of IP protection in the Copyright and Patent Clause, which gives the Congress the power “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.” IP law protects both innovators and the public. It protects innovators by giving them a bundle of exclusive rights, such as the exclusive right to make, sell, and export their innovation for a temporary period (e.g. 20 years protection to patented innovation). And, it protects the public by ensuring that innovations are disclosed and ultimately part of the public domain once the term of protection expires (Posner, 2005). As Mr. Justice Binnie, a former puisne justice of the Supreme Court of Canada, explained in the context of patent law:

---

“A patent, as has been said many times, is not intended as an accolade or civic award for ingenuity. It is a method by which inventive solutions to practical problems are coaxed into the public domain by the promise of a limited monopoly for a limited time. Disclosure is the quid pro quo for valuable proprietary rights to exclusivity which are entirely the statutory creature of the Patent Act […]”.

On the other hand, several scholars have doubted the role of IP in fostering innovation. For example, Jaffe & Lerner (2004) argue that patenting stifles innovation. Bessen & Maskin (2000) show that in dynamic industries such as software and computer chips industries, in which innovation is both sequential and complementary, patenting could decrease innovation. Merges and Nelson (1990) argue that patenting stifled innovation in the automobile and airplane manufacturing industries. Moser (2005) finds no evidence that patents stimulate more innovation but shows that without patent protection innovation seems to reside in industrial sectors where knowledge can be kept secret (e.g. chemical industry) and disappear in industries where knowledge cannot be kept secret (e.g. machine manufacturing industry). Moreover, Arrow (1962) acknowledges that the enforcement of patent rights will ultimately decrease the amount of appropriable information available to others and, thus, the “incentive” to carry out R&D may decrease. Hall (2009) notes that little empirical research has been conducted on the impact of patenting on financial innovation but believes that since financial innovation is of incremental nature, it is unlikely that patenting is beneficial. Other scholars (Lanjouw, Pakes, & Putnam 1998; Gallini, 2002) contend that the number of patents in a given sector does not accurately indicate the impact of patenting on innovation in that sector. Hunt (2010) is also not optimistic about the impact of patenting on financial innovation. He argues that since the financial sector heavily relies on information and telecommunication technologies, the impact of patents on financial innovation could be analogous to the impact of patenting on the ICT: it will be complex and tend to involve litigations (Ibid.).

Nonetheless, IP law is here to stay; the debate on its impact on innovation will certainly shape its future reform but will never abolish it. Yet, although IP protection is necessary for stimulating innovation, excessive protection can be counterproductive. As Landes & Posner (2003, p.74) explain:

“Some copyright protection is necessary to generate incentives to incur the costs of creating easily copied works. But too much protection can raise the costs of creation to a point at which current authors cannot cover their costs even though they have complete copyright protection for their own originality”.

This echoes the vision of Jefferson (1807) who believed that ideas should move freely between people and their originators should receive some reward that did not jeopardize the rights of those who wish to improve on them (cited by Dodgson, Gann & Salter 2008).
It is worth noting that although there is a strong overlap between the subject matter of innovation in general and the subject matter of IP, not every form of innovation will necessarily enjoys IP protection. Copyright law protects literary and artistic innovation (e.g. music, maps and software). Patent law protects new, useful and non-obvious inventions (e.g. drugs and machines). Trade-secrets law protects secret industrial formulas and process. Industrial design law protects the original design of a useful article. And, trademarks law protects the marks or logos of innovation businesses used to distinguish their goods and services. The advancement of technological innovation has required IP law to provide new types of IP protection, such as the protection provided to digital databases or computer chips. A form of innovation, therefore, needs to satisfy the protection requirements under the relevant IP law. For example, a form of innovation seeking copyright protection must satisfy the subject matter requirement of copyright (e.g. literary and artistic works), must be original and, in most of the cases, must be fixed in material format. Further, a form of innovation seeking patent protection must be new, useful and nonobvious patentable subject matter. Notably, the level of originality of creativity required under patent law is much higher than its counterpart under copyright law. With regard to trademarks law, it has a number of requirements that the mark must satisfy in order to receive protection and to continue enjoying it. Generally, the logo, sign, symbol or word used to distinguish the goods or services of a business using it must satisfy the definition of a “mark” for the purpose of trademarks law, must be distinctive and, in varying stages depending on the specific jurisdiction, must satisfy the “use” requirement.

Furthermore, some categories of IP protection are easier to get than other categories due to the difference in their protection requirements. For example, copyright in most jurisdictions is automatic. The creator of the copyrighted work does not need to register the copyright over the work in the national IP office to enjoy protection. On the other hand, patent protection is not automatic since it involves complex procedures involving, among other procedures, an application, examination, publication, and registration.

Generally, IP law protects knowledge-based innovation through monopolies. Copyright and patent give the right holder a bundle of temporary exclusive rights over their copyrighted and patented innovations. Trade secrets, however; can enjoy trade secrets law protection as long as they remain “secret.” The protection of trademarks can also last indefinitely upon satisfying certain conditions provided by the relevant law, such as the payment of maintenance fees.

Traditionally, IP law has played a key role in protecting innovation in the era of “closed innovation,” a framework under which firms rely on their own resources to develop and market innovation (Huizingh, 2011). In recent years, however, open innovation emerged as a new innovation model that depends on “the use of purposive inflows and out flows of knowledge to accelerate internal innovation and to expand the markets for external use of innovation, respectively” (Chesbrough et al., 2006, p. 1).
Over time, the innovation process has increasingly been depicted as interactive, non-linear, incorporating feedback processes both within and between firms and is now usually categorized into five generations (Rothwell, 1992). The innovation literature originally conceptualized the innovation process in a linear and sequential manner, starting with a scientific discovery and ending with the introduction of a new product into the market. Accordingly, the model was known as research-push. The demand-pull model, or the second-generation model, emerged in the mid-1960s and reflected the growing awareness granted to customers and their perceived needs. Integrating both research-push and demand pull, the coupling model introduced the concept of feedback loops and the interactive nature of the innovation process. The fourth generation stressed the role of external linkages and alliances, whereas the fifth generation innovation process further emphasizes the strategic and technological integration with customers, suppliers, communities and networks, which is facilitated by information technologies (Ibid.). Innovation has thus long been depicted as a “multi-player game” (Bessant & Tidd, 2011, p.339). After being coined by Chesbrough in 2003, the concept of open innovation drastically gained in popularity. Besides stressing the fact that firms do not innovate in isolation, it suggests that understanding and profiting from innovation requires “a more externally focused perspective, involving the actions of multiple actors in a far more distributed environment” (Chesbrough, Vanhaverbeke and West, 2006, p.11). Chesbrough (2003) lists several distinctive features of the open-innovation model that distinguish it from the traditional closed innovation model. First, many talented people who would provide valuable inputs into the innovation process work outside the firm. Second, external R&D can create value from which the firm can benefit, provided that it keeps an acceptable level of internal R&D so as to be able to absorb this externally generated knowledge (Cohen & Levinthal, 1990). Third, the firm does not need to originate research internally in order to profit from it, provided that it has the proper connections. Fourth, first-mover advantage is not the only option. Elaborating a business model centred on the exploitation of external ideas can turn out to be more effective. Finally, open innovators not only use IP as a control mechanism to protect their valuable knowledge and ideas but also exploit others’ IP to advance their business objectives. All these features converge towards the idea that the locus of knowledge generation can be decoupled from both the locus of innovation and the locus of commercialization (Gassmann & Enkel, 2004).

Accordingly, three open innovation approaches can be defined: outside-in, inside-out and coupled. Firms may seek knowledge outside its boundaries, so as to enrich its own knowledge base and innovate internally. This approach relates to the outside-in or inbound open innovation and has been widely investigated in innovation literature, thanks amongst other sources, to the harmonized innovation surveys based on the Oslo Manual, which gather information on information sourcing and co-operation practices of innovative firms. Latest figures for EU-27 confirm the role of co-operation with a variety of partners for innovation, as more than a third of innovative firms rely on co-operative agreements for their technological innovations (Community Innovation Survey 2008, Eurostat).
Firms may choose to let other firms commercially disseminate and exploit the knowledge and ideas they have developed. In doing so, they use external channels to commercialize their IP. This approach is referred to as inside-out or outbound open innovation (Gassmann & Enkel, 2004). A final option is the coupled process, which links inside-out and outside-in processes, and requires the setting up of cooperative arrangements so as to allow firms to benefit from each other's complementarities. Unfortunately, current harmonized surveys neglect these two perspectives of open innovation, as they concentrate on innovation occurring inside the focal firm, i.e. the firm responding to the survey.

Co-operation is considered as an innovation stimulus and is expected to bring benefits such as achieving economies of scale and of scope, reducing uncertainty, gaining access to new markets or accessing complementary knowledge (Miotti & Sachwald, 2003; Becker & Peters, 1998; Hagedoorn, 1993).

The governance of co-operation for innovation relies, to a good extent, on IP rights, protected by the so-called formal mechanism of IP protection (Hall et al., 2011), such as patents, copyrights, trade-secrets and trademarks. Thus, the following section focuses on the relationship between the legal protection of IP rights and open innovation. It evaluates the extent to which IP law protection will play a role in promoting or discouraging this business model.

The Relationship Between IP Protection and Open Innovation

As discussed earlier, the impact of IP protection on innovation generally is controversial but it is arguable that the best approach to enable IP law to stimulate innovation is to design it in such a way that strikes the right balance between the interests of innovators against other socio-economic interests of the public at large. Yet, the impact of IP law on open innovation is more ambiguous. The monopolistic nature of IP rights entices the internal creation and utilization of innovation. Attracted by the bundle of exclusive rights that IP laws provide to innovators, a firm may direct all its internal resources to develop innovations that generate IP rights in order to gain a competitive advantage against competitors. It is worth noting that different IP provide different levels of exclusion and, consequently, some categories of IP may encourage firms to opt for closed innovation models more than other categories.

More specifically, patented innovations are more likely to influence the firm's decision to adopt closed innovation models. Patent protection is the strongest amongst all the categories of IP. Patents protect both the idea and its industrial application. Therefore, even if a firm independently develops a form of innovation that is similar to a patented innovation of another firm, it will be infringing the rights of the firm that already holds the patent rights over the invention. Generally, during the term of patent protection, usually 20 years from the date on which the patent application was
filed, the patent holder is entitled to prevent anyone from making, using, selling, importing and/or exporting the patented invention. This high level of control over the patented innovation enables the firm to exclude competitors and, thus, encourages closed innovation models. This is apparent in the pharmaceutical industry, for example. Nevertheless, the duration of patent protection is shorter than the term of protection provided to other categories of IP. This is not surprising given the difference in the scope of protection - control - given to patent holders compared to the rights given to the right holders in other IP categories.

The second category of IP providing right holders with a high level of control over their innovation is trademarks. A trademark enables the right holders to exclude others from using their trademarks in association with the others’ goods or services. Therefore, it protects the economic interests of the owner of the trademark by preventing others from misappropriating the reputation associated with the trademark. Further, it protects the public by indicating to them the source of the goods and services they are receiving, which is an important indication of quality. An advantage of trademarks is that the owner can renew them indefinitely. Therefore, registering a trademark with goods and services may guarantee a long lasting market advantage. Notably, trademarks are not limited to words, logos or distinguishing guises, but sometimes extend to cover unconventional marks, such as smell, sound, or touch marks. For example, trademarks have been sought and registered in association with scents and sounds.

The third category is copyright. It provides right holders with control over their literary, artistic, musical and dramatic works. Copyright is important for innovation in the information technology sector. Computer programs per se are excluded from patent protection in some jurisdictions but they are copyright subject matter - literary works. Copyright provides a long duration of protection that must not go below the life of the author of the work plus 50 years after her/his death. This term of protection is the minimum that States must provide to be compliant with international copyright law, but in practice many jurisdictions provide longer durations, such as in the United States and Europe where the term of protection is the life of the author plus 70 years. Despite the long duration of copyright protection, copyright protects expressions, not ideas. Therefore, for instance, it is possible that two firms independently develop an identical piece of software without infringing each other’s copyright. In other words, the ambit of protection under copyright law is narrower than it is under patent law.

The fourth category of IP is industrial designs. The protection of industrial designs covers the original and aesthetic features added to a useful article. Famous examples of industrial designs include

---

8 See TRIPS, supra note 3, art. 33.
10 TRIPS, supra note 2, art.12.
Apple’s iPod and iPhone. By registering the industrial design the firm can exclude competitors from making similar articles having the same design throughout the term of protection. Accordingly, for instance, phone producers are not allowed to produce phones that have the exact design of Apple’s iPhone during the term of protection. The duration of protection for industrial designs is usually shorter than the duration of patent, trademarks or copyright; industrial designs are usually protected for a term ranging between 5–25 years, depending on the jurisdiction. The protection of an industrial design covers only the aesthetic features of a useful article and does not extend to cover the function of the article.

Trade secrets are the only form of IP that requires strictly closed innovation environment to enjoy legal protection. No registration is required to protect a trade secret and the protection will last so long as the innovation remains secret. The disadvantage of trade secrets is that they lose their protection when they become known. They also do not provide protection against independent creation or reverse engineering. The secret formula of Coca Cola is an example of trade secrets. In short, IP protection provides an incentive to firms to follow a closed innovation model. However, the level of enticement varies depending on the category of IP protecting the firms’ innovation. Trade secrets and patents play the highest role in influencing firms’ choice to follow a closed rather than open innovation model.

IP protection may have a negative impact on open innovation (Vallat, 2009; West, 2006) but it is still capable of playing its traditional role of rewarding and stimulating innovation even in an open innovation environment (West, 2009; Gallini, 2002). Open innovation is new as a label but old as a notion (Huizingh, 2011; Christensen, 2005) and IP has always functioned in innovation environments in which firms use external knowledge to support internal research and to market its outcomes externally (West, 2009). In this context, IP is a fellow not a rival to open innovation, albeit under different disguises.

The starting point of illustrating the value of IP protection for open innovation is to imagine the situation where IP is not provided to protect innovation. In this situation, it is likely that firms will resort to, *inter alia*, absolute secrecy to avoid free ridings. On the other hand, a firm that has patent rights over its innovation, for example a machine, will be more open toward licensing this innovation to other firms, because this firm is sure that any uses of the innovation that go beyond the uses allowed under the license will be infringing under patent law. Licensing IP, in other words, solves the tension between knowledge protection and knowledge sharing (Bogers, 2011). After surveying over 154 industrial firms, Lichtenthaler (2010) concludes that the size of the firm’s IP portfolio plays an important role in encouraging the firm to move toward the open innovation paradigm.

Looking at the issue from the side of the firms that are users of innovation, IP protection can be seen as an incentive to engage in open innovation. A firm that can copy other firms’ innovations will
have no motive to acquire or license in IP. It is true that closed innovation is still the more prevailing model for creating and exploiting IP and that managing IP in open innovation paradigms is not an easy task (Luoma, Paasi & Valkokari, 2010), but it is equally true that firms are gradually shifting into the open innovation paradigm (Lee, Nystén-Haarala, & Huhtilainen, 2010). For example, IBM, which is one of the largest holders of IP rights in the world, has noticeably become an active actor in open innovation. In 2006, it launched Open Collaborative Research (OCR), a program designed to foster the collaboration between IBM and universities in the domain of open source software.11 Furthermore, Horacio Gutierrez, who was Microsoft Vice President and Deputy General Counsel for IP and Licensing, describes IP as a “bridge” that has enabled Microsoft to collaborate with other firms.12 For Philips Research, open innovation is a key for success: “Through ‘outside-in’ innovation, we draw on the capacities of individuals, organizations, and even small start-ups from around the globe. By providing a broader window on the world of health and well-being, these strategic partners help us gain new insights and access to new technologies.”13

IP management is essential for the success of open innovation (Bekkers & Granstrand, 2011; Alexy, Criscuolo & Salter, 2009; Bogers, Chesbrough, 2003b) and its main tools are IP acquisition/assignment and licensing. The easier are these tools to use, the more successful is open innovation (Gallini & Scotchmer, 2002). The following sections explain them and discuss the IP law challenges associated with them.

IP ASSIGNMENT/ACQUISITION AND LICENSING AS THE MAIN CHANNELS FOR INBOUND AND OUTBOUND INNOVATION

Utilizing IP in open innovation environments can mainly take the forms of IP assignment/acquisition and licensing. Both forms are legal acts that may have negative implications for the legal protection of the IP of the firms engaged in open innovation if they are not practiced carefully.

IP ASSIGNMENT AND ACQUISITION

Firms may not be able to produce IP because this usually requires strong R&D investment and when this investment is available, the results of the R&D may fail to attract IP law protection. For example, a pharmaceutical company may invest for years in developing a certain drug, but a publication of a research paper on its effective ingredients by anyone else renders the outcome

12 Horacio Gutierrez, “Microsoft’s Collaboration Imperative” (2008) <http://www.microsoft.com/Presspass/ofnote/04-01-08GutierrezAMArticle.mspx/).
of the pharmaceutical company’s research obvious and, as a result, not patentable. Furthermore, a firm may already have a form of innovation that is missing some technological components to be ready for the market. In this situation, waiting for the R&D team to develop this technology may take some time during which the firm may lose the first mover advantage. To overcome these issues, firms can acquire IP instead of producing it. An assignment of IP is the transfer of the bundle, or some, of the exclusive rights of the owner of the IP (the assignor) to another person (the assignee). Right holders can transfer wholly or partially their IP rights over inventions, copyrighted works, trademarks or other categories of IP based innovations. For example, a publishing house can assign all the copyright it has over one of its publications or it can assign only the translation right over this publication. Further, the assignment of IP rights can be limited to one or more geographical areas. For instance, an American pharmaceutical company may assign its patent rights over one of its drugs patented in Japan while continue enjoying its patent rights over the same drug in other jurisdictions where it enjoys protection. It should be noted that in most jurisdictions the assignment of IP rights must satisfy some formalities prescribed by the relevant legislation, such as the requirements of writing and registration.

A firm may assign its IP to another firm to generate income (Bogers, Bekkers & Granstrand, 2011), which it can use to strengthen its downstream capabilities to exploit its other IP in producing and marketing products. Looked at from the side of the firm receiving the assignment, the assignment of IP rights is IP acquisition. In other words, for a firm involving in open innovation, its outbound innovation may take the form of assignments of IP rights and its inbound innovation may take the form of IP acquisition. Most of the time, an open innovation firm is involved in both assignment and acquisition of IP.

IP acquisition creates a wall around the firm’s field of innovation that ultimately prevents the entry of other competitors to the market (Bogers, Bekkers, & Granstrand, 2011; Yoffie, 2005). This importance is practically illustrated in the frequency of IP acquisition deals. For example, many giant companies were in a fierce competition to acquire the IP of Nortel, which filed for bankruptcy in 2009. A consortium of Apple, EMC, Ericsson, Microsoft, Research In Motion (RIM), and Sony managed to outbid Google and purchased almost 6000 patents of Nortel for $4.5 billion. On the other hand, soon after, Google acquired Motorola Mobility for $12.5 billion to make its patent portfolio stronger and, consequently, protect its famous operating system - Android - from the competition it is facing from Apple and Microsoft. Larry Page, Google’s co-founder, explained that the acquisition “will increase competition by strengthening Google’s patent portfolio, which will enable [Google] to better protect Android from anticompetitive threats from Microsoft, Apple and other companies.”

Acquiring IP is not limited to organizations specialized in information and communications technologies; it is important for other industrial sectors as well. In 2008, several pharmaceutical companies merged to strengthen their patent portfolios. The sum of the deals reached that year amounted to $70 billion.\(^{15}\)

In addition to IP acquisition focusing on copyright and patent rights, trademarks are also an important IP asset that has been subject to a number of acquisition deals. Firms buy famous trademarks to capture the market reputation associated with products or services sold or provided in association with these trademarks. For example, Acella Pharmaceuticals acquired the PRENATE®, a family of trademarks, from Avion Pharmaceuticals to benefit from its reputation associated with pregnancy and prenatal vitamins.\(^{16}\)

Failing to produce or acquire IP may open the door for competitors to arrive into the firm’s innovation domain. For example, Eastman Chemical did not obtain enough patents over “polyethylene terephthalate,” a polyester material used in producing plastic bottles. As a result, Dow Chemical managed to capture IP rights that facilitated its entry into the business sector of soft-drink bottles (Yoffie, 2005; Rivette & Kline, 2000).

**IP LICENSING**

A licence of IP is a permission given by the right holder (licensor) to another person (licensee) to exercise some or all of the rights of the licensor in exchange for an agreed payment. For instance, a firm that owns a patented machine can license another firm the right to sell the machine, which is only one right of the bundle of the patent exclusive rights. Also, the firm can license more of its patent rights or all of them. An IP license can be limited to one or more geographical areas. In the aforementioned example, the firm may decide to license its right to sell the patented machine in one geographical area only but maintain this right in other geographical areas.

IP licensing can be divided into three categories. The first category is exclusive licensing under which the licensee will exclusively practice the rights licensed under the exclusive license; neither the licensor nor anyone else can practice any of the rights licensed during the term of the exclusive license. Usually, the licensing of patented pharmaceuticals takes this form of licensing. The second category is non-exclusive licensing under which the licensor can practice the same rights licensed and can grant other non-exclusive licenses to other licensees during the term of the license.

---


\(^{16}\) “Acella Pharmaceuticals, LLC Announces Its Acquisition of the PRENATE® Family of Trademarks and Associated Intellectual Property” (2012) <http://www.reuters.com/article/2012/01/05/idUS185968+05-Jan-2012+PRN20120105>. 259
And, the third category is sole licensing under which both the licensor and licensee can practice the same rights licensed during the term of the license. However, the licensor cannot licence the same rights to other licensees.

Licensing is an important open innovation channel that contributes to firms’ competitiveness. A firm that has no immediate capabilities of developing its IP into market products can license it out to generate income that can help develop it later into marketable products (Lichtenthaler & Ernst, 2007; Lichtenthaler, 2005). Licensing out is also a source of important income for firms specialized in R&D. Similarly important, licensing out activities could help firms create de facto standards in the industry. For example, Apple’s reluctance to license out its Mac operating system denied it the opportunity to become a standard in the industry (Yoffie, 2005). On the other hand, Microsoft was more flexible in licensing out its windows operating system, a fact that made it dominate the market of personal computers. Moreover, a firm that licenses in IP will have faster entry to the market, especially when the firm does not have the capacity for developing its own. For instance, Procter & Gamble’s “SpinBrush” is an innovative product that relied on licensing in IP from four other firms (Yoffie, 2005).

Notably, firms may be reluctant to license out their IP when licensing out would generate competition costs that outweigh the royalties gained from licensing (Yoffie, 2005). In contrast, firms usually license out IP that is not directly beneficial for their main business activities (Yoffie, 2005). Cross-licensing is another form of licensing that occurs when firms agree to cross-license IP rights to each other. A famous cross licensing deal was the $16 billion deal struck between Dell and IBM. Cross-licensing, and licensing in general, especially with regard to patents saves firms from engaging in patent litigations (Bogers, Bekkers & Granstrand, 2011; Granstrand, 2004) that may eventually lead to invalidating some of the patents of each firm. Cross-licensing also helps firms use each other’s knowledge to produce collaborative innovation in a more effective, simple and inexpensive manner (Bogers, Bekkers, & Granstrand, 2011).

A very relevant concept to cross-licensing is “patent pools” where two or more firms agree to cross-license their patents to each other. Patent pools play a major role in the development of innovation since patent litigations suppress incremental innovation to a large extent. Further, patent pools specifically and IP pooling generally serve both consumers and producers of innovation, because they facilitate interoperable innovation (Bogers, Bekkers, & Granstrand, 2011). For example, in 2005, a consortium of 20 companies agreed to establish a patent pool of their patents relating to Radio Frequency Identification (RFID) (Michael Blakeney, 2009). Without this consortium, IP infringement litigations would have hindered much of the RFID innovation.
The Challenges Facing IP Assignment/Acquisition and Licensing in Open Innovation Environments

IP acquisition is complex and involves a number of challenges. Foremost, the firm should ensure that the IP to be acquired enjoys legal protection by one of the IP categories recognized by law. This requires the firm to carefully study the legal validity of the patent, copyright or trademark protecting this IP. In patent law some subject matter, such as business methods, is inherently weak to attract patent protection and even when it receives protection, it usually a result of lengthy and costly litigations. For example, Amazon.com received patent protection for its famous one-click purchasing system in the United States in the late 1990s, it obtained the patent protection in Canada in 2011 after a series of litigations, and never received protection in Europe. This type of subject matter, when patented, is vulnerable to invalidity in the future, especially when new case law questions its patentability. For example, upon a request from an interested party in 2006, the United States Patent and Trademark Office (USPTO) ordered a re-examination of the “One-Click” patent and invalidated some of its claims, which required Amazon.com to revise its patent claims (Orozco, 2012). Notably, the rejection of the test for patenting business methods originally developed in State Street Bank & Trust Co. v. Signature Financial Group by the Supreme Court in Bilski v. Kappos has shed some doubts on the validity of a large number of patents granted under the old test. Similarly, in trademarks law some marks are also inherently weak, such as the “common words” in contrast to the “invented words” (Fox, 1972).

The importance of ensuring the validity of the copyright, patent and/or trademark protecting the IP that the firm is going to acquire lies in the fact that when the firm wants to enforce its IP rights against an alleged infringer, the invalidity of the patent, copyright or trademark is usually a defence. This is always the case in patent and trademark infringement cases. It is used also in copyright infringement cases, but it is used to a lesser extent since the validity conditions for copyright protection are generally less stringent than the conditions in the laws of patent and trademarks.

Secondly, a company acquiring another company’s patent, copyright and trademark portfolio should be aware of the strength of this portfolio by considering other important factors, such as the

---

18 See Boards of Appeal of the European Patent Office, Case No.T 1244/07 - 3.5.01 (27 January 2011).
19 State Street Bank & Trust Co. v. Signature Financial Group, Inc. 149 F.3d 1368 (C.A. Fed. Mass. 1998). In this case the United States (U.S.) Court of Appeals for the Federal Circuit (CAFC) upheld the validity of a patent over a “data processing system for hub and spoke financial services configuration.” The CAFC reached this conclusion based on the test it formulated for the patentability of business methods and which provides that a business method is patentable subject matter if it “produces a useful, concrete, and tangible result.” This flexible test opened the door wide for the United States Patent and Trademark Office (USPTO) to issue patents over computer based business methods (Hall, 2009).
removing term of patent and copyright protection and the broadness of the claims of each patent since the scope of the patent claims determines the scope of its monopoly power. With respect to trademarks, the firm should carefully examine the scope of the categories of goods and/or services with which the trademark is associated as well as the overall reputation of the trademark. When the trademark is registered in association with a large number of goods and services, the firm will be able to enjoy the reputation associated with the trademark in more business sectors and/or benefit from licensing it to businesses interested in using it in such sectors. For example, the trademark “Jaguar” is registered in association with a wide variety of goods and services, such as clothing, watches, shoes, hand-bags and cars. As a result, the owner of the “Jaguar” trademark can license it to a company interested in making bags, if the owner is not interested in making bags.

Thirdly, a firm that acquires the copyright of another company over computer software should ensure that its proprietary software exploitation will not be hindered if the acquired software comprises open-source software. The terms and conditions of an open-source license under which the open-source software was obtained will impact the nature of the further distribution or exploitation of the software. The United States Court of Appeals for the Federal Circuit affirmed in Robert Jacobsen v. Matthew Katzer 21 the enforceability of an open-source license. In this case, Robert Jacobsen, a developer of open-source software, sued Matthew Katzer, a developer of proprietary software, for using some of Jacobsen’s open-source code in the proprietary software without including a proper notice required by the open-source license indicating the origin of the software and the part of which that has been modified. Therefore, Jacobsen argued that Katzer infringed his copyright and therefore sought both damages and an injunction preventing Katzer from distributing the software. The district court held that Katzer did not infringe the copyright of Jacobsen. However, the United States Court of Appeals for the Federal Circuit reversed the decision holding that Jacobsen has enforceable copyright and since Katzer did not abide by the terms of the open-source license, he infringed Jacobsen’s copyright. It further confirmed that “[o]pen source licensing has become a widely used method of creative collaboration that serves to advance the arts and sciences in a manner and at a pace that few could have imagined just a few decades ago.”22 The United States Court of Appeals for the Federal Circuit returned the case to the district court for re-examination, but the case was finally settled out of court in 2010. Nonetheless, this case remains as a leading case for the enforceability of open-source licenses.

In 2003, Cisco Systems acquired Linksys, a company that was producing networking products. Some of the products that Linksys produced incorporated open-source software licensed from the Free Software Foundation (FSF). Later on, Cisco Systems started distributing some of Linksys’


22 Ibid.
products without disclosing the source code associated with the software incorporated in these products as required by the terms of the open-source licenses. The Free Software Foundation sued Cisco Systems for copyright infringement and sought both an injunction preventing Cisco from further distributing products that includes firmware incorporating open-source software and recovery of profits that had already resulted from previous distribution. Courts did not decide on this case, because Cisco systems agreed to make the source code of the software at issue available on its website, to donate an undisclosed amount to the FSF and to appoint a person responsible for ensuring that Linksys products are compliant with the FSF's license.\textsuperscript{23}

Fourthly, a firm buying a trademark should also make sure that the trademark is not about to lose its distinctive character. In trademarks law, “distinctiveness” is the ability of the mark to distinguish the goods and services of one business from the goods and services of another business. The distinctiveness character of the mark is a condition that a mark needs to satisfy in order to be registrable, and this character has to continue existing as a condition for the mark to continue receiving protection (Gervais and Judge, 2011). Once distinctiveness is lost, the mark will become “generic” or “descriptive” since it will be perceived by the public as a word that refers to a given good or service rather than a word that differentiates the goods and services of one business from those of another business. For example, “Vaseline” is a mark that has lost its distinctiveness and become generic or descriptive (Shpetner, 1998). This word is now perceived as a petroleum jelly used as a lubricant rather than a trademark distinguishing the petroleum jelly of one producer from that of another.

In addition to the law challenges associated with IP assignment/acquisitions, licensing activities may raise some challenges. For examples, a firm licensing its trademark to another firm should ensure that the licensee will use the trademark in association with goods and services that have the same level of quality of the goods and services with which the trademark is originally associated. Otherwise, the trademark will lose its distinctiveness and thus could be vulnerable to expungement (Gervais and Judge, 2011). As explained earlier, customers always develop a link between a given trademark and the quality of the goods and services with which it is associated; therefore, when a trademark becomes associated with goods or services of a lower quality, the public interest requires the expungement of this trademark (Gervais and Judge, 2011).

In Heintzman v. 751056 Ontario Ltd,\textsuperscript{24} the trademark owner was a producer of high quality pianos, but it decided to sell its business along with its trademarks. The purchasing business outsourced the production of the pianos to another company that produced pianos with lower quality. The Court found that the trademark lost its distinctiveness because the public was not informed about the

\textsuperscript{24} Heintzman v. 751056 Ontario Ltd. (1990), 34 C.P.R. (3d) 1.
change of the source of the goods with which they associated the trademark. In this case, the fact that the quality of the pianos after the trademark assignment was lower was important to find that the trademark lost its distinctiveness.

Licensing a trademark may also pose a threat to the protection of the trademark if the licensor does not practice direct or indirect control over the quality or nature of the goods or services of the licensee with which the trademark is associated (Gervais and Judge, 2011). In most jurisdictions, the “use” of the trademark is one of the requirements for maintaining its registration. Thus, when it is not used for a period of time prescribed by law, its registration could be expunged upon the request of an interested party. If the licensor is no longer using the trademark, the use of it by the licensee will not satisfy the requirement of “use” under trademarks law unless the licensor continues maintaining a direct or indirect control over the quality or nature of the goods and services associated with the trademark (Gervais and Judge, 2011).

CONCLUSION

For centuries, the relationship between IP and innovation has been prominent and this relationship will continue in the era of open innovation. While strong IP protection stifles open innovation, its absence may lead firms to resort to secrecy to protect their innovation, a situation that not merely hinders open innovation but abolishes it. IP law provides innovators, whether firms or individuals, with the ability to control their innovation. However, it leaves it to the innovators to decide how much of this control they actually want to exercise. It is also up to innovators to decide how to exercise this control. They may follow closed innovation models or opt for open innovation paradigms, which require clear and detailed IP management strategies. The legal implications that may result from incautious IP strategies could be serious. Licensing out, licensing in, and cross-licensing strategies as well as the strategy of IP acquisition are based on a complicated IP law framework the understanding of which by open innovation firms is essential to prevent any negative implications on their ability to protect their IP and avoid liability.

Further, the decision to engage in an open innovation process should be driven not only by the strategic objectives of the firms but also by their current situation with respect to IP ownership. Listing their portfolio of assets and assessing their value are critical steps that firms should undertake to evaluate the complementarities and expected benefits of an open innovation strategy. At a more tactical level, managers should also consider the organizational readiness towards open innovation and the ability of its innovators to overcome the “not invented here” and “not sold here” syndromes. Adopting an open innovation approach also requires the development of proper competences, which have been described as absorptive, multiplicative and relational by Gassmann & Enkel (2004). Nurturing these competences may be costly; therefore, managers
should also consider the coordination and transactions costs that are associated with an open innovation strategy. In line with the debate on the concept of absorptive capacity, firms should also maintain a suitable level of R&D and innovation capabilities and avoid becoming over reliant on external partners.

KEY TAKE-AWAYS

• Intellectual property protection is a driver of innovation.
• Intellectual property acquisition and licensing enable open innovation.
• A firm should consult with intellectual property law experts about its open innovation activities in order to avoid liability and to ensure the continuous protection of its intellectual property.

REFERENCES

3.3 INSTANTIATING OPEN INNOVATION: FROM INDIVIDUAL TO SOCIETY LEVEL

OPEN INNOVATION AT THE INDIVIDUAL LEVEL

SEIDALI KURTMOŁLAIJEV, JOACHIM HAFKESBRINK

Abstract

This chapter consists of two modules. In the first module, we provide a theoretical overview of individual ambidextrous competences for Open Innovation. We categorize individual competences into professional, methodical, social, and personal competences, and discuss each of them. In addition, we suggest how these competences can support exploration and exploitation activities. In the second module, we provide a teaching case study in design thinking that aims at the development of individual innovation competences. We offer a detailed description of the teaching procedure, including pedagogical guidelines and teaching tips. The content of the two modules allows enriching teachers’ and students’ knowledge of innovation activities and developing their skills and competences in both creativity and organizational innovation.

### Prerequisite
Basic definition of Open Innovation, knowledge about ambidexterity in the open innovation process.

### Objectives of the lecture
To impart knowledge about what individual competences are relevant for conducting open innovation processes. To develop open innovation competences through design thinking training.

### Workload
Teaching; group work.

### Learning outcomes

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Skills</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>#40: Innovation: to develop an understanding of the role of creativity and innovation for value creation and competitiveness.</td>
<td>#3: Creativity: to recognize and evaluate the creative process in individuals and teams and how it contributes towards increased innovation.</td>
<td>#4: Creativity: to apply idea generation tools to add value to the product/process/service/business model in an organization.</td>
</tr>
<tr>
<td></td>
<td>#8: Creativity: to develop creative thinking skills and methods.</td>
<td>#5: Creativity: to know how to plan and manage a creative process. To apply creative thinking methods in innovation and personnel management.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#9: Creativity: to apply techniques for inventive problem solving.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#65: to apply methods and techniques utilized in Stage Gate or Design Thinking individually.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#80: Organizational Innovation: to be able to evaluate and monitor organizational innovation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#83: Organizational Innovation: to implement change and develop leadership skills.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#84: Organizational Innovation: to implement communication skills as a contributing factor to innovation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#85: Organizational Innovation: to be able to apply knowledge about the mediating factor of transformational leadership and their influence on innovation.</td>
</tr>
</tbody>
</table>
## Reading List

<table>
<thead>
<tr>
<th>Individual Competences</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Design Thinking</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Interpretive management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stickdorn, M, &amp; Schneider, J. (2012). This is service design thinking: Basics, tools, cases. New Jersey: John Wiley and Sons.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>European Qualifications Framework (EQF) Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 6, 7</td>
</tr>
</tbody>
</table>

## Lecture Content

The lecture has two main modules: (1) a general introduction into individual ambidextrous competences for Open Innovation, and (2) a special case study in design thinking as one of the important problem-solving methods.

## Individual Ambidextrous Competences for Open Innovation

Ambidexterity is usually defined as the ability to develop and utilize new resources and competences (resource exploration) and at the same time make efficient use of already available resources (resource exploitation) (Bledow, Frese, Anderson, Erez, & Farr, 2009).

The findings of numerous empirical and theoretical studies show (cf. Hafkesbrink & Schroll, 2010) that, for opening up the innovation process, especially in the phases of idea generation and design, there is a need for more exploratory forms of organizational design to provide a maximum of
flexibility and knowledge absorption in the innovation process. This includes in particular cultural openness, dynamic adaptability of the structures and processes, IT-support, networking skills, collaboration capability beyond organizational boundaries, and the ability to identify new knowledge and technologies (see Figure 1).

In contrast, for later phases of the open innovation process, rather exploitative forms of organizational design are needed, which ensure efficient exploitation of new knowledge. Thus, product development and production are dependent on reliable and stable organizational structures that are used to retain obligations and routines. In this respect, less the appropriation, but rather the transformation and exploitation of knowledge are central organizational performance factors:

**Characteristics of Ambidextrous Organizations**

<table>
<thead>
<tr>
<th>Implementation Mode</th>
<th>Explorative</th>
<th>Exploitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Mode</td>
<td>Organic</td>
<td>Mechanistic</td>
</tr>
<tr>
<td>Adaptation Condition</td>
<td>Flexible</td>
<td>Stable</td>
</tr>
<tr>
<td>Rules</td>
<td>Heuristical</td>
<td>Routinized</td>
</tr>
<tr>
<td>Decision Making</td>
<td>Implicit Leadership</td>
<td>Explicit Leadership</td>
</tr>
<tr>
<td>Communication</td>
<td>Lateral</td>
<td>Vertical</td>
</tr>
<tr>
<td>Governance</td>
<td>Advice and Learning</td>
<td>Decisions by Superiors</td>
</tr>
<tr>
<td>Control ans Authority</td>
<td>Network and Trust</td>
<td>Hierarchy</td>
</tr>
</tbody>
</table>

**Figure 1. Characteristics of ambidextrous organizations in the OI Process (Source: Hafkesbrink, Bachem & Kulenovic, 2013)**
According to the different organizational modes needed for exploration and exploitation, in the debate on individual competencies, also two fundamentally different work situations have to be distinguished (Erpenbeck & von Rosenstiel, 2003).

(1) On the exploration side, it is about divergent self-organized processes with creative, partially or totally open goal attainment situations that often require a deviation from known patterns of action (Wang & Rafiq, 2009). Here, skills are required that help to enhance variety and effectiveness (“doing the right things”). (2) On the exploitation side, it is about convergent requirement-driven processes, i.e. meeting external requirements in much more familiar, experience-based situations, where it makes sense to build skills that reduce variety and support efficiency orientation.

The core challenges in exploration and exploitation to cope with in OI are displayed in Figure 2. In this sense, individual competencies to cope with ambidextrous challenges of resource exploration and exploitation need to develop:

- combinative and focusing skills in the area of professional competencies
- complexity management and variety reduction skills in the area of methodic competencies
- cooperation and hierarchical skills in the area of social competencies
- self-reflective and authority skills in the area of personal competencies

![Figure 2. Principal challenges of individual competencies to cope with in exploration and exploitation](image-url)
Open Innovation At The Individual Level

In this lecture, these individual competencies will be differentiated by using the dimensions of professional, methodical, social and personal competencies (Hafkesbrink & Schroll, 2010).

Professional competencies are those skills that help to cope with typical occupational tasks and requirements based on a self-organized process, i.e. to solve problems creatively with specialist knowledge and to be able to classify and evaluate meaningfully knowledge that is relevant for task fulfillment. Professional competencies are key features in the innovation process, thus also in OI. In resource exploration, it is important to identify and translate new specialist knowledge for the organization's innovation process. There the focus is primarily on access to new knowledge, either in the form of trend reports and market studies (explicit knowledge) or in the form of so-called 'tacit knowledge' (Hess & Rothaermel, 2008), bound to e.g. university research personnel. On the other hand, in resource exploitation it is about enriching existing knowledge incrementally with experience along a chosen technology path, with the aim to optimize the expertise based on the existing (business) processes.

On this background, it seems reasonable that broad expertise is beneficial to the exploration process, as diverse knowledge for different domains and tasks is available (Schudy, 2010). In contrast, specialized knowledge is more conducive for exploitation processes, because specialists dispose of very deep knowledge in their own field and can use it effectively to apply knowledge in more or less known situations (ibid).

Methodical competencies are defined as skills to identify, procure, process, store, and use professional knowledge. They serve as a bridge in the innovation process: on the exploration side, methodical skills bridge the process of knowledge identification and knowledge acquisition in relation to external partners. In the transition from exploration to exploitation, methodical skills support the assimilation and transformation of knowledge within the organization, i.e. the translation of existing external knowledge to internally understandable knowledge (ter Wal & Salter 2011; Lane & Lubatkin, 1998).

Methodical competencies for variety enhancement (e.g., abstraction skills, mastery of different learning techniques, multitasking, mastery of research techniques, design thinking) support processes of exploration fundamentally, as they are likely to generate new expertise for the organization, as well as enable the transition to a new technology path or business model. By contrast, methodical competencies to support experiential learning (e.g., coaching, ability to integrate opinions, modeling skills, structured thinking) rather support processes of exploitation (in the sense of decreasing variety), as incremental improvements in existing processes, products, etc. on the existing technology path or business model are reached.

Social competencies play a supporting role in all stages of the OI exploration and exploitation process, as all related transactions require social-communicative interactions. However, social skills
on their own do not enable either the generation of new information and solutions (Kauffeld, Frieling & Grote, 2002) or the exploitation of existing knowledge. Instead, they only support the exchange of information, serve as the mechanism to understand communication partners and should help to establish necessary social relations that underlie the exploration and exploitation process.

Personal competencies reflect the personality of active players. This competence dimension is the basis for the acquisition of social-communicative, methodological and technical/professional skills. For exploration activities, such personal skills are asked for that put the actor into a learning mode to capture new knowledge. For exploitation activities, such personal skills are conducive to support the application of knowledge in the context of a known issue.

Studies on the competence of innovation staff in knowledge exploration and invention (Kaltenegger 2008) highlight the following personal skills:

• Creativity, initiative, commitment, curiosity, flexibility, frustration tolerance, value orientation, spontaneity, and discipline in the implementation (op.cit., p. 109),
• Self-reflection, openness to experience (e.g. active imagination, independent thinking, curiosity) (Barrick & Mount, 1991; Costa & McCrae, 1992),
• Aesthetic appreciation, varied interests, appeal through complexity, high energy, independent judgment, autonomy, intuition, self-confidence, conflict resolution, etc. (Barron & Harrington, 1981; Comacchio & Bonesso, 2011, p. 5).

During the phases of knowledge exploitation and implementation, the share of creativity, personality, and variety enhancing personal competencies may be lower; since such personal competences are in demand that focus on routines, such as authority, assertiveness/persistence/persistence, patience, strength of character (advocacy of beliefs), ambition, accuracy, punctuality, diligence, execution, and reliability.

To summarize:

For individual competencies that support exploration activities, attributes are needed that are directed at:

• combining and expanding knowledge (professional skills),
• coping with complexity in the context of variety enhancement (methodical skills),
• cooperation in the framework of interaction relationships (social skills)
• self-reflection in personal action routines (personal skills).

For individual competencies that support exploitation activities, the attributes should focus on

• knowledge concentration (professional skills),
Open Innovation At The Individual Level

- simplification and narrowing of variety (methodical skills),
- hierarchy for control of work processes (social skills),
- authority in the implementation of personal action (personal skills).

Innovation actors must deal regularly with the inherent tensions between these properties, especially in OI processes. The question is whether the ambidextrous skills are available that resolve these tensions, or at least pair together those complementary skills that are able to reduce the tensions and make them manageable.

Based on our analysis, Figure 3 displays the relevant methodical, social and personal competencies along the dichotomic axes of exploration and exploitation:

- To accomplish the day-to-day work and innovation tasks, certain constitutive interdisciplinary competencies must exist, such as patience, stress-resistance, self-confidence, emotional stability, etc. These competencies provide the basic enabling levers for acquiring social and methodical competences for exploration and exploitation (Quadrant I).

- Interdisciplinary exploitation competencies (1st order competencies) serve as a lever to reduce variances with the aim of best possible exploiting of existing professional knowledge. These are e.g. process management skills, time management skills, adaptive learning skills, timeliness, diligence etc. They provide the ground for incremental improvements of existing processes and for routinizing business models (Quadrant II).

- Interdisciplinary exploration competencies (1st order competencies) serve as a lever to enhance variance with the aim of exploring new potentials and professional competences. These are e.g. creativity, openness, generative learning, transformational leadership, reorganization capabilities, etc. They serve as a basis for (radical) innovation processes (Quadrant III).

- Ambidextrous interdisciplinary competences (2nd order (meta-) competences) serve as a lever to solve role conflicts in balancing exploration and exploitation processes. These are e.g. dialectic (relativistic) thinking/trade-off or synthesis thinking, emotional ambivalence, knowledge brokerage, topsy-turvy thinking, paradoxical cognition etc. (Quadrant IV).

We assume for all individual interdisciplinary competencies that the development requirements of these competencies do not alter significantly as the size of the organization changes, but we consider – as a result of SMEs’ scarce resources – that SME managers and employees have to play more complex hybrid or ambidextrous roles in day-to-day business and in innovation compared to large companies (cf. Hafkesbrink, Bachem & Kulenovic, 2013).
**Quadrant I: constitutive interdisciplinary competences**
- transnational leadership
- mastery of research techniques
- reorganization capabilities
- empathy
- assertiveness
- frustration tolerance
- divergent thinking
- ambition
- perceptivity
- self-organization
- strength of character
- emotional stability
- patience
- stress-resistance
- self-confidence

**Quadrant II: interdisciplinary exploitation competencies**
- entrepreneurial integration of opinions (balance of interests)
- ability for hybridization of alternative logics
- ambiguity tolerance
- rhetorical skills
- lateral thinking
- emotional ambivalence
- mediation skills
- knowledge brokerage
- topsy-turvy-thinking
- paradoxical cognition

**Quadrant III: interdisciplinary exploration competencies**
- willingness for further training
- creativity
- openness
- generative learning
- coaching skills
- appreciation
- long-term thinking
- error tolerance
- social networking capabilities
- tustworthiness
- capacity for cooperation/teammwork
- analytical and planning skills
- media/presentation skills
- abstraction ability
- loyalty
- problem-solving ability
- persistence
- adaptive learning skills
- accuracy, diligence, timeliness
- transactional leadership

**Quadrant IV: ambidextrous interdisciplinary competences**
- entrepreneurship
- ability to inspire and convince others
- ability to create a mutual sense of responsibility
- skillful rapport settling or conflict resolution
- structuring thinking
- communication
- project management
- willingness and ability to transfer knowledge
- moderation skills
- time management skills
- convergent thinking
- divergent thinking
- near-time thinking
- process management skills
- authority
- ability to simplify
- adaptive learning skills
- accuracy, diligence, timeliness
**Design Thinking Case Study**

Design thinking is a problem-solving methodology, “a human-centered innovation process that emphasizes observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping, and concurrent business analysis” (Lockwood, 2009, p. xi). Design thinking strongly relies on practice, and many often describe it as “what designers do”, referring to design methods and tools (Kimbell, 2012). The main objective is to create a new emotionally and functionally appealing user experience (Seidel & Fixson, 2013, Liedtka, 2014). Applying design thinking thus means focusing on users and user needs and requires an iterative process that continuously goes from observation of users to idea generation and testing (Brown, 2008).

Glen et al. (2015) provide a practical guidance for teaching design thinking in business schools. They outline six main phases of the design thinking project: problem finding, observation, visualization and sense making, ideation, prototyping, and viability testing. The authors recommend planning the teaching with respect to these phases. Thus, students should start with problem finding and developing an initial problem statement, even if they feel discomfort when dealing with ill-defined tasks. Next, students have to learn how to form empathy for the end user. This is the core of design thinking and relies predominantly on direct observation and interviews with users. Students then try to visualize and make sense of the data. Several techniques are available, including customer journeys, personas, and empathy maps. This becomes an input for ideation, which takes form of brainstorming within cross-functional teams; in the case of students, the goal is to create diverse teams. The ideas are further prototyped and tested, using, for example, customer journey mapping, user scenarios, storyboarding, desktop walkthrough, and experience prototyping. Finally, the prototyped idea gets through viability testing, when students gather feedback on the desirability and feasibility of the suggested solutions.

Research shows that an action-based entrepreneurship training can make participants more skilful in identifying business opportunities (DeTienne & Chandler, 2004; Gielnik et al., 2015) and more entrepreneurial (Glaub, Frese, Fischer, & Hoppe, 2014; Rauch & Hulsink, 2015). We build our teaching (the combination of a lecture and a workshop) on the principles of action-based training with the aim to develop students’ innovation competences and skills. By increasing the students’ understanding of what design thinking is and how to apply the basic design thinking tools, we expect that students will become better in sensing market opportunities as they become more attentive to consumer needs and more capable of designing new solutions as they learn techniques for idea generation and testing. Not the least, it also contributes to improving the ability to work through the innovation process as it focuses on collaboration and communication during teamwork.

The content requires a 2-days teaching, consisting of a 2-hour introductory lecture and 4-hour workshop on the first day, and 3-hours workshop and 1-hour session with group presentations on
the second day. The introductory lecture includes the presentation of design thinking and the design thinking tools with the focus on interviewing, customer journey mapping, brainstorming, collaboration, scenarios, and experience prototyping. Some examples of the successful implementation of design thinking may be used (e.g., Yoo & Kim, 2015). The lecture should also include the discussion of challenges of applying design thinking in corporations (e.g., Kolko, 2015). In turn, the workshop relies on a teamwork with an ill-defined problem and a real customer, implies active use of the design thinking tools, and finishes with the presentation of ideas in front of other students to get feedback. A teacher and – if there are many groups – assistants, who have knowledge of design thinking, should facilitate the workshop in its full duration.

**PEDAGOGICAL GUIDELINES**

It is up for a teacher to choose an experience to be designed, but it should be sufficiently easy for students to relate to (e.g., banking, public transportation). We use an example of shopping experience.

As a part of preparation for a class, the teacher agrees with two external persons on the participation in the training as customers (for example, students from another course). The customers should represent two competing shops/chains. A short general description of each person should be prepared, containing information about age, occupation, lifestyle, family, and interests. No obvious problem should be defined, but the person's shopping habits should receive a sufficient attention. In addition, the teacher prepares a general information about the shops (a short history, existing products/services).

After the introductory lecture, a teacher primes students into being representatives of particular departments (IT, customer service, seller; etc.) of one of the two shops. As a result, a teacher gets two groups (two companies) with the similar functional structure. Students then receive the general information about the corresponding company. In addition, they get 45 minutes to interview the relevant customer. Next, the teacher mixes students into “cross-functional groups” of 5-7 people (different functional roles, but from the same company), and the group work starts. Each cross-functional group should have sufficient space (better if they have each own group room), and the supply of auxiliary materials, such as marker pens and post-it of various colours, large paper sheets, and an example of a customer journey canvas. Then the ideation phase begins, when students brainstorm their ideas and visualize them. Customers should be available to the groups, regularly visiting them and asking whether they have new questions or want to discuss their ideas. The teacher with eventual assistants should also be available for the groups, continuously facilitating the workshop. As the outcome of the day 1, the groups should produce scenarios for their ideas (the detailed description of an imaginary customer experience with their new product/service).
Glen et al. (2015, p. 190-191) provide the detailed overview of challenges and solutions related to the facilitation of design thinking workshops. For each of the six main phases of the design thinking project, they describe challenges and the ways of handling them. The continuous encouragement of students, non-intrusive supervision, help, and the nourishment of their holistic perspective are the authors’ key advises to teachers.

On the second day, students meet in two groups (“companies”) according to the original division and discuss the feasibility of the ideas from the day 1 (1 hour). The cross-functional groups present their ideas by using scenarios and storytelling. Each “company” chooses the most feasible idea from their point of view. During the next two hours of the workshop, the companies finalize these ideas and prepare a presentation to the teacher and customers.

**Evaluation questions**

The last hour of the two-day session is devoted to the “companies’” presentation of ideas in the form of experience prototyping. In prototyping, students may resort to roleplay. In addition, they may use additional material (carton, paper, various objects) if they need it. They then get feedback from the teacher and customers with respect to desirability of the solutions. It is, however, important to continuously stress that it is OK to fail and make mistakes during the ideation and prototyping. The final feedback should be constructive and not negative. If a teacher finds it relevant, it is possible to organize it in the form of a competition, when a group, whose suggestion the teacher and the customers will evaluate as the most desirable, gets a prize. Teacher might decide to discuss the implementation strategies for each of the ideas.

**Teaching tips**

Teacher might use the examples of a persona (the fictional description of a customer) to demonstrate how the description of a real customer can be organized.

**Key take-aways**

- Be aware of different individual competences needed for exploration and exploitation of knowledge in the Open Innovation process. On the exploration side, it is about divergent self-organized processes with creative, partially or totally open goal attainment situations that often require deviation from known patterns of action (Wang & Rafiq 2009). Here, skills are required that help to enhance variety and effectiveness (“doing the right things”). On the exploitation side, it is about convergent requirement-driven processes, i.e. to meet external requirements in much
more familiar, experience-based situations, where it makes sense to build skills that reduce variety and support efficiency orientation.

- In that sense individual competencies to cope with ambidextrous challenges of resources exploration and exploitation need to develop both combinatoric and focusing skills in the area of professional competencies complexity management and variety reduction skills in the area of methodic competencies cooperation and hierarchical skills in the area of social competencies self-reflective and authority skills in the area of personal competencies.

- A Design Thinking exercise will make students better in sensing market opportunities, as they will become more attentive to consumer needs and more capable of designing new solutions when learning techniques for idea generation and testing. Not the least, it also contributes to improving the ability to work through the innovation process, as it focuses on collaboration and communication during teamwork.

REFERENCES

- Hafkesbrink, J., & Schroll, M. (2010). Organizational Competences for OI in Small and Medium Sized Enterprises of the

OPEN INNOVATION IN SMEs

JOACHIM HAFKESBRINK, YVONNE KIRKELS

ABSTRACT

This section contains specific content of the characteristics of applying the Open Innovation concept in SMEs. First a definition and characterization of SMEs is given, as well as basic definitions of the terms used in this section, followed by a description of the relevance of SMEs in the economy. The main challenges for SMEs to adopt the Open Innovation concept are illustrated, as well as chances for SMEs to apply the concept. Individual competences for applying the Open Innovation concepts in SMEs are presented based on an empirical investigation in the OI-Net project. According to this investigation, it is apparent that certain organizational competences for Open Innovation are more elaborated in SMEs than in large organizations. The lesson concludes with a section on practical implications and future research needed.
## Open Innovation In SMEs

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Students should have basic knowledge about the Open Innovation concept, theoretical background, terms and definitions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives of the lecture</td>
<td>To impart knowledge about the differences of Open Innovation implementation in large companies and SMEs. To make students aware of the challenges and opportunities of Open Innovation for SMEs. To impart knowledge and skills to apply Open Innovation instruments successfully in SMEs. To foster competences in evaluating OI best practice and policy support for SMEs.</td>
</tr>
<tr>
<td>Workload</td>
<td>4 h teaching; 4 h self-study.</td>
</tr>
</tbody>
</table>
| Learning outcomes | #55: Innovation Management: To remember and understand OI needs of a SME company.  
#128: Opportunity Generation: To assess innovative ideas and define roadmap for commercialization. |

### Knowledge

**#22 Entrepreneurship:** to become acquainted with strategies and institutions for supporting innovative entrepreneurship, especially to understand the role of (technology) intermediaries in the OI processes of SMEs.  
**#44 Innovation:** to understand the innovation process and how it can be disseminated and implemented in SMEs active in different sectors.  
**#46 Innovation Management:** To recognize and exploit aspects related to Open Innovation in SMEs.  
**#54 Management:** to understand innovation in the SME organizational context  
**#74:** to distinguish between the modes of inbound, outbound and coupled Open Innovation in SMEs, especially to explain important activities of inbound (exploration) and outbound (exploitation) innovation in the SME environment.  
**#82 Organizational Innovation:** to recognize the role of company age, size and business sector in innovation, especially to be aware of differences between medium sized (100-250 empl.) and small (< 100 empl.) companies in implementing OI. To compare SMEs’ and large organizations’ capabilities in OI. To understand SMEs' resource limitations as a framework condition for OI activities.
Skills

**#42 Innovation:** to analyse the innovation needs of a company, especially of SMEs

**#68 Open Innovation:** to analyse the pros and cons of the Open Innovation approach to the innovation strategy of SMEs

**#71 Open Innovation:** to identify Open Innovation activities in real life SMEs. To appraise the key indicators for successful implementation of the Open Innovation model in an SME organization, and to identify the key success factors related to Open Innovation strategies in SMEs.

**#93 Strategy:** to analyse the endogenous and exogenous contexts of SMEs, especially to understand the business/market environment as an important driver to apply OI in SMEs.

**#76 Organizational Culture:** to understand the organizational structure and the influence of culture, politics and leadership on innovation and changes, especially to use management skills to handle cognitive, cultural and institutional differences in inter-organizational collaboration.

Competences

**#2 Collaborative Innovation:** to explore the concepts of collaborative innovation and make them actionable in SMEs, especially to identify means of linking to outside innovation actors. To discuss the options of SMEs for inter-organizational ties and networking.

**#41 Innovation:** to analyse case studies related to innovation in SMEs critically, especially to evaluate and judge the good practice of OI in SMEs, based on case studies. To consult and support SMEs in implementing OI. To design innovation support programs to facilitate OI in SMEs.

**#48 Innovation Management:** to design, evaluate and apply models for the implementation of innovation in SME organizations.

**#70 Open Innovation:** to elaborate and specify how SMEs can benefit from Open and User Innovation.

Reading List

European Qualifications Framework (EQF) Level: Levels 6, 7.

**Lecture Content**

**Definitions: SMEs and Open Innovation**

First of all, definitions related to SMEs and Open Innovation must be made clear in order to avoid misinterpretations.

SME: Small and medium-sized enterprises (SMEs) are defined in the EU recommendation 2003/361. The main factors determining whether an enterprise is an SME are:

<table>
<thead>
<tr>
<th>Company category</th>
<th>Staff headcount</th>
<th>Turnover or Balance sheet total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium-sized</td>
<td>&lt; 250</td>
<td>≤ 50 € m</td>
</tr>
<tr>
<td>Small</td>
<td>&lt; 50</td>
<td>≤ 10 € m</td>
</tr>
<tr>
<td>Micro</td>
<td>&lt; 10</td>
<td>≤ 2 € m</td>
</tr>
</tbody>
</table>

These ceilings apply to figures of individual firms only. A firm that is part of a larger group may need to include staff headcount/turnover/balance sheet data from that group as well.

**Open Innovation** is usually defined as the targeted opening of the innovation process to include external knowledge such as of customers, suppliers and research institutes etc. into the innovation process (outside-in), with the aim to implement new products or services on the market successfully and/or to exploit own knowledge via collaboration with third parties (inside-out), e.g. by way of licensing (cf. Hafkesbrink & Schroll, 2010).
Part 3.3. Instantiating Open Innovation: From Individual to Society Level

**Outside-in Collaboration**: Outside-in collaboration is about the ability to build solid communication and working relationships with appropriate external sources of knowledge and expertise in order to support the identification and acquisition of knowledge (cf. Hafkesbrink & Schroll, 2010). In addition to the known groups of partners in the innovation process, such as suppliers and consultants, the OI debate has directed attention towards crowdsourcing communities, i.e. working with customers to generate ideas for new products and services (ibid.), or with other communities of practice, affinity, or knowledge (cf. Evers & Hafkesbrink, 2010; Hafkesbrink & Schroll, 2010). The sustainability of these communication and working relationships can be operationalized by the sum of the tightly and loosely coupled connections (cf. ,983; Andriopoulos & Lewis, 2009) to the corresponding market partners. It is a question of both building formal structures of relationships, for example in the context of strategic alliances, as well as informal social relationship structures that provide access to ‘tacit knowledge’ (cf. Hess & Roithaermel, 2008).

**Inside-out collaboration** is about a company utilizing its knowledge externally, which is not used for its own market-based purposes (cf. Kutvonen, 2009; Kutvonen & Torkkeli, 2008; Hafkesbrink & Schroll, 2010; Escher, 2005; Gassmann & Enkel, 2004; Lichtenthaler, 2007), and establishing communication and working relationships with corresponding market partners. This kind of ‘downstream or outbound utilization’ is usually production- and marketing-oriented and addressed to as the ‘exploitation of explicit knowledge’ (cf. Hess & Roithaermel, 2008). The ability for inside-out collaboration can be operationalized by, for example, the number of licenses sold, or the number and quality of exploitation alliances with third parties.

**Absorptive capacity** means a firm’s ability to sense, value, assimilate, and apply new (outside-in) knowledge internally, and desorptive capacity means a firm’s ability to transfer and exploit their knowledge externally (Lichtenthaler, 2007). For knowledge exploration, it is decisive to establish capabilities for the identification of technological and market-based options that are relevant to the company (cf. Mortara et al. 2009), and the ability to evaluate and build compatibility with the company’s existing expertise (cf. Schroll 2009, Schreyögg & Kliesch, 2002; Boscherini et al. 2009, Cohen & Levinthal, 1990, Mortara et al. 2009). In the literature, this part of the acquisition of knowledge is referred to as ‘potential absorptive capacity’. “Potential absorptive capacity, [...] includes knowledge acquisition and assimilation, captures efforts expended in identifying and acquiring new external knowledge and in assimilating knowledge obtained from external sources” (Zahra/George 2002, p. 189). It may make a difference whether the source of knowledge is of academic or industrial nature (cf. Vega-Jurado et al. 2008), thus ‘scientific absorptive capacity’ and ‘industrial absorptive capacity’ are distinguished: “The former is a firm’s ability to absorb scientific/technological knowledge from universities, technology institutes, and public and private research centers; the latter is its ability to assimilate and exploit knowledge from actors in the industry chain. The factors that determine the development of these types of absorptive capacities is different although in certain sectors they may be complementary” (op.cit., p. 11). The ability for the identification and acquisition of
knowledge can be measured by how successfully the organization identifies and acquires relevant knowledge from external sources (i.e. knowledge for the purpose of new problem solutions in the company).

The subsequent steps following knowledge identification and acquisition are the integration of (existing) knowledge for the continuous improvement of business processes (cf. Lazzarotti & Manzin, 2009; Mortara et al. 2009; Schreyögg & Kliesch, 2002), and the ability to utilize knowledge in the market (cf. Boscherini et al. 2009). In the literature this part of knowledge utilization is also described as ‘realized absorptive capacity’, “which includes knowledge transformation and exploitation, encompasses deriving new insights and consequences from the combination of existing and newly acquired knowledge, and incorporating transformed knowledge into operations” (Zahra & George 2002, p. 190). The ability to transform and utilize knowledge in the enterprise can be operationalized, for example, by observing the extent to which existing knowledge (including knowledge, which reached the company via a knowledge acquisition process or exploration process) is actually incorporated in new products, services or their underlying technologies, or is used to improve existing products, services and technologies (e.g. the number of own patents as a basis for the company’s product portfolio). According to Spithoven et al. (2013) large companies have no superior absorptive capacity to sense, assimilate and integrate external knowledge compared to SMEs.

**Relevance of SMEs**

SME’s are relevant in the Open Innovation context. The Annual Report on European SMEs (2014/2015) lists the most important facts and figures with regard to SMEs in Europe (Figure 1).

Firstly, the job-creating SMEs were primarily those providing services. They were far more prominently represented in this group than, for instance, manufacturing firms. However, there is no reason or indication to assume that manufacturing firms could not replicate the employment expansion observed in the services firms.

Secondly, net employment creation was particularly strong from 2008 to 2014 in knowledge-intensive services. This was the case across all three SME size classes (i.e. micro, small, and medium-sized firms). In contrast, all of the four types of technology-intensive goods producing sectors (ranging from low technology to high technology) showed net job losses between 2008 and 2013. During this period the less technology-intensive SMEs lost a higher proportion of their jobs than the more technology-intensive SMEs. In 2014, in terms of employment, the goods-producing sectors stagnated.

Thirdly, young SMEs of no more than nine years of age were the main net employment creators in recent years. However, a number of older firms created new jobs as well, or kept their staff, which contributed to stabilising the labour market as a whole.
Part 3.3. Instantiating Open Innovation: From Individual to Society Level

“In short, SMEs are ubiquitous, and in 2014 accounted for 99.8% of all enterprises in the non-financial business sector in the EU28.

For every km² of land surface the EU has an average of 5 SMEs. Moreover, in 2014 SMEs employed almost 90 million people - 67% of total employment, and generated 58% of the sector’s value added.

Almost all SMEs (93%) are micro SMEs employing less than 10 people.

About three quarters of SMEs are active in the five key sectors: ‘wholesale and retail trade’, ‘manufacturing’, ‘construction’, ‘business services’ and ‘accommodation and food services’...

Finally, general economic conditions, especially the macro-economic environment, have a major influence on the SME’s employment creation performance. This means that many of the job-creating firms were based in Member States with a more favourable macro-economic environment” (EC 2015).

**Theoretical Background**

The next section describes the main challenges for SMEs, the OI efforts they can carry out to overcome these challenges, and the differences between large and small companies.
SMEs AND (OPEN) INNOVATION; MAIN CHALLENGES

Today's complex and demanding environment affects especially small innovative firms because they tend to rely more heavily than large firms on technological developments outside the firm to obtain new knowledge (Hicks & Hedge, 2005; Porter, 2000). Since they have a lack of economies of scale and scope (Nootenboom, 1994), small enterprises tend to keep a smaller part of R&D in-house than large firms. In addition, SMEs' opportunities to spread risk among their small portfolios are often limited (van de Vrande et al. 2009). Especially finance-related issues are barriers to firms (Madrid-Guijarro et al. 2009). Their restricted internal resources reduce the ability to engage in innovative efforts as well as access to new technologies (European Commission, 2005; Pittaway et al. 2004).

A related complication for SMEs is the increasing drive towards specialization. Increased global competition leads to an increase in specialization; uncertainty and market fragmentation force organizations, especially SMEs, to enhance flexibility and search for new ways to differentiate (Acs et al. 1996). Strategic management literature emphasizes the need to focus on a certain value discipline to create value (Treacy & Wiersema, 1993; Porter, 1980). No company can succeed today by trying to be all things to all people. The need to focus on a unique value that the organization alone can deliver to a chosen market will influence their mix of in-house resources and capability; more specialization is created. As a result, organizations have increasingly fewer knowledge bases in common, and therefore lack a basis on which they can communicate with each other. Due to the differentiated technological know-how and large cognitive distance between the parties (Nootenboom et al. 2007), it becomes more difficult to communicate with companies outside their own industry and also absorb the acquired novel knowledge. When open innovation is preferred, the absorptive capacity of organizations is challenged (Cohen & Levinthal, 1990; Nootenboom, 2000; Zahra & George, 2002). Moreover, especially SMEs are affected by this problem. For example, they rely on fewer human resources (Hausman, 2005) and therefore have to deal with the lack of a broad multidisciplinary competence base (De Toni/Nassimbeni 2003).

One crucial challenge to implementing the open innovation approach in SMEs in this context is insufficient knowledge and awareness of managers or owners (Parida et al. 2012), the usual decision makers in SMEs, who often have a technological background (Bougrain & Haudeville, 2002). Thus, before SMEs incorporate external knowledge, they need to develop and structure their own capacities (Bougrain & Haudeville, 2002). Previous studies have also shown that SMEs lag behind in the implementation of open innovation (Narula 2004; Lee, 2007; Lee et al. 2010), especially when it includes collaboration with more powerful partners (Narula, 2004).

Once novel knowledge is in-house, SMEs often lack structured internal knowledge sharing, gathering and utilization (Varis & Littunen, 2010), and structural fostering of an innovation culture
(Terziovski, 2010) to exploit the novel knowledge. Also, innovation performance is negatively affected by the absence of sophisticated hierarchical structures (Jones & Tilley, 2003). SMEs experience more difficulty in successful implementation of the innovation process, including successful commercialization, than in the invention or idea generation phase itself (Hutter et al. 2013; Gans & Stern, 2003; Bianchi et al. 2010; Hothro & Champion, 2011). According to O’Dwyer et al. (2009), this lack of commercial competences often leads to spontaneous, unstructured and ineffective market introductions and activities.

In general, SMEs have less time and fewer resources to spend on learning, and to acquire and exploit novel knowledge outside their own industry (Lavie & Rosenkopf, 2006; European Commission, 2005; Edwards et al. 2005; MacGregor, 2004; Narula, 2004; Powell et al. 1996). The open innovation approach can offer promising ways for small firms to overcome their difficulties (Gassmann et al. 2010; Hothro & Champion, 2011). It may reduce their time-to-market, their costs and risk, and increase the acquisition of missing knowledge (van de Vrande et al. 2009).

In their effort to survive and overcome their liability of smallness (Chesbrough, 2010) SMEs are increasingly looking for competent partners that can provide them with complementary assets and resources (Almeida & Kogut, 1997; Audretsch & Lehmann, 2005; Hite & Hesterly, 2001; McEvily & Zaheer, 1999; Narula, 2004). However, the complex environment and the limited resources and scanning abilities make it again difficult for SMEs to find competent partners.

Small and medium-sized enterprises are faced by a dilemma. On one hand, SMEs need to cooperate with others in order to acquire knowledge and other competencies, on the other hand they often face difficulties in finding partners and lack the knowledge base and internal structure to acquire and absorb the required knowledge (Kirkels & Duysters, 2010).

Fortunately, SMEs have also advantages in contrast to large firms with respect to how they innovate and interact with others. The next paragraph will go into more detail with regard to how SMEs can overcome their challenges.

**IS OPEN INNOVATION A CHANCE FOR SMEs TO OVERCOME THE CHALLENGES?**

In view of the challenges described in the previous section, there are also arguments to motivate SMEs for Open Innovation processes. SMEs can gain benefits from open innovation due to such characteristics as less bureaucracy, increased willingness to take risks, and faster ability to react to changing environments (Parida et al. 2012). SMEs that are successfully applying open innovation activities are mostly firms that are inclined toward the in-bound or technology exploration aspects of open innovation (Bianchi et al. 2010; Chesbrough & Crowther, 2006). SMEs are already strongly
customer-oriented as, they often provide unique products which require high customer participation. Hence, they are used to collaborating directly with their customers and responding to their needs (Hutter et al. 2013). Thus, customer involvement, user innovation, external networking, and outsourcing of R&D tools are among the most frequently applied open innovation practices in SMEs (van de Vrande et al. 2009). Lee et al. (2010) and Kirkels & Duysters (2010) also highlight the role of an intermediate organization or individuals in supporting SMEs’ innovation activities, where the intermediary assumes research activities, the creation of adequate collaboration structures, consulting services, and targeted marketing support.

DIFFERENCES BETWEEN LARGE AND SMALL COMPANIES WITH REGARD TO OPEN INNOVATION

SMEs are different from large organizations, but what are the differences exactly when it comes to open innovation (see also Spithoven, Vanhaverbeke, & Roijakkers, 2013)? The following table contrasts large and small companies in certain aspects, as there are specific antecedents for the Open Innovation approach depending on the size of companies. Please note that of course large companies also adapt more and more mechanisms of flexible organizational solutions as a means of learning in Open Innovation (for further information see the section on “OI in large organizations”).

Table 1. An overview of challenges and solutions related to the facilitation of a design thinking workshop

<table>
<thead>
<tr>
<th>Item</th>
<th>SME</th>
<th>Large Companies</th>
<th>Pro or contra Open Innovation in SMEs?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed of decision-making</td>
<td>Flexible and fast innovation</td>
<td>Slow decisions in organizational hierarchy</td>
<td>Pro SME OI</td>
</tr>
<tr>
<td>Location of resources</td>
<td>Fewer resources (time, money and knowledge)</td>
<td>More financial leeway</td>
<td>May be a motivator for SME OI, especially in the exploration phase</td>
</tr>
<tr>
<td>Attitude toward risk</td>
<td>The whole business is a risk, focus on the affordable loss instead of acceptable risk</td>
<td>Risk adverse, because the relevant business may only be “one project” out of many</td>
<td>Pro SME OI, since larger companies may be more reluctant</td>
</tr>
<tr>
<td>Business model understanding</td>
<td>Mutual understanding of what the company wants to accomplish. The manager/owner</td>
<td>Much more fractured; More effort has to be put into generating a mutual understanding</td>
<td>Pro SME OI once the owner has experienced the benefits of OI</td>
</tr>
</tbody>
</table>
### Part 3.3. Instantiating Open Innovation: From Individual to Society Level

<table>
<thead>
<tr>
<th>Item</th>
<th>SME</th>
<th>Large Companies</th>
<th>Pro or contra Open Innovation in SMEs?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Management processes</strong></td>
<td>has the main control and is often the main liaison for relations</td>
<td>of the business model and creating complementary innovation activities together</td>
<td></td>
</tr>
<tr>
<td><strong>Rules</strong></td>
<td>SMEs break rules; they do not try to predict the future, but are more inclined to embrace opportunities as they come along</td>
<td>Large firms follow rules, they preoccupy themselves with competitive analysis and careful planning</td>
<td>Pro SME OI</td>
</tr>
<tr>
<td><strong>Definition of innovation</strong></td>
<td>No special teams; the whole company is involved in new developments</td>
<td>Special product teams in large firms are dedicated to their product development roadmap, searching for innovations that fit their roadmaps exactly</td>
<td>SMEs need complementary partners who are interested in the opportunities of their development and not partners who search for innovations that fit their roadmaps exactly</td>
</tr>
<tr>
<td><strong>Contribution to earnings from OI</strong></td>
<td>OI practices in SMEs contribute to their earnings from new innovations, mostly based on IP. Earnings from new innovations affect their total turnover considerably</td>
<td>More effective in generating new products and services through OI than SMEs, but relatively less impact on the total turnover</td>
<td>Motivator for SME OI</td>
</tr>
</tbody>
</table>
Finally – as mentioned in the previous paragraph - Open Innovation practices differ in certain types of SMEs according to their technology intensity. For example in external knowledge sourcing, R&D sources such as universities, research labs or suppliers seem to be highly relevant sources for a pioneering high tech entrepreneurial firm, but less so for a demand-oriented SME that mainly interacts with customers and users (Brunswicker & Vanhaverbeke, 2014), whereat there are different impacts on SMEs’ innovation performance, depending on technology sourcing (for radical innovation) and technology scouting (for incremental innovation) (Parida, Westerberg, & Frishammar, 2012). Especially when doing technology sourcing. “SMEs can advance their internal innovation process as they can integrate almost-ready technologies from external sources and use it to address the emerging gaps in the market” (op.cit., 294). Thus, it can be observed that SMEs in the high-tech sector are in general more open that those in low-tech sectors. That is the way how high-tech SMEs cope with their lack of internal sources and resources for innovation.

**Open Innovation Competences and SMEs**

The results presented above are endorsed by research in the OI-net project (OI-Net Project) in which OI capabilities are investigated in various industries. These competences embrace professional, methodical, social, and personal skills that cover both exploration (in-bound) and exploitation (out-bound) innovation activities, i.e. so called ambidextrous competences for Open Innovation (cf. the chapter on Individual Competences). Three categories can be specified for measuring open innovation in organisations: Organizational Readiness (culture of openness, dynamic capabilities for organizational change, organizational structure, and technological knowledge enhancement), Collaborative Capabilities (internal collaboration, networking) and Absorptive Capacity (Hafkesbrink & Schroll, 2014).

The following Figure 2 and Figure 3 depict the relevant individual skills, knowledge and abilities that an Open Innovation Manager in Micro-, SME and large companies should possess (result of an OI-Net investigation).

SMEs in general are more involved in open innovation, but they are also more intuitive than large firms. For example, in an SME less attention is paid towards formal rewarding methods to support OI. SME managers (as well as start-up entrepreneurs) still need to develop specific individual competences for making Open Innovation more successful in their company. In order to develop these competences further, the company must first determine what OI competences are already present. Several audits have already been developed for this purpose. For more information, see section “OI and Individual Competences” in this book.
Figure 2. What skills and knowledge does an open innovation specialist should have? (Podmetina et al., 2016)

Figure 3. What abilities and knowledge does an open innovation specialist should have? (Podmetina et al., 2016)
**Practical Implications**

The paper of Hossain (2015) explores the practical implications of Open Innovation and SMEs in depth.

- Factors that accelerate the capacity of SMEs to develop and manage open innovation systems include the size of the firm, its organizational stage, its capability to develop partnerships, its capacity to identify partner organizations with complementary resources, and its capacity to implement and manage open innovation systems.
- SMEs lack absorptive capacity and hence technology intermediaries are useful for them.
- SMEs’ collaboration with external agencies increases their chances of launching products and services, vertical collaboration is relevant for radical innovation, and horizontal collaboration is appropriate for incremental innovation.
- Vertical and horizontal co-operation with customers, suppliers, and other agencies plays a more distinct role in the innovation process of SMEs than horizontal cooperation with research institutions, academic institutes and state agencies.
- Open innovation SMEs tend to collaborate for product introductions, whereas closed innovation SMEs tend to collaborate for incremental changes of their existing products.
- Collaboration for SMEs is more important and useful in the commercialization stage than in the early (R&D) stages of innovation.
- Networking is an effective way to facilitate open innovation among SMEs. However, due to resource and other limitations, SMEs are not able to maintain numerous networks. Therefore, their skills in maintaining a few relevant networks are essential for open innovation activities. A relatively closed, focused and consistent networking approach results in high innovation performance. SMEs’ open innovation via external collaboration has a curvilinear (inverted U-shape) relationship with innovative efficiency, i.e. there is a collaboration and networking density optimum to be explored.
- SMEs that are more open to external sources or channels are more likely to gain higher levels of innovation performance.
- The roles SMEs play in an alliance may be subject to change in some industries. Large firms and SMEs are exchanging best practices and insights into collaboration to create commitment for new forms of collaboration. The Original Equipment Manufacturers in Southeast Netherlands try to share their success in the entire supply chain by competing per supply chain instead of per organization (also termed as value sourcing). Open innovation is used to create collaborations and value within the supply chain. The advantages and disadvantages to the SME organization and the minimal conditions for applying new business models are described in an industry document of Loeh, Pels, Ebeling, & Faber, (2007).
- Compared to large firms, SMEs need to be more careful in terms of their intellectual property (IP), as they protect very selective technologies. Patenting activities also help SMEs significantly in licensing out their knowledge to external parties.
Finding a partner is often associated with uncertainty about the skills of the potential partner and his or her reliability (Powell, 1990). Start-ups, which in general focus on creativity, or in other words product leadership, will want partners who can complement their shortage in commercial and material assets and consequently increase their effectiveness and efficiency. In contrast, incumbent companies are in general looking for socialization and intellectual assets that can increase their flexibility and creativity and ensure continuity in the future (Hardjono, 1995 & 2000; Quinn & Rohrbaugh, 1983; Verhoef, 2010). Researchers should explore the conditions under which the different types of SMEs can reap the full benefits from OI practices while managing the potential risks of becoming too dependent on external sources effectively (Spithoven, Vanhaverbeke, & Roijakkers, 2013). For example, too many SMEs do not take a systematic approach to IP, and this leads to unintended knowledge spillovers. This is even more important in the OI setting where firms collaborate with several technology partners (Spithoven et al., 2013). Researchers should be aware that in open innovation, the focal unit is a community and not a single firm. Although the nature and social structures of communities are explored, the impact of such communities on SMEs is not well understood (Benner & Tushman, 2015).

A particular industry defines the specialization in a region. The technical issues surrounding the specific nature of industries influence the kinds of social structures. What you do shapes how you do it (Cohen & Fields, in Kenney, 2000). New research is planned regarding the way innovation is managed in so called Phoenix Industries (clusters of small and medium-sized businesses working with broadly similar technologies that have sprung up in former industrial areas). Still, there are many low-tech areas in rural regions. Future studies should also investigate firms that are not related to high-tech industries (Hossain, 2015). Researchers should be able to construct more nuanced understanding of open and closed innovation. For example, according to Santoro, Ferraris, Giacosa, & Giovando, (2016), the SMEs in the Piedmont area still have a closed approach to innovation and mainly rely on internal sources to develop new products and services. Moreover, with regard to external sources of knowledge, they primarily rely on one source, the customers. In addition, open innovation involves various issues, such as culture, trust, and litigation. These issues remain unexplored in the existing literature (Hossain, 2015).

With regard to fostering open innovation, several studies have discussed the policy requirements for SMEs to adopt open innovation, but in a very superficial way (Hossain, 2015). The role of the state, public organizations and intermediaries influence the innovation opportunities. Intermediaries, especially non-profit/public-related intermediaries are claimed to reduce uncertainties by being able to connect partners in a mutually beneficial way for all parties (Howells, 2006; Kirkels & Duysters, 2010). However, the social and ecological challenges of today ask for new ways of organisation and new ways of support. For example, energy organisations are getting into trouble because a lot of
(renewable) electric current is generated by the citizens. Research regarding how new forms of organisation among firms, institutions and even citizens can be fostered, is needed.

In addition, most firms find it difficult to exploit knowledge. Non-profit/public-related intermediaries do contribute to innovation in wide-ranging ways; however, most concentrate on the exploration of knowledge (Kirkels, 2010). Intermediaries in the non-profit and science sector are bound by public regulations and cannot exploit knowledge, or operate in a competitive field. Despite the more frequent use of open innovation in the commercialization stage, studies towards that stage are still relatively few (Hossain, 2015).

**KEY TAKE-AWAYS**

- SMEs face specific challenges in implementing Open Innovation due to their resource restrictions.
- In low-tech SMEs, Open Innovation is a downstream activity, since customer orientation is a usual practice in these SMEs.
- In high-tech SMEs, Open Innovation is an upstream activity, since these technology-oriented SMEs are used to collaborating more intensely with universities and other knowledge carriers.
- Networking is an effective way to facilitate open innovation among SMEs. Intermediaries play an important role in facilitating external knowledge sourcing and establishing collaboration networks.

**CONTENT-RELATED MATERIALS**

The following tools should be made available for students in this module:

LEARNING EXERCISES

An SME is often a company with less than 50 employees. The whole company is involved in new developments. Therefore, in order to assess ideas and define roadmaps for commercialization, the whole company needs to be assessed. The innovation process itself, as well as the enabling processes which support innovation in an SME may need to be changed in order to be more successful. Innovation in SMEs may not be very complicated or new to the world. However, for an SME a small change e.g. in their production process can be a big adjustment to them.

Groups of 4 students could do a quick innovation scan of a (real) company to discover all areas in which the company could improve. Together with the company, a development area can be chosen and improved. At least 8 weeks are needed to complete this assignment; to discover a problem, analyse the problem in depth and design a solution including an implementation plan. A good result of an assignment will largely depend on the kind of SME (above 20 employees is recommended) and the support they can provide to the student(s).

TEACHING TIPS

Supporting case material: please refer to the OI-Net Case study repository for case studies on Open Innovation in SMEs.

REFERENCES

Part 3.3. Instantiating Open Innovation: From Individual to Society Level

QUALITY MANAGEMENT IN OPEN INNOVATION PARADIGM CONTEXT

KRISTINA ZGODANOVA, PAVOL PALFY, ANDREA SUTOOVA, LUBOMIR LENGYEL

ABSTRACT

This chapter aims at discussing quality-related issues in the Open Innovation (OI) environment. The chapter is divided into two separate subchapters, where the first addresses the history and culture of quality, quality engineering and management tools and methods, as well as Business Excellence (BE) models and performance measurement. A separate part is dedicated to organisational processes and structures, information flow, quality-related competencies, responsibilities and authorities. The second subchapter focuses on Open Innovation organisations’ Quality Management System (QMS) models and the Open Innovation maturity perspective. Practical implications of QMS in different situations in the OI environment are summarised, and a mini-case of Faurecia featuring a real-world example is presented. This chapter is a general contribution to interlinking Quality Assurance (QA) with the OI environment. The chapter is primarily intended for students of master’s degree programs and MBA students, but would also be useful for PhD students in forming their research, and for a wide range of professionals interested in quality management in OI organisations.
<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>General knowledge of strategic management, new product development/quality management issues from an introductory course.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives of the lecture</td>
<td>Lecture targets are MSc students in engineering and management and MBAs in management, and aims to provide them with profound understanding of quality management in the context of open innovation.</td>
</tr>
<tr>
<td>Workload</td>
<td>4 teaching hours; 8 h self-study.</td>
</tr>
<tr>
<td>Learning outcomes</td>
<td>LO #5 Creativity: To know how to plan and manage a creative process. Apply creative thinking methods in innovation and personnel management. LO #60 New Product Development: To understand product and service innovation. To structure a new product development project. To describe and explain individual phases of stage-gate process. LO #76 Organizational Culture: To understand the organizational structure and the influence of culture, politics and leadership on innovation and changes. LO #XX Quality Management System: Understanding the QMSs and OI business model, related organisational processes and structures, information flow, maturity level evaluation. LO #XX Quality Management System: Quality-related competencies, responsibilities and authorities.</td>
</tr>
<tr>
<td>Knowledge</td>
<td>LO #41: To analyse case studies related to innovation critically. LO #42: To analyse the innovation needs of a company.</td>
</tr>
<tr>
<td>Skills</td>
<td>Understanding quality engineering and management skills, which are needed and can be developed in the Open Innovation context.</td>
</tr>
</tbody>
</table>
### Competences

| **LO #1:** | To recognise, design and analyse innovative business models. |
| **LO #43:** | To emphasise the strategic perspective of innovation management. |
| **LO #46:** | To recognise and exploit aspects related to open innovation. |

### Reading List Books

- New Frontiers in Open Innovation (Chesbrough & Bogers, 2014)
- Open Innovation: A Multifaced Perspective (Mention & Torkkeli, 2016)
- Open Innovation: Researching a New Paradigm (Chesbrough, et al., 2006).
- A comprehensive guide to "Efficient Open Innovation" (ACE, 2012).

### Brochures

- EFQM Framework. Enterprise 2.0 (EFQM, 2016).
- ASQ Innovation. Think Tank Executive Summary (ASQ, 2013).
- Faurecia Supplier Requirements Manual (Faurecia, 2013).

### Articles

- Toward and inter-organisational perspective on managing quality in virtual organisations (Sitek, Seifert & Thoben, 2010).
- Learning before doing; utilising a co-operative role play for quality management in a virtual organisation (Zgodavova, Kosc & Kekale, 1997).

### European Qualifications Framework (EQF) Level

- Levels 6, 7, 8.
**Lecture Content**

**Definitions**

**Innovation** – A new or changed object realising or redistributing value (ISO, 2015). Activities resulting in innovation are generally managed. Innovation is generally significant in its effects.

**Open innovation (OI)** – A distributed innovation process based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organisation’s business model (Chesbrough & Bogers, 2014).

**Organisational culture** – The values and behaviours that contribute to the unique social and psychological environment of an organisation (businessdictionary.com, 2016).

**Networked innovation** (related to supply chain) – Occurs “through relationships that are negotiated in an ongoing communicative process, and which relies on neither market nor hierarchical mechanism of control” (Swan & Scarborough, 2005 p.6). It is a hybrid form of an organisation with a specific purpose for collaboration and multiple actors involved in the innovation process. The collaboration covers both knowledge transfer and co-creation activities between the actors (Valkokari, Paasi, Lee & Luoma, 2009).

**New product development** – The creation of products with new or different characteristics that offer new or additional benefits to the customer (businessdictionary.com, 2016a).

**Performance** – A measurable result (ISO, 2015). Performance can be related either to quantitative or qualitative findings, as well as to the management of activities, processes, products, services, systems, or organisations.

**Process** – A set of interrelated or interacting activities that use inputs to deliver an intended result (ISO, 2015a) via certain workflow and decision-making practices, to reach strategic business objectives (Pellikka & Kajanus, 2015).

**Product** – The output of an organisation, which can be produced without any transaction taking place between the organisation and the customer (ISO, 2015).

**Project** – A unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources (ISO, 2015).

**Project management** - Planning, organising, monitoring, controlling and reporting of all aspects of a project, and the motivation of all those involved in it to achieve the project objectives (ISO, 2015).

**Quality** – The degree to which a set of inherent characteristics of an object fulfils the requirements.
The term “quality” can be used with adjectives such as poor, good or excellent and “inherent”, as opposed to “assigned”, means existing in the object (ISO, 2015).

**Quality innovation** – An innovation that: (i) has novelty value and is timely; (ii) is practical and can be utilized; (iii) has been developed in a systematic way; (iv) corresponds to stakeholders’ current and future needs; and (v) has improved technical, social or commercial performance (qualityinovation.org, 2016)

**Service** – The output of an organisation with at least one activity necessarily performed between the organisation and the customer (ISO, 2015).

**Supplier quality assurance** – Confidence that a supplier’s product or service will fulfil its customers’ needs (ASQ, 2016).

**Virtual organisation** – One that (1) does not have physical (bricks and mortar) presence but exists electronically (virtually) on the internet, (2) is not constrained by the legal definition of a company, or (3) is formed in an informal manner as an alliance of independent legal entities (businessdictionary.com, 2016b).

**THEORETICAL BACKGROUND**

**History and culture of quality in the perspective of Open Innovation**

*Quality* is a relative term for which each person or sector have a definition of their own. According to (ASQ, 2016), quality can have two meanings in technical usage: (a) the characteristics of a product or service that bear on its ability to satisfy stated or implied needs; and (b) a product or service free of deficiencies. Quality definitions can be more easily understood when we distinguish their meaning from the perspective of an adjective\(^1\) and a noun\(^2\).

The responsibility for *product* quality was initially on the creator of a simple product. As products became more complex, responsibility was transferred to the foreman and then later to the controller. With the introduction of the *Quality Management System* (QMS) in the ISO 9000 series of standards in 1987 and the *Total Quality Management*\(^3\) (TQM) philosophy during the late 1980s, the

---

\(^1\) The adjective quality applies to objects and refers to the degree to which a set of inherent characteristics fulfils a set of requirements. An object is any entity that is either conceivable or perceivable, and an inherent characteristic is a feature that exists in an object.

\(^2\) The quality of an object (noun) can be determined by comparing a set of inherent characteristics against a set of requirements. The quality of an object depends on a set of characteristics and a set of requirements, and how well the former complies with the latter.

\(^3\) TQM is an approach to management embracing both social and technical dimensions aimed at achieving excellent results, which needs to be put into practice through a specific framework (Bou-Llusar et al., 2009).
responsibility for quality was further moved to top management and specific departments in the organisation, managers of quality, and the “owners” of processes.

As the assortment of products and technical product complexity increase, the customers are ever more demanding, and with the development of technologies, their requirements are also changing. Products are developed to meet a broad range of consumer needs. If some users experience unmet needs, they make the adjustments themselves to satisfy their needs, which was introduced by MIT Professor Eric von Hippel in 1986 as “lead user innovation”. This term is often mentioned in relation to Open Innovation. User innovation can be found across a wide range of products and services.

Looking at the evolution of quality thinking over the last half century, innovation is in fact a natural outcome of quality thinking, although innovation sometimes involves behaviours and thinking that run counter to some practices in quality (ASQ, 2013). According to John Timmerman, Ph.D. Chairman of the ASQ Board of Directors, the science of innovation defines quality of tomorrow. Quality Innovation is a new frontier of quality management for competitive advantage.

The term Open Innovation (OI) was introduced on 2003 by the Berkeley Professor Henry Chesbrough in the book “Open Innovation The New Imperative for Creating and Profiting from Technology”, and since then it has influenced the mindset of companies around the globe. Having initially evolved in the high-tech sector, especially software firms, the OI paradigm has now spread to most industries around the world, and has become a hot topic in innovation communities (ACE, 2012).

Contemporary products have become more modular (Chesbrough, 2003; Marsh, 2011) and standardised, and are carried out along production chains composed of the contributions of different companies (Sitek, Seifert & Thoben, 2010; ASQ, 2013).

From the functional management viewpoint, organisations have proceeded to process management principles, the systems approach and teamwork towards the management of complex projects.

We know that quality is the main distinguishing feature, not only among products and services but also among people, corporations, nations, and states. However, quality is perceived, understood and evaluated by each individual in their own way, always a little differently, and it is significantly influenced by the culture (Zgodavova, 2015). Likewise, quality culture means different things to different people and organisations, and a variety of factors have made the compliance of quality more challenging. Every organisation has a unique culture, and it is virtually impossible to achieve excellence unless a suitable quality culture has been introduced, because culture is the driving force of quality. The perception of the level of quality varies in different cultures, and this affects customer satisfaction (Reimann, Lünemann & Chase, 2008) and also the maturity of customer requirements significantly. For more details about building a culture of Open Innovation you can read on pages 23 – 25 in the (APS, 2012) brochure.
A survey carried within the OI-NET project (Podmetina et al., 2016) showed that about 70% of organisations in a sample of 500 companies from 35 EU countries (large, SMEs, and micro firms) adopted or planned to adopt open innovation activities, including the competencies needed. The ACE (2012) research showed that organisations collaborated mainly on the basis of clusters and ecosystems (read more in (Vanhaverbeke, 2006), collaborative projects, internet platforms and virtual networks in the context of:

- R&D projects (networks and partnerships) – read case studies: Faurecia OI: NPD.
- Sharing human capital (cooperation between companies, labs and universities) – read case studies: Faurecia OI: NPD.
- Technology transfer (prototypes, demonstrations and showrooms) – read case study: Electrolux (OI-NET case repository).
- Open business models, such as spin-off/spin-in, licensing, patent transactions – Case studies: Volvo wireless car; Open innovation helps Whirlpool (Muller & Hutchins, 2012).

Within these OI models, it is then possible to use different existing, modified, and also new tools and methods of quality engineering and management. In the same way, it is possible to employ the principles and tools of Quality Management Systems (ISO, 2015a), Occupational Health and Safety Management Systems (ISO, 2016), and Environmental Management Systems (ISO, 2015b), and explore the level of Business Excellence, as well as the maturity and performance of OI in organisations.

Quality engineering and management tools and methods

From the statistical tools to control product quality in the 1940s, quality engineering and management tools and methods moved to the development of the body of knowledge by the American Association for Quality (ASQ), which includes standards, process improvement, product design, total quality management, and performance excellence.

Managers must find a new approach to quality - one that moves beyond the traditional quality management tools of the last century to the specific actions needed to help an organisation shift from a rules-based quality environment to a true culture of quality (Srinivasan & Kurey, 2014).

The Open innovation approach opens the door for co-innovation and creation of networked co-operation by using:

- Modified or generic management system standards – e.g. ISO 9001:2015; ISO 14001:20015; ISO/DIS 45001:2016 and ISO/TS 16949:2016 with five basic core tools: Advanced Product Quality Planning (APQP)\(^4\), Failure Mode and Effects Analysis (FMEA), Measurement Systems Analysis

\(^4\) APQP is a structured approach to product and process design. This framework is a standardised set of quality requirements that enable suppliers to design a product that satisfies the customer. Read more on Quality-One web page.
Quality Management in Open Innovation Paradigm Context

(MSA), Statistical Process Control (SPC), and Production Part Approval Process (PPAP). Applications can be derived e.g. based on principles of supply chain quality management, see the (iso.org, 2016) brochure and the Faurecia supplier requirements manual (Faurecia, 2013), Volvo supplier quality assurance manual (Volvo, 2014), and the Electrolux supplier quality assurance system and supplier process audit questionnaire (Electrolux, 2007).

- For understanding quality management in a virtual organisation, read the journal articles (Zgodovova, Kosc & Kekale, 1997) and (Sitek et al., 2008).
- Business Excellence Models: EFQM Excellence Model (e.g. for Enterprise 2.0 can be found in the brochure); Malcolm Baldrige Performance Excellence Model or internal Excellence Systems models of the organisation (e.g. Faurecia Excellence System (FES), Whirlpool’s Worldwide Excellence System (WES).
- Six Sigma or Lean Six Sigma philosophy and tools – for more details see Purdue Technology slides. Design for Six Sigma (DFSS) for the new product development using Design of Experiments (DoE), Quality Function Deployment (QFD) and Failure Mode and Effect Analysis (FMEA) for Open Innovation, read the article (Çubukcua & Gümüü, 2015).
- A useful methodology for organisations that struggle with Open Innovation is TRIZ – Theory of Inventive Problem Solving. A six-step process to delivering breakthrough with conceptual solutions by using TRIZ can be found at the CoCatalyst sites.
- Another tool is the Stage-Gate® (Cooper, 2016) idea-to-launch model and its application for Open Innovation.
- The principles of project quality management, e.g. according to ISO 10006:2003 (ISO, 2003) and project portfolio management in OI are explained in the book Project-Based Knowledge in Organizing Open Innovation (Boneso, Comacchio & Pizzi, 2014, p. 5, 91).

5 DoE deals with planning, conducting, analysing and interpreting controlled tests to evaluate the factors that control the value of a parameter or group of parameters (ASQ, 2016a).

6 QFD is a systematic process for motivating a business to focus on its customers. It is used by cross-functional teams to identify and resolve issues involved in providing products, processes, services and strategies which will more than satisfy their customers. For cooperative development of innovative ideas with the help of QFD see the slides (Schumacher, 2015).

7 FMEA is a step-by-step approach for identifying all possible failures in the design, manufacturing or assembly process, or a product or service. Read more on the ASQ web page (ASQ, 2016b).

8 TRIZ is a methodology that can be used to accomplish disruptive innovation in an open way (through the discovery of what you currently do not know). Read more in the innovationmanagement.se web portal (Silverstein, 2016).

9 The Stage-Gate® model is a value-creating business process and risk model designed to transform an organization’s best new ideas quickly and profitably into winning new products, developed by Dr Robert G. Cooper.
Part 3.3. Instantiating Open Innovation: From Individual to Society Level

**Business Excellence models, performance and maturity measurement**

Measuring performance is crucial for managers who want to monitor the activities of any organisation. The scoring principle of the EFQM Excellence model and Malcolm Baldrige Performance Excellence model allows assessing how well an organisation is accomplishing what is important to it: the maturity of processes and their deployment, and the breadth and significance of the organisation’s results (Enkel, Bell & Hogenkamp, 2011). Self-assessment is used in both models, which helps organisations to improve their performance and results. It can lead to planned improvements and contribute to achieving continuous improvement.

Open business models must allow for a certain degree of organisational permeability to facilitate the in- and outflow of knowledge across organisational boundaries (Chesbrough, 2006; Saebia & Fossa, 2015).

Knowing which elements to manipulate could thus help organisations to improve the quality and effectiveness of Open Innovation. If the instrument is applicable to organisations in general, it could perhaps even be used as a method of benchmarking with which to prioritise activities at a wider scale (Enkel, Bell & Hogenkamp, 2011).

Open innovation activities and processes naturally require some time to mature and work effectively. Measuring the effectiveness and efficiency of open innovation is essential for further improvement. A suitable set of Open Innovation indicators, which can be found e.g. in the work of (Erkens, Wosch, Piller & Lüttgens, 2014), can provide valuable feedback on how open innovation is performing in the organisation. Another approach to Open Innovation measurement is assessment of its maturity. Open Innovation maturity is a multidimensional concept describing the overall capacity of an organisation to engage successfully in and make use of open innovation. As in the field of quality management, where the maturity of the management system can be assessed by various maturity models, there are several frameworks for open innovation maturity assessment, as well. Open Innovation maturity models help to identify where the organisation currently operates and what areas need to be improved.

Many innovation maturity models have been presented in the innovation management literature, and some of them include Open Innovation elements, e.g. the Innovation Capability Maturity Model (ICMM) (Essmann & du Preez, 2009) and the framework for the Service Innovation Capability Maturity Model (SICMM) designed for service organisations (Li, Chen, & Shen, 2010). In recent years, as the topic of Open Innovation has become popular, several Open Innovation maturity models have been developed.

**Organisational processes and structures supporting Open Innovation**

The relationship between organisational structures and innovation has been the focus of numerous studies, but only a few studies have concentrated on organisational structures for open innovation.
Studies done by Chesbrough (2003) underline how modifications in organisational support allow the process to be opened towards the outside. From Chesbrough's further works, we can conclude that:

• Specific structures and measures are created to promote and evaluate the opening up of an innovation model (Chesbrough & Crowther, 2006);

• Incentive systems are set up, which should include more open-oriented goals and metrics (Chesbrough, 2003);

• Formalised processes for evaluating external knowledge are put in place to complement the existing explorative network. In this evaluation process, an important role is played by the IP Office, which defines the mechanisms for facilitating knowledge transfer and protecting companies from opportunistic behaviour (Chesbrough, 2006). In the same work, Chesbrough points out that coordinating and centralising activities are also a key to operating an open model, and that multiple options exist to coordinate the two extremes of centralised and decentralised approaches.

In Open Innovation processes, organisational boundaries are permeable and firms interact significantly with different actors in their environment (universities, research laboratories, suppliers, customers, exhibitions, venture capital firms, etc.). The Open Innovation Design Thinking process model can be found on the Nine Sigma platform.

Depending on the chain of command, a company's structure could be classified as centralised or decentralised, as well as vertical or horizontal. While centralised organisational structures rely on one individual making decisions and providing direction for the company, decentralised organisational structures have often several individuals responsible for making business decisions. In the decentralised organisational structure, organisations rely on a team environment at different levels in the business, and individuals at each level may have some autonomy to make business decisions.

Both the centralised and decentralised ways of organising open innovation have their pros and cons, as presented in the literature. According to (innovationmanagement.se, 2016), companies have in most cases a central organisation of open innovation at the beginning. It becomes a more hybrid structure once the companies understand that they need to involve more people to bring openness into the firm’s innovation DNA. The MOOI team members Vanhaverbeke, Chesbrough, & Roijakkers (2014) conclude that a lot of companies have moved towards hybrid models as their organisations have matured in open innovation.

In the case of Electrolux (see the OI-NET case repository), the company has preferred a centralised approach for implementing the OI model by using a cross-functional team rather than a distributed approach with responsibilities spread to several parts of the organisation. The flat hierarchical structure directly connected to the top management (Design, Marketing and Finance, also called the Innovation Triangle) allows saving time for decision-making as well as the time for product
development. The top-down approach has been preferred to communicate the shift from a closed to an open system clearly (Martinelli & Grimaldi, 2016).

Vertical integration is a corporate structure whereby product development through the supply chain is controlled/owned by one organisation (innovationmanagement.se, 2016). This structure allows the company to design and manufacture components, subsystems and final product assembly before selling it to customers. An example of OI application is the one of GM and Ford’s with the powertrain systems, which are produced vertically (Ford, 2014).

A successful example of horizontal integration is Dell Computers and IdeaStorm application (Dell, 2016) in the OI process.

On the basis of several cases, we can conclude that Open Innovation is relevant for different types of companies and industries, as long as Open Innovation is structured in an appropriate way to achieve the organisation’ innovation strategy and objectives, and as long as they are able to manage quality and performance successfully.

Further discussion about the ways of opening innovation in formal vs. informal and centralised vs. decentralised or hybrid organisations can be found in (innovationmanagement.se, 2016).

**KEY TAKE-AWAYS**

- Quality is the main distinguishing feature not only among products and services but also among people, corporations, nations and states. Products are carried out along the process chains composed of the contribution of different multinational companies and multicultural teams.
- Different open innovation models bring different approaches to quality and performance assurance of cooperating organisations that mainly collaborate on R&D projects, sharing human capital, technology context, or the open business model.
- Innovation platforms and new or combined tools supporting creativity and processes of new product development are formed.
- Organisations are moving away from hierarchical, internally oriented models to externally oriented (international) networks of (leading) professionals (ACE, 2012) through collaborative leadership.
- Open Innovation maturity models help to identify where the organisation operates currently and what areas need to be improved.
OPEN INNOVATION ORGANISATIONS´ QUALITY MANAGEMENT SYSTEM MODELS

In designing the QMS model for an OI organisation, which is characterized by a co-innovation goal-oriented strategy, it is important to take account of the size of the organisation, the region of operation, and to recognise whether the innovation mechanism is inbound or outbound, what is the object of innovation (management system, process, product, service or technology) and what is the stage of the product lifecycle:

- Research and development
- Design and engineering
- Prototyping and industrialisation
- Component production
- System integration
- Sales and service

External organisations are outside the scope of the management system of the Open Innovation organisation (provider), although the co-creation functions or processes are within it.

The problem of quality management in the OI environment appears primarily in the communication interface between OI organisations if one of the participants:

- has significantly different culture of quality and cannot adapt to the culture of the OI organisation;
- does not have a compatible quality management system with the OI organisation;
- does not have defined processes and attributes affecting the quality of innovation.

In this chapter, the Virtual Organisation (VO) as a model of the increasingly networked organisation is used for organisational processes and structures, design, quality-related information flow, and the definition of competencies, responsibilities and authorities in OI organisations.

A common case is that cooperation and communication are coordinated by the provider, e.g. the OI organisation, see Figure 1. (OIO), similarly to the supply chain quality management explained in Chapter 4.3 and Electrolux case study in the OI-NET repository.

COLLABORATION BASED ON TECHNOLOGY TRANSFER IN THE OPEN INNOVATION ENVIRONMENT

OI activities are provided through integrating the “Open Innovation Council” (OIC), with representatives from different sectors. This integrating element ensures cooperation, knowledge transfer, communication, and assurance of quality.

Responsibilities and authorities: OIC is responsible for the new product development process. An external provider usually has its own certified or at least documented QMS and is responsible for its own innovation and process and product quality.
Part 3.3. Instantiating Open Innovation: From Individual to Society Level

Documented information flow: Information flow between an external provider and the OIC is shown in Figure 1.

Quality management: Management systems of networked organisations should be as compatible as possible, and quality and performance should be audited (if agreed on) according to common principles. For new product quality assurance, it is important to eliminate variance and, if possible, reduce tolerances so that the components and modules can be used with fulfilment of the requirements.

A more complex situation arises when cooperation and communication take place among a multiply interlinked network of organisations. Figure 2 shows the case of a co-creative OI environment for co-operation and communication in a network-based group (e.g. Helix) on R&D projects.

---

10 Provider – organisation or individual person that provides a product or a service. It can be a supplier, producer, distributor, retailer or vendor of a product or a service (ISO, 2015a).

11 Star topology explanation and its relationship with QMS can be found in (Sitek, Seifert & Thoben, 2010).
Networked innovation based on R&D projects

Figure 2. OI environment with network-based group and project topology\(^{12}\) (with illustration of open and closed chain providers)

ORGA, ORGB, … ORGN – members of network-based OI

- information flow
- providers

**Responsibilities and authorities:** One of the possible solutions is the establishment of the OI Quality Management Office (OI QMO) (Zgodavova, Kosc & Kekale, 1997) and competencies according to (Sitek, Seifert & Thoben, 2010, p. 241), and creating the role of the OI quality manager with responsibility for project success.

**Documented information flow:** Information flow is outlined in Figure 2.

**Quality management:** From the intra-organisational perspective, in networked organisations, the quality of all partners’ single contributions to the common output should be guaranteed by today’s innovation quality (ASQ, 2013) management approaches. From the inter-organisational perspective, the quality of all individual product contributions is not equal to the quality of the common output.

The case study of Faurecia describes the Open Innovation “dWorks” Think Tank process of successful achievement based on networked team cooperation of designers, engineers and marketers, working in a free and independent environment, to help invent automotive seats of the future.

\(^{12}\) The project topology network is illustrated by a general network topology adapted from (Kumar & van Dissel, 1996; Sitek, Seifert & Thoben, 2010) and a tiered supplier system.
There are various ways in which an organisation can claim that its QMS meets the requirements. For example, for the automotive industry (ISO, 2009, revision, 2013), they include: (a) supplier’s declaration of conformity; (b) second and third-party assessment; and (c) acceptance sampling (ISO, 2005).

**KEY TAKE-AWAYS**

- Quality management in the OI environment means creating a communication interface between the OI organisations.
- Measuring the effectiveness and efficiency of Open Innovation is essential for further improvement.
- For OI supply chain quality assurance, OI activities are ensured through integrating the Open Innovation Council with representatives of the Quality Management System.
- For networked organisations, one of the possible solutions is establishment of a OI Quality Management Office with responsibility for innovation quality.

**PRACTICAL IMPLICATIONS**

The issue of quality assurance in the Open Innovation organisation is essentially applied and practical. Hitherto, in the above sections, we have already referred to several examples of how the discussed concepts can be implemented and what their consequences on business practices are. In this section, we will further exemplify and illustrate some specific impacts, changes, and imperatives that are relevant for practitioners eager to understand, implement, and develop QMS in OI organisations. We also propose two short case studies as a basis for discussion.

- In every sector where collaboration is based on R&D projects, sharing human capital, technology transfer and open business model, it is necessary to harmonise the culture of quality, to share the vision and negotiate the level of new product quality. The coordination of individual (specific) QMS and common processes and their attributes are also important because it affects the quality of innovation.

OI organisations should identify the current state of the OI maturity level in individual actors (collaborators) and the QMS maturity level based on gap analysis:

- In the case that the OI organisations have a QMS in place, it is sufficient to modify the process interfaces between the participants.
- If the differences are too big, it is necessary to establish a common QMS and to define the responsibilities, authorities, and competencies.
New approaches to collaboration are a key to innovation in an open context. Increasingly important is the ability to build virtual communities that also include non-traditional participants. As industries transform towards intelligent products, and eco-friendly and sustainable products and product systems, the role of non-traditional actors increases.

- A central challenge is how open business models and value creation processes will be matched by a changed quality management strategy.

**MINI CASE**

**FAURECIA: OPEN INNOVATION – NEW PRODUCT DEVELOPMENT**

**Learning objective**

The case fosters discussion about quality management issues related to the Open Innovation process in the highly competitive, price-sensitive market of car seating.

**Introduction**

Faurecia is an Open Innovation world-leading automotive supplier with four key business groups: automotive seating, emission control technologies, interior systems, and automotive exteriors. The Faurecia Group has 270 industrial plants in 33 countries to provide all customers with a local, on-the-ground service. Faurecia has based its progress-oriented culture on research & development, supported by 5,000 engineers and technicians in 40 centres worldwide.

Faurecia’s mission is to create and deliver high-quality and innovative products, technical solutions and services that contribute to the customers’ competitiveness and create value for employees and shareholders. One-third of its plants work on a just-in-time basis. The bases of Faurecia’s quality culture are the Faurecia Excellence System (FES) and the Supplier Excellence System (SES).

The team has developed such products as SmartFit, a system that enables drivers and occupants to use their smartphones to adjust their vehicle seats automatically to the best position for their body. Another innovation that has been developed by using the Faurecia methodology is the Performance Seat, a unique dynamic comfort system and composite back technology to create a comfortable, attractive, safe seating system that is 30 percent thinner and 20 percent lighter than conventional seats (PR Newswire, 2012).
In 2012 Faurecia was recognised as one of the world’s top innovation companies by Product Development and Management Association (PDMA). For more information, visit: www.faurecia.com.

An Open Innovation process

“Faurecia is focused on Open Innovation,” said Rob Huber, vice president of innovation for Faurecia North America. “We are constantly looking outside the company and the industry to find the best ideas that can move our industry forward in such areas as light-weighting, passenger wellness and comfort, premium features and other critical trends. We are set up to work actively with people outside the company to translate these concepts into real products” (PR Newswire, 2012). The Open Innovation process is conducted via “xWorks” centres which research the regional market closely, collaborating with various ecosystems that present different opportunities for development of automotive seating in those regions.

The “dWorks” organisation is the latest in a series of Faurecia think tanks, established in Munich. “dWorks” brings together a team of designers, engineers and marketers, working in an open and independent environment, to help invent automotive seats of the future. The “dWorks” office includes a small workshop and space for numerous simulators, mockups and vehicles. “The process tool box also includes multi-day workshops, using a proprietary ideation process, in which multifunctional experts from all disciplines within Faurecia Automotive Seating participate, after weeks of pre-work exploring business, consumer and technology tenets that apply to the topic,” said Dr. Olaf Biedermann (Faurecia Press Release, 2013).

The “xWorks” process is founded on very open product-development principles. The “xWorks” sites share 80 percent of their processes, with each area shaping project implementation, collaboration and growth to take the best advantage of its own ecosystem. While “xWorks” think tanks focus on seating, they require that the teams understand the complete vehicle environment and the manner in which seating relates to other systems, so developments from “xWorks” sites may help influence the design of entire vehicles.

Rules for co-operation among networked organisations

Faurecia has set ambitious quality objectives to achieve its mission. These objectives are reaching a 15 parts per million (PPM) average, and commodity dependent and zero red Safety and Regulation alerts. Zero defects and zero tolerance of non-quality is the objective of Faurecia Excellence System (FES). An adaptation of FES has been made for Suppliers as a Supplier Excellence System (SES). The Breakthrough Quality Plan is implemented to bridge the gap between the current quality performance and the demanding objectives. At Faurecia,
purchased parts account for over 60% of overall costs. As such, Faurecia’s performance is highly dependent on that of their suppliers (Faurecia, 2013). All suppliers are required to produce Advanced Quality plans to support the development of new products and/or services, in accordance with the guidelines in the Advanced Product Quality Planning and Control Plan (APQP). The principal phases of the new product development at Faurecia are:

- Acquisition
- Product and Process Design & Development
- Production Set-up and Pre-Series
- Launch
- Production

During each NPD phase, the suppliers’ performance is tracked and monitored to ensure that the suppliers achieve their targets. All suppliers are required to report the status of plan activities. The suppliers’ workforce must be specially trained in this procedures. The APQP process consists of 31 elements deployed within the phases of the program. The responsibility for each element is either by Faurecia or the Supplier, or shared as defined in a kick-off meeting. A detailed description of responsibilities can be found on pages 11-22 of the Faurecia Supplier Requirements Manual (Faurecia, 2013).

**Conclusion**

Faurecia had incorporated the Open Innovation business model in their strategy. Faurecia recognises the ISO/TS 16949, ISO 14001, and ISO/DIS 45001:2016 management system models and accepts other customer requirements. Faurecia has its own quality management system called FES, which together with SES is the basis of the quality culture in the organisation and the open innovation network.

In order to enhance innovation performance, Faurecia has opened its R&D process and established the “dWorks”, a think tank for automotive seat research. This process has made it possible to bring external innovative concepts to the market.

The opening of the R&D process raised the question of quality assurance within the OI network. Suitable support for quality assurance in the planning and development of new products or services proved to be the existing Supplier Requirements Manual (Faurecia, 2013), with the APQP tools and Program Management Core System (PMCS) procedures (internal Faurecia documentation).
CONTENT-RELATED MATERIALS

Case studies
OI-NET portal case repository: Faurecia – Open Innovation in Supply Chain goo.gl/yNZxGQ. Electrolux: Supplier enabled innovation along with Open Innovation goo.gl/BpXLBj.

Harvard Business School (HBS) Cases
• Henry Chesbrough: Managing Research at IBM in Internet Time https://cb.hbsp.harvardedu/resources/marketing/docs/chesbrough_formatted.pdf.

Other cases

Video

Publications
The list of references contains essential readings that can be selected by instructors depending on the orientation they select for their course. The most recommended readings are listed in the Lecture Overview table at the beginning of the chapter.

PEDAGOGICAL GUIDELINES

Interactive activities
Business Games that explain the OI business model
Business Games that explain QMS in the OI environment
• Open Innovation Management System Role Play Simulation, goo.gl/C8FyxM.
Learning exercises

• The mini-cases in the chapter come with suggested discussion questions. For the cases listed, all HBS cases come with teaching notes.
• Other cases and blogs can be used as basis for classroom discussion on the topics presented in this chapter, as well as other related issues around OI and quality assurance.
• The topics presented can be conveniently expanded by students in the form of an essay identifying, synthesising and analysing additional literature critically. In particular, an essay would be an effective learning exercise for achieving the knowledge learning outcomes (c.f. the Lecture Overview).
• The concepts of collaborative innovation and how the QMS model are implemented in the case of technology transfer in the Open Innovation environment.
• The concepts of collaborative innovation and how QMS model are implemented in networked innovation based on R&D projects.
• Field work involving observations and data collection through interviews with persons responsible for quality or innovation quality can be effective exercises in order to achieve the learning outcomes related to skills and competencies.

Self-study

After having studied the chapter and worked through the mini cases, students are encouraged to access the references in the reference list, and after reading and analysing abstracts and summaries select those for in-depth reading that provide most relevant additional insights, depending on each individual learner’s objectives.

Self-evaluation

Students are encouraged to work through the text actively with the help of the self-evaluation questions listed below.

EVALUATION QUESTIONS

History and culture of quality in the perspective of Open Innovation

1. Explain how companies can open up their innovation department to enhance creativity.
2. Give examples of organisational structures and processes supporting Open Innovation.
3. Describe the responsibility of team leaders in the externally oriented organisation structure.
4. How can team members take responsibility for their process, as well as the content of their work?
5. Indicate and briefly describe quality assurance in the new product development process through technology transfer.
6. Give an example of the new competencies required for the Open Business Model.
7. List and briefly describe Business Excellence models suitable for Open Innovation organisations.
8. Which Design for Six Sigma tools can be used for idea generation and new product development?
9. Define the principles of project quality management and main business aspects of an OI project.
10. Based on the recommended case studies and recommended references, propose an OI maturity model.

**Open Innovation organisations’ Quality Management System models**

1. Based on the recommended case studies describe and compare different models of QMS.
2. Give an example of new competencies required for the OI organisation and compare various stages of OI maturity and QMS maturity.

**Individual work examples**

The presented topics can be conveniently expanded by students in the form of an essay identifying, synthesising and analysing additional literature critically.

By searching and analysing case studies in academic references, white papers and company websites, concepts of collaborative innovation and how they are implemented can be compared and thus understood better.

Field work involving observations and data collection through interviews with QMS managers and innovation managers can be effective exercises in order to achieve the learning outcomes related to skills and competences.

**Group work examples**

Students work in groups of 3-6, depending on class size, and each individual selects/is assigned a specific industry where he or she will make an analysis of the QMS and the level of OI maturity and extent and nature of innovation quality assurance. Then, each student presents his/her case, and comparisons are made and discussed in the group. Students can be asked to develop an analysis framework initially in the group for easier and more effective cross-industry comparison. If time is limited, the instructor can provide such a framework depending on the focus envisaged in the course.

Students work by using the role play simulation portal [http://web.tuke.sk/simpro-ims/index_en.php](http://web.tuke.sk/simpro-ims/index_en.php) and then are asked to present individually a part of homework related to competencies, responsibilities and authorities in a fictive or case OI organisation. If time is limited, the instructor can provide such a framework depending on the focus envisaged in the course.
TEACHING TIPS

Slides

Six sigma and open innovation Purdue Technology slides: [http://prec.pr/symposium/2014/pdfs/feb21-pm/Chad-Laux.pdf](http://prec.pr/symposium/2014/pdfs/feb21-pm/Chad-Laux.pdf)


Links to teaching material

Links provided for each source indicated.

Supporting case material

The list of supporting case material contains essential case studies (in the part Content-related material) that can be selected by instructors depending on the orientation they select for their course.

REFERENCES

Part 3.3. Instantiating Open Innovation: From Individual to Society Level

• Vallkokari, K., Paasi, J., Lee, N. & Luoma, T. (2009). Beyond Open innovation - the concept of networked innovation. New York City, USA, ISPM.
OUTSOURCING DEVELOPMENT AND LIFE CYCLE MANAGEMENT

WIM STEENBERGEN

ABSTRACT

During the last few decades we have seen the development of open supply chains for production. These supply chains are quite mature in terms of balanced relationships between OEMs and suppliers, as well as in terms of the associated business models and ways of working. The expectation is that we will see a similar development towards open supply chains for Development and Life Cycle Management (D&LCM) during the next few decades.

Outsourcing D&LCM involves three challenges. The outsourcing of Development requires the Original Equipment Manufacturer (OEM) and the supplier to manage development projects carefully and to agree on fair risk-reward schemes for the risks associated with innovation, including technology risks, warranty on design and intellectual property. After outsourcing Development, the outsourcing of Life Cycle Management is often a relatively small step, but the implications are significant, as this outsourcing will impact virtually all disciplines in both organizations. Again, this requires compensation and risk-reward schemes, which should create a win-win situation for both parties. Managing the cooperation between the OEM and the supplier can easily become as complex as managing an alliance between companies, requiring great strategic alignment, a high level of operational integration and comprehensive contracts.

The selection of a D&LCM partner requires a broad approach. The Total Quality Model is introduced as a means to guarantee such a broad approach. It touches all relevant organizational enablers: leadership and strategy, resources, people competencies, and processes. It also provides a guide to evaluating the relevant result areas: customer satisfaction, people and society-related results and business results.

The implementation of the alliance is described as a step-by-step process. It requires continuous management of the balance between control and trust between the alliance partners. Once the alliance is established, it requires continuous evaluation and improvement, and it can be developed further by longer term joint product and competence roadmaps. Finally, there are some considerations around ending a D&LCM partnership, or not.
## Prerequisite
Generic knowledge of innovation management and alliance management.

## Objectives of the lecture
- Understanding the relevant industry trend towards outsourcing D&LCM.
- Understanding the three key challenges for outsourcing D&LCM and the ways to deal with them.
- Understanding the methods to select a D&LCM partner.
- Understanding the way to organize a D&LCM partnership.

## Workload
4-6h teaching; 4 h self-study.

## Learning outcomes

**Knowledge**

- **LO #2:** To explore the concepts of collaborative innovation and apply them.
- **LO #38:** To identify the nature and characteristics of the innovation process.
- **LO #56:** To understand the dynamics of Alliance formation.

**Skills**

- **LO #30:** To identify and plan the phases and factors of innovation activity in a firm from the life-cycle viewpoint.
- **LO #71:** To identify Open Innovation activities in real life companies. To appraise the key indicators for successful implementation of the open innovation model in an organization. To identify the key success factors related to open innovation strategies on organizations.

## Reading List
- Bell, John H.J. Walking the tight rope: balancing between cooperation and competition. sl : Katholieke Universiteit Nijmegen, 2003.

## European Qualifications Framework (EQF) Level
Levels 6, 7.
**PART 3.3. INSTANTIATING OPEN INNOVATION: FROM INDIVIDUAL TO SOCIETY LEVEL**

**INTRODUCTION**

**THE GENESIS OF AN OPEN INNOVATION NETWORK**

During the last few decades we have seen the trend of outsourcing activities which are not the core activities of an organization and which could be executed more effectively by specialist organizations. This has happened for secondary processes like ICT, administration and catering, and for primary processes like the production of parts, modules or complete products.

![Figure 1. OEM Value chain with the new battle ground called Open Innovation](image)

**Figure 1. OEM Value chain with the new battle ground called Open Innovation**

Figure 1 shows a simplified value chain of an OEM. The continuous battle of an OEM is in the area of its core development and marketing. Core development refers to the innovation activities which allow the OEM to differentiate itself in its market. This innovation will typically be done by the OEM. At the bottom of figure 1 we see what we call the past battle ground of competitiveness: outsourcing of parts and of production. During the last few decades we have seen the trend from totally vertically integrated OEMs towards open supply chains.

At the middle level of figure 1 we find the development activities which are relevant, but not core for the OEM. This is where a new battle has started to develop. Suppliers are specializing in development competencies, which are relevant but not core to the OEM. This is where the OEM will need to benchmark its own development activities and to take strategic decisions about ‘make and buy’. Not making such strategic tradeoffs may turn into a competitive threat, just like staying as a vertically integrated production company became a threat just a few decades ago.

While the open supply chains for production are quite mature in terms of balanced relationships between OEMs and suppliers and in terms of the associated business models and ways of working,
the supply chain for Development and Life Cycle Management is still quite immature. There is very little literature about this form of outsourcing. This contribution provides an introduction to the ‘new battle ground for OEM competitiveness’: the outsourcing of Development & Life Cycle Management (D&LCM). The contribution is a summary of a book that will be published in early 2017 (Steenbergen, 2017). The book aims at contributing to the development of a mature supply chain for D&LCM and, as such, at contributing to the Genesis of an Open Innovation network.

There are various reasons to outsource D&LCM. Figure 2 is an adaptation of Chesbrough’s Open Innovation funnel (Chesbrough, 2003), with three examples of the role of the D&LCM supplier:

1. An OEM who decides that they will get a better return on innovation investment by letting their own development resources focus on the core competences of the company. The D&LCM supplier is asked to provide D&LCM with non-core modules or products. Example: a manufacturer with 6 billion euro revenues who outsources D&LCM for non-core modules of its lithography machine.

2. An OEM who does have its own development competence in a new relevant innovation area. Outsourcing makes sense because building up development competencies can easily take 2 to 3 years, and it is costly and risky. Example: a supplier of bottling lines (around 1 billion euro revenues) who outsources the development and production of printing modules to enable direct printing on bottles.

3. A start-up with researchers and a core technology, but without a development organization. Again, time to market and risk reduction are important reasons to outsource D&LCM. Example: a market leader in table top electron microscopy who outsources part of its developments to gain time to market.

Finally, there are economies of scale. The supplier development organization can develop products and modules for multiple OEMs, which can make this development organization more effective than the development organization of the OEM. This is especially likely when non-core products or modules do not require a continuous development effort, and this does not justify having own OEM development resources available all the time.

The ways of working in this contribution were developed in the high-tech machine industry. OEMs and suppliers in other markets are recommended to consider the adoption of similar ways of working.

**THREE CHALLENGES**

Outsourcing D&LCM involves three big challenges. The first challenge is outsourcing Development. The people in OEMs who are typically involved in outsourcing (for instance purchasers) do not necessarily understand how development works, what development risks are and what reasonable
Part 3.3. Instantiating Open Innovation: From Individual to Society Level

Figure 2. Open Innovation and outsourcing D&LCM (adapted from Chesbrough (2))

1. Outsourcing by established OEM with own D&LCM resources
2. Outsourcing by established OEM without own D&LCM resources for new market
3. Outsourcing by start up OEM without own D&LCM resources for new market

Figure 3. How a seemingly small decision grows big

3. Outsourcing of Development
4. Outsourcing of Life Cycle Management
5. An Alliance without Equity
risk-reward models are. Paragraph *Outsourcing Development* provides some basic insights into this subject matter. Once Development has been outsourced, it makes a lot of sense to outsource Life Cycle Management as well. It is important for the D&LCM partners to realize this dependency from the outset and to make it part of the scope of the cooperation (Paragraph *Outsourcing Life Cycle Management*). The implication is that virtually all disciplines in the partner organizations will have to work together, very much like in an Alliance, but this time there is no equity stake, or one line of command that will eventually deal with costs and risks and with profit and loss. In a D&LCM partnership all the elements of the cooperation need to be translated into a financial win-win, with a fair risk reward (Paragraph *An Alliance without equity stake*).

### Outsourcing Development

Outsourcing development typically involves innovation risks. People are challenged to develop and build a product they have never built before. As a result, the outcome of a development project is uncertain when it starts, both in terms of product functionality and in terms of cost and lead time to develop the product. To manage this uncertainty, a development project is normally split into various phases (Figure 4).

- The Definition phase is meant to agree on the product requirements. This is not an easy task, especially when we are dealing with complex, high tech products. In this phase also the critical design and production process elements are identified, which makes it difficult to predict the outcome of the project.
- In the Feasibility study the critical design and process elements are investigated. This helps to reduce the risk in the subsequent phases of the project to an acceptable level. The result of this phase is a set of concept choices for the actual design of the product.

The first two phases are very dynamic, and they are hard to plan. They should be considered as part of the innovation risk the OEM is willing to take when starting a project. This implies that the supplier will typically not be able to offer a fixed price quote for these phases and will be compensated by the OEM for all related costs. The subsequent phases, however, should be considered as phases in which the supplier uses its workmanship in a way that can be planned reliably. The supplier can therefore offer these phases for a fixed price. The exception is when both parties agree to start these phases with a residual innovation risk.

- In the Design phase the design is worked out in detail, for instance as drawings for mechanical and optical parts, designs for printed circuit boards, or software.
- In the Product Validation phase the first prototype is built and tested.
- In the Process Validation phase the production process is tested to prepare for volume production.
Part 3.3. Instantiating Open Innovation: From Individual to Society Level

![Diagram of Development Project phases and innovation risk]

Figure 4. Development Project phases and innovation risk

Besides project-related risks there are various other types of risks associated with Development. The implications of these risks are normally absorbed by the OEM. This is one of the reasons why OEMs typically have much higher gross margins than their suppliers. When outsourcing development it needs to be agreed explicitly who carries these risks. When the supplier accepts these risks, he needs to be compensated for it.

- Design warranty – after a product has been released to be sold, problems with the design may pop up. This may lead to costs of redesigns, scrapping of faulty parts and upgrades in the field.
- Patent infringement – even after lots of research, it may turn out that the product design violates the patent rights of someone else. This may lead to financial claims.

Finally, there is Intellectual Property (IP). During the development project the supplier may develop a new IP, possibly together with the OEM. It needs to be agreed if and how this new IP can be applied after the project by the supplier and / or the OEM.

Outsourcing Life Cycle Management

In the previous section we have described that Development involves both product design and production process design. For this reason it makes sense to ask the Development partner to take the responsibility for the production and the supply chain management of the product. This avoids additional costs and risks associated with the transfer of the product design to another production partner. It also avoids unclarity about product responsibility, for instance at the appearance of a warranty claim.

Another element of life cycle management is customer service. The partners will have to agree on the way of working, for instance on who will be responsible for the installation of the product, product training, and for maintenance and repairs.
Finally, life cycle management requires clear agreements about product roadmap responsibilities. Examples of this are management of component obsolescence, a cost roadmap to address market price pressure, and product upgrades.

Every element of life cycle management has its own characteristics and therefore requires its own compensation or risk-reward model.

**AN ALLIANCE WITHOUT EQUITY STAKE**

The implication of the development and life cycle management activities is that virtually all functions in the OEM and the supplier organization get involved in the cooperation, very much like in an Alliance. The difference is that the companies will in general not be interested in equity stakes. One important reason for this is that the supplier will want to have the freedom to work with the competitors of the OEM.

De Man (2003) describes various forms of alliances. In his terminology the outsourcing of D&LCM can best be described as a contractual alliance. Figure 5 shows a model to illustrate the scope and depth of D&LCM cooperation:

- Outsourcing of D&LCM will normally require a long-term relationship, and therefore the level of strategic integration should be high. This involves for instance the alignment of product and competence roadmaps.
- In the previous section we have seen that the level of operational integration is also very high.
- The financial integration shall be contractual, with risk-reward elements. The challenge is that many of the costs related to this type of cooperation are rather hidden inside the OEM, for instance the costs for design warranty or obsolescence management.

**D&LCM PARTNER SELECTION**

Once the decision is made to look for a D&LCM partner the question is: how do we select the right partner for such a complex cooperation? Part of the answer is: a structure to ensure that all relevant aspects of the partnership are evaluated. Figure 6 proposes the Total Quality Management (TQM) model as a framework, because it captures both the enablers and results of the potential partner and offers a mechanism for continuous improvement once the partnership has been established. It is possible to work with scoring mechanisms and weighing factors for all TQM elements to allow for numeric comparison of potential partners. It is recommended to also ‘score’ the development organization of the OEM, if applicable. This will help to either confirm or deny the assumption that outsourcing D&LCM was a good idea in the first place. Also, the comparison with the own organization helps to communicate about the rationale of outsourcing.
Some examples of possible criteria are listed here:

- **Strategy**: alignment of vision, mission and objectives; balance in win-win between the partners; and sustainability of the D&LCM partner (e.g., financially).

- **Resources**: leadership skills; technical skills, infrastructure and tools; team distance in terms of geography, language and culture; team maturity (Lencioni, 2002) and alliance maturity (Bell, 2003).

- **Organization and processes**: organizational structure and culture, process maturity, governance model for the partnership.

- **Results**: customer satisfaction in terms of technology, quality, logistics and cost; financial results in terms of (long-term) profitability, creditworthiness and future financial dependency of the partners; employee satisfaction, illness rates, employee turnover; societal results in terms of labour conditions, and the ecological footprint.

Ideally, the possible future partnership should also be looked at from the Total Cost of Ownership perspective. Figure 7 shows an illustrative profit & loss account of the OEM before and after the outsourcing of D&LCM. It highlights the regular costs and the Cost of Risk (CoR), which need to be translated into a risk-reward model in case the supplier accepts the associated risks. After the outsourcing, the D&LCM costs move from the OEM to the supplier. The model shows the
temporary extra transaction costs of implementing the partnership. Somewhere in this model the OEM should be able to identify savings or extra revenue that will allow for a surplus profit margin for the OEM.

Figure 6. Total Quality Management Model

Figure 7. Total Cost of Ownership Model
D&LCM Partnership organization

After the selection of the D&LCM partner the challenge to organize the partnership starts. Figure 8 shows the lifecycle of an alliance. It introduces the essential element of trust as a basis for a D&LCM partnership. The previous sections described the first three steps in the lifecycle: the strategic analysis, preparations for the alliance and partner selection. Between the last two steps, trust between the partners will have to be developed as a basis for the organization of the partnership. In this section the highlights of the other steps are introduced.

Building an D&LCM alliance requires two types of agreements and a balance between these two: control and trust (De Man, 2003). The cooperation will often be too complex to manage via strict controls only. There needs to be a basis of trust, which allows the partners to discuss and solve challenges and possibly change the objectives along the way.

Examples of elements in a control agreement include:
- objectives, for instance per development phase,
- evaluation criteria, for instance a test specification to prove that the product complies with the OEM’s requirements,
- financial win-win, including business models for life cycle management and risk-reward, and
- a ‘transactional change management’ program: the many interactions between the two partners may require actions to adapt for instance the organization, processes, tools, or competences.

The trust (or behaviour) agreement may consist of the following elements:
- transparency in for instance cost models and technological challenges,
- insight into the competences of the key people who are part of the cooperation, for instance a system architect, a project manager or the alliance manager; and
- periodic evaluation moments, for instance to compare the actual results of the cooperation with the scores during the partner selection process.

The implementation of the alliance will require strong leadership, both by the alliance managers and the various relevant management levels in both organizations. A governance model will be needed to cooperate at the strategic level (typically executive-level managers), the tactical level (typically the alliance managers) and the operational level (typically the project managers and operations managers). The managers will also have to manage the impact of the alliance at an individual employee level, for instance by minimizing possible fears of uncertainty by creating a ‘sense of opportunity’. First and foremost, the leadership will have to manage the balance between control and trust.
Once the alliance has been established it needs to be maintained and developed. During periodic evaluations at strategic, tactical and operational level, improvement actions can be defined and monitored. A specific element of this type of alliance management is the periodic alignment of roadmaps for OEM products and supplier competences, infrastructure and tools. Useful sources to learn more about this phase of cooperation are pages 352-355 in chapter ‘Supplier Development’ of ‘Purchasing and Supply Chain management’ (Van Weele, 2014) and Chapter 8 of ‘Alliances’ (De Man, 2003).

The partnership may come to an end for many reasons. Poor performance of one or two of the partners can be a reason. Also changing market conditions or strategies for one or two of the partners are possible. The impact of an exit scenario will be big, probably comparable to the impact of the start of the partnership. For that reason it is recommended to at least redo the strategic analysis before taking such a decision. Even repeating the partner selection exercise may be needed to underpin such an important decision.
KEY TAKE-AWAYS

• The development of an Open Innovation network requires the development of ways of working, fair compensation and risk-reward models between OEMs and suppliers.
• Managing Open Innovation partnerships starts with deep and comprehensive understanding of all the possible implications of outsourcing Development & Life Cycle Management.
• Proven methods for Alliance management are recommended for the selection of a D&LCM partner and the subsequent implementation of the partnership.

TEACHING GUIDELINES

In general

• Discuss the outsourcing of D&LCM from both the OEM and the supplier perspective.

Example assessment questions

• How can mature D&LCM ways of working contribute to the development and growth of Open Innovation networks?
• In what ways are the supply chains for D&LCM not mature yet? Compare with open supply chains for production.
• What are the key challenges in managing outsourced development? Propose solutions.
• Explain how outsourcing development often results in a non-equity alliance between the OEM and the supplier.
• Describe the main elements of the selection process of a D&LCM supplier.
• Implementing and managing a D&LCM alliance requires a balance between Control and Trust
  o Explain why Trust is so important
  o Describe examples of Control agreements in D&LCM alliance
  o Describe examples of Trust agreements in D&LCM alliance
• Just like any long term relationship, a D&LCM alliance requires to be maintained and, ideally, developed: describe how this can be done.

Example case studies

• An OEM who has its own development resources, but considers outsourcing part of its existing, non-core development activities:
  o Describe the relevant Cost of Ownership considerations which can lead to the outsourcing decision.
  o Propose a financial compensation and a risk-reward model for the development.
o Propose a financial compensation and a risk-reward model for life cycle management services.
  o If possible, present a high-level discounted cash flow calculation with high-level financial assumptions.
• An OEM who does not have its own resources with a given development competence.
  o Answer the same questions as above.

REFERENCES

OPEN INNOVATION IN SUPPLY CHAINS; OPEN SUPPLY CHAINS

KLAS ERIC SODERQUIST, KRISTINA ZGODAVOVA, CHRISTOS TSANOS

ABSTRACT

The chapter starts with an overview of the origins of supplier-driven innovation, introducing central concepts and models including supply chain management, lean production and lean supply, tiered supplier structure, open supply chain, and networked innovation. Then, the evolution of supply chains, from OEM-centred to networked ones in the open innovation context is presented analytically. Particular attention is paid to the early supplier involvement perspective, exemplifying how it relates to OI and how it can be implemented and managed stepwise. How supplier involvement is related to the different stages of the life-cycle of a product and how this affects stakeholder engagement and supplier-buyer relationships for sustaining collaborative innovation over time, is then analysed. Finally, the practical implications of OI in supply chains are summarized, and two mini-cases featuring real-world examples of collaborative innovation in the supply chain are presented.
### Prerequisite
Generic knowledge of operations management / supply chain management / logistics from an introductory course; Knowledge about the basics of Open Innovation, outbound, inbound and coupled innovation.

### Objective of the lecture
Lecture targets are MSc students in engineering and management and MBAs in management, and the lecture aims at providing them with profound understanding of open innovation concepts and strategies in the context of supply chains.

### Workload
4-6 teaching hours; 8 h self-study.

### Learning outcomes
Understanding the evolving role of suppliers as partners in innovation and contributors to innovation and new product development. Understanding how OI has contributed and contributes to transforming industrial models in the global manufacturing industry, and how the supply chain is managed in order to leverage innovation.

**Knowledge**
- **LO #2**: To explore concepts of collaborative innovation and apply them.
- **LO #17**: To learn to recognise the sources of innovation and operationalisation of these sources.
- **LO #38**: To identify the nature and characteristics of the innovation process.
- **LO #69**: To identify external sources of innovation.

**Skills**
- **LO #41**: To analyse critically case studies related to innovation.
- **LO #42**: To analyse the innovation needs of a company.

**Competences**
- **LO #1**: To recognise, design and analyse innovative business models.
- **LO #43**: To emphasise the strategic perspective of innovation management.
- **LO #46**: To recognise and exploit aspects related to open innovation.

### Reading List
1. Open vs. closed supply chain – definitions and comparison (Marsh, 2011).
### Lecture Content

#### Definitions

**Supply chain** – A network created by different companies producing, handling and/or distributing a specific product. Specifically, the supply chain encompasses the steps it takes to get a good or service from the supplier to the customer (Investopedia, 2016).

**Supply chain management** – Planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies (Council of Supply Chain Management Professionals, 2013).

**Lean Production** – A particular way of organising work, making use of technology, managing relationships between customers and suppliers, streamlining the product development process, dealing with customers, and so on. Lean production is ‘lean’ because “it uses less of everything compared with mass production - half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also, it requires keeping far less than half the needed inventory on site, results in many fewer defects, and produces a greater and ever growing variety of products” (Womack, Jones & Roos, 1990, p. 13).

<table>
<thead>
<tr>
<th>European Qualifications Framework (EQF) Level</th>
<th>Levels 6, 7.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Lean Production – the origins of OI in supply chains (Krafcik, 1988; Lamming, 1993).</td>
<td></td>
</tr>
<tr>
<td>3. Overview of product development process (Cooper, 2008).</td>
<td></td>
</tr>
<tr>
<td>4. Early supplier involvement (Dowlatshahi, 1998; Schiele, 2010).</td>
<td></td>
</tr>
<tr>
<td>7. OI and industry dynamics (Christensen, 2014 in Chesbrough &amp; Bogers, 2014).</td>
<td></td>
</tr>
</tbody>
</table>
Lean Supply – A strategic model for assembler-supplier relationships that relies on the concept of equals’ contributions to the strategic, tactical and operational goals of the supply chain. It targets at a particular innovation; the supplier must not only contribute to product technology via the medium of collaborative effort with the assembler, but also develop technologies independently of the assembler’s requirements (Lamming, 1993).

Supply Chain Integration (SCI) – Integration in terms of forward physical flows between suppliers, manufacturers and customers, and backward physical flows of information and data from customers to suppliers (Frohlich & Westbrook, 2001). Further, the strategic position of the supply chain with regard to integration can be measured on the basis of two key dimensions: i) the direction of integration, i.e. towards customers or suppliers, and ii) the degree of integration, i.e. narrow or broad. The resulting concept is an “arc of integration” (Frohlich & Westbrook, 2001), which is presented below. Generally speaking, integration postulates the movement from conventional, arms-length and conflict-laden relationships to cooperative, long-term business partnerships and strategic alliances (Tsanos, 2016).

Early Supplier Involvement (ESI) – A form of vertical collaboration between supply chain partners in which the manufacturer involves the supplier at an early stage of the product development process (Knowledge Brief Manage, 2016).

Closed Supply Chain (CSCH) – A highly integrated set of networks in which many of the technologies being applied are developed at least partially by the company orchestrating the system (Marsh, 2011).

Open Supply Chain (OSCH) – The emphasis is on standardised components that fit together in a modular fashion. In these systems, suppliers are generally encouraged to be the main innovators and sell the same components to a range of customers. OSCH is common in such industries as automotive, aerospace and many areas of consumer electronics (Marsh, 2011).

Open innovation (OI) – A distributed innovation process based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organisation’s business model (Chesbrough & Bogers, 2014).

Open innovation (related to the supply chain) – The focus is on knowledge flows between suppliers and their customers, and between complementary or collaborating suppliers in the same tier, or across tiers in a given supply chain, with the objective of enhancing innovation in the final output. The focus is also on developing and implementing those pecuniary and non-pecuniary mechanisms that will ensure appropriate coordination, collaboration and integration in the supply chain so that the intended innovation outcomes can be reached.

Networked innovation (related to the supply chain) – Occurs through relationships that are negotiated in an ongoing communicative process, and which relies on neither market nor hierarchical
mechanism of control” (Swan & Scarborough, 2005, p.5). It is a hybrid form of an organisation with a specific purpose for collaboration and multiple actors involved in the innovation process. The collaboration covers both knowledge transfer and co-creation activities between the actors (Valkokari, Paasi, Lee & Luoma, 2009).

**Process** – A set of interrelated or interacting activities that use inputs to deliver an intended result (ISO, 2015), via certain workflow and decision-making practices, to reach strategic business objectives (Pellikka & Kajanus, 2015).

**Project** – Unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources (ISO, 2015).

**Supplier quality assurance** – Confidence that a supplier’s product or service will fulfill its customers’ needs (ASQ, 2016).

**THEORETICAL BACKGROUND**

**The Origins of Supplier-Driven Innovation**

The terms “supply chain” and “supply chain management” were first used in 1982 by Keith Oliver, a British top logistician and consultant, in an interview with Arnold Kransdorff for the Financial Times to describe the range of activities coordinated by an organisation to procure and manage supplies (Heckmann, Shorten & Engel, 2003). A supply chain is an integrated structure of activities that procure, produce and deliver products and services to customers. The chain starts with suppliers of the focal organisation – the assembler or Original Equipment Manufacturer (OEM), and ends with its customers. The widespread focus on the supply chain and suppliers as a source of enhanced efficiency, productivity and innovation has its roots in the introduction, diffusion and implementation of Japanese-inspired concepts, methods and tools in complex manufacturing businesses, which can be conveniently summarised under the notions of lean production (Womack, Jones, & Roos, 1990) and lean supply (Lamming, 1993).

The term “lean” was originally introduced as opposite to the term “buffered” (Krafcik, 1988). In his seminal Sloan Management Review paper, Krafcik specifies a buffered production system as having:

- high inventory levels buffering against unexpected quality problems;
- built-in buffers in assembly lines to keep production moving if equipment breaks down;
- legions of utility workers on the payroll to buffer unexpected periods of high absenteeism; and
- huge repair areas to buffer against poor assembly line quality, and so on.

Lean production systems, stated then by Krafcik as best exemplified by Toyota, show opposite conditions to buffered production systems: inventory levels are kept at an absolute minimum so that
quality problems can be detected and solved quickly; bufferless assembly lines assure continuous flow of production; utility workers are no longer necessary; repair areas are tiny as a result of the belief that quality should be achieved within the process.

Relying on a global quantitative and qualitative research of production organisation in the world automobile industry, Womack, Jones and Roos (1990) have presented lean production, originally from Toyota, through five elements:

• running the factory,
• designing the car,
• coordinating the supply chain,
• dealing with customers, and
• managing the lean enterprise.

To understand lean production, every step in the process (not only final assembly) must be regarded. The study takes a global perspective and establishes that in 1990, lean production existed, i.e. lean design, lean supply, lean manufacturing, and lean sales management were regarded as fully developed at Toyota and Honda and as being extensively adopted by some Western manufacturers (e.g. Ford, mainly due to learning from their then alliance with Mazda).

Each lean production element is described through a comparison with classical mass production, and lean is argued to be superior to traditional mass production in all elements. This is supported by performance indicators such as product development lead time, assembly hours, assembly defects, and inventory. Womack, Jones and Roos (1990) conclude that the worldwide automotive industry needs to adopt the lean model. Its diffusion is discussed, but not its transferability. Finally, they introduce the notion of ‘lean enterprise’, which is the mechanism of coordination needed to bring all lean elements into harmony also on a global scale.

In the mid-1990s, lean production and lean supply principles were widely diffused and deeply implemented, often not without frictions, in the global automotive industry, and due to the important depth and breadth of the automotive supply chain, in the wider manufacturing industry in Europe and the US alike (De Banville, Barnerias, Deranlot & Chanaron, 1997; Helper, 1994; Karlsson & Åhlström, 1996; Karlsson et al., 1998; Ward, Liker, Cristiano & Sobek, 1995).

Based on these developments, the new ‘lean’ buyer-supplier relationships in industrial component supply can be summarised in three points (Soderquist, 1997):

• Notable reduction in the number of suppliers with whom the carmaker has direct contact;
• Increased innovation and product development responsibility for the remaining suppliers; and
• Tight coordination and control over the restructured supply chain, involving specific forms of trust.
Behind these changes lay the need for cost reductions, quality improvements, and lead-time reductions – both in terms of development and delivery lead-time, all of which were driven by the globalisation of competition and the emergence of Japanese products (i.e. cars) that showed higher performance in these three criteria\(^1\), and that also enjoyed an extraordinary growth in the worldwide market share of passenger cars\(^2\).

At the level of industrial structures, these changes resulted in the development of a new industrial organisation; the pyramidal tier-structured supply chain. Coupled with this was a new sourcing strategy for the buying part; single or parallel sourcing. This supplier structure, defining the tier concept, is illustrated in Figure 1.

This illustration is of course simplified. It only assumes one final assembler, while in reality most suppliers, independent of their tier position, supply more than one customer – a higher level supplier or a final assembler. Moreover, it does not consider the complicated real-world pattern where one specific supplier can be first- and second-tier supplier at the same time, either in relation to different customers or in relation to different product groups.

---

\(^1\) For figures see Womack, J. P., Jones, D. T. & Roos (1990). Reduced development lead time becomes visible to the end-customer above all through quicker adaptation to switching trends in the demand.

\(^2\) From 3.6% to 25.5% between 1965 and 1989 according to the Motor Vehicle Manufacturers Association of the United States, quoted in (Dyer & Ouchi, 1993).
Lamming (1993) proposes another basis for suppliers’ tier classification than physical supply, namely supply of know-how and development of intelligence for enhancing innovation. He introduces the notions of direct and indirect suppliers to illustrate this phenomenon. The following four situations are identified:

1. Direct supplier of components and know-how. This is typically a system supplier, integrating several components into a system, which is delivered to the assembly line ready for fitting into a final product.

2. Indirect suppliers of components (no intelligence links). They supply components to the direct suppliers on a contract.

3. Indirect/direct supplier. This kind of supplier has a direct relationship (components and knowhow) to the assembler and an indirect relationship through other direct suppliers. Depending on how aligned such a supplier is or would like to be with the OEM’s industry (thus depending on the product/market strategy of the supplier), it will tend to move either towards more direct supply, taking on more technological responsibility, or be phased out from the direct supplier base by the OEM. It could also be possible for this kind of a supplier to maintain a dual role.

4. Indirect influential supplier. Suppliers of high-tech products or materials tend to have intelligence exchange with the OEM even though they supply their products to be incorporated (e.g. microprocessors) or transformed (e.g. composite materials) by another supplier to be of use to the assembler.

This typology is a big step towards a better understanding of the innovation potential in the supply chain as compared to the tier model. It indicates that it is theoretically irrelevant to talk about suppliers only in terms of tiers; both the supply of components and development of intelligence must be considered. Moreover, the degree to which a supplier is aligned with the industry of the OEM (e.g. cars, appliances, mobile phones/tablets...), in terms of the current situation and the strategy for the future, has to be analysed in order to understand the innovation potential.

KEY TAKE-AWAYS

• The widespread focus on the supply chain and on suppliers as a source of innovation has its roots in the introduction, diffusion and implementation of lean production, which, inspired by Japanese practices, was implemented across the Western manufacturing industry during the 1990s.

• Lean production as an integrated industrial model involving design, manufacturing supply chain and customer relations, presents lower inventory levels, uncovers and solves quicker and more systematically quality problems, ensures continuous flow of production and makes utility workers unnecessary, compared to traditional ‘buffered’ mass production systems.
• Lean drives changes in supplier relations and in SCM, in particular the implementation of the pyramidal tier-structured supply chain structure. It brings a reduced number of direct suppliers for the OEMs, increased innovation and product development responsibility for the remaining suppliers, and tight coordination based on trust.

• Direct and indirect supply concern the supply of both physical components and development of intelligence leveraging innovation. This can be illustrated in a typology of suppliers with four distinctive roles based on the relationship types.

From lean supply to open innovation in the supply chain

The increasingly open supply chains are a natural evolution of lean production and lean supply, especially as the main principles of lean have spread across industries, attaining also services, and the parallel open source movement has brought the ideas of lean – or agile - to the sphere of code writing and software development.

As regards component-intensive consumer product manufacturers, e.g. of cars, white and black goods, and technology products, as well as industrial equipment manufacturers (machines, tools, robots...), businesses have over the past 10 years been gradually opening up the product development process to new ideas hatched outside their walls by suppliers, independent inventors and university labs. Rapid technological development, shorter product life cycle, clockspeed competition, and increased outsourcing have prompted many firms to involve their suppliers early in their new product development activities and rely more on them as sources and even drivers of innovation (Sun, Yau & Suen, 2010).

Collaboration has extended in many directions, e.g. when companies pursue a new product, many of them consult suppliers, research providers and contract specialists, and test prototypes with their customers (Bughin, Chui & Johnson, 2008). Suppliers should be actively involved in all stages of the Product Life Cycle (PLC), as they need to be fully aware of customer feedback to integrate it into their innovation and development efforts.

In many sectors, suppliers understand the technology challenges and the manufacturability of their parts of the end product much better than the OEMs do. For example, in the design of a new generation of mobile devices through an open network of engaged customers, software engineers, and component suppliers, all working interactively with one another (Bughin, Chui & Johnson, 2008), the suppliers are instrumental both for integrating customer feedback in their component designs and for ensuring that the interfaces between the components allow for the final product architecture to materialize as intended by the OEM. The fundamental perspectives and strategies related to open innovation (OI) and supply chain management are presented in Table 1 below.

---

3 Respectively refrigerators, stoves, washing machines, air conditioners..., and televisions, stereo / hi-fi equipment...
Table 1. Perspectives, strategies and focus on open innovation and supply chain management adapted from (Al, 2013)

<table>
<thead>
<tr>
<th>Perspective, strategies and focus</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Innovation evolution</strong></td>
<td>Internal R&amp;D with closed innovation/research</td>
</tr>
</tbody>
</table>
| Illustration of flows of innovation Blankendaal (2016) | ![Diagram of flows of innovation](image)

| Supply chain evolution and relation to innovation | Traditional supply chain. Suppliers mainly as subcontractors executing specifications. Arm’s length price bargaining | Lean supply with emphasis on strengthening collaboration. Evolution towards Open Innovation in the Supply Chain with increasing supplier responsibility for innovation | Open supply chain established. Supplier driven innovation |

<table>
<thead>
<tr>
<th>Organisational structure</th>
<th>Formal</th>
<th>Informal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical integration</td>
<td>Hybrid</td>
<td>Networked and increasingly virtual organisation</td>
</tr>
<tr>
<td>Horizontal integration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product architecture</th>
<th>Dependent architecture</th>
<th>Modular architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Diagram of dependent architecture" /></td>
<td><img src="image" alt="Diagram of modular architecture" /></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Focus</th>
<th>Individual organisation performance</th>
<th>Supply chain performance</th>
<th>Network performance</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Buyer – supplier</th>
<th>Trust in the chain</th>
<th>Equal partnership</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Scope</th>
<th>I:1</th>
<th>I:N</th>
<th>N:N</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Agreement upfront</th>
<th>Standards to confirm relationship</th>
<th>Pre-competitive standards</th>
</tr>
</thead>
</table>
Open innovation can be understood as the antithesis of the traditional vertical integration approach, where internal Research and Development (R&D) activities lead to internally developed products that are then distributed by the firm.

The flows of knowledge in the open innovation logic may involve knowledge inflows to the focal organisation (leveraging external knowledge sources through internal processes), knowledge outflows from the focal organisation (leveraging internal knowledge through external commercialisation processes) or both (coupling external knowledge sources and commercialisation activities) (Chesbrough & Bogers, 2014). The building and leveraging of innovation capabilities of suppliers relied initially on knowledge outflows from OEMs to larger suppliers of systems and, in parallel, smaller expert suppliers. The latter are suppliers with an explicit strategy of supplying components which provide a value added function, largely dependent on their own R&D efforts. They could deliver the physical components both from the first and the second tier, but would keep knowledge exchange links with the OEMs. This outflow, accompanied by a management logic of focusing on core competences and outsourcing of secondary competencies, enabled suppliers to take increased responsibility for the functionality, cost and development lead-time, and, ultimately, to build innovation capability. The concept of black box engineering (Karlsson & Åhiström, 1996) was introduced to illustrate a new approach to supplier relations. It consists of OEMs generating overall requirements on product functionality and performance, cost targets, and development lead time, before communicating this information to suppliers that enjoy total design and development responsibility as long as they meet the general requirements. As the open innovation logic has evolved, the inside-out process aims to make the OEM more profitable also by commercialising intellectual property (IP) rights and even co-developing internally generated technologies with the suppliers (Enkel, Gassmann & Chesbrough, 2009). With the increasingly growing innovation capability of suppliers from the generalization of the black box engineering approach, the importance of inflows of independently generated supplier knowledge to OEMs increases.

Today, as the networked innovation model has emerged, the coupling of knowledge inflows and outflows, where inbound and outbound processes are applied at the same time, emphasising both more upstream research and concrete project-based new product development, is becoming the norm in technology and innovation –driven businesses. This can be achieved mostly by the cooperation of supplementary partners (joint ventures, alliances) (Enkel, Gassmann & Chesbrough, 2009). Coupled innovation refers to innovation in cooperation with supplemental partners (Karamitsios, 2013) on a basis of equal contribution to the innovation outputs of the network.

Accompanying the networked approach to innovation are the «dependent architecture» and «modular architecture» approaches to component designed highlighted by Chesbrough (2003)

4 For graphical presentation of dependence or modularity of the product or service see (Chesbrough, 2003, pp. 60-61).
Modular design enables easy assembly of components, “plug and play”, whose interfaces are well specified as pre-competitive standards. Different suppliers, innovating in their component technology and architecture, can thus upgrade their components without having to pay attention to possible effects on other parts of the system. This is an important design- and collaboration-driven facilitator that enables innovation to flourish more freely than in a traditional system where the interfacing of components is a major challenge. Executives in a number of companies are considering the next step in this trend toward more structured supplier networks in the open innovation logic. They are looking at ways to delegating more of the management of innovation to networks of suppliers and independent specialists that interact with each other to co-create products and services.

Marsh (2011) discusses open and closed supply chains in a financial article, and illustrates it graphically on this Link (see also the reference list). He analyses two contrasting situations of an open and a closed supply chain:

(a) closed supply chain – with the OEM as a “hub” company situated close to specialist suppliers and exerting strong top-down control in the supply chain. An example is Apple, which drives and controls innovation top-down. The closed chain suppliers are dedicated to the hub OEM and are therefore also locked-in by its customer through tight control and execution of OEM-driven innovation specifications. The closed supply chain is vulnerable when parts of the system are disrupted by external events, as it is hard to replace the specialized and strictly controlled suppliers;

(b) open supply chain – with the OEM setting targets for component performance that suppliers are then free to reach by taking responsibility for their own innovation. Open chain suppliers focus on general components that are used in a wide range of products. They develop relations with direct and indirect supply of both components and innovation intelligence to a larger number of OEMs, including closed system hub OEMs.

**KEY TAKE-AWAYS**

- Increasingly open supply chains are a natural evolution of lean production and lean supply, as the main principles of lean have spread across industries, including services, and the open source movement has brought the ideas of lean – or agile - to the sphere of code writing and software development.

- The evolution of supply chains with an increasingly open and supplier-driven approach to innovation can be summarized in three phases: Internal R&D with closed innovation/research; Open innovation; and Networked innovation / Coupled innovation.

- Each of these phases represent different characteristics and approaches on a range of criteria including the relation to innovation, organisational structure, focus, relationship, and collaboration.
Part 3.3 Instantiating Open Innovation: From Individual to Society Level

- The main driver and explanatory factor of this evolution is the relation to innovation in the supply chain, which has evolved along the types of open innovation: the Internal model relying on inside-out innovation, the Open model relying on inside-out innovation, and the Networked model relying on coupled innovation of equal contributors.

- A major facilitator of the networked model is the pre-competitive standard of ‘plug and play’ interfaces, allowing innovators to focus on core technologies instead of solving interface problems.

Supply chain evolution perspective

As explained above, the supply chain perspective has evolved from vertically integrated structures fully controlled by the OEM, to a network of suppliers focusing on core competences and contributing on an equal basis to innovation in the entire product system orchestrated by the OEM. Analysing this evolution in depth, Blankendaal (2016) illustrates an open supply chain system in the context of the flow logic of a product development process, e.g. the stage-gate or funnel logic (Cooper, 2008), see figure 2.

![Open supply chain system in the context of the product development process (Blankendaal, 2016)](image)

Figure 2 illustrates how suppliers of different tier levels contribute to innovation by engaging in the central activities of product development, from design and engineering to system integration. This
Open Innovation in Supply Chains; Open Supply Chains

means that they also contribute to and are part of the management of all the horizontal activities transcending the development steps.

Hence, a great untapped potential for innovation lies within organisations’ supply chains. But the question remains: what is the best way to capture supplier-enabled or supplier-driven innovation? Procurement often faces difficulties when trying to tap into the more advanced capabilities of the suppliers (Rae, 2015). Important issues that have to be taken into account by procurement in all buying companies in an open supply chain, in order to capture supplier innovation, include (Short, 2015):

• Customer of Choice – the organisation has to make sure that its business is recognised as a Customer of Choice from the viewpoint of suppliers. This is normally not an issue in a tiered system, where the OEM is the final ‘destination’, at least of all physical flows. In a networked system, however, this becomes more critical, as a partner supplier, playing for example the role of an intermediary customer, may not necessarily be recognised at its full importance by the suppliers on whom it depends.

• Process – the procurement function has to involve also processes such as idea generation and idea implementation. Procurement must integrate these with established procurement processes – logistics and quality insurance - so that clear, structured approaches with key performance indicators and outputs are defined and implemented. This formalised approach ensures that the key stakeholders have the catalysts and frameworks needed to drive innovation.

• Internal stakeholder alignment – all information should be passed easily by expanding tools and authority to employees to enable them to make decisions without delay. The reduction of the traditional ‘silo approach’ to procurement is needed wherever possible. Supplier collaboration comes before supplier innovation, and for this to happen the internal stakeholders must be aligned.

• Supplier connectivity – procurement has to link the correct suppliers and their capabilities with the best internal stakeholders, which can leverage value and boost effectiveness significantly. Once the internal stakeholders are aligned, procurement can use its unique position to increase connectivity, alignment and collaboration with the chosen suppliers. This requires much tighter integration between innovation activities in engineering departments and the procurement activities managing the supplier relations.

• Technology – Information technology (IT) and information systems (IS) are key enablers for delivering supplier innovation. Businesses using technology, including data analytics, mobile and cloud applications, to enhance their processes and deliver a real Return on Relationships (ROR) are leagues ahead of those who do not. Concepts such as modular architecture, discussed above, can also be of decisive importance.

A case study of Electrolux (see the OI-NET case repository) describes the process used to capture innovation possibilities outside Electrolux and shows an example of supplier-enabled innovation
where the innovation mechanism did not come from a supplier serving the relevant category, but from a different supplier that was only given the opportunity to work on the project because of the innovation programme of Electrolux.

**KEY TAKE-AWAYS**

- The open supply chain, in the context of the flow logic of the product development process (stage-gate or funnel logic), makes it possible for suppliers at all tier levels to engage in innovation activities along all the steps of the process, and also to take part in and contribute to horizontal activities, e.g. quality assurance, process development etc., transcending the development steps.
- In order to capture supplier-enabled and supplier-driven innovation, the procurement functions in all buying companies in an open supply chain need to strategize around and manage the following: recognition as a Customer of Choice; process integration of both innovation and procurement activities; internal stakeholder alignment; supplier connectivity mechanisms; and technological enablers for delivering supplier innovations.

**Early supplier involvement and involvement in different life-cycle stages**

Several models for external technology sourcing have appeared, including joint ventures, alliances, licensing, venture capital investments, and an orientation towards buyer–supplier relationships (Van de Vrande, Lemmens & Vanhaverbeke, 2006). Opening the process towards suppliers can be interpreted as a particular feature that institutionalises the open innovation approach through early supplier involvement - ESI (Schiele, 2010).

The ESI concept leverages the advantages of involving suppliers in cross-functional teams at the early stages of product development. It also formalizes the process for working with suppliers to ensure alignment and accountability throughout the product launch and innovation processes (Knowledge Brief Manage, 2016). ESI is applied across industries and enables supplier-driven innovation in cases such as automotive fuel injection by Bosch (Bosch worldwide, 2016), sun protecting and security glass by Saint Gobain (Saint-Gobain, 2016) and energy storage material development by BASF (BASF, 2015).

The ESI conceptual framework developed by Dowlatshahi (1998) provides quite a comprehensive list of areas of collaboration, focusing on ESI in product and process development through four building blocks:

- Design (D) ➤ Procurement (P) ➤ Suppliers (S) ➤ Manufacturing (M)
Each set of tasks is grouped within its respective building block; however, the tasks should not be considered as mutually exclusive from the tasks of other building blocks. The collaboration and interrelationships of the requirements of these blocks determine the nature and scope of the ESI program. This means that some of the tasks are performed with the aid from other components, and information should flow freely between each component in order to form a seamless integrated supply chain.

A case study (Jiao et al., 2008) of the semiconductor industry shows how ESI can be applied in product and process development by using a modified framework based on Dowlatshahi (1998), consisting of eight steps:

1. Set up effective means of communication internally and externally;
2. Establish means to motivate suppliers;
3. Create a motivating environment, embrace continuous improvement;
4. Develop a formal process for selecting suppliers for partnerships;
5. Establish means of securing proprietary information;
6. Establish key performance indicators;
7. Establish clear goals and objectives; and
8. Set up a formal set of supplier selection criteria.

Once such a basic framework for early and substantial supplier involvement is established, open innovation organisations involve suppliers in various stages in the life cycles of their products — from the earliest, when the suppliers may provide design suggestions or even be given complete responsibility for the design, engineering and development of the new product, to later stages, when the suppliers may help commercialise the product and manage after-sales product quality. Involving suppliers in the product development process and using their skills and expertise in other, less formal, collaborative processes can create great benefits for the customer. These benefits include shortened product development cycle times, lower costs and higher-quality end products.

Supplier involvement in the product lifecycle is complemented by the involvement of end customers. In the context of open innovation, companies find the involvement of end customers in the product lifecycle as a valuable source of external knowledge for the innovation development process (Antikainen, Mäkipää & Ahonen, 2010). This has hitherto mainly concerned the OEMs, but gradually end-customer involvement becomes a reality for suppliers as well. Customer involvement in various lifecycle stages may include:

• specification of functional and performance requirements through the delivery of parts from suppliers to the manufacturer whose functional and performance characteristics are specified by the customer (Bigliardi, Bottani & Galati, 2010),
• online involvement, e.g. through crowdsourcing techniques and the use of social media to elicit customer preferences and requirements on new products,
• web-based testing of product prototypes, and
• elicitation of requirements through virtual communities of existing or potential customers. The last three points are examples of customer involvement not only with the OEM, but it also affects the entire supply chain.

KEY TAKE-AWAYS

• Early supplier involvement (ESI) is one way of institutionalizing an open approach to innovation.
• ESI leverages the advantages of supplier involvement and formalizes the process of working with suppliers in innovation and new product development.
• ESI affects the management of buyer-supplier relationships in design, procurement and manufacturing.
• ESI needs a basic framework for early and substantial supplier involvement including means of communication, motivation, supplier selection process, securing of propriety information, and clear goal setting.
• Supplier involvement concerns all stages of the product lifecycle.
• In the context of open innovation, supplier involvement in the product lifecycle is complemented by the involvement of end customers.

Inter-organisational supply chain relationships and collaborative innovation

The increasing degree of the involvement of suppliers in the innovation process, as illustrated by concepts such as ESI, and in all stages of the product life cycle, suggests that collaboration among supply chain partners constitutes a core element of open innovation. The relationship between collaborative supply chain relationships and open innovation is mediated by the degree of integration across the supply chain. Recent research, e.g. (Tsanos, 2016), has shown that the development of collaborative supply chain relationships facilitates the attainment of a higher degree of integration across the supply chain.

On the other hand, it is accepted that poorly integrated manufacturing/production and information exchange processes, attenuated by poor relationship integration between the focal firm and its upstream and downstream partners, hampers the success potential of the supply chain (Bigliardi, Bottani, & Galati, 2010). This argument also applies to open innovation: successful participation of supply chain partners (but also of broader stakeholders) in the innovation process throughout the
product/service lifecycle requires a substantial degree of production, information exchange and relationship integration.

The attainment of collaborative supply chain relationships for open innovation is strengthened by several behavioural factors that determine the conditions on which the relationships are built. These come on top of a basic framework for collaboration, as discussed through the eight points in the previous chapter. There is a wide debate on the effectiveness of power and coercion vs. collaboration and acquiescence in the creation and maintenance of successful relational exchanges. A line of thinking that is aligned with the concept of open innovation suggests that the formation of collaborative relationships is facilitated by factors such as:

- trust between the supply chain partners,
- relationship commitment, and
- mutuality and reciprocity of benefits stemming from the relational exchange.

All the above factors lead to relationships that can achieve a higher degree of integration across the supply chain. Indeed, empirical results support this argument (see for example Kwon & Suh, 2005; Tsanos, 2016). The impact of these behavioural factors, and especially trust, on open innovation is quite pronounced. For example, it has been strongly stated that “trust is at the heart of a collaborative innovation capability” (Fawcett, Jones & Fawcett, 2012) and examples of well-known companies (Honda; P&G; Wal-Mart) that reap the benefits of collaborative innovation through the establishment of trust in their relationships with strategic supply chain partners are available. Establishing and maintaining commitment to inter-organisational relationships associated with open innovation approaches is also identified as a challenge (Manceau, Kaltenbach, Bagger-Hansen, Moatti & Fabbri, 2012). Therefore, the perspective of collaborative interorganisational relationships/networks as a factor for fostering open innovation is important.

A case study of Faurecia – an automotive equipment supplier (see the OI-NET case repository) - describes an open innovation process which is used to bring highly innovative concepts to market. Each xWorks center researches its regional market closely, collaborating with various ecosystems that present different opportunities for the development of automotive seating in the regions.

As a final note, it is important to emphasise that new stakeholder engagement concepts are being championed, including ‘Open Innovation 2.0’, promoted by the European Commission (European commission, 2016), and the ‘Quintuple Helix’ model (Carayannis et al., 2012), where, beyond industrial and business partners in supply chains, also the government, academia, civil society and the natural environments of society and the economy are seen as drivers for innovation and cocreators of the future, far beyond the scope of what any one organisation or person could do alone. In the supply chain context, the focus of stakeholder engagement is on integrating external actors that
do not only comprise supply chain partners (suppliers, customers) but also competitors, representatives of other industries, societal stakeholders and potential end users, as well as internal actors and knowledge sources in the innovation process. Stakeholder engagement models, such as Open Innovation 2.0 and the Quadruple/Quintuple Helix can serve as blueprints towards systematisation of the innovation process in the supply chain.

KEY TAKE-AWAYS

• The degree of integration mediates between collaborative supplier relationships and open innovation; weak integration hampers supply chain performance in general and supplier-driven innovation in particular.

• The attainment of collaborative supply chain relationships for open innovation requires the development of behavioural issues such as trust, commitment and mutuality/reciprocity on top of a basic framework for collaboration.

• Beyond industrial and business partnerships in supply chains, recently developed stakeholder engagement concepts such as ‘Open Innovation 2.0’ and the ‘Quintuple Helix’ model also emphasise the government, academia, civil society and the natural environments of society and the economy as drivers for innovation and co-creators of the future.

PRACTICAL IMPLICATIONS

The issue of open innovation in the supply chain is essentially applied and practical. Hence, in the above sections, we have already referred to several examples of how the discussed concepts can be implemented and what their consequences on business practice can be.

To sum up the practical implications, three issues are of particular importance:

1. In nearly every sector, many of the ideas and technologies that generate products emerge from a number of participants in the value chain (Bughin, Chui & Johnson, 2008). This implies that an active process of scanning for new technologies and solutions in order to nurture the inflow of knowledge is a core capability for supply chain management. This has to be accompanied by strong structures, both procedural and more behavioural, i.e. based on trust and communication, in order to build long-lasting relationships that can leverage innovation.

2. Innovations were previously associated mostly with the application of new technologies to products and services, which was closely linked to their commercialisation according to existing business models. Open innovation means accessing new technology, delivering process improvements, and creating added value by tapping into capabilities of a broad range of partners, including suppliers...
and customers. Thus, OI drives the development of new business models. This implies that new approaches to collaboration become a key to innovation in an open context. Increasingly important is the ability to build virtual communities that also include non-traditional suppliers. As industries transform towards intelligent products, and eco-friendly and sustainable products and product systems, the role of non-traditional suppliers increases constantly.

3. As open innovation spreads in supply chains, the importance of supplier-driven innovation will increase, leading to new demands being raised on procurement and supply chain management. This calls for mechanisms that ensure and facilitate collaboration, early supplier involvement and a climate of trust based on a network rather than a chain perception of the supply chain. Equal partnership is a basic condition that will enable strong integration supported by clear goals and transparent structures for communication, shared rewards and responsibilities, and protection of intellectual property.

Finally, we propose two short case studies on practical implications as basis for classroom discussions.

### MINI CASE 1

**OLD WINE IN NEW BOTTLES? MERCEDES-BENZ – TELDIX - BOSCH**

MINI CASE ON THE DEVELOPMENT OF ABS BRAKING SYSTEMS

The title of the case refers to the paper by Paul Trott and Dap Hartmann, entitled «Why ‘Open Innovation’ is Old Wine in New Bottles» (International Journal of Innovation Management, 2009). A little bit more about this after the case! The case simply illustrates that important innovations (the ABS breaking technology is considered to be among the most significant automobile innovations (cars.com, 2016)) are often the fruit of intensive collaboration, and that cases in the past can be seen as pre-forms of a more consistent and conscious open innovation approach in the supply chain.

Antilock brakes, or, originally in German, Anti Blockier System, were firstly introduced by Mercedes-Benz on larger-volume production cars in 1978 (cars.com). The first models were the top–of-the-line Mercedes S-class (w116 model, produced between 1971 and 1980), while the innovation relatively quickly democratised to be found on almost all cars on sale today, even the lowest-cost ones.

The ABS technology keeps the wheels from skidding when hitting the breaks, which enables faster stopping (not on snow), and above all the ability to steer when stopping on all surfaces. Particularly important in a panic situation, the ABS technology works with the regular braking
system by automatically pumping it so that the brake fluid pressure, by means of an electronic control unit, changes automatically at each wheel to maintain optimum brake performance (NHTSA.gov).

Before the innovation breakthrough by Mercedes-Benz, many carmakers had been experimenting with similar systems, including Chrysler, GM, Nissan, and Toyota. Common for all these was that the innovation was the fruit of intensive joint R&D with entrusted suppliers, such as Bendix for Chrysler and Teldix and Bosch for Mercedes-Benz.

As an innovation, ABS was a risky venture, both from the technological and the commercial point of view. Being conceived strategically as a major active safety breakthrough, Mercedes put its world-class safety and performance/quality reputation at stake. That was the major reason why OEMs wanted to share the development effort with their key suppliers. In the case of Mercedes-Teldix-Bosch, this collaboration went back decades.

As stated on Daimler’s media site devoted to the case (media.daimler.com), ABS is an example of the great effort required to bring an innovation up to production standard. The main challenge was to achieve full reliability of the mechanical wheel sensors. The first presentation to the public held in 1970 relied on the joint sensor solution by Mercedes and Teldix engineers in the shape of contactless speed pickups which operated on the principle of induction. The next challenge was to develop the electronic control unit in terms of reliability and performance. Here the expertise of Bosh was brought in, and during the eight years that followed, the prototypes were gradually evolving towards the degree of technical maturity and reliability required for large-scale production. This happened as the prototypes also incorporated new advances in electronics and digital control developed in intensive collaboration between the three key partners (media.daimler.com). A characteristic photo from a late pre-launch test in real driving conditions can be seen under the following link: https://www.mercedes-seite.de/wp-content/uploads/2012/08/959155C27511.jpg.

ABS development is ongoing, with recent advances including Electronic Brake force Distribution (EBD), the Electronic Stability Program ESP, emergency brake assist, or Electronic Stability Control (ESC). The complete control system is becoming more integrated, smaller, and ever more robust. It is thus not only a ‘historical’, but also a continuous example of open innovation in the supply chain. As stated on media.daimler.com, «If the anti-lock braking system is today taken for granted in virtually all cars of the majority of automotive brands throughout the world, we owe this to the commitment of the large number of engineers and technicians at Daimler-Benz and cooperation partners Bosch, TELDIX and Wabco, who searched for the best solution for this system which improves handling safety, avoids accidents and saves lives». 
As indicated in the beginning of the case, its title refers to a paper by Paul Trott and Dap Hartmann, “Why ‘Open Innovation’ is Old Wine in New Bottles” (International Journal of Innovation Management, 2009), where the authors claim that some of the hype around open innovation ignores its early applications, its long evolution, and past contributions of others. Responding to the essence of this critique, i.e. “that there was no real change in innovation paradigms from Closed to Open” (Chesbrough & Bogers, 2014, p. 18), the latter claim that all OI work initiated by Chesbrough is indeed a novel synthesis of many previously disparate points in a context that is different, however: This context refers to the erosion factors that influence the conditions under which innovation takes place (e.g., increased mobility of workers, more capable universities, declining US hegemony, and growing access of start-up firms to venture capital) have changed, giving rise to a new paradigm in which firms need to be and benefit more from being open for innovation” (Chesbrough & Bogers, 2014, p. 18).

Discussion topics and Questions:

1. The case refers to big companies collaborating in the development of an innovation. Search for examples of recent innovation in the automotive industry (e.g. hybrid cars, connected car...) and investigate if the nature of the collaborating suppliers is different. How can more recent collaboration examples be related to the erosion factors advanced by Chesbrough & Bogers (2014)?

2. Non-supplier innovation is sometimes referred to as an example where open innovation brings increased innovation to an industry. Search for information about BMW’s iDrive control unit and relate this example to the ABS case. What OI conditions are similar and what differ between the ABS and the iDrive?

3. The car industry can be seen as an early example of open trends in innovation. What sectors are late adopters and why?

MINI CASE 2

DEVELOPING NEW INNOVATION CAPABILITIES: EXPERT SUPPLIERS BROADENING THEIR INNOVATION CAPABILITIES

When facing the challenges of becoming more competent innovation partners in the supply
chain, small and medium-sized suppliers run the risk of being ‘downgraded’ in terms of their position in the tier structure, therefore losing their direct interactions with the OEM. This is particularly problematic when system suppliers take on more and more of the supplier coordination activities as a result of OEMs reducing their direct supplier base.

This can be referred to as the ‘tier dilemma’ and it drives suppliers’ need to widen their offers, i.e. to provide a more complete function, without falling into the trap of becoming a preassembly unit at the expense of engineering capability. The formulation of clear strategies on the part of the suppliers plays an important role in how this problem can be dealt with. When comparing the following two strategy formulations of two competing suppliers ‘Extension of product functions should be done as a result of innovative design and not only as a result of integrating assembly’, vs. ‘The objective is to assemble parts in order to supply functions’, it is obvious that in the latter case there is a risk of becoming more of a pre-assembly unit and less of a development-intensive expert supplier.

For the first supplier, which consciously took on the challenge of becoming an innovation partner, the way forward was to focus on an extended function from an engineering perspective more than from an assembly one, and to integrate the design of neighbour components to the core product. Thus, if assembly also needed to be developed it would be as a result of innovative design. In a context where extension of product functions is essential, the ability to rapidly undertake organisational modifications, and also modifications in the manufacturing equipment, becomes a significant competitive advantage for an expert supplier competing for the highest possible tier position.

The example of a successful extension of functional solutions in this case concerns a technical component that was traditionally assembled into a plastic cabinet. Both the supplier of the technical component and the supplier of the plastic cabinet were considered as experts by the carmaker customer. Nevertheless, the latter decided to reduce the couple to only one interlocutor. The most natural evolution would be to choose the plastic manufacturer; as the technical component had to be ready before being fitted into the cabinet. However, the other supplier responded by including the plastic cabinet in the design study, and succeeded in designing a cheaper overall solution with higher performance through this widening of the engineering activity. Concerning the design, both the technical component and the plastic cabinet were completely reconfigured. Instead of what happened previously, when the carmaker presented the technical component to the plastic manufacturer to find a solution, the supplier of the technical component succeeded in making the plastic cabinet an integral part of the function and not only an interface element. Besides employing their traditional design know-how, this supplier had to make an important investment in process and material
technology scanning in order to ensure the possibility of manufacturing the new product at a reasonable cost. This meant that process development and manufacturing constraints became central problems in this development project, something that contributed to strong enhancement of technical competences and innovation capabilities.

As a result of this line of action, the supplier of the technical component has remained a direct expert. Naturally, it will be necessary to develop an assembly capacity for the integrated function, but this will happen as a result of innovative product design and is not only taken on as a necessary evil to stay in direct contact with the carmaker at any price.

**Discussion Topics and Questions:**

1. Discuss the pros and cons for the supplier as it took on the challenge of becoming an innovation partner. What is your opinion about the strategy selected?
2. Explain how the case relates to one of the important OI drivers, namely technology synergy.
3. The price that the OEM had to pay for the integrated component was higher than the price paid for the two separate components used before. It was still selected as a preferred solution. Why?

**CONTENT-RELATED MATERIALS**

**Case studies**

OI-NET portal case repository:

**Harvard Business School Cases**

- **Numico (A):** Delivering Innovation through the Supply Chain, 2005. Carlos Cordon; Thomas E. Vollmann; Luis Vivanco.
- **Numico (B):** Transforming the Supply Chain to Support New Realities, 2005. Carlos Cordon; Thomas E. Vollmann; Luis Vivanco
- **Three-Dimensional (3D) Printing:** Jolts on Supply Chain Management and the Chinese Manufacturing Industry, 2016. Benjamin Yen; Yihong Yao.
- **Quirky:** A Business Based on Making Invention Accessible, 2013. David Hoyt; Michael Marks.
- **AmTran Technology Ltd.,** 2015. Willy Shih; Jyun-Cheng Wang; Karen Robinson
- **Apple Inc.:** Managing a Global Supply Chain, 2014. Fraser P. Johnson; Ken Mark
- **Muñoz Group:** Sustaining Global Vertical Integration Through Innovation, 2015. Jose B. Alvarez; Annelena Lobb.
Other cases


Blogs

• Focus helps Electrolux to clean up with Supplier-Enabled Innovation (Rae, 2015). http://www.procurementleaders.com/blog/my-blog--david-rae/focus-helps-electrolux-to-clean-upwithsupplier-enabled-innovation-569930.
• 5 Steps to Capturing Supplier Enabled Innovation (Short, 2015). http://blog.vizibl.co/5-stepscapturing-supplier-enabled-innovation/.

Publications

The list of references contains essential readings that can be selected by instructors depending on the orientation they select for their course. The most recommended readings are listed in the Lecture Overview table at the beginning of the chapter.

PEDAGOGICAL GUIDELINES

Interactive activities

Business Games that involve OI and SCM

Business Simulations that involve OI and SCM
Learning exercises

• The mini-cases in the chapter come with suggested discussion questions. For the cases listed, all Harvard Business School cases come with teaching notes.

• Other cases and blogs can be used as a basis for classroom discussion on the topics presented in this chapter, as well as other related issues around OI and SCM.

• The topics presented can be conveniently expanded by students in the form of an essay identifying, synthesising and analysing additional literature critically. In particular, an essay would be an effective learning exercise for achieving the knowledge learning outcomes (c.f. the Lecture Overview) by exploring concepts of collaborative innovation and how they are implemented, and reflecting on the sources of innovation in the supply chain and how the opening of innovation in the supply chain changes its nature and characteristics.

• Field work involving observations and data collection through interviews with supply chain and innovation managers can be effective exercises in order to achieve the learning outcomes related to skills and competences, for example, investigating how companies’ innovation needs can be satisfied from supplier-driven innovation and supply chain collaboration, and investigating how business models change with increasing supplier innovation and how firms strategize in this dynamic context.

Self-study

After having studied the chapter and worked through the mini cases, students are encouraged to access the references in the Reference List and from reading and analysing abstracts and summaries select those for in-depth reading that provide most relevant additional insights depending on each individual learner’s objectives.

Self-evaluation

Students are encouraged to work through the text actively with the help of the self-evaluation questions listed below.

EVALUATION QUESTIONS

The questions below are presented sequentially, according to the unfolding of the chapter text.

Self-Evaluation Questions

The Origins of Supplier-Driven Innovation

1. Explain the difference between ‘lean’ and ‘buffered’ production systems by comparing them on some key characteristics.
2. Explain why lean production is an integrated industrial model.
3. What are the new buyer-supplier relationships based on the development brought about by lean production?
4. Explain and illustrate the tier-structured supply chain.
5. Indicate and explain briefly the four buyer-supplier relationships based on the notions of direct and indirect supply.

From lean supply to open innovation in the supply chain

6. Give some examples that illustrate why «Increasingly open supply chains are a natural evolution of lean production and lean supply».
7. What are the three models of innovation evolution in the supply chain?
8. Illustrate graphically the three models of innovation evolution in the supply chain.
9. Explain each of the three models of innovation evolution in the supply chain by identifying key characteristics in the dimensions of relation to innovation, organizational structure, product, focus, relationship, scope, and collaboration.
10. What is ‘black box engineering’ and how does it relate to open innovation?
11. Explain how the different modes of open innovation - outbound, inbound and coupled - relate to and can partially explain the evolution of innovation in the supply chain.
12. What is the pre-competitive standard of ‘plug and play’ interfaces?

Supply chain evolution perspective

13. Indicate the six steps in the product development process. In what steps are suppliers mostly engaged?
14. Indicate the horizontal activities transcending the development steps.
15. Explain briefly the logic of supplier contribution to innovation from the perspective of an open supply chain system in the context of the product development process.
16. Indicate and explain briefly the five issues that have to be managed by all buying companies in an open supply chain in order to leverage supplier-driven innovation better.

Early supplier involvement and involvement in different life-cycle stages

17. Explain how Early Supplier Involvement can institutionalize open innovation.
18. What other mechanisms exist for external technology sourcing?
19. List and explain briefly the eight steps of the basic framework for early supplier involvement.
20. Indicate some customer involvement activities that may also affect suppliers.

Inter-organisational supply chain relationships and collaborative innovation

21. Explain the importance of the degree of integration between the partners in the supply chain.
22. What behavioural factors in collaborative supply chain relationships for open innovation come on top of a basic framework for collaboration?
23. Explain briefly how ‘Open Innovation 2.0’ and the ‘Quintuple Helix’ complement the core ideas of open innovation.

Questions for written exams

The Origins of Supplier-Driven Innovation

1. What is lean production? Exemplify how it differs from traditional mass production.
2. Is lean production an integrated industrial model, and if yes why is it seen as such?
3. What are the new buyer-supplier relationships based on the development brought about by lean production?
4. Explain and illustrate the tier-structured supply chain.
5. Explain the notions of direct and indirect supply. Exemplify some buyer-supplier relationships that illustrate these notions.

From lean supply to open innovation in the supply chain

6. Explain why increasingly open supply chains are a natural evolution of lean production and lean supply.
7. First describe and then contrast the three models of innovation evolution in the supply chain by selecting three of the characterising dimensions analysed in the text.
8. Why can open innovation be seen as a main driver and explanatory factor of the evolution of supply chain structure and relations? Consider how the different modes of OI have been/are used in supply chains.
9. How does the pre-competitive standard of ‘plug and play’ interfaces support the networked supply chain model?

Supply chain evolution perspective

10. By referring to product development steps and horizontal activities in the new product development process, discuss the logic of supplier contribution to innovation in an open supply chain system.
11. Select three of the five procurement management issues that buying companies have to attend to in open supply chains and explain briefly what they involve.

Early supplier involvement and involvement in different life-cycle stages

12. Explain why Early Supplier Involvement can be seen as a way to institutionalize open innovation.
13. Mention and explain briefly four of the eight steps of the basic framework for early supplier involvement.
14. Discuss supplier involvement across the product lifecycle and exemplify the suppliers’ role in different stages.

**Inter-organisational supply chain relationships and collaborative innovation**

15. What role does the degree of integration between partners in the supply chain play for open innovation in the chain?
16. Discuss the behavioural factors in collaborative supply chain and the basic conditions needed to establish open supply chains.
17. Explain briefly how ‘Open Innovation 2.0’ and the ‘Quintuple Helix’ complement the core ideas of open innovation.

**Individual work examples**

The presented topics can be expanded conveniently by students in the form of an essay identifying, synthesising and analysing additional literature critically. By searching and analysing case studies from academic references, white papers and company websites, concepts of collaborative innovation and how they are implemented can be compared and thus understood better.

Field work involving observations and data collection through interviews with supply chain and innovation managers can be effective exercises in order to achieve the learning outcomes related to skills and competences.

**Group work examples**

Students work in groups of 3-5, depending on class size, and each individual selects / is assigned a specific industry where he or she will make an analysis of the supply chain structure and the extent and nature of supplier-driven innovation. Then, each student presents his/her case and comparisons are made and discussed in the group regarding OI in the respective supply chains, its advantages, difficulties and future trends. Students can be asked to develop an analysis framework initially in the group for easier and more effective cross-industry comparison. If time is limited, the instructor can provide such a framework depending on the focus envisaged in the course.

Students work in groups of 3-5, depending on class size, and each student selects / is assigned a specific challenge in open supply chain innovation where he or she will make an analysis of the nature of the challenge, what solutions companies have developed to cope with it, how effective the solutions are, and what could be ways of improving further management practices to come to better terms with the challenge. The challenges could include structures and mechanisms for collaboration, developing communication across different professional languages, building trust in open supply chains, joint creation and sharing of knowledge, fair sharing of innovation outcomes – IP rights, etc.
TEACHING TIPS

Slides


Links to teaching material

Links are provided for most of the sources indicated.

Supporting case material

The list of supporting case material contains essential case studies (in the part Content-related material) that can be selected by instructors depending on the orientation they select for their course.

REFERENCES

Part 3.3 Instantiating Open Innovation: From Individual to Society Level

• Valkokari, K., Paasi, J., Lee, N. & Luoma, T. (2009). Beyond Open innovation - the concept of networked innovation. New York City, USA.
SPECIFIC EXAMPLES ON FOSTERING OPEN INNOVATION AT THE INDUSTRY LEVEL: UNIVERSITY-INDUSTRY COLLABORATION

MARAL MAHDAD, EKATERINA ALBATS

ABSTRACT

This chapter highlights the role of university-industry collaboration in generating innovation. It provides an overview of the actors’ motives for collaboration, the most common barriers and drivers of this type of inter-organizational relationships, and reviews the types of collaborative links. Moreover, this chapter introduces various online tools for bridging the academia and the industry and presents some real cases of university-business collaboration. The chapter is supplemented by pedagogical guidelines, evaluation questions, teaching tips and suggestions for reading.
| **Prerequisite** | Open innovation ecosystems.  
Triple helix / quadruple helix collaboration. |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives of the lecture</strong></td>
<td>This lecture aims at providing practical examples of open innovation ecosystems involving universities and/or public research organizations.</td>
</tr>
<tr>
<td><strong>Workload</strong></td>
<td>2h teaching; 8h homework.</td>
</tr>
</tbody>
</table>
| **Learning outcomes** | LO #2: To explore concepts of collaborative innovation and make them actionable.  
LO #52: To identify opportunities for the exploitation of new digital technology and related platforms for sourcing new ideas as part of the organisation’s open innovation strategy.  
LO #120: To assess critically the motives for OI and mechanisms through which OI create value for an organisation  
LO #128: To assess innovative ideas and define a roadmap for commercialization. |
| **Knowledge** | Basics of OI. |
| **Skills** | Analytical thinking and opportunity generation. |
| **Competences** | Case evaluation. |
University–industry interactions in applied research: The case of microelectronics (Banconi & Laboranti, 2006).  
A typology of research training in university–industry collaboration: The case of life sciences in Finland (Chiang, 2011).  
Companies on campus (Chiang, 2011).  
University-industry collaboration: Grafting the entrepreneurial paradigm onto academic structures (Dooley & Kirk, 2007).  
Lecture Content

The aim of this lecture is to provide evidence of university-industry collaboration (UIC) in practice by identifying different modes of collaboration with universities: coordinated efforts, parallel projects and symbolic collaboration (Thune & Gulbrandsen, 2014). The perspective of the university as a key contributor to economic development (Mansfield and Lee, 1996) has increased in recent decades. Within the current knowledge-based economy, the university acts as both a “knowledge educator and a seed-bed for new firms” and for innovation (Etzkowitz & Leydesdorff, 2000). Viewed simply, a nation that can achieve a most effective inter-linkage between the three actors of university-industry-government, can achieve faster transition of discoveries from the lab bench to the marketplace. Empirical research on university-industry relationships has typically focused on the types of interaction (Thune & Gulbrandsen, 2014), the volume of interaction, initiatives, and motivators (D’Este & Perkmann, 2011), firm size and R&D budget, the individual characteristics of academy members, and accordingly the consequences and results of these collaborations (Bruneel, d’Este, & Salter, 2010, Perkmann et al. 2013, Bonaccorsi & Piccaluga 1994). All these factors vary in each type of collaboration.

When understanding why collaboration with universities is beneficial for the industry, the following key drivers emerge:

1. Access to basic scientific competence built up within the university within a niche area of science where the industry partner may be weak. (See the example by Rohrbeck & Arnold, 2006).
2. Access to knowledge (both codified and tacit) that has been developed within the research centre through decades of publicly funded research. (See the example by Felsenstein, 1994).
3. Access to world-class academics who are both scientifically and industrially aware of the state of the art. (See the example by Dooley and Kirk, 2007).
4. Acquiring competitive advantage by gaining access to better leads through faster channels than the competitors, thereby enhancing the product development process. (See the example by Rohrbeck, Hölzle, & Gemünden, 2009).
5. Access to rich sources of highly skilled researchers. (See the example by Thune, 2011).
MOTIVES, DRIVERS AND BARRIERS IN UNIVERSITY-INDUSTRY COLLABORATION

The principle difference between firm-to-firm and firm-to-university relationships arises from the difference in the primary objectives and motives of these two types of partners. University as an academic partner is more oriented towards searching for new ideas and discoveries, creating fundamental knowledge. Companies, in turn, are more oriented towards profit and practical applications of knowledge (Parker, 1992). That is, in part, why collaboration between academia and business can be difficult to establish and manage. This is illustrated by differing motivation (Siegel, Waldman, Atwater & Link, 2003b), the level of internal bureaucracy (Bruneel, d’Este, & Salter, 2010), the languages the parties speak, and the time horizons and day-to-day practices undertaken (Barnes, Pashby & Gibbons, 2002; Muscio & Pozzali, 2012). Table 1 summarises the motives and rationale of two collaborating actors.

### Table 1. Motives for university-industry collaboration

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>University Actions</th>
<th>Industry Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary motive</td>
<td>Discovery of new knowledge</td>
<td>Commercializes new technology</td>
</tr>
<tr>
<td>Secondary motives</td>
<td>Recognition within the scientific community</td>
<td>Financial gain</td>
</tr>
</tbody>
</table>

- **University**
  - Access to resources and equipment
  - Support for students
  - Getting additional funds from the industry
  - Access to learning opportunities
  - Getting a reference of partnership with industrial companies

- **Industry**
  - Access to scientific competence
  - Access to knowledge (both codified and tacit)
  - Access to skilled personnel
  - Taking part in curriculum development

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Scientific</th>
<th>Organic/entrepreneurial</th>
</tr>
</thead>
</table>


The fact that collaboration with a university is different compared to interaction with other types of partners is well illustrated by the specific challenges emerging in university-industry collaboration. Among the most recent studies, the one by Galan-Muros and Plewa (2016) defines four groups of barriers and two groups of drivers in university-business cooperation. The first group of barriers is related to the ‘connection problem’ – the lack of collaborating parties’ awareness about the
capabilities of external organizations, and lack of contacts and difficulties in finding the right partner (Muscio & Pozzali, 2013). The second type of barriers is related to lack of funding on both sides and at the various stages of collaboration – from searching for a new partner and investments into stimulating new partnerships (Etzkowitz, 1998) to the resources allocated for maintaining the existing collaborative links (Howells, Ramlogan, & Cheng, 2012). The third group of barriers defined by Galan-Muros and Plewa (2016) combines a wide range of problems caused by the differences in organizational cultures existing between the business and academia and arising no matter what type of collaboration is it – education, research or something else. Particularly, it includes differing motivation (Bruneel, d’Este, & Salter, 2010), different modes of communication and different languages (academic vs. business) (Lambooy, 2004; Muscio & Pozzali, 2013), the time-horizons of universities being normally more long-term oriented (Meyer-Krahmer & Schmoch, 1998), and the levels of bureaucracy at university administration being often less flexible than the business would desire it to be (Siegel, Waldman, Atwater & Link, 2003). Finally, the fourth group of barriers very closely linked with cultural issues is relate to differences in the internal characteristics of both types of organization – disagreements on IPR and disclosure research results (Hall, Link & Scott, 2001), as well as the limited absorption capacity of business (Khamseh & Jolly, 2008; Galan-Muros & Plewa, 2016). The core drivers of UIC include the availability of complimentary resources (funding, human resources, knowledge, etc.) and relationship type of drivers (trust, commitment, shared goals and balancing differing expectations, as well as prior experiences of collaboration) (Galan-Muros & Plewa, 2016).

Types of university-industry collaborative links

To characterize university-industry collaboration, it is necessary to highlight the known types of collaboration links. A number of authors have proposed typologies of collaborative links (Perkmann & Walsh, 2007, Perkmann et al., 2013; Boronowsky, Mention & Woronowicz, 2012; Alexander & Childe, 2013). Discussing the types of interaction, it is important to define the actual direction of knowledge transfer happening during collaboration. Figure 1 shows a three-group classification of collaborative ‘links’ by the direction of knowledge transfer, particularly: university-industry activities (in the figure they are shifted more towards the block University); bi-directional interaction (blue and placed in the center); industry-university directed activities (in the figure they are shifted more towards the block Industry) (Albats, 2013).

Online tools for collaborating with universities

As mentioned above, the lack of resources inhibits university-industry interaction, but it also hampers the partner search (Muscio & Pozzali, 2012,) contributing to a ‘connection’ barrier to university-industry collaboration (Galán-Muros, & Plewa, 2016). Browsing through potential partners’ websites
is extremely time consuming process, and therefore, electronic tools which assist in partner search
are needed for solving the connection problem. A number of online tools or platforms designed
specifically for bridging and facilitating university-industry collaboration already exist and develop
rapidly, while new ones emerge continuously. Albats, Fiegenbaum and Alexander (2016) provide
an overview of such tools and classify them according to their functions or collaborative links to
be supported. Sources like Coursera (www.coursera.org) support digital, project-based learning,
platforms like in-part (www.in-part.com) support search for complimentary knowledge or IPR. A
Part 3.3. Instantiating Open Innovation: From Individual to Society Level

Number of crowdsourcing platforms (as www.nimblebee.eu and www.marblar.com) are rapidly developing to facilitate generation of ideas from university for solving industry’s challenges. Tools for marketing university innovations (as www.leadingedgeonly.com) increase awareness of the academic knowledge, while tools for building networks (as www.uiin.org and www.bridgelight.co.uk) facilitate networks development with digital infrastructure (Albats, Fiegenbaum & Alexander, 2016).

Examples of famous large industries that are leaders in the collaboration with universities:

1. Philips: Philips has and had in the past a number of types of collaboration with universities. Philips was founded in Eindhoven, and that led to the establishment of the University of Technology there in 1956 and supported a continuous flow of human resources between the company and the academia. The region of Eindhoven per se is recognised as one of the top technology centres in Europe, and Philips has definitely played its role in it. Among the studies on the collaboration of Philips with the academia, see Salimi, Bekkers and Frenken, (2015) and Philips website: http://www.philips.com/a-w/research/about-philips-research.html.

2. IBM (see e.g. the case of ETH Zurich and IBM establishing Binnig and Rohrer Nanotechnology Center in Zurich - Edmondson et al., 2012: http://www.sciencebusiness.net/Assets/94fe6d15-5432-4cf9-a656-633248e63541.pdf).

Example of an SME collaborating with a university:


KEY TAKE-AWAYS

- Understanding the rationale for university-industry collaboration: motives, drivers and barriers.
- Understanding the collaborative modes and awareness of the online tools for matching companies and universities.
- In-depth understanding of how university-industry collaboration works, through case studies.
PEDAGOGICAL GUIDELINES

The lecture leverages on both a frontal lecture and interactive activities. After 2 hours of frontal teaching, the participants will be divided into groups in order to find examples of university-industry collaboration in their network. They should analyse and evaluate the collaboration and find probable solutions in case of problem recognition. The groups will present their cases and analysis to the other groups.

EVALUATION QUESTIONS

Individual work examples: Could you find examples of university-industry collaboration at your university? How do they work together? What possible problems did you observe? What could be done better? Do you know any famous collaboration cases? Why are they famous in your opinion?

Group work examples: Why did you choose this case? Can you present a summary of the evaluation? Do you think this is a success story? How can the partners make it better?

TEACHING TIPS

Supporting case materials:
http://www.theguardian.com/higher-education-network/blog/2012/aug/02/the-value-of-research-collaborations
http://www.nsf.gov/eng/iip/iucrc/home.jsp

REFERENCES


OPEN INNOVATION WITHIN INDUSTRIAL NETWORKS

GER POST

ABSTRACT

Companies, especially large and multinational ones, have to deal with challenges of globalisation, complex and risky technological developments, and continuously changing market needs. One way of dealing with these uncertainties and opportunities is to build collaborations with other firms and R&D organisations. Open innovation, strategic alliances and other forms of collaboration are built on interfirm networks. These Industrial networks and interfirm relationships can be studied from different disciplinary angles and theoretical perspectives. This chapter describes these theoretical perspectives and the practical implications of industry networks for open innovation management.
### Prerequisite
Generic knowledge of the organizational theory, systems theory and innovation management.

### Objectives of the lecture
This module aims at providing knowledge on industrial networks and offering practical examples of innovation-driven collaboration within (or between) these networks.

### Workload
2-4h teaching; 8-16 h self-study.

### Learning outcomes

**Knowledge**
- **LO #115**: To remember and to understand the basic concepts of OI and their relationships
- **LO #90**: To understand the dynamics between innovation and the contextual environment.
- **LO #119**: To recognize and assess the interdependencies in the system of innovation (ecosystem) across organizations.

**Skills**
- **LO #99**: To understand and assess networks and collaboration networks.

**Competences**
- **LO #64**: To apply, analyse, evaluate and design strategic decision making with regard to the implementation of relevant open innovations mechanisms in the organization.

### Reading List

### European Qualifications Framework (EQF) Level
Levels 6, 7.
Definitions

The term ‘(business) network’ has been widely used in academic research and in business practice. According to Håkansson and Ford, a network – in its most abstract form – is “a structure where a number of nodes are related to each other by specific threads” (Håkansson & Ford, 2002, p. 133).

‘Innovation Networks’ are defined by Espelid et al. (2013, p. 112) as “business network structures within which actors are intensely interacting to develop and implement innovations through adaptation, cooperation and coordination”.

Theoretical Background

Basic Systems Theory

The (general) systems theory is trans- or interdisciplinary study of the abstract organisation of phenomena, independent of their substance, type, or spatial or temporal scale of existence. It investigates both the principles common to all complex entities, and the (usually mathematical) models which can be used to describe them (von Bertalanffy, 1968; Midgley, 2003).

A system can be said to consist of four things. The first is objects – the parts, elements, or variables within the system. These may be physical or abstract or both, depending on the nature of the system. Second, a system consists of attributes – the qualities or properties of the system and its objects. Third, a system has internal relationships between its objects. Fourth, systems exist in an environment. A system, then, is a set of things that affect one another within an environment and form a larger pattern that is different from any of the parts.

The fundamental systems-interactive paradigm of organisational analysis features the continual stages of input, throughput (processing), and output, which demonstrate the concept of openness/closedness. A closed system does not interact with its environment. It does not take in information, and it is therefore likely to atrophy, that is to vanish. An open system receives information, which it uses to interact dynamically with its environment. Openness increases its likelihood to survive and prosper.

Various system characteristics are: wholeness and interdependence (the whole is more than the sum of all parts), correlations, perceiving causes, the chain of influence, hierarchy, suprasystems and subsystems, self-regulation and control, being goal-oriented, interchange with the environment,
inputs/outputs, the need for balance/homeostasis, change and adaptability (morphogenesis), and equifinality: there are various ways to achieve goals. A central topic of the systems theory is self-regulating systems, i.e. systems self-correcting through feedback.

Industrial networks consisting of individual companies (actors) and relationships between these actors have been observed in a range of studies over the past 25 years (for summaries, see Iacobucci, 1996; Laage-Hellman, 1997; Ford et al., 1998; Naude & Turnbull, 1998; Sheth & Parvatiyar, 2000). The relationships are likely to become complex and dynamic over time. Their current form is the outcome of previous interactions between the actors embedded in the network.

**Industrial Network Approach**

Håkansson and Ford claim that individual companies can not been seen as ‘isolated’ actors but must be studied and managed as actors embedded in a wider (industrial) network with other actors, structures and relationships. They even label these networks as “quasi-organisations”, built on similar dimensions that can been seen within individual organisations. “A business network has a specific and intense structure with economic, technical and social dimensions” (Håkansson & Ford, 2002, p. 135).

Firms are embedded in various ways in networks where both economic factors and social dimensions are crucial (Gadde et al., 2003). One special characteristic of a network is its indeterminateness. In the Industrial Network Approach, the usual distinction between a firm and its environment is not advocated (Snehota, 1990). The set of actor bonds is not given, since there is no overarching purpose governing the network. Rather, relationships are established for various purposes. The network does not have a natural centre or clear borders and it is dynamic over time (Snehota & Håkansson, 1995). In this view, networks are loosely connected systems of actors and relationships in which no firm can dominate (Wilkinson & Young, 2002).

Scholars studying innovation in industrial networks build in many cases on the early network approach developed by the International Marketing and Purchasing group. To industrial network scholars, the embedded nature of relationships leads to a ‘networked view of reality’ (Easton, 1992).

Gadde et al. (2003) argue that the traditional strategic management theory brings a clear competitive focus to relationships and builds on the concept of ‘winning,’ whereas the industrial network view provides a more balanced approach to cooperation and competition. More recent developments presented in the literature on strategic networks and relational strategies support the industrial network view.

The structure and dynamics of an industry network can be described and analysed by using a wide array of social and organisational network analysis tools. The figure below describes the
development of a wind turbine industry network over two periods. The UCINET toolkit for social network analysis has been used in producing the figure.

Figure 1. Development of a wind turbine industry network (adopted from Zhou, Li, Lema & Urban, 2015)

Resource-Based View on Industrial Networks

One basic assumption in the industrial network approach is the existence and significance of business relationships. These relationships with customers, suppliers, and other organisations represent strategic resources in different ways. A company’s relationships are important resources in themselves. Especially when it comes to technical development, each individual firm is increasingly reliant on relationships with others. These relationships combine the physical and organisational resources of a company with those of its counterparts. Therefore, a significant part of a company’s total resource base is located beyond its ownership (Gadde, Huemer & Håkansson, 2003).

An industrial network can be described and studied as a set of interconnected resources. In this perspective, the actors possess resources and perform activities in cooperation and competition with other firms. The activities and resources are not coordinated and combined spontaneously. They are purposefully directed by many individual actors who try to influence one another systematically (Gadde, Huemer & Håkansson, 2003).

A significant part of a company’s total resource base is located beyond its ownership boundaries and is controlled bilaterally with other firms. In this view, the resources of a company are tied to resources in other firms. Every company is part of a larger collective entity involving relationships with counterparts. In the interaction between two business partners, the resources of the two units are affected—both in terms of how they are used and how they develop.

From the network resource perspective, the main concern for a company is to make the best use of the resource constellation in the network. In these efforts, it is important that resources
are not perceived as given. Resources have always ‘hidden’ and unexploited dimensions that can be explored and developed in interaction with business partners (Gadde, Huemer & Håkansson, 2003).

Industry Nets

Building on the academic debate on the benefits and limitations of the Industrial Network Approach, strategic and social research on networks and resource-based studies on networks, Möller & Rajala (2007) focus on intentionally formed networks that contain a finite set of at least three organisations, and call these networks strategic or business ‘nets’. These nets come in many forms and with many purposes: supplier nets, distribution nets, technology development or R&D nets, competitive coalitions, technology coalitions, etc. Möller and Rajala presents a framework for studying these nets, the processes taking place (like innovation), and the management of these processes (see Table 1).

Innovation and change in industrial networks

Each company gains benefits and incurs costs from the network in which it is embedded and from the investments and actions of the other companies involved. Håkansson and Ford (2002, p. 135) claim that a company’s “ability to act and the effects of its actions are constrained by the existing structure of the network. Change by companies and change within companies occur through changes to the structure of the network”.

From this perspective, in order to establish innovation, companies need to build on interaction with other parties within the industrial network(s). Innovation in an industrial network is not the result of an individual company or a single technology, but comes from collaborative development, synthesis and application of various technologies, competencies and facilities across the network.

Practical implications

IMP scholars debate regularly whether firms are able to ‘manage networks’ or can only ‘manage in networks’ (Golffeto, Salle, Borghini & Rinallo, 2007, Möller & Halinen, 1999) introduces four levels of complexity in managing business networks and relationships: (1) industries as networks, (2) firms in a network, (3) relationship portfolios, and (4) exchange relationships.

Håkansson and Ford (2002) claim that companies often do their best to control the network surrounding them and to manage the relationships so that their own objectives are achieved. This ambition is one of the key mechanisms in network development. This causes the paradox that the more successful a company is in its control ambitions, the less innovative the network will become.
### Table 1. Network management framework (Möller & Rajala, 2007)

<table>
<thead>
<tr>
<th>Level of Management Issues</th>
<th>Key Themes</th>
<th>Managerial Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industries as Networks</td>
<td>Networks, as configurations of actors and value activities are not transparent. Capability to understand networks, their structures, processes and evolution is crucial for network management. Capability to influence other core actors is essential.</td>
<td>How to develop valid views of relevant networks and their opportunities? How to analyze strategic nets and key actors for understanding network competition? How to orchestrate whole networks?</td>
</tr>
<tr>
<td>Network Visioning &amp; Orchestration</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level 2</strong></td>
<td>Firms’ network behavior is related to: - strategic nets they belong to - positions and roles they play in these nets - major business relationships Capability to identify, evaluate, construct and maintain positions and relationships is essential in strategic nets.</td>
<td>How to develop and manage strategic nets? How to mobilize and coordinate key actors? How to enter new nets (market entry, new product field, new technology net)? How to manage net positions?</td>
</tr>
<tr>
<td>Firms in Strategic Nets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level 3</strong></td>
<td>Firm is a nexus of resources and activities. Which activities to carry out internally and which through different types of nets is a core strategic issue. Capability to manage one’s positions and roles in multiple nets is required.</td>
<td>How to develop and manage an optimal strategic portfolio? How to manage the actor relationships in particular nets - from organizational and analytical perspectives?</td>
</tr>
<tr>
<td>Net &amp; Relationship Portfolios</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portfolio Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level 4</strong></td>
<td>Individual customer/supplier relationships form the bases of strategic nets. Capability of creating, managing and concluding strategic relationships is a core resource for a firm.</td>
<td>How to evaluate future value potential of a strategic relationship? How to manage relationships efficiently - from organizational and analytical perspectives? How to manage major relational episodes efficiently?</td>
</tr>
<tr>
<td>Exchange Relationships</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship Management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
If one actor directs the development processes totally, the network runs the risk of becoming a hierarchy with reduced potential for innovation.

More generally, Håkansson and Ford (2002) describe a network as a basis from which developments can take place but also as a resource constellation that creates inertia and limits innovation. Some scholars and practitioners emphasise the costs of changes and the importance of using the resources that are already available to the company in its existing relationships.

Network configurations can be analyzed from two perspectives (Cantù, Corsaro, Fiocca & Tunisini, 2013): that of the focal actor versus that of the collective, emergent network. In the focal actor perspective, the company deliberately tries to ‘orchestrate’ the network by developing relationships with selected partners so as to benefit from their resources (Möller & Rajala, 2007). Conversely, the emergent network vision emphasises the self-organising aspects of networks, claiming that networks cannot be managed entirely by a single company. In this perspective, the firm has never complete control over the journey of its innovation. It can nevertheless try to influence how its innovation resources are used and combined through interaction (Baraldi & Strömsten, 2009).

Innovation-driven interaction between parties occurs within a single industrial network – within supply and demand chains – or between multiple industrial networks. In many cases this collaboration is organised in (strategic) alliances.

Supply and demand chain collaboration

Original Equipment Manufacturers are increasingly seeking to involve their suppliers and service partners in product, process and service development in an attempt to reduce the development costs and time, and to increase product quality and value (e.g. Wynstra 1998). Håkansson and Eriksson (1993) present four key issues in “getting innovations out of supplier networks”, related to combining and integrating different supplier relationships: prioritising, synchronising, timing, and mobilising. However, the existence of network interdependencies may also obstruct innovation and the time to market. In order to bring innovative technology and novel products to the market, companies have to deal with technological, knowledge, social, logistic, and administrative interdependencies (Johnson & Ford, 2007).

Cross-industry innovation

Various problems in the society call for radical change and collaboration across industries (also called crossover innovation). Collaboration across industries extends the network resource base of an individual company, as well as the collaboration itself. It helps to combine and integrate technologies from different industries and to exploit these combined resources and business skills via novel products and services in new or existing markets. However, cross-industry collaboration requires (basic) understanding of the technologies, structures and cultures of these other industries.
### Table 2. The impact of different types of innovation on firms, relationships and the network (Luthardt & Mörchel, 2000)

<table>
<thead>
<tr>
<th>Innovation Type</th>
<th>Firms</th>
<th>Relationships</th>
<th>Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modular Innovation</td>
<td>Value of resources of $CS_{BOLD}$ destroyed. New resources are integrated in the network $CS_{BNEW}$. Value for customer firms enhanced.</td>
<td>Relationships of Integrators with $CS_{BOLD}$ destroyed. Establishment of relationship with $CS_{BNEW}$ has to be established (low transaction costs).</td>
<td>Network structure slightly changed. Resources of network enhanced.</td>
</tr>
<tr>
<td>Architectural Innovation</td>
<td>Value of resources of established integrators threatened. New resources are integrated into the network (Integrator$_{NEW}$). Custom Value enhanced, but period of uncertainty.</td>
<td>Relationships of established integrators with component suppliers and customers have to be established (high transaction costs).</td>
<td>Network structure considerably changed. Resources partly sustained, partly destroyed.</td>
</tr>
<tr>
<td>Radical Innovation</td>
<td>All existing resources threatened/destroyed. Value for customers significantly enhanced, but period of strong uncertainty.</td>
<td>All relationships threatened/destroyed.</td>
<td>Network endangered in its entirety (resources and relationships).</td>
</tr>
</tbody>
</table>

**Exploration and exploitation in alliances**

A special type of industrial networks are alliance networks. Alliances and alliance networks are made of (strategic) collaboration agreements aiming at sharing and valorising technological expertise and intellectual property. In many cases these networks also aim at (pre-competitive) collaboration on basic or applied research, technology development, product and service engineering, and the joint development of industry standards. Dittrich and Duysters (2007) describe four types of strategic
technology alliances: (1) joint research pacts, (2) joint development agreements – both non-equity based – (3) joint ventures, and (4) research cooperation. The latter two are equity-based types of collaboration.

Building on the work of March (1991), Dittrich (2008) describes two kinds of alliance-based networks: exploration networks and exploitation networks. These kinds of networks differ from each other in four ways. Exploration networks demonstrate a preference for flexible legal structures like non-equity-based alliances, whereas exploitation networks tend to use legal structures for long-term collaboration like equity-based alliances. Second, in exploration networks the partnerships are more dynamic and flexible due to the need for continuous search for novel technologies and business opportunities, requiring access to a variety of competences and facilities. Exploitation networks, on the other hand, require more sustainable and close collaboration and will require more stable partnerships. In exploration networks companies can benefit from companies’ competences and networks in other industries and technological domains, while exploitation networks are more often built on partnerships in similar technological areas.

ADDITIONAL READING MATERIAL FOR STUDENTS

In order to describe, analyse and design open innovation in industrial networks, one must be able to describe and understand the topology of a network. In doing this scholars can use the theory and tools of social network analysis. See the links to SNA software below. Additional reading material on Industry Networks can be found on the portal of the IMP-group (http://impgroup.org).

KEY TAKE-AWAYS

The main lessons learned from this chapter are:

• The development of open innovation collaboration builds on existing but continuously changing industry networks;
• These networks can be described and analysed from different theoretical perspectives and according to different methodologies and tools;
• Industry networks emerge and develop over time and cannot be fully controlled by a single company.

PEDAGOGICAL GUIDELINES

The concept of the Industry Network and the various theories on industrial networks are difficult to understand for Bachelor-level business students and for technology students in general. Their
understanding of industry is primarily based on and driven by the perspective of the individual firm. Teaching the concept of the industrial network and how companies operate within these networks requires the use of (in depth) case study materials.

Master and PhD students should be able to deal with the suggested reading materials by themselves, but could use additional frontal teaching and case materials.

**EVALUATION QUESTIONS**

**Individual work examples**

What does the industry network of [EXAMPLE OR CORE COMPANY] look like? Who are the dominant actors? How can this network be described (topology)? How does innovation take place within this network? How do the actors collaborate on technology development and innovation?

**Group work examples**

Select an industry or company and collect data on the network structure and intercompany collaboration. Prepare a report that deals with the questions described above and how open innovation in this network could be improved.

**TEACHING TIPS**

**Links to slides and other teaching materials**

- Part of the materials provided by Antero Kutvonen (LUT) on the OI-Net platform could be used;

**Supporting case materials**

- Mobile communication: Nokia's Strategic Change by Means of Alliance Networks. A Case of Adopting the Open Innovation Paradigm by Dittrich.
REFERENCES


OPEN INNOVATION WITHIN GEOGRAPHICAL AND INSTITUTIONAL SETTINGS

MARCIN BARON

ABSTRACT

Open innovation is a managerial concept. Originally - and consequently in mainstream understanding - this concept has no direct links to territory. However, some contemporary studies, especially related to SMEs, add the territorial dimension to OI. Also plenty of studies in economic geography relate to innovation similarly to OI. The well scrutinized notions of the innovation milieu, clusters, regional innovation systems, and the triple-, quadruple- and quintuple helix are presented in this chapter. In reality they all include open innovation mechanisms. A theoretical background is provided, including comparison of open innovation and territorial innovation. In praxis, the wide approach to OI and territory can be utilized for the sake of modern territory-related policies like smart specialization or open innovation 2.0.

This contribution contains excerpts of the concept published by the author in «Open Innovation. A Multifaceted Perspective (chapter 10)» by «World Scientific» on 2016. Full citation is provided in the references.
### Prerequisite
The students should be aware of the principles of OI and previous more general courses on networking, entrepreneurship, and technology transfer might be useful.

### Objectives of the lecture
To bridge OI theory and regional studies for providing insight into the territorial nature of OI processes.

### Workload
6h teaching; 24h self-study.

### Learning outcomes

#### Knowledge
- **#72:** To apply theories of national and regional innovation systems.
- **#99:** To understand networks and collaboration networks.

#### Skills
- **#90:** To understand the dynamics between innovation and the contextual environment.
- **#68:** To analyse and evaluate the interaction between the main players in the OI system.
- **#119:** To recognize and assess the interdependencies in the system of innovation (ecosystem) across organizations.

#### Competences
- **#53:** To execute innovation project management across organizations.

### Reading List

### European Qualifications Framework (EQF) Level
- Levels 6, 7.
Lecture Content

In theory, open innovation is not place-bound. On the other hand, numerous approaches consider territory to be the primal location of innovation and its sourcing. Consequently, it can be stated that OI may not rely upon the local / regional context, but it might occur. This understanding is especially important for the innovation policy, as we can often see OI-based tools to be implemented throughout local / regional innovation support schemes.

Definitions

Philippe Aydalot and his research group GREMI pioneered the search for “something” that makes it possible for some regions to be more dynamic than others (Crevoisier, 2004). The studies concerned primarily the resources and interactions available to companies in their innovation processes, innovation networks and their spatial aspects, and developmental trajectories of regions with the same dominant economic sector. Altogether the studies by GREMI gave the “something” the name *innovation milieu*, which is conditioned by three paradigms: the technological paradigm, the organizational paradigm, and the territorial paradigm (Crevoisier, 2004), see Fig. 1. The logic of this construct says that processes running in territorial proximity benefit of being specific, utilizing specific know-how, dealing with issues that are better known, and mobilizing resources in a unique way. If this proves to be true, businesses well rooted in their milieus should enter the OI patterns easily, especially within their existing networks.

Clusters are another important notion in the research on territorial innovation systems. Dating back to the studies on industrial complexes by Stan Czamanski, they became widely known and followed after the studies of Michael Porter (1998) gained attention not only by the scientific audience. Porter sees clusters as geographic concentrations of companies and institutions, mainly in research and technology development, which are inter-connected and work in a common industry. They draw upon a shared pool of talents and skilled, specialized labor; as well as utilize specialized infrastructure, services and providers in proximity. Knowledge spillovers boost the dynamics of the clusters and make it possible for various players to act in a manner of coopetition (i.e. competition blended with cooperation).

Regional innovation systems, mainly associated with Bjørn Asheim or Hans-Joachim Braczyk, Philip Cooke and Martin Heidenreich bridge research and policy approaches. RISs encompass innovative companies and their surroundings: partners, competitors, customers, the available human capital, the regional knowledge infrastructure, institutions, regulation and legislation, untraded interdependencies, and other factors that influence innovation directly or indirectly, as well as external links into the national and global economy (Martin, 2003).
The concept of the triple helix of university-industry-government relationships initiated in the 1990s by Henry Etzkowitz and Loet Leydesdorff, interprets the shift from a dominating industry-government dyad in the industrial society to a growing triadic relationship between university-industry-government in the knowledge society. The triple helix thesis is that the potential for innovation and economic development in a knowledge society lies in a more prominent role for the university and in the hybridization of elements from the university, industry and government to generate new institutional and social formats for the production, transfer and application of knowledge (Ranga & Etzkowitz, 2013). The concept has been further developed mainly by Elias Carayannis. In his work, quadruple helix embeds the triple helix by adding as a fourth helix the ‘media-based and culture-based public’ and the ‘civil society’. The quintuple helix innovation model is broader and more comprehensive by contextualizing the quadruple helix and by adding the helix of the ‘natural environments of the society’. The triple helix acknowledges explicitly the importance of higher education for innovation. However, in one line of interpretation it could be argued that the triple helix places the emphasis on knowledge production and innovation in the economy, and so it is compatible with the knowledge economy. The quadruple helix already encourages the perspective of the knowledge society, and of knowledge democracy for knowledge production and innovation. In quadruple helix understanding, the sustainable development of knowledge economy requires coevolution with the knowledge society. The quintuple helix stresses the necessary socioecological transition of the society and economy in the twenty-first century (Carayannis, Barth & Campbell, 2012).

**THEORETICAL BACKGROUND**

Territorial understanding of innovation is usually traced back in time to the concept of industrial districts by Alfred Marshall (19th/20th Century), who discusses the concentration of specialized industries in particular localities and stresses not only pure business relationships but also the atmosphere of the location. Industrial agglomeration in a certain location, accompanied by related externalities and knowledge spillovers result in processes of industry territorialization. Adding to the state of the art, various researchers have proved that the territory (which means much more than a geographical place) is a primal location of innovation.

This notion gave origin to two key approaches well established in theory and further in policy making since the 80s / 90s of the 20th century: innovation milieux (more characteristic for Italian, Swiss and French researchers) and clusters (described more often by the widely understood Anglo-Saxon world).

Both notions share similar characteristics that can be depicted by the following well-acknowledged schemes taken from the innovation milieux literature (Figure 1, Figure 2) and Porter’s work on clusters (Figure 3):
The approaches pinpoint the role of territory in innovation performance. The nearby-located entities are expected to have better conditions for cooperation and enjoy minimized transaction cost, also due to a higher level of trust and industry-related (especially knowledge-based) pools of resources. The knowledge landscape is the link between territorialized innovation and theoretically non-territorialized OI (Figure 4).

In other words, we face two important scientific streams proposing similar tools for dealing with knowledge, ideas and resource transfer aimed at innovativeness, and these streams do not usually merge. The key difference is that the OI stream is biased towards in-house innovation management strategy and tactics, while the territorial innovation stream is biased to networking as a co-ordination mechanism.

Since the theory of triple helix developed, it has been implemented into the territorial approach to innovation, because triple helix actions are in most cases strongly territorially-bound and policy-related. The triple helix (and further - Figure 5) approaches are commonly seen as a tool to open the innovation process and involve territorial actors.
Open Innovation Within Geographical and Institutional Settings


Practical implications

Territorial understanding of innovation was attractive enough to make it a policy concept. Initially (20th/21st Century) it was mainstreamed into a policy as a regional innovation system approach (RIS). In the EU the concept of RIS evolved into another territorial policy concept of regional smart specializations. These specializations are expected to be place-based innovation policies expressed in dedicated strategies:

National/regional research and innovation strategies for smart specialization (RIS3) are integrated, place-based economic transformation agendas that do five important things:

• they focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development, including ICT-related measures;
• they build on each country’s/region’s strengths, competitive advantages and potential for excellence;
• they support technological and practice-based innovation and aim at stimulating private sector investment;
• they get stakeholders fully involved and encourage innovation and experimentation; and
• they are evidence-based and include sound monitoring and evaluation systems (Foray et al., 2012).
Part 3.3. Instantiating Open Innovation: From Individual to Society Level

<table>
<thead>
<tr>
<th>Scientific background</th>
<th>Open innovation</th>
<th>Territorial innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Management, innovation management</td>
<td>Economics, regional science</td>
</tr>
</tbody>
</table>

| Orientation | • Business model perspective  
|            | • Knowledge landscape  
|            | • Effectiveness and profitability | • Territorial perspective  
|            |                                         | • Knowledge spillovers  
|            |                                         | • Competitiveness and reduction of transaction costs |

| Objective | Benefiting of opening the innovation funnel and/or of participating in business ecosystems | Benefiting of a pool of tangible and intangible resources and ties available in geographical proximity |

| Notions | • Open innovation  
|         | • Open innovation 2.0  
|         | • Open business model  
|         | • Innovation ecosystem | • Industrial districts  
|         | | • Innovation milieu  
|         | | • Clusters  
|         | | • Regional innovation systems  
|         | | • Regional smart specializations  
|         | | • Regional innovation-oriented ecosystems |


The concepts of RIS and further RIS3 enabled sound public funding of innovation policy instruments which resulted in setting up numerous institutions and projects applying OI-rooted techniques to boost the performance of regional innovation systems / ecosystems.

Another policy keyword that has emerged lately is open innovation 2.0. The OI2 paradigm is an innovation model based on extensive networking and co-creative collaboration between all actors in the society, spanning organizational boundaries well beyond normal licensing and collaboration schemes. The authors claim that with OI2, sharing and the co-generation of innovation options will enable a significant competitive advantage and will help achieve broader scale innovation benefits for larger numbers of stakeholders. In OI2 there is also a cultural shift away from resisting change and toward innovation and the creation of shared value. Again, OI2 can be territorialized but may also be considered extra-territorial. In practice, the European OI2 policy utilizes the quadruple helix model (Curley & Salmelin, 2013).

To sum up, practically any array of actions is nowadays categorized as being “everything”: OI, OI2, quadruple helix, innovation (eco-)systems, clusters… All of them have become a kind of buzzwords in terms of planning and implementing policy measures.
KEY TAKE-AWAYS

• OI and territorial innovation can be studied jointly, even though they emerge from different research backgrounds.
• Keywords to be remembered are: innovation milieu, clusters, regional innovation systems, smart specializations, and also triple or quadruple helix.
• Nearby-located entities are expected to have better conditions for cooperation and enjoy minimized transaction cost, also due to a higher level of trust and industry-related (especially knowledge-based) pools of resources. All these factors can be considered territorial antecedents of OI.
• OI practices fit easily in the concepts of territorial policies, like strategies concerning regional innovation systems, smart specializations or open innovation 2.0.
Content-related materials

Practical examples of OI-related territorially-bound initiatives are presented by Baron (2016), as well as in the EURIS study: [www.euris-programme.eu/docs/euris_guide](http://www.euris-programme.eu/docs/euris_guide).

Pedagogical guidelines

Interactive activities

The lecture should encompass examples shown with the use of newsletters, YouTube movies, etc.

https://www.youtube.com/user/hightechcampusehv
https://www.youtube.com/watch?v=mF2CsUcwFrw
https://www.youtube.com/watch?v=QDymgp90hRQ
https://www.youtube.com/watch?v=sqS4nypwwYs

Learning exercises

An in-depth case study showing the growth of a regional (open) innovation system should be envisaged and discussed with the students.

Self-study and Self-evaluation

The students (in small groups) should select a city / region and identify the main stakeholders of its innovation system. The objectives of the pro-innovative initiatives should be listed and a narration about history and ambitions for the future should be prepared. OI-based techniques that were / are to be applied should be identified and described. Impact of the initiatives should be assessed. All participants should discuss the results in class. The quality of work and its findings should be assessed by the group and by the teacher.

References

PUBLIC POLICY COMPONENTS RELATED TO OPEN INNOVATION

MARCIN BARON

ABSTRACT

To reduce risk and minimize the impact of market failure on innovation processes, countries and regions / cities set up policy actions targeted at applying open innovation. The well acknowledged typologies of OI policy approaches and instruments are presented in this chapter, quoting the works of: the OECD, the Vision ERA-NET partnership and the EURIS partnership, as well as the statements of the charter for OI policies in Europe. The policy of the European Union concerning open innovation 2.0 is also signalized. A plethora of actions and policy instruments are associated with OI, but in practice it is hardly possible to differentiate general innovation policies and OI policies.

This contribution contains large excerpts of the policy documents presented by: the OECD in 2008, the ERA-NET in 2008, ESADE Business School & the Science Business Innovation Board AISBL in 2011 and the European Commission in 2015. Full citation is provided in the references.
<table>
<thead>
<tr>
<th><strong>Prerequisite</strong></th>
<th>The students should be aware of the principles of OI, and previous more general courses on technology transfer or territorial approach to innovation might be useful.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives of the lecture</strong></td>
<td>To present the role of public policy in fostering OI.</td>
</tr>
<tr>
<td><strong>Workload</strong></td>
<td>4h teaching; 16h self-study.</td>
</tr>
</tbody>
</table>
| **Learning outcomes** | **Knowledge**  
#72: To apply theories of national and regional innovation systems.  
**Skills**  
#90: To understand the dynamics between innovation and the contextual environment.  
#68: To analyse and evaluate the interaction between the main players in the OI system.  
**Competences**  
#53: To execute innovation project management across organizations. |
| **European Qualifications Framework (EQF) Level** | Levels 6, 7. |
Lecture Content

Open innovation can be a subject to policy intervention. It is due to the need to reduce risk and the impact of minimize market failure that countries and regions/cities set up policy actions targeted at OI. Here the question emerges of whether the OI policy is much different from the known innovation policy approaches.

Theoretical Background

The discussion over policy implications of the OI concept started a few years after the first book on OI by Chesbrough had been published. In 2008 two policy-related publications were presented by the OECD (De Backer, Cervantes, van de Velde & Martinez, 2008) and within the ERA-NET (De Jong, Vanhaverbeke, Kalvet & Chesbrough, 2008).

The OECD ring-fenced OI policy areas by following findings based on case studies in OI:

• The technology life cycle matters.

Case studies on firms in a broad range of sectors and industries have shown that the incidence of open innovation is related not only to the size of the company but also to its position in the technology life cycle. When the technology is rather new and explorative, companies and other research organizations collaborate actively to find solutions in the market. This has implications for public research institutes.

• Open innovation requires a differentiated approach to knowledge sourcing and development.

The emphasis on external co-operation and in-house knowledge diffusion varies. With regard to external linkages, the nature of knowledge and customer bases is important for shaping structure and strategy. Consequently, openness towards various external actors also varies.

• University knowledge plays a key role in the exploration phase of open innovation.

Large firms in the case studies have been especially concerned by access to public research upstream. CIS-4 data on collaboration show that collaboration between universities and small firms remains weak.

• A pro-active strategy towards the management and use of intellectual property rights (IPR) is important for open innovation.

Universities tend to be less well equipped in this area, and making collaboration with firms difficult.

• Trust matters.

The case study exercises have identified trust and commitment as especially important for the success of open innovation strategies.

• There are organizational limitations to open innovation, and there are often trade-offs between
different approaches, resulting in experimentation through trial and error. Increased networking also generates greater costs.

- Building a culture of open innovation in companies requires rewarding teamwork and organizational changes that foster internal and external collaboration.

This requires work arrangements that encourage and reward risk taking.

- Small firms' participation in open innovation is limited, owing to internal resource constraints.
- Technology markets matter in helping foster open innovation.

The ability to use inside-out and outside-in strategies is facilitated by frameworks that allow for the purchase or sale of intellectual assets that can create value, as well as opportunities for firms inside or outside their core businesses.

The OECD (2008) states that “The emergence of open innovation also raises policy issues. While open innovation is essentially business-driven, it has implications for science, technology and innovation policies” but also claims that “because open innovation involves going beyond firms’ and nations’ boundaries, it may create issues for government research and innovation policies. Most OECD countries’ S&T policies are predominately national in scope, but it is becoming clear that policies designed for geographically circumscribed knowledge-based activities or for vertically integrated value chains of firms need to be reviewed”. Policies targeted by the OECD are:

- General economic framework conditions including those that play a role in the attractiveness of foreign R&D,
- R&D and innovation policies, including instruments to support business R&D and to promote linkages between industry and the public research sector,
- IPR and related policies,
- Human resource capacity building, including policies to promote the mobility of human resources.

Policy measures like grant and indirect financial schemes (e.g. R&D tax credits), open source platforms and procurement strategies in the public sector, technology foresight and road-mapping, as well as networks and clusters (incl. regional/local policies for R&D and innovation) are perceived to be relevant to address the dynamics of OI.

A policy framework consisting of 7 policy areas is alternatively presented in The Vision ERA-NET report (De Jong, Vanhaverbeke, Kalvet & Chesbrough, 2008). The classification (including 21 guidelines) is the following:

- RTD policies
  - Financial incentives
  - High-quality IP system
III Support standards
IV Support user innovation
• Interaction-oriented policies
V Develop skills
VI Stimulate interaction
VII Enhance technology markets
VIII Use go-betweens
IX Back up clusters
• Entrepreneurship policies
X Support corporate entrepreneurship
XI Access to finance
XII Back up challengers
• Science policies
XIII Appropriate funding
XIV Balanced incentives
XV Focus on excellence
XVI Organized diffusion
• Education policies
XVII General stimulation
XVIII Entrepreneurship education
• Labor market policies
XIX Aim for flexibility
XX Enable knowledge migration
• Competition policies
XXI Stimulate competition.

The proposed classifications quoted above encompass the whole spectrum of possible policies and policy measures. It should be noted here, however, that generally speaking the frameworks are quite typical also for general innovation and even entrepreneurship policies. In both national and regional dimensions, in numerous places across the world, these types of policy instruments have been discussed, tested and implemented even before the OI concept emerged. This recalls the long lasting scientific argument on whether OI is old wine in new bottles (Trott & Hartmann, 2009). Only by looking at policy implications it is hard to show a real difference [see also the part on practical implications].
Anyway, a case-based approach to the identification of OI-rooted policy measures is possible. In an extensive way it has been done by the EURIS partnership (Sluismans & de Kinderen, 2012). EURIS has identified and studied regional policy measures on 5 collaborative policy areas that contribute to regional innovation systems enabling open innovation practices:

• Networking and collaboration
• Human capital and entrepreneurship culture
• Intellectual property management and technology markets
• Access to finance
• Knowledge, science and technology base

35 good practices have been identified and published on http://www.euris-programme.eu. Nevertheless, a look on the listed projects / concepts confirms the doubts about a real difference between OI policies and general innovation policies.

On the other hand, maybe the problem should be highlighted in another way: assuming that all territorialized approaches to innovation (see the subchapter on OI within geographical and institutional settings) are in fact related to OI – all policy concepts will perfectly fit OI. As there are certain serious premises to consider territorialized approaches to innovation to be place-bound OI (“we face two important scientific streams proposing similar tools for dealing with knowledge, ideas and resource transfer aimed at innovativeness, and these streams do not usually merge. The key difference is that the OI stream is biased towards in-house innovation management strategy and tactics, while the territorial innovation stream is biased to networking as a co-ordination mechanism.” – see the chapter on OI within geographical and institutional settings), this assumption holds true.

Finally, a slightly different approach to the OI policy has been presented by the EU Open Innovation Strategy and Policy Group. The OISPG builds upon its anchorage in service economy and information society issues. The group proposes the Open Innovation 2.0 approach that can be defined as the fusion of Henry Chesbrough’s OI concept and Henry Etzkowitz’s triple helix innovation concept (and even further quadruple helix) (EU Commission, 2012). Collaborating with citizens to understand what they might want in the future is at the heart of the user-centric and -driven innovation – called OI2 – promoted by the OISPG.

**Practical implications**

As it has been pinpointed above, in practice it is hardly possible to differentiate general innovation policies and OI policies. According to Baron (2016) “The reason for that has been already given. OI as a concept is relatively new, compared to the presented territorial concepts and their related policy
approaches. Therefore, for obvious reasons some of the existing innovation management techniques and tools were incorporated into OI thinking, and the other way, some of the existing territorial initiatives or toolkits received the fancy OI label.” It can be said for sure that due to this fact, OI has been promoted throughout many policy initiatives even though they have not been OI-labelled. For example in the European Union, plenty of OI-based techniques / methods have been generously co-financed with cohesion policy funds (European Regional Development Fund, European Social Fund) as well as under the research and innovativeness agenda (Framework Programs). Especially in the two programming periods influenced by the (unfortunately unsuccessful) Lisbon Strategy for 2000-2010, i.e. 2000-2006 and 2007-2013, the EU contributed a lot to establishing relevant initiatives across the European territory.

Having this in mind, another part of Baron’s (2016) scrutiny can be recalled – concerning the general guidelines on possible (open) innovation policies in the member states to be funded by the European Union in 2015-2022: «The policy overview allows further reflections upon the possible readiness level towards territorially-based OI applications. [...] Firstly, in some of the countries (e.g. Bulgaria, Croatia, Romania, Spain), the focus of political intervention in territories is on social issues or infrastructure, not on innovation. These countries usually have some general approaches to innovation issues. The other countries (e.g. Latvia, Lithuania, Poland, Slovakia) still catch-up and try to fix as many issues as possible with use of external money even though their plans are rather of a general nature. There is also a group of countries that (still?) focus on setting up a system, relevant public administration patterns etc. (Greece is a leading example here), believing that sound governance will boost innovativeness and competitiveness. Finally, there’s a group of experienced players, who mostly get limited EU cohesion policy funding due to their overall high economic performance. In these countries (e.g. Germany, the Netherlands, Austria, Belgium), maybe due to smaller sums available, approaches are much more focused and some of the recommendations sound as ready-to-use themes for regional or national OI actions».

In 2011, Henry Chesbrough and Wim Vanhaverbeke led a policy initiative under which a charter for OI policies in Europe was created. The charter calls for following actions:

1. Education and human capital development
   - Increase meritocracy in research funding within the EU.
   - Support enhanced mobility during graduate training.

2. Financing open innovation: the funding chain
   - Increase the pool of funds available for VC investment.
   - Support the formation of university spin-offs to commercialize research discoveries.

3. Adopting a balanced approach to intellectual property
   - Reduce transaction costs for intellectual property.
   - Foster the growth of IP intermediaries.
Public Policy Components Related To Open Innovation

- Rebalance university IP policies so that broad diffusion of publicly funded research results is easier, rather than focusing on royalty income alone.

4. Promoting cooperation and competition
   - Shift support from national champions towards SMEs and start-up companies.
   - Promote spin-offs from large companies and universities.
   - Focus on innovation networks.

5. Expanding open government
   - Accelerate the publication of government data.
   - Use open innovation processes in government procurement.
   - Support private commercialization of government-funded technology.

Referring to the OI2 policy, it can currently be roughly defined with the quotation: «The key is to see innovation as ecosystem-driven, including all stakeholders as active players in jointly creating and experimenting in the new ways of doing things and creating new services and products. Innovation is very much daring to see the unexpected and capture the moment. Experimenting and prototyping in real-world settings, with real people is a strong driver to stretch the boundaries for new marketplaces, new products and new services, to understand the changes and take advantage of weak signals that eventually become mainstream» (EU Commission, 2015). Consequently, three areas are listed in the document:
   - Regional innovation, innovation platforms and university research
   - Open innovation 2.0: living labs
   - Open innovation 2.0: smart cities.

This, unfortunately, again opens Pandora’s Box by highlighting a question of what – in policy terms – the OI is. And probably all the answers will be partly true...

KEY TAKE-AWAYS

- While open innovation is essentially business-driven, it has implications for science, technology and innovation policies.
- There are at least a few typologies of OI policy approaches and instruments (OECD, Vision ERA-NET, EURIS, Charter for OI policies in Europe).
- Setting the framework conditions, enabling indirect financial schemes (e.g. R&D tax credits) or venture capital environments, promoting the best use of IPR protection mechanisms, stimulating R&D interactions, facilitating joint initiatives concerning human capital, entrepreneurship and
collaboration, as well as approaching the future by foresight and road-mapping are the most common ways to address the dynamics of OI in policy terms.

- OI2 policies target the fusion of Chesbrough’s OI and Etzkowitz’s triple helix concepts by collaborating with citizens to understand what they might want in the future.

**CONTENT-RELATED MATERIALS**

Practical examples of actions based upon OI-related policy initiatives are presented in the EURIS study: [www.euris-programme.eu/docs/euris_guide](http://www.euris-programme.eu/docs/euris_guide).

**PEDAGOGICAL GUIDELINES**

**Interactive activities**

The lecture should encompass examples shown with the use of policy newsletters, YouTube policy teasers, etc.

**Learning exercises**

For better understanding of the concept, the group may discuss the British conceptual paper “Missing an open goal? UK public policy and open innovation” ([http://www.theworkfoundation.com/DownloadPublication/Report/319_Missing%20an%20open%20goal.pdf](http://www.theworkfoundation.com/DownloadPublication/Report/319_Missing%20an%20open%20goal.pdf)).

**Self-study and Self-evaluation**

The students (in small groups) should run a mapping exercise on the identification of key national and regional policies targeting at (open) innovation. Policy programs and their stakeholders should be listed and analyzed. Complementarities should be mapped and possible gaps should be highlighted. Overall assessment of the system should be provided.

All participants should discuss the results in class. The quality of the work and its findings should be assessed by the group and by the teacher.
REFERENCES

3.4. IMPLEMENTING OPEN INNOVATION: TOOLS, METHODS & PROCESSES

OPEN INNOVATION AND BUSINESS MODELS

DARIA PODMETINA, EKATERINA ALBATS, JUSTYNA DĄBROWSKA, ANTERO KUTVONEN

Abstract

A mediocre technology pursued within a great business model may be more valuable than a great technology exploited via a mediocre business model – Henry Chesbrough (2010, p. 354).
Open Innovation And Business Models

Prerequisite
- Basic knowledge of open innovation; pre-reading on business model basics.

Objectives of the lecture
- The lecture aims at providing an overview of business model innovation and open business models.

Workload
- 8 h teaching; 16 h self-study (paper reading and group work assignment).

Learning outcomes
- #1: Business model innovation to recognize, design and analyse innovative business models.

Reading List

European Qualifications Framework (EQF) Level
- Levels 6, 7.

Lecture Content

Definitions


Business model innovation - “[…] designing a new, or modifying the firm’s extant activity system – a process which we refer to as business model innovation […]” (Amit & Zott, 2010, p. 2).

Open business model - “An open business model describes the design or architecture of the value creation and value capturing of a focal firm, in which collaborative relationships with the ecosystem are central to explaining the overall logic.” (Weiblen, 2014, p. 57).

“Open business models enable an organization to be more effective in creating as well as capturing value. They help create value by leveraging many more ideas because of their inclusion of a variety of external concepts. They also allow greater value capture by utilizing a firm’s key assets, resource or position not only
in the organization’s own operations but also in other companies’ businesses.” (Chesbrough, 2007, p. 22).

**Theoretical background**

We study business models in the context of open innovation because they are essential to the basic theory of open innovation. Business model thinking keeps you grounded on how value is created, captured and distributed. According to Chesbrough and Bogers’ definition from 2014 Open Innovation is a “distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model” (Chesbrough & Bogers, 2014, p. 27). There should be also a clear distinction between the concept of open innovation and open business models, as many practitioners and researchers use these terms interchangeably (Vanhaverbeke & Chesbrough, 2014). These differences are described in this chapter; but to understand the concepts better, the students should be introduced to the basic concept of business model innovation first.

There is evidence that business model innovation is leading as a mode for margin growth compared to product, service, marketplace and operational innovations (Figure 1), indicating that business model innovators can achieve a higher profit growth rate.

![Figure 1. Operating margin growth in excess of competitive peers, compound annual growth rate over five years](http://www-07.ibusinessmodel.com/sg/cioreg/CIO_Implications.pdf)

Business model innovators have also cited benefits (Figure 2) in cost reduction, strategic flexibility, focus and specialization, exploiting new markets and product opportunities rapidly, sharing or reducing the risks and capital investments, and moving from fixed to variable costs.
Open Innovation And Business Models

Figure 2. Benefits cited by business model innovators (percentage of respondents)

Figure 3. Position of the business model in the company
Source: Osterwalder, 2011

Business models aim at providing a holistic representation of the firm’s business, and achieving better communication between various activities. They offer companies a comparison between different strategies (positioning and differentiation) and are the foundation of competitive advantage. While adapting to new situations, business models help in reacting to environmental changes and in seeking for new opportunities.
From the academic point of view, business models have experienced an “academic renaissance” (Zott, Amit & Massa, 2010). Between 1995 and June 2010, 1177 business model articles were published in academic journals. Business model represents a new unit of analysis that focuses on value creation and capture, and is represented in three dominant streams of literature: e-commerce, strategy, and technology and innovation management.

Business models are successful when they serve a customer in a new or more complete way, and contain key elements that competitors are unable to imitate (profitably). Good business models can be made public without a concern for competitive imitation.

A number of studies have tackled different aspects of business models. Amit and Zott (2001) have defined the links between the sources of value creation and business models, Afuah and Tucci (2001) have built a taxonomy of Internet business models, and Osterwalder and Pigneur (2009) have developed the Business Model Canvas tool that brings the different components of the business model together: The business model canvas represents nine building blocks of a business model (Osterwalder & Pigneur, 2010) - the nine elements and their interaction make up the business model (see Figure 4). Building the business model can start from any one of the elements. The starting point can be set in e.g. resources, offering, customers, or finance. The elements are interdependent: choices in one area restrict the choices in other parts of the business model.

Business models are not static: even the best business models need regular critical revision and development. The change may come from change in competition (new entrants, others innovating their business models, imitation), changes in the market environment, customer needs, technological progress, or breakthroughs.

The strength of business model innovation in coping with (or even initiating) change is in simultaneous isolation and linking of the business model elements. Major changes are often limited to even one element. The business model framework interprets the effect of that change for the wider context of the business. Using tools like the Canvas enables companies to carry out and implement radical experiments and scenarios.

The complex environment forces companies to move from traditional approaches of value creation (closed innovation strategy) and value capturing (closed business model) towards an open approach (open innovation strategy and open business model) (Sandulli & Chesbrough, 2009). According to Vanhaverbeke and Chesbrough (2014, p. 52), a business model is a ‘framework to link ideas and technologies to valuable economic outcomes’ and its two main functions are creating value and capturing a portion of this value.
Chesbrough and Rosenbloom (2002) have explored the role of business models for value capturing through the prism of corporate spin-offs, and suggest that a business model should fulfil the following functions:

1. to articulate the value proposition
2. to identify a market segment and revenue mechanisms
3. to define the structure of the value chain that is needed to create and distribute the offerings, as well as complementary assets to support the position in the value chain
4. to estimate the profit potential and cost structure
5. to formulate the competitive strategy
6. to describe the position of the company within the value network.

Apart from the Business Model Canvas, Chesbrough (2007) lists other tools and processes that may help to formulate alternative business models. For example processes related to experimentation (Thomke, 2002), McGrath and Macmillan’s (1995) discovery-driven planning, a set of processes related to effectuation (Sarasvathy, 2008) where mapping tools may be used; and a set of processes
related to organizational leadership (Chesbrough, 2007). In addition, Zott and Amit (2010) describe two sets of design parameters that should be taken under consideration (interdependently or not) while designing business models - design elements and design themes. The design elements constitute of contents, structure and governance, and describe the architecture of an activity system. The design themes comprise NICE models (Novelty, Lock-In, Complementarity and Efficiency) that describe the sources of the value creation of the activity system (Zott & Amit, 2010). The NICE characteristics of a business model are:

- Novelty – Newness. Schumpeterian innovation, introducing a new way to organize the business or provide the offering to customers.
- Lock-In – the ability of locking customers into the business model (by introducing major switching costs for customers) and inducing repeat business effectively.
- Complementarity – the business model offers complementarities that facilitate bundling.
- Efficiency – the business model offers outstanding transaction efficiency, it is superior in providing its core function.

For the purpose of this lecture, we focus specifically on open business models and the different classifications of them developed in the literature.

Open business models serve in creating and capturing greater value through the division of labour between partners, sharing complimentary assets, and sharing the risks with external actors, as well as through looking for additional ways to capture value from internal assets. Hence, open business models may lead to improved financial performance because of decreased costs of innovation and generating additional revenues (e.g. by licensing-out or spin-off activities). (Chesbrough, 2006)

Vanhaverbeke and Chesbrough (2014) argue that a company can open a business model, but still apply a closed strategy when it comes to innovation. By combining different types of open innovation activities (outside-in, inside-out open innovation and closed innovation) with two types of business models (open vs closed business model), the authors present a matrix of six different combinations.

1. The first one is a combination of a closed business model and closed innovation strategy – a completely closed innovation model, when companies rely on their own capabilities through the entire cycle: from idea generation to marketing and after sales services.

2. The second type of model is called unused knowledge used by others, and implies a combination of a closed business model and inside-out open innovation strategy, when the innovation has been developed internally and then sold or licenced to others.

3. The third type, the use of others’ knowledge to develop a new offering is a combination of
outside-in open innovation with a stand-alone business model, when the company is searching for external knowledge, ideas or technologies to be used within its own, closed business model.

4. The fourth strategy is a combination of the closed innovation approach with an open business model - a search for assets owned by others to develop a new business model. This approach is used when the company is capable of developing new ideas internally, but requires an external input in capturing its value.

5. The fifth combination is making internal knowledge accessible to others in order to develop a new business model. This is the case where a company does not get direct benefit from its internal knowledge, but opens it up to receive indirect profit. It could be launching a platform for application development (as IBM supported Linux, see Vanhaverbeke & Chesbrough (2014)), where the platform owner gets profit from an open source platform, since it is less costly than own software development.

6. The last strategy type is using others’ knowledge to create an own business model – a combination of outside-in open innovation and an open business model. This strategy implies that the company utilizes external knowledge to develop a business model which is linked with other organizations.

Vanhaverbeke and Chesbrough (2014) claim that a majority of the existing studies on open innovation deal with the closed business model, even though inside-out and outside-in open innovation have been studied and compared with closed innovation strategy.

Harbor Research (2014) have done a study on various types of business models for so-called connected products, which demand continuous collaboration and interdependency between various actors. The study presents another six types of business models. The set includes two solo-driven models: an embedded innovator (keeping rather automated processes and attracting partners only to fulfill particular tasks) and a system professional model (leverages service automation to feed diverse needs across product providers). The next two types of business models are partner-driven and include a solutionist (which builds broad support capabilities across the entire lifecycle) and a value chain aggregator model (which still owns the product lifecycle but aims at optimizing interactions across the actors’ chain). The third group of business models is open collaboration-driven models, which include a collaborator (which builds collaborations with various actors across delivery chains) and a community business model (which drives value via extensive multi-party systems and collaboration between the public and private actors).

Saebi and Foss (2015) focus specifically on the open business model and define four types of open business models across three dimensions: the level of value co-creation, the type of knowledge flow, and the level of collaboration capability. The first type of the open business model is an efficiency-centric open business model, where the company targets at already developed external knowledge with limited co-creation, relatively unilateral knowledge flow, and relatively simple mechanisms
of collaboration governance (e.g. incentives to encourage external collaboration). The second type is a user-centric open business model, which implies that the company increases the user communities’ participation in the value creation, but the knowledge flow is still directed rather outside-in and governance is still rather focused on identifying and integrating external knowledge. In the collaborative open business model the degree of co-creation rises further; the knowledge flow is bidirectional, and the collaborative capabilities require setting a greater focus on mutual knowledge exchange and long-term partnerships. The fourth type, an open platform business model, is extreme in all the three dimensions: the degree of co-creation is the highest, as the platform approach allows the participation of various actors, the knowledge flow is multidirectional between all the various partners, and the collaboration capability requires extreme flexibility and long-term orientation.

A study of Kortmann and Piller (2016) introduces an integrated framework of open business models in extended product life cycles. By distinguishing between three stages of value creation (production, consumption, circulation) and three types of collaboration that may be used to reallocate open innovation activities to external partners (firms/closed business models, alliances, platforms) they present nine different business model archetypes. These archetypes are: maker-platform operator; sharing platform operator; circulation platform operator; co-creating manufacturer; co-creating service provider; recycling alliance; transaction-oriented manufacturer; servitizing manufacturer; rebound manufacturer.

Content-related materials and pedagogical guidelines

To make the lesson more interactive with students and to encourage active participation and group discussion, it is recommended that the course participants will be assigned with compulsory reading before the class starts.

The core suggested reading list is the following:

Depending on the hours available, the list may be extended to additional cases. For example, the course participants may be divided into groups. Each group receives one additional article with the task to prepare a 15-20 minutes Power Point presentation summarizing the article content and its key take-aways, and present it to the class.
An additional reading list for the group assignment:


The articles listed above contain many company examples that can be used in class.

To introduce the students with the basic idea of the Business Model Canvas, a YouTube video developed by Strategyzer may be used (https://www.youtube.com/watch?v=QoAOzMTLP5s).

**LEARNING EXERCISES**

**Activity 1.** The teacher may start the lecture with questions: What is a business model and business model innovation? What role does the business model play in innovation?

**Activity 2.** Based on the pre-assigned readings, students make a 15-20 minute presentation summarizing the articles. After each presentation, the teacher asks the classroom to think of examples of other companies that use similar business models to capture and create value.

**Activity 3.** The teacher may divide the course participants into two groups: open business model optimists and open business model pessimists. Each group has 10-15 minutes to brainstorm the pros/cons of why companies should/should not have open business models. After that, the teacher should facilitate a 30-minute debate on this topic between the two groups. The activity may be modified by providing a concrete example of a known company in the region where the course is held or related to the course industry.

**EVALUATION QUESTIONS**

The participants may be evaluated on the basis of class participation, group discussion, group presentation, and an essay on lessons learnt.

**GROUP WORK EXAMPLES**

**Activity 4.** Besides the group activities described above, the course participants may have additional task to develop a business model for a particular company’s offering by using the Business Model Canvas.
Activity 5. In groups, students brainstorm on the question: How can firms open up their business model to utilize partnerships and collaboration in creating and capturing new value? The groups may be divided into subthemes and brainstorm on the same question for different types of firms – e. g. for incumbents, start-ups, large firms, or SMEs.

KEY TAKE-AWAYS

- Opening up the innovative process is a big change for many firms’ business models.
- Business model thinking can help make sense for whether opening up is the correct move and how it will affect the business holistically.
- Many of the legendary” superstar” companies have both business model innovation and open innovation behind their success.

REFERENCES

OPEN INNOVATION IN THE FUZZY FRONT END OF THE INNOVATION PROCESS

BORUT LIKAR, PETER STRUKELJ, KATARINA KOŠMRLJ, KLEMEN SIROK

ABSTRACT

This chapter stresses the importance of the preinvention phase in the innovation process chain, and explores its connection to the open innovation approach. The chapter focuses especially on problem identification activities (and methodologies) in the preinvention phase as the decisive first step in the chain of innovation activities – this phase and the methodologies available therein are often neglected in the scientific literature on innovation. Following a brief presentation of the list of available methods for problem identification and idea generation, two selected methodologies (eMIPS and Innovation Cube) are presented in detail that can be used in the preinvention phase in real organizational settings. For each method, its open innovation characteristics are pointed out, as well as some possibilities on how to teach these methods as a part of innovation courses at Bachelor and Master course levels.

This chapter is primarily based on the book ‘The Art of Managing Innovation Problems and Opportunities’ (Košmrlj, Širok, & Likar, 2015). It was adjusted and some parts were extended to include open innovation topics as the main guiding theme of this Handbook.
**Prerequisite**

Generic knowledge on business processes, creativity and innovation.

**Objectives of the lecture**

This module aims at:

1. Getting familiar with the preinvention phase in relation to the identification of users’ problems/needs and the creation of solutions;
2. Providing insights into how to orchestrate the open innovation approach within the fuzzy front end of the innovation process;
3. Getting familiar with concrete methods on how to identify users’ problems and needs.

**Workload**

4-6h teaching; 4 h self-study.

**Learning outcomes**

<table>
<thead>
<tr>
<th>Knowledge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LO #87</strong>: To Understand How To Capture Value From Innovation –</td>
<td>Appreciate The Challenges And Methods For Designing Innovative Organizations.</td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LO #4</strong>: To Apply Idea Generation Tools To Add Value To The Product /</td>
<td>Process / Service / Business Model In An Organization</td>
</tr>
<tr>
<td><strong>LO #8</strong>: To Develop Creative Thinking Skills And Methods</td>
<td></td>
</tr>
<tr>
<td><strong>LO #9</strong>: To Apply Techniques For Inventive Problem Solving</td>
<td></td>
</tr>
<tr>
<td><strong>LO #20</strong>: To Critically Analyze Opportunity Identification, Evaluation</td>
<td>And Exploitation For Entrepreneurship</td>
</tr>
<tr>
<td><strong>LO #28</strong>: To Develop And Contrast Future Scenarios And Appropriate</td>
<td>Corporate Strategies Based Upon The Application Of Corporate Foresight Methodologies.</td>
</tr>
<tr>
<td><strong>Competences</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LO #12</strong>: To Plan And Manage An Idea Generation Session.</td>
<td></td>
</tr>
<tr>
<td><strong>LO #14</strong>: To Recognize Opportunity (Business).</td>
<td></td>
</tr>
<tr>
<td><strong>LO #42</strong>: To Analyze Innovation Needs Of A Company.</td>
<td></td>
</tr>
</tbody>
</table>
### Reading List


| European Qualifications Framework (EQF) Level | Levels 6, 7. |
Lecture Content

Introduction

Open innovation as a very broad and complex concept is related to the innovation process as a whole, i.e. to each phase in the innovation process chain. Therefore, the open innovation model/approach as a specific way of carrying out innovation activities can be adopted at every step of the innovation strategy and is not limited only to some specific activities or steps in the innovation process.

This chapter focuses on the very first phase in the innovation process, the so called “fuzzy front end” or the preinvention phase (sometimes also called unclear or problem phase, pre-development, pre-phase 0 or pre-project activities phase). Just like all other phases, this initial phase can assume an open innovation approach. After discussing the basic features of this preinvention phase and the methods available therein briefly, we present two methods in more detail that can be applied in this preinvention phase with the open innovation approach. We also present potential usage of these two methods in higher education curricula.

Preinvention Phase

Contemporary literature (Koen et al., 2002; Deppe, Kohn, Paoletti, & Levermann, 2002) states that this phase is the most important in the innovation process, because it has the greatest optimisation potential and highest impact on the whole innovation process (influencing the design and total cost of innovation), it has the lowest costs of implementing change and the least amount of available information – it is therefore a key step to successful innovation. Yet only few authors or studies have paid considerable attention to this stage, despite its vital role in the innovation process.

Usually, thinking about the preinvention phase starts with the element of idea as a potential source of innovation opportunity (see e.g. Deppe, Kohn, Paoletti, & Levermann, 2002; Hüsig & Kohn, 2003; Verworn, Herstatt, & Nagahira, 2008; Sperry & Jetter, 2009; Breuer, Hewing & Steinhoff, 2009). Only Paasi et al. (2007) talk explicitly about a problem as a potential source of innovation opportunity in the preinvention phase. The element of a problem with regard to the preinvention phase is rarely discussed in the literature.

---

1 This means that the starting point in the preinvention phase (and later on in the subsequent innovation activities) is a problem that customers or users face. An example for this are mobile phones (and also tablets). When they became larger and equipped with a touch screen, the problem of phones falling to the ground emerged, as a large display was significantly more sensitive to impacts. Hence, protective covers emerged on the market en masse, which was a new market opportunity resulting from a clear problem.
In the literature, an opportunity is seen to be related primarily to the pursuit of new technologies, discovering niche markets and potentials, identifying consumer needs, but rarely to a specific problem in relation to an existing product, process, business activity, or as a specific starting point for the creation of an entirely new product. However, by merely focusing on an idea, organizations may miss some key opportunities or may not detect problems that may become unsolvable later. This refers not only to new products, but also to organizational, process, strategy and other “soft” aspects of operations. All of these are sources of problems and eventually innovation opportunities. Ideas as sources of innovation opportunities have their potential and relevance, yet all organizations face problems on a daily basis that may be visible or concealed, known or yet unidentified. An organization that detects and solves its problems and difficulties regularly (at all levels) may potentially innovate and operate more successfully.

Potential challenges and obstacles in the preinvention phase

In managing this crucial phase in the innovation process, there is a danger that organizations (especially smaller ones, like SMEs) will approach this phase in a simplistic/vague manner which can result in a higher failure rate of innovation projects. Another possible danger is that organizations may focus much more on the second major part of the innovation process (new product development), neglecting the crucially important first part (preinvention phase) – efficient management of the preinvention phase is strategically more important than managing the new product development phase (Koen et al., 2002). Additional challenges that organizations face in the preinvention phase are lack of resources and knowledge of innovation, lack of analysis, poor planning, insufficient use of management, and lack of methodical, systematic and structured procedures. All this can have potentially detrimental effects on the subsequent phases of innovation projects.

In the following, we present some challenges (or potential mistakes) that are related specifically to problem identification activities as the cornerstone of the preinvention phase.

Possible mistakes in the problem identification phase

In the problem identification phase (the cornerstone of the whole innovation process), it is crucial to arrive to a correct understanding of a problem/challenge as a potential source of innovation opportunity. Sometimes problems are clearly visible, yet having general knowledge of a problem does not necessarily mean that its causes are really understood. Correct definition of a problem facilitates its proper solution substantially. The reasons for failing to solve a problem adequately are multiple.
Incorrect assessment of circumstances

The assessment of a manager, entrepreneur, executive head or other people arises from previously generated conceptions and experiences that have led to partial or incorrect assessment. This is the basis for further activities, which are consequently incorrect. There are basically two causes for incorrect assessment:
• inadequate understanding of a problem, and
• incorrect specification of a problem.

We talk primarily about perception in connection with subjective assessments based on incorrect assumptions and an old mindset, while we talk about incorrect specification when we have failed to obtain the necessary objective information.

Example: On a long trip the bicycle tyre goes flat. As this tyre has had several punctures in the same season, we make a stop in a store and buy a bicycle puncture repair kit. When the tube is taken out of the tyre type, we discover that there is no hole and that the problem is actually in the leaky tire valve. As we failed to investigate the problem in more detail and relied on previous experience, we lost time and money. The example therefore points to two elements: inappropriate perception and inadequate analysis, and consequently, erroneous specification of the problem.

Insufficient data, information and analyses

Intuition is one of the most common reasons for managers’ incorrect decisions. There are a variety of forms in this. The first form is related to insufficient information, which leads to incorrect conclusions, as crucial scenarios are designed without the necessary professional broadness. Another type of problems is a result of incorrectly processed data or improperly considered limitations of individual analytical methods, or even misunderstood results of analyses. The third problem is linked to the “information era”, where there is a wealth of information from which we fail to select the most relevant for a particular case.

Example: A publishing organization launches a new magazine into the market. The organization has carried out analysis on the readership for an existing magazine with similar content. Based on this analysis, they have established that they can expect 300,000 readers. However, the organization has failed to consider that each magazine is read by three readers on average, and hence, there are only 100,000 potential customers on the market.

The importance of focusing on the future

A modern innovation strategy must also ensure that the research and development work and
Implementing Open Innovation: Tools, Methods & Processes

innovation are not always subject to the pressure of today’s business needs. Simply said, great innovators usually do not allow today’s needs and pressures to nullify their look into the future. Thus, innovative leaders, according to an AT Kearney study (2014) create separate “engines” for the management of today’s business processes and those who look into the future and will be able to take advantage of the long-term benefits of growth. For example, IBM created three teams to manage the organization’s innovation programme, which focused specifically on innovation strategy, technological trends and operationalisation of innovation. So as to ensure the focus on present and future priorities, IBM has built its business opportunities on three different time frames: short-term fundamental business opportunities, medium-term growth prospects, and long-term upcoming opportunities. IBM has consciously decided to allocate a relatively large part of its funds (10 to 15 percent) for the development of long-term opportunities, and they do not allocate those funds to any immediate priorities or “fighting fires” in the organization (AT Kearney, 2014).

KEY TAKE-AWAYS

- The preinvention phase is the most important one in the innovation process: it has the greatest optimization potential, highest impact on the whole innovation (yet only few authors or studies have given considerable attention to this stage, despite its vital role).
- The element of a problem with regard to the preinvention phase is rarely discussed in the literature.
- By merely focusing on an idea, organizations may miss some key opportunities or may not detect problems that may become unsolvable later (this refers to new products and also to organizational, process, strategy and other “soft” aspects of operations).
- The dangers in the preinvention phase include: simplistic/vague approach, focusing too much on other phases in the innovation process, lack of resources and knowledge of innovation, lack of analysis, poor planning, insufficient use of management, and lack of methodical, systematic and structured procedures.
- In the problem identification phase, it is crucial to understand (define) a problem/challenge correctly as a potential source of innovation opportunity: most common reasons for failing to solve a problem adequately are incorrect assessment of circumstances, insufficient data, information and analyses, and focusing too much on the present business needs.
Available methods for addressing problems. Identifying opportunities and how to choose the most appropriate ones

There are many methods available (see the table below) for potential innovators in the preinvention phase for defining and addressing problems as sources of innovation opportunities. When there are a lot of tools or methods available for a particular task, the selection of the right tool is often more complex than the task itself. In order to facilitate the decision on selecting appropriate methods for potential innovators, each method has been labelled according to the following three aspects that define its features and implementation.

1. **Scope**: the method is suitable for addressing either a *problem* or an *opportunity*, which is already an intermediate phase on the way to the solution. When talking about the problem, we have in mind an issue or an inappropriate, yet important situation, which needs to be detected first and then defined and analysed clearly. On the other hand, an opportunity indicates either a challenge in the work process, a source of solutions for an already known problem, or detection of the potential for an innovation, but it can also indicate an idea for a solution.

2. **Duration of implementation**: *swiftly* (may be implemented in no more than a few hours) or *slowly* (lengthy version). Most methods may be implemented in a very short time, swiftly, yet such a manner of implementation cannot provide optimal results. Therefore, the icon “swiftly” is only given to methods which give visible results in a short time. Lengthy, slow implementation is very versatile: it can last several days or even weeks or months. This is specified further in the description of the method.

3. **Number of participants**: the method may be performed *individually* or may require work in a *group*. Most methods give the best results if they are performed in a group. Group dynamics may contribute to more associations, to divergent thinking and to greater creativity than the ability and practice of identifying and developing new deals. Moreover, the professional background of the participants mostly represents a useful basis for creative work. However, there are methods that may be performed quite effectively independently. These methods are marked in the text with the icon for independent execution, while the remaining methods are marked with the icon for the group. Nonetheless, the individual methods may be very effectively carried out also in a group. It is also useful to include in the group people who are not heavily involved in the searched problems, as they often notice them more easily. Moreover, critical and pervasive individuals, even the “eternal grumblers” should also make part of a group.
A classification of methods according to the above-mentioned features is presented in the Table 1 «List of methods per scope, duration and number of participants». The presented methods have been labelled further according to the profile of the participants, potential and orientation. For detailed description of the methods, see: Košmrlj, K., Širok, K., & Likar, B. (2015), The Art of Managing Innovation Problems and Opportunities.

**BOOKLET: THE ART OF MANAGING INNOVATION PROBLEMS AND OPPORTUNITIES**

The book is intended for those who wish to include elements of innovation in their academic work processes, as well as people who wish to use it in praxis and who would like to structure and improve their existing processes of innovation. It focuses primarily on the management of the pre-invention phase or the so-called fuzzy front end of innovation, i.e. the identification of problems and innovation opportunities. The book brings together a selection of some well- and less known methods, together with a number of newly deliberated techniques and complex web-supported approaches. It should be noted that some of the methods are original. Not only in the Slovenian area, but also in the wider international scientific community, the pre-invention phase has proved to be somewhat neglected. Accordingly, this book should serve as an original approach aimed at systemizing the fuzziness of the front end of innovation. It is a useful accompanying tool in the realization of processes facilitated by curiosity, imagination and the desire to succeed.

**METHODS FOR THE OPEN INNOVATION APPROACH**

As the concept of open innovation includes simultaneous active involvement of several different actors from different institutions in the innovation process, it may be inferred that for the open innovation approach, the most appropriate methods in the table above are those that are designed for group implementation, especially those that require different profiles (backgrounds, expertise) of active participants. In the following, we present two such methods, eMIPS and Innovation Cube,
Open Innovation In The Fuzzy Front End Of The Innovation Process

that can be used in a particular preinvention phase with the open innovation approach. Modern innovation models (e.g. the 6th generation) are built on the principle that innovation processes should be based on users’ problems and market needs – eMIPS and Innovation Cube methodologies are both based on the same premise of problems as starting point of innovation projects. For each method, we first present its basic features and implementation procedure, then its open innovation attributes, and finally its potential implementation in a Bachelor or Master level course.

<table>
<thead>
<tr>
<th>ADDRESSING A PROBLEM</th>
<th>ADDRESSING AN OPPORTUNITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swift Implementation</td>
<td>Slow Implementation</td>
</tr>
<tr>
<td>Cause-Effect Diagram</td>
<td>Focus on the Goal</td>
</tr>
<tr>
<td>Ishikawa Diagram</td>
<td>Gemba Walk</td>
</tr>
<tr>
<td>Mindmap</td>
<td>TRIZ</td>
</tr>
<tr>
<td>Problem Mining</td>
<td></td>
</tr>
<tr>
<td>QaDIM</td>
<td></td>
</tr>
<tr>
<td>Problem Breakdown</td>
<td></td>
</tr>
<tr>
<td>SWOT Analysis</td>
<td></td>
</tr>
<tr>
<td>Forced Connections</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual Implementation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Implementation</td>
<td></td>
</tr>
<tr>
<td>Innovation Cube</td>
<td>Innovation Cube</td>
</tr>
<tr>
<td>Ishikawa Diagram</td>
<td>Attribute Listing</td>
</tr>
<tr>
<td>Matrix Structure Design</td>
<td></td>
</tr>
<tr>
<td>Problem Mining</td>
<td>QaDIM</td>
</tr>
<tr>
<td>Progressive Abstraction</td>
<td>SWOT Analysis</td>
</tr>
<tr>
<td>QaDIM</td>
<td>Forced Connections</td>
</tr>
<tr>
<td>SWOT Analysis</td>
<td>PACIS</td>
</tr>
<tr>
<td>Forced Connections</td>
<td></td>
</tr>
<tr>
<td>PACIS</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. List of methods per scope, duration and number of participants

An inspiring case comes from a 6-year-old Slovenian girl Pia Alina, who invented an attractive education game. She got the idea from a problem which she intuitively sensed in learning mathematics at school. She was good at maths and the teacher asked her to coach her schoolmates with study problems. As Pia Alina was very sympathetic towards the problems

INSPIRING CASE OF PROBLEM-BASED OPEN INNOVATION BY A 6-YEAR-OLD GIRL

An inspiring case comes from a 6-year-old Slovenian girl Pia Alina, who invented an attractive education game. She got the idea from a problem which she intuitively sensed in learning mathematics at school. She was good at maths and the teacher asked her to coach her schoolmates with study problems. As Pia Alina was very sympathetic towards the problems
of others, she started thinking about the issue. For years, her parents had stimulated her to be creative and had often persuaded her that problems are not a reason for sadness, but an opportunity for improvement. Based on these starting points, she came up with a surprising and inspiring solution: a combination of the well-known «Memory» game and a game of basic maths operations - addition and subtraction. Helped by her parents, she designed a very simple prototype. In less than one hour after her idea appeared, children started playing, and the potential of the funny and haunting game was discovered.

Later on, the family, supported by external experts, developed also a game for learning multiplication and learning about countries/capitals of the EU. With the help of her parents and a team of professionals, Pia Alina designed and prepared a formal prototype of the game to test in her school. The responses of her classmates and their parents, the teachers and other experts were very positive, as the game strengthens complex thinking processes as well as the social component of cooperation. In addition, it is a ‘2 in 1’ concept game - a memory game and an innovative pedagogical learning tool. When her efforts were awarded with bronze medals at some international invention exhibitions (SIIF 2015 - Seoul, South Korea, ARCA 2016-Zagreb, Croatia…), her family decided to file a patent and Pia Alina became one of the youngest inventors in the world. The family also decided to market the game. Pia Alina’s success in this endeavour is paved by her brilliant inspiration, yet it is important to stress that one of the key moments within the invention-innovation process was a well-defined problem, the open innovation concept and her personal motivation to produce a solution.

KEY TAKE-AWAYS

• There are many methods available to potential innovators in the preinvention phase for defining and addressing problems as sources of innovation opportunities: they differ with regard to scope (addressing a problem or an opportunity), the duration of implementation (swiftly/slowly), the number of participants (individual/group), the profile of the participants (expert/generalist), poten-


Open Innovation In The Fuzzy Front End Of The Innovation Process

tial (incremental/breakthrough), and orientation (present/future).

- Examples of methods include the Innovation Cube, Ishikawa Diagram, Problem Mining, Forced Connections, PACIS, PAPSA, QaDIM, TRIZ, eMIPS etc.
- For the open innovation approach, the most appropriate methods are those that are designed for group implementation, especially those that require different profiles (backgrounds, expertise) of active participants.

EMIPS (E-SUPPORTED MASS IDENTIFICATION OF PROBLEMS AND SOLUTIONS)

Description

eMIPS is a methodology developed by Klemen Širok and Borut Likar which enables outsourcing the front end of innovation. The name stands for “e-supported mass identification of problems and solutions”. In a way, it represents an extreme form of open innovation. eMIPS is a well-defined set of procedures which can be adapted dynamically to a specific case/challenge in an organization. The eMIPS methodology represents a sort of “umbrella methodology” – a set of procedures where various methods (e.g. for problem identification, decomposition and idea creation) can be applied, depending on the organization's needs. It is based on proactive involvement of the organization's employees, supported by an appropriate methodology and external experts. The goal is to establish/improve the innovation process and to create concrete solutions. eMIPS incorporates the principles of blended learning, offering an appropriate mix and sequence of F2F (face-to-face) and online (eLearning) activities by combining F2F workshops with eMentoring of organizations taking place in eLearning Moodle environment, and the utilization of other ICT communication channels (videoconferences).

Purpose and applicability

The eMIPS methodology is useful for identifying known, hidden and potential problems, and their precise definition and analysis. Through the implementation of eMIPS, awareness of the importance of (simultaneous) detection of problems increases on one hand, and on the other hand, useful knowledge for the identification and analysis of problems is created.

Implementation process

Alongside the ability to adapt to the specifics of the involved organizations, eMIPS provides flexibility and a broad selection of potentially suitable innovation tools and methods. Out of the broad selection of innovation tools and methods that are applied in the first phases of innovation process, eMIPS mentors offer the involved organizations only those few methods and tools which have
been established to be suitable within their line of business and at the same time suits the organization specifics – mainly the size of the organization. In order to address this requirement, a catalogue of more than 40 innovation tools and methods has been compiled, together with a corresponding rudimentary decision making system in Excel, enabling an overview of the methods and supporting the method decision process.

The eMIPS implementation encompasses three constitutive elements:

1. Preparatory activities,
2. Core activities: problematisation & ideation phase, and
3. Sustainability providing activities.

![Figure 1. eMIPS concept](image)

**A. PREPARATORY ACTIVITIES**

These consist of the following sub activities:

1. Identification of the main challenge(s)
2. The organization’s team definition
3. Introductory workshop

1. Identification of main challenge(s)

This phase deals with the basic problem, often representing the top of the iceberg. It can be a single serious problem from any field or department of an organization. It can be related to a concrete product, process, organizational issues, marketing challenge, or others. It can also be defined as a
challenge of enhancing incremental innovations among all the employees. However, it is important that the basic problem has been clearly defined. Even though it is not an obvious precondition, it is also useful to check whether the problem is not too narrow (probably dealing with very specific technical details) and whether it offers possibilities for team work.

2. Organization’s team definition

A great deal of importance is also given to the selection of the participants, as this can be a crucial factor in the creativity processes. If viable, the eMentor selects participants with various profiles and backgrounds. The organization’s team coordinator is also an important part of the group, who should possess personal characteristics like empathy, openness, proactivity, creativity etc. According to the eMIPS concept, external partners (customers, suppliers, other experts and subcontractors) are also offered to participate in the eMIPS process where appropriate.

3. Introductory workshop

eMIPS envisages the organization of two F2F (face-to-face) events. First, an introductory workshop serves the purpose of introducing the eMIPS to the participants and providing the initial motivational impetus. It is a short-format workshop, taking less than 8 hours.

The primary aim of the workshop is to demonstrate the potential of innovation tools and to learn how to use them. The workshop introduction is short, relying on basic information on creativity and innovation, and the advantages of open innovation (Chesbrough et al., 2008). In order to build up the motivation impetus, the presentation focus is tilted towards the presentation of the advantages to the organization. Next, a condensed presentation of three to five problem identification methods takes place. The principle and usefulness of each method is presented in a few sentences, accompanied by visual aids to reinforce the comprehension.

The continuation of the workshop comprises three activity sets. In the first activity set, the participants are tasked to identify as many real problems within their organization as possible. In order to achieve this, the workshop facilitators take each working group through 3-5 problem identification methods, where each of the methods follows a different underlying principle. Different methods are carried out successively, subjecting the participants to different mind-sets (production, marketing, management, organization…) and the different underlying principles conveyed by each method (for instance: Problem focus, Quick and Dirty Innovation Method and Ishikava diagram).

The aim of the first activity set is to demonstrate that under proper guidance, each participant can identify relatively numerous actual problems in a short time period. The modus operandi of this exercise also exploits the potential of group dynamics, since an exchange of alternative views of the participating organizations takes place under proper guidance.
In the second set of practical activities, the participants are tasked with the evaluation of the problems identified earlier. They assess each problem as to whether it is a fundamental problem already suitable for direct solution seeking, a problem requiring further decomposition, or a problem suitable for discarding.

The third activity set aims at demonstrating the potential of idea generation methods (for instance brainstorming, Phillips buzz 66 etc.) as well as the fact that guided implementation of the method can provide significant results in a short time period.

The last part of the workshop is reserved for the presentation of eClassroom, where the emphasis is put on eMentoring, as presented in the next section. The aim of the presentation is to give the organizations a realistic picture of the envisaged activities and required resource inputs, as well as the expected results and benefits. Within the workshop, the participants from the organization get information on eMIPS principles and basic knowledge on the methods used. The (e)Mentors later support and guide the innovation team at the organization level during the implementation of the methods through Moodle-based eClassroom and other ICT channels.

B. Core activities: problematisation & ideation phase

This is the most important part of the whole methodology. The phases of the Core activities are the following:

1. Identification of innovation problems/opportunities

This phase deals with the basic problem often representing the top of the iceberg. If the organization has one serious problem, it might be useful to redefine or decompose the problem into smaller, clearer sub-problems. The result of this phase is a set of the most important problems or the roots of the basic problem. The other option is to focus on “mass” detection of problems/innovation opportunities within a certain department or in the whole organization. The result is a clearly defined basic problem or a set of problems.

2. Evaluation of problems/opportunities

In the case of many (sub)problems being identified, those with high potential should be selected. Regarding the basic problem and the organization’s needs, the appropriate method and selection criteria should be defined first. According to them, the selection process is performed. We can simply say that these are the problems, if solved, that will offer significant benefits. The result of this phase is a set of the most relevant and serious (sub)problems.
3. Searching for solutions

Similar to the procedure presented in section “Introductory workshop”, for each of the selected problems, ideas for solutions should be found. Even though there are at least a hundred idea creation methods available, it is important to choose the appropriate one. For many simple problems, e.g. Phillips buzz 66 or Brainwritting could be appropriate, for single but important problems Gordon’s technique, for technical problems Sinectics or a combination of methods is recommended. The result is most often a huge repository of ideas that should be evaluated.

4. Idea selection

The selection process consists of the appropriate method and criteria selection. It is important to stress that the criteria should be chosen according to the initial innovative challenge, the organization’s specificities and some other influencing factors. The result is a set of the best ideas for solutions of the initial problem(s).

5. Implementation plan

The last phase is dealing with the preparation of the implementation plan, taking account of the most important issues of project management, e.g. goal(s) definition, tasks and deadlines, the resources needed, risk planning etc. The result is a clear and realistic plan ready for implementation.

6. eClassroom

eClassroom repeats the method application sequence of the introductory workshop in a real environment, whereby implementation is carried out by the organization’s employees themselves under the supervision and support of eMentors. Innovation team members are enrolled in eClassroom as a study group. This gives the eMentor the possibility either to adapt tasking to implementation dynamics or to encourage the innovation team when needed. The group work in eClassroom also separates individual and group communication. This is essential for proper communication management, which in turn provides protection of intellectual property in relation to other organizations in the eClassroom.

All eClassroom activities are focused on building up innovation competencies at the organization level. In the eClassroom the innovation team is provided with tools, corresponding instructions and relevant additional information (cases, articles…). The participants follow the instructions prepared for a specific method/tool and report back to the eMentor on the implementation. Reporting is also structured in the form of guided reflection or structured discussion. The eMentor promptly responds to each posted document by providing feedback or setting additional questions or suggestions stimulating the implementation process and bringing it to a higher level. Simultaneously, the eMentors also gather valuable information useful for fine-tuning the tools and methods, as well as eMIPS modus operandi.
After the conclusion of the first problem identification – problem selection – idea generation – idea selection cycle, the cycle is repeated once more but with a different set of methods. eMIPS concludes with focused action planning. At this point, the mentoring in the eClassroom envisages the integration of (middle) management structures in the feedback loop, first by only informing them of the eMentor’s feedback, and if necessary also by consulting them on the viability of the proposed suggestions.

C. SUSTAINING THE INNOVATION PROCESSES

The third eMIPS pillar represents the set of activities intended to provide sustainable long-term effects at the organization level. Three sets of activities serve this purpose: collection and dissemination of good practices, proper communication, and innovation process monitoring. Information collected in the eClassroom serves as a rich source of good (and bad) practice examples that can be shared by the participating organizations when and if complementary interests emerge. The communication of the eMentors is focused on boosting the effectiveness of the implementation. Regular and open communication also presents a channel for collecting relevant monitoring data on the extent and quality of innovation activities. It is important to include the top management and PR department and to use all the available communication channels (internal conference, newspapers, intranet and e-news etc.). Obviously, it is important to strive towards systemic implementation of good practice into the strategic and operational plans of the organization or at least to upgrade them.

Participants

eMIPS is carried out in groups of at least 6 employees and is guided by qualified external moderators.

Duration

The introductory workshop lasts for about 8 hours, while work in the eClassroom lasts from a few weeks up to two months. The duration depends on the complexity of the problem, as well as the number and especially the motivation of the participants.

OPEN INNOVATION ATTRIBUTES OF eMIPS

• Collective behavior patterns in knowledge creation, knowledge transfer, and knowledge application of the recipients;
• Collaborative work environment: online collaboration (e.g. virtual teams, mass collaboration, massively distributed collaboration) and online communities of practice (e.g. open source community);
• Distant collaboration, distance-working platform and e-learning (Moodle environment and eMentors),
• The goals of joint endeavours;
• Mass externalisation of the preinvention phase;
• eMentor as an external source of ideas to the organization and the particular problem;
• Openness of the organization’s team coordinator;
• Flexibility in the number of participating organizations (provided by the Moodle learning management system);
• Participants with various profiles and backgrounds;
• Potential inclusion of external partners (customers, suppliers, other experts and subcontractors);
• Participation of dislocated external experts (e.g. R&D partners, suppliers, users, buyers, distributors etc.);
• Potential sharing of good (or bad) practices by the participating organizations;
• Possibility of supporting horizontal, interdisciplinary challenges;
• Enabling convergence of scattered, unstructured knowledge, experience and ideas into clear innovation problems and solutions;
• Flexible methodology (various problems can be addressed);
• A wide database of innovation tools;
• Open to variations depending on the specific innovation problems of the organizations;
• Variability required by simultaneous support for the various organizations within the different preinvention phases and
• Creating a culture that values outside competence and know-how.

**Potential implementation in a Bachelor or Master level course**

eMIPS is a meta-method (collaborating innovation work in the e-environment, distant mentorship), within which a series of specific creativity/innovation methods could be potentially used (e.g. Ishikawa Diagram, Problem Mining, Innovation Cube ishigawa etc. – see the List of methods above) for application on either realistic or hypothetical innovation challenges. For students to gain practical knowledge and experience with respect to using eMIPS, there are three main possibilities:

1. Students can be involved in real application of eMIPS in organizations. The students collaborate with other participants on a real practical problem in several consequent sessions that connect different stakeholders (a heterogenous group of organizations, eMentors, students of mechanical engineering, psychology, marketing, management etc.). In the course of a specific Innovation module, the students are actively engaged in working, helping, and collaborating in a real innovation process in organizations. This is the most active and rewarding possibility for students. They can search for real eMIPS application projects by themselves or the module teacher(s) could find appropriate projects for them. For practical reasons, it is recommended that a group of 2-5 students join one innovation challenge, instead of participating individually.
2. Students can be involved in real application of eMIPS in (university, techno-park) incubators. A particular innovation project that is based on eMIPS methodology can engage students from different study fields (faculties) actively, e.g. chemistry, marketing, management etc. A project has a few eMentors, each of which supervises one particular aspect of the innovation project. This approach is based on very intense inter-departmental or inter-faculty student collaboration. As with the first teaching possibility above, here too the students can search for real eMIPS application projects by themselves or the module teacher(s) could find or even organize appropriate projects for them.

3. A teacher can organize an Innovation module in the form of role-play: he/she provides students with some typical cases of real innovation challenges, and then divides the students into different groups, where each group has its own separate role, e.g. organization A, B, C, D, E, municipality, natural park administration, tourist agency, etc. The students in each group then work jointly to find appropriate solutions to given typical innovation problems (by using different innovation/creativity methods), where they should take the specifics of their assigned roles (interests, behaviors, norms) into consideration (at least to some extent). The goal of this joint group collaboration is to develop and upgrade the proposed initial solution(s) to the level of a potentially applicable service/product for the market. The module teacher has the role of an eMentor who coordinates the whole simulation of a real eMIPS application. Ideally, the teacher should have extensive experience in being an eMentor in a real eMIPS application and should master the first phases of the innovation process completely.

**KEY TAKE-AWAYS**

- The goal is to establish/improve the innovation process and to create concrete solutions
- Represents an extreme form of open innovation
- Enables outsourcing of the front end of the innovation process
- Can be dynamically adapted to the specific case/challenge in an organization
- Represents an “umbrella methodology” – a set of procedures where various methods (e.g. for problem identification, decomposition and idea creation) can be applied, depending on the organization’s needs
- Involves proactive involvement of the organization’s employees, supported by appropriate methodology and external experts
- Incorporates the principles of blended learning, offering an appropriate mix and sequence of face-to-face and online (eLearning) activities
- Combines face-to-face workshops with eMentoring of organizations taking place in the eLearning Moodle environment and the utilization of other ICT communication channels (videoconferences)
Open Innovation In The Fuzzy Front End Of The Innovation Process

- Carried out in groups of at least 6 employees and guided by qualified external moderators
- Students can gain practical knowledge and experience by being involved in real application of eMIPS in organizations, in (university, techno-parks) incubators or a teacher can organize the Innovation module in the form of role-play.

**INNOVATION CUBE**

The Innovation Cube is a simple and concise method for rapid implementation. It can be learned quickly and performed even more swiftly. It does not need a long period of preparation, and the results are immediate. The method has already been used in practice, and it has been finally developed by Borut Likar, Matjaž Marovt and Katarina Košmrli. It is recommended that the reader studies the example first and then examines the technical aspects of the methodology.

**Description.** The Innovation Cube directs the participants systematically towards a broader way of considering and addressing problems and needs, opportunities and ideas for novelties, as well as towards finding new markets. This methodology guides our thinking towards incremental and breakthrough ideas, while its application also leads to consideration of future trends and needs.

**Purpose and applicability.** Primarily used for innovative products and services, this method is directed towards the present and the future through the anticipation of completely new markets and products, as well as for minor innovations to existing ones.

**Implementation process.** The innovation cube also serves as a tool for creating visions and related objectives. In-depth knowledge across the broader area of the field of expertise, as well as creativity, are essential when using this method. Only a combination of both delivers maximum results.

The method builds on three groups of challenges and/or dimensions of the cube:

1. existing and future needs and requirements of buyers/users,
2. existing and potential users and
3. overt and covert – apparent and latent – problems.

The method may be applied in a simple or in-depth version.

In the implementation of the innovation cube methodology, we talk about a combination of the “bottom-up” approach, where we start from the present and the future – as well as the apparent and latent needs of the users, in conjunction with the “top-down” approach, because innovation is built on new technologies and emerging trends. Indeed, in this part we leave the so-called secure area of innovation, since it does not arise from the clear needs of users, and only time will reveal which potential innovations the market shall actually adopt.
The process is conducted systematically with the following steps:

1. Analysis of the dimensions (needs, users, problems); we try to amass as much information as possible for each of the three dimensions of challenges.

2. “Filling the cubes” or merging dimensions of different fields, which is carried out in such a way that we find compatible information on convergent dimensions (e.g. the future needs of existing users in relation to their latent problems) and then complete the entire cube with this information.

3. Identification of problems and opportunities per cubes (with regard to the common information with which the cubes were filled).

4. Searching for solutions that represent opportunities for innovation in existing products or the development of new ones. For this purpose we use one of the idea creation techniques.

Process analysis of the dimensions in specific areas of challenges is presented in detail below.

Users’ needs are analysed in terms of current and future requirements.

• The needs of current users can be ascertained on the basis of surveys, interviews, critical observation of the direct use of the product, and monitoring and analysis of the verbal and non-verbal expressions of dissatisfied customers, with an analysis of comments and suchlike.

• Future needs are those that will arise after a certain time; they can, however, be detected already at present. Such needs are a reflection of the development of technology, materials, new concepts, business models, etc.. If we want to use this part of the cube well, then excellent knowledge of trends across various fields is necessary. Thus, for example, the manufacturers of motor homes need to be broadly familiar with that particular segment of the market, as well as pertaining design and materials. An important element of ideas for novelties is associated with the transfer of good practices from complementary and related sectors, i.e. those whose products do not represent competition, but who are developing similar items (e.g. the transfer of best practices and innovation from the construction sector as well as the information and communication technologies sector can be sought for the application of energy saving solutions in motor homes). Trends can also be monitored in relation to the leading competitors, their current plans and novelties in the preparation phase, as well as their presentations at trade fairs, etc.

Users and/or buyers are analysed in terms of current and potential users.

• Existing users are the key element and most reliable part of our market, as they are the ones who are already using our product, and thus it is essential to keep them. We need to meet their current needs and solve their expressed, overt problems, but we also have to anticipate their future needs as well as their latent, covert needs.

• Potential users are those who do not use our product yet. This segment may be divided into two
Open Innovation In The Fuzzy Front End Of The Innovation Process

...subgroups: firstly, those who have decided in favor of the competition, which has convinced them on the basis of their product, brand, price or otherwise; and secondly those potential users who are satisfying the same needs with products from other segments and sectors. In determining new potential users, we need extensive knowledge, creativity and intuition. New potential users are not actually acquired from the “pool” of customers of our direct competition, but rather created from new groups drawn from other sectors. One example is the Cirque du Soleil. The audiences of traditional circuses have long been parents with children. This circus, however; set as its target group all people who are looking for fun and entertainment. So, the protagonists created a business model which combines elements of the classical circus (the erstwhile target audience), with stories and choreography (theatre goers target group), excellent music (music lovers target group), costumes (fashion lovers target group) and vigorous performance (athletic events target group). Based on the innovative concept, the circus has gained a wide range of visitors and experienced a remarkable boom, unlike the traditional circus sector which has been in a long-term decline.

Problems or challenges are addressed as expressed/overt or concealed/covert.

- The expressed/overt problems are the ones that are clearly known to us as a producer or a user. However, we often fail to have a solution.
- For various reasons, we are often not aware of either the problems or the opportunities for improvement. We, or our users, can only be (partially) dissatisfied or say “that is the way it is”, or maybe “it can’t be any different”, or “this has always been a problem” and suchlike. Such self-evident issues may not be unsolvable –if they can be identified, appropriate solutions may also be sought.

Both in terms of expressed/overt as well as concealed/covert problems, it has proved to be reasonable to break down the area under consideration first into several smaller ones. For example: as regards the applicability of functionality, or simplicity, or materials, or maintenance, or transport, packaging, faults and cancellations, and suchlike, the division must be adapted to the specific product under consideration, but we must not forget to connect the partial solutions into an appropriate comprehensive solution. We can deal only with our product, and likewise only address those challenges that come from the environment. Several additional guidelines for this endeavor may be found in relation to the Problem-mining methodology, which should be applied similarly at this instance.

Application. The method of the Innovation cube can be undertaken simply and rapidly or in depth. In the first instance, a systematically oriented thinking of experts per the abovementioned needs, users and problem fields (per the 3 x 2 innovation cube) is sufficient to achieve positive results without further analysis. If we want to exploit the full potential of the method, however; then in-depth assessment should be carried out. This requires additional preliminary activities that include in-depth analysis of the existing users and competition analysis, together with analysis of the development trends both in the particular and other industries. More participants should be included in the in-depth version.
Example: Spending your leisure time and holidaying with a motor home is a special experience, and the owners and users of motor homes have become almost a subculture. Therefore, innovation is particularly important for the designers and manufacturers in the industry. One manufacturer addressed the development of their motor home models by using the innovation cube, which was implemented across the following areas.

![Innovation Cube for Motor Home Models](image)

**Energy autonomy.** One of the key needs of motor-home users is seven-day autonomy without the need to turn on the engine. This is particularly difficult to achieve in winter conditions. The basic problem is associated with energy, and the provision of massive reserve battery power is problematic. There are various system solutions available on the market, based on, for example, the use of gas, solar power, or fuel cells.

*Expression as to the current needs and problems of existing users (lower front-left portion of the cube).*

**Motor-vessel-home.** There is a segment of potential customers who want the freedom provided by a motor home and the freedom enabled by navigation on water. One segment favors the vehicle, the other the vessel. An especially significant part of the content of both is the living area. This opens the opportunity to produce a motor-home-vessel according to the “two in one” principle.
The vessel is an independent unit, its living area can also be used in instances where it is fixedly attached to an overland vehicle.

Current needs expressed on the basis of an overt problem that may attract new potential users or customers are thus presented.

Looking to the future. Today, there is almost no motor home user who would venture out without a smart phone. This device can enable the remote control of lighting, air conditioning, alarm, and suchlike. It can also engender the application of “common sense” and provide an important step in the direction of prediction. Thus, for example, weather forecasts for the week ahead can be obtained via the web to ensure and optimize energy consumption in the provision of 7-day autonomy. This represents the future needs of existing users – which are already partially expressed overtly; however, for the majority of users this need or desire remains latent.

Camper-car. Many users of motor homes are facing the problem of poor mobility (not permitted to enter inner city areas with motor homes, fixing the motor home for a temporary stay, as well as the static awkwardness of the vehicle consequent to its size). There is actually a solution offered by the motor home itself: a small detachable vehicle which is an integral part of the camper and also contains a power unit or engine. This presents an interesting, clearly expressed challenge to attracting new potential customers whose existing preference is to travel by car and either camp or stay in hotels. At the same time, it is a covert problem of existing users who take the inflexibility of today’s motor homes for granted. This example demonstrates the potential future needs and expectations of existing users. This example presents an expressed need of existing users, and at the same time also the overt problems of potential users.

Gas cylinder levels. Mandatory in the operation of a motor home is the supply of (butane/propane) gas. Despite its extremely widespread use, even in households, the market still does not offer a simple and reliable meter that indicates the remaining amount of gas in the cylinder. As a consequence, we face the need to replace the gas cylinder only when we actually run out of gas completely. This challenge pertains, as a rule, to another sector/industry (production of metering devices), but it could also be encouraged by the designers and manufacturers of motor homes. The example illustrates a latent problem for existing users and reflects the current needs.

Loss of energy. Motor homes usually have a heater installed for use in cold weather. This heater is often located in an especially poorly insulated space, thus a large part of the heat energy it generates is lost externally. This creates a challenge to produce a better insulated heater; which is a covert challenge for the manufacturers. A balance that will ensure adequate ventilation and the avoidance of overheating has to be found, and the failure to achieve this balance is reflected in an
over-dimensioned heater in a poorly-insulated part of the vehicle. This scenario provides a further opportunity to reduce the power of the heater, which is associated with lower manufacturing costs, lower fuel consumption and fuel costs, as well as a consequent reduction in operational noise. In this context, the concept of innovation needs to be passed to the heater suppliers and manufacturers. There also exist additional possibilities arising from technology transfer associated with energy recuperation, the use of appropriate glazing and insulation materials and seals, etc., from the energy-saving and passive house construction sector, which in themselves engender additional opportunities for innovation.

*This is a covert problem of existing users, which, however, largely reflects future needs.*

**Design is everything.** In the design and manufacture of motor homes, utility and functionality are generally at the forefront. Design is otherwise a desirable supplement, but not an essential guiding force in product development. At the same time it must be recognised that there is a segment of potential buyers who see design as the key feature; in this, however, they are unwilling to look at, let alone deploy and fasten the almost mandatory awnings, canopies and similar accessories. For such users, the solution would be a design camper, with utility in terms of both the interior and exterior spaces, i.e. the exterior framework – replacing the traditional awning and canopies – could easily be opened to create a semi-enclosed fore-space.

*This example reveals a covert problem of existing users, while at the same time indicates a future need and desire for both existing and potential users.*

With the example of motor homes, we have illustrated further development opportunities identified in accordance with the structure of the innovation cube. Some of the innovation concepts could be developed in closer detail by motor home manufacturers and incorporated into their products. Other ideas for innovation, however, are of such a nature and magnitude that they require major changes and may not be taken into consideration until after that change occurs. The examples also revealed that a portion of the innovation proposals formulated on the basis of the “cube” are incremental, while others are breakthrough ideas by nature.

**Participants.** To implement this methodology, it is necessary to include various experts who have sufficient knowledge and experience in relation to customers, markets, technologies, and products. This way, the solutions thus iterated will be both useful and applicable. Group implementation of this method is the most reasonable and the most effective procedure.

**Duration.** Without previous preparation, the method may be carried out in a simple, swift version of 1 to 3 hours of duration. In-depth implementation, which requires extensive preparation, may take much longer, depending on the size and complexity of the market, industry and product. Will and ambition are also, of course, essential factors in this process.
Open Innovation Attributes of the Innovation Cube

- A broader way of considering and addressing the problems and needs, opportunities and ideas for novelties, as well as towards finding new markets;
- Combining knowledge across the broader area of fields of expertise;
- Cooperation of participants with various profiles and backgrounds (not only experts and R&D personnel);
- Potential inclusion of external partners (customers, suppliers, other experts and subcontractors);
- Systemic possibility of addressing horizontal, interdisciplinary challenges;
- Focused on future markets and technological trends/needs (not only present ones);
- Enabling convergence of scattered, unstructured knowledge, experience and ideas into clear innovation problems and solutions;
- Flexible methodology (various problems can be addressed); and
- Open to variations depending on the specific innovation problems of organizations.

Potential Implementation in a Bachelor or Master Level Course

For students to gain practical knowledge and experience with respect to using the Innovation Cube, the most immediate and most easily applicable possibility is for a teacher to organize the Innovation module in the form of role-play: he/she provides students with some typical, standard cases of real problems, and then divides the students into different groups, where each group has its own separate role, e.g. technology developers, craftsmen, designers, market researchers etc. By using the Innovation Cube methodology, the groups of students then jointly work on finding appropriate solutions to given standard problems, whereby they should be taking into consideration (at least to some extent) the specifics of their assigned roles (interests, behaviors, norms). The goal of this joint group collaboration is to follow the guidelines of the Innovation Cube and create various types of ideas. Further on, the students can also develop and upgrade the proposed initial solution(s) to the level of potentially applicable services/products for the market. This is just the basic outline of implementing the Innovation Cube in a classroom, which means that it can be structured and coordinated in different ways, depending on the specific goals of the Innovation module.

A second possibility is to perform the method on an existing or fictionary product/service or industry as a “project” that is carried out in the following two phases.

1. Field analyses. Students (6 to 9 in total) are divided into groups according to different sides of the cube, namely one group works on users (existing buyers and potential target groups and their specifics in terms of demographics, economic status, lifestyles), a second group analyses the needs (those that are already satisfied with the product/service/industry in consideration and those that are arising or may arise in the future along with alternative possibilities of satisfying these needs).
Finally, a third group works on the problems and challenges in connection with the chosen topic, thoroughly studying the sources of existing problems and trying to detect future challenges along with reasons for their occurrence. The students may present their analyses’ results in a report or as a public presentation to the class.

2. Innovation opportunities. This step is carried out similarly to the first example of the implementation of the Innovation Cube. The students in the group are given different roles: organization A, B, C, D, E, representing designers, manufacturers, industry, market analytics, policy makers, etc. The roles can be either assigned by the teacher or drawn randomly as in a lottery. An alternative way in the case of several groups in a class is to swap the initial topic between groups, so that each group has to study in depth an analysis report of the previous phase. The group then works on finding innovation opportunities for all or just selected segments of the Innovation Cube. The results can be delivered as developed product/service samples, public presentation or report. The class may even organize an “Innovation fair” to present their work to the public and invite representatives of different industries.

KEY TAKE-AWAYS

- Simple and concise method for rapid implementation
- Can be learned quickly and performed even more swiftly
- Does not need a long period of preparation, the results are immediate
- Directs the participants systematically towards a broader way of considering and addressing problems and needs, opportunities and ideas for novelties, as well as towards finding new markets
- Guides our thinking towards incremental and breakthrough ideas
- Its application also leads to the consideration of future trends and needs
- Requires in-depth knowledge across a broad area of fields of expertise, as well as creativity (only a combination of both delivers maximum results)
- Builds on three groups of challenges and/or dimensions of the cube: 1. existing and future needs and requirements of buyers/users, 2. existing and potential users, 3. overt and covert – apparent and latent – problems
- It is necessary to include various experts with sufficient knowledge and experience in relation to customers, markets, technologies and products
- Students can gain practical knowledge and experience by performing the Innovation Cube on an existing or fictionary product/service or industry as a “project” that is carried out in two phases (field analyses, innovation opportunities), or the teacher can organize the Innovation module in the form of role-play.
REFERENCES

FINANCIAL ASPECTS OF OPEN INNOVATION

MIROSLAV SPACEK

ABSTRACT

This chapter concludes that competition plays an important role in how firms organize and finance their projects, especially in the innovation-intensive sector. It is shown that a limited number of innovation financing types are suitable for the discrete stage in the company life-cycle. It is shown empirically that for each stage, 2-3 types of financing are appropriate. These approaches to innovation financing differ by the financial provider’s risk exposure. The scope of innovation approaches varies from the FFF (Friends, Family and Fools) approach that carries the highest risk to the least risky bank loans. Between these there are well-elaborated approaches like Venture Capital or Private Equity, P2P lending, Crowdfunding, Mezzanine financing, Business angels, and others. The basic principles of each approach to innovation financing are addressed. Apart from private funding of innovation, the attention is also paid to innovation financing from public sources, which is gaining growing importance in the EU. Especially public funding of innovation tied with the EU program Horizon 2020 represents a worthwhile source of financing.
**Prerequisite**

Basic knowledge of OI and financial management.

**Objectives of the lecture**

To demonstrate possible approaches to OI financing. To make students familiar with the evaluation of the pros and cons of the approaches presented. To make students aware of the risks combined with various ways of OI financing.

**Workload**

26h teaching; 52h self-study.

**Learning outcomes**

Understanding the key underlying principles of OI financing.

**Knowledge**

Being familiar with the key characteristics of OI financing, various models of OI financing coming from both private and public sources.

**Skills**

Acquiring knowledge and know-how about financing OI projects. Mastering the identification and analysis of the financial risks of OI projects. Implementing financial risk mitigation provisions. Capability to be conducive to implementing and monitoring suitable schemes of OI project financing. Being able to evaluate the financial and non-financial effects of the selected OI financing approach.

**Competences**

Acquiring expertise in OI financing. Being able to make an analysis focused on choosing the appropriate way of OI financing. Treating the risks tied with OI financing.

**Reading List**

Enclosed.

**European Qualifications Framework (EQF) Level**

Level 7.

---

**Lecture Content**

**Definitions:** Alternative approaches to Open innovation financing from public and private sources.

**Practical implications:** The student will be able to choose the most suitable approach to OI financing depending on the progress of the OI project.

**Content-related material:** Books by H. Chesborough, Linkegaard and Osterwalder. Financial management book by Brealey & Myers “Principles of Corporate Finance”.

**Additional reading material for students:** see the list of references below.
3.4. Implementing Open Innovation: Tools, Methods & Processes

INTRODUCTION

A new growth program for EU member states, known as “Strategy 2020” accentuates the concept of innovative companies which play a major role in advancing the internal cohesion of the EU. It brings into focus the need for the creation of enterprises based on knowledge, co-operation and innovation. The Europe 2020 strategy requires business, science, financial institutions and national governments in the EU to develop their strategic capacity for innovation, which is defined as the ability to create and implement innovative strategic products and innovative business models. Such activities are inherently risky and require capital that is not always certain to yield a satisfactory rate of return (Europe 2020, 2010).

To keep on sustainable growth, companies are looking for sources of competitive advantage. One of the most important underlying factors of their competitiveness is their ability to innovate (Lewandowska, 2013). Companies which are able to base their competitive advantage on innovation are ranked among innovative companies. A company is considered innovative if at least one of following four criteria are met (Pisano, Pironti & Bertoldi, 2009):

1. The company has introduced new or significantly improved products (goods or services) to the market,
2. The company has new or significantly improved processes for producing or supplying products (goods or services),
3. The company has been involved in activities – including R&D activities, which are aimed at the development or the market introduction of new or significantly improved products (goods or services) that are still ongoing (i.e. not completed),
4. The company has been involved in innovation activities similar to the above point, but these activities have been untimely aborted.

The innovation potential of a company is contingent upon several factors, among which the availability of resources plays the main role (financial, human, technical and information). Another factor is a pro-innovative corporate culture which creates an environment that stimulates creativity, mutual trustworthiness and sharing ideas and competences. The underlying factor of a functional pro-innovative corporate culture is corporate communication oriented both inwards and outwards. Companies should not leave behind a technology base and knowledge originating outside the company’s borders. Companies that have an ambition to play the roles of branch leaders should adopt flexible organizational structures (matrix, network or virtual etc.) that will help them react more effectively to market needs. For human resources to be effective in the innovation process, the typology of innovation roles should be taken into consideration. With respect to innovation role typology, the innovation champions, leaders and sponsors should be represented proportionally (Galbraith, 1999).
From the macroeconomic point of view, it is advisable for the state to establish an innovation policy which is aimed at the support of innovative companies. The state has to establish a policy which provides start-ups and companies in early development stages with legal, consultancy and financial support. Moreover, well-established companies or organizations with a proven track record may benefit from goal-directed or institutional financing innovations. It has been proven that public subsidy enhances companies' liquidity and thus may boost the probability of their survival (Ebersberger, 2011).

INNOVATIVE COMPANY FINANCING

An important factor in innovation is its financing. Financing is a critical issue for the survival and development of small and medium sized enterprises. It is clear that the profit generated by an innovation lags behind the expenditure of innovation development. Therefore, the availability of financial sources to be sufficient for both the development and the commercial launch of the innovation is crucial. Moreover, innovation decisions are highly risky. Properly structured innovation financing is thus a condition for further success of the innovation. It has become apparent that the innovative company which goes through its life cycle operates with alternating risk profiles typical for each life cycle period. The subjects in charge of financing the innovative company operate with a different "reference risk level" (Špaček, 2009). This term can be explained as the maximum level of risk which the financing subject or institution is willing to accept.

Figure 1 demonstrates possible approaches to the financing of a company during its life cycle.

Figure 1. Financing of a company during its life cycle
Source: own elaboration
The Friends, Family, Fools approach

The approach with the highest risk to innovation financing is FFF (Friends, Family and Fools). This approach is applied at the seed stage of a company’s existence. Mostly it represents financing the plain idea because the company has not come into existence yet. Seed capital is also applicable at the rudimentary stage. As opposed to FFF, innovative company financing by seed capital requires usually co-financing from private sources.

Crowdfunding approach

A company in an early development stage can be financed also by crowdfunding or crowdsourcing (Hossain, 2015). This approach is based on publicly announced money collection dedicated to a specific purpose. Individuals can freely decide to what extent they provide financial support to the investment project, if at all. Crowdfunding is believed to democratize both the financing and the commercialization of innovation. It also creates entirely new forms of interconnections between the project creators and entrepreneurs with their backers and investors. Crowdfunding is about making a dream real for both the crowd and the creator. For managers and executives, crowdfunding presents an exciting opportunity to examine the innovation process at the grassroot level. It helps them to understand consumer demand, user-driven innovation and nascent organization that are about to launch new ideas better (Mollick & Robb, 2016). From the technical point of view, crowdfunding is organized on electronic marketplaces which balance money supply with money demand. Crowdfunding platforms lower the costs of these campaigns dramatically by leveraging the geographic and social reach of the Internet to connect fundraisers to millions of potential backers (Fleming & Sorenson, 2016). If the requested sum of money is actually collected, then the project is implemented. If not, the money is given back to the investors. Various innovative products like the Pebble watch, book issues or cultural events have been subsidized through crowdfunding. Compensation for the investors varies from “having a good feeling from the investment” to direct engagement in the company, typically by acquiring a stake in the company.

Business Angels approach

Early-stage innovative projects may also be funded by private investors known as Business Angels (BA). They can be defined as wealthy private individuals who decide to invest part of their equity in the early stage of the life of a company, at the stage in which other financial operators such as banks or venture capitalists are generally reluctant to play a role due to lack of guarantees and/or the small size of the capital required (Aernoudt, 1999). Business angels are usually wealthy individuals who have been successful in management or entrepreneurship. They have usually held leading positions or managed their own business during their careers. They basically invest a small part of their wealth in new enterprises so that in case they lose their money, this would not drastically influence their way of life. BAs are typically engaged in the early stages of projects, at a time when
neither banks nor institutional investors find them interesting. They are usually able to perform reliable assessment of an investment opportunity and make the final decision quickly. Most BAs use their private resources to contribute to innovative projects in return for intellectual satisfaction, a chance to be a part of the team, the possibility of fulfilling their passion, appreciations, etc. rather than financial gains. BAs are interested in innovative projects with high growth potential. Their tenure in the firm usually covers a period from 3 to 7 years.

In addition to necessary funding, BAs also contribute to the innovation project by their experience, knowledge and professionalism, business contacts, passion and commitment (Lewandowska, 2013). They fill the gap between the founders, family and friends on one side and institutional venture capital funds on the other side as a financial source. In addition to providing money, they are hands-on investors and contribute their skills, expertise, knowledge and contacts to the business they invest in (Ramadani, 2009). They invest in seed, start-up and early-stage enterprises in exchange for acquiring a stake in these companies. The precondition for the investment is high growth potential. BAs secure high risk capital and are motivated by something larger than money. Even today their emotional relationship to the investment plays an important role. The fact that BAs invest personal assets distinguishes them from institutional investors of high-risk capital, whose funds come from sources such as pension funds, banks, university endowments, and insurance companies that have legal obligation to exercise caution and invest in less risky ventures (Ramadani, 2009).

On average a BA invests 10,000 GBP per deal and has a portfolio of two to five investments (Ramadani, 2009). In the Czech Republic, BAs’ investments rank from hundred thousand to several million CZK. In contrast, Amazon’s CEO Jeff Bezos, who is believed to be one of the most important BAs in the USA, has subsidized 11 projects at the minimum 1.5 M USD each (Prive, 2013). In terms of the scope of the investments, BAs cannot compete with investment funds. They may operate either on individual basis or as an investment conglomerate. Some of them may be publicly known, while others are anonymous. It is no surprise that a BA’s engagement in the business implies better financial performance. Financing through a BA is also associated with improved likelihood of survival for four or more years, higher level of employment, and more traffic on the firm’s website (Kerr; Lerner & Schoar, 2011). Moreover, a BA’s involvement in start-up financing ensures high innovation propensity and creates more innovations in a medium-term period the others types of funding (Pisano et al., 1999). Finally, it is worth mentioning that companies like Amazon, the Mining Company, Go2Net and Firefly owe their survival to BAs, their funds and expertise and experience (Ramadani, 2009).

Some sub-categories to BAs have been developed over time. One group are Founding Angels (FAs) who operate on a slightly different ground than the usual BAs. FAs join the start-up team of a new technology-based firm (NTBF), complementing the scientific members coming mainly from universities and research institutions with business expertise and scientific understanding. They
make significantly fewer investments than BAs. An FA plays more the role of a founder and an entrepreneur than that of an investor because of his/her early engagement in the venture (Festel & Cleyn, 2013).

**Private Equity and Venture Capital approaches**

A very effective way of innovation financing is the involvement of risk capital funds. These funds can be roughly divided into Venture Capital (VC) Funds and Private Equity (PE) Funds, which mainly invest into companies listed in the Stock Exchange with later stage development. Lewandowska (2013) contends that VC funds seek to invest in the early stages of promising projects or firms while PE funds focus on a later stage of company development.

The prerequisite for PE or VC fund engagement in innovative company financing is a competent management and viable business plan. Venture capital is a medium- or long-term investment where the investor buys interests in an unlisted company to sell them when the company has become successful (Lewandowska, 2013). A risk capital fund usually buys a minority stake in the target company and then pushes the company management to boost the company's performance. The expected company valuation ranks between 20-30% per annum. Should the investment be recognized as having lost its potential for growth, measures are undertaken to terminate the agreement. At the end of a successful investment, which is tentatively 4-7 years, the fund exits the company and sells its stake, which was in the meantime significantly revaluated to the company managers (management buy-out – MBO) or external managers (management buy-in – MBI), or sells the shares in the Stock Exchange (Initial Public Offering – IPO) or to strategic investor which can further benefit from incorporating the target company into its network. It has also been shown that more innovative and profitable ventures are more likely to go public than ventures with more imitative or derivative projects (Schwienbacher, 2008). Lerner, Sorensen and Stromberg (2013) state that the engagement of PE funds in the transaction will result in higher investment in innovation.

Ebersberger (2011) argues that public subsidies, when successful in fostering innovation, affect the exit of firms indirectly. Subsidized firms are significantly less likely to exit than they would without subsidy. Moreover, subsidies do not have a significant effect on the closure of firms. Subsidies for innovation do not keep an innovation alive which would have to close without subsidies.

Today, Corporate Venture Capital (CVC) has gained increasing importance in innovation financing. CVC is defined as the practice where a large firm takes an equity stake in (or enters into a joint venture arrangement with) a small but innovative or specialist firm to which it may also provide management and marketing expertise. The objective is to gain a specific competitive advantage (Business Dictionary, 2016). Many reputable companies, like Microsoft, Intel and Merck have made substantial amounts of CVC investment in collaboration with external start-ups where they have
reduced the start-up’s need to raise financing from external capital markets and independent venture capitalists (Chesbrough, 2002). The role of CVC has been thoroughly studied by Fulghieri and Sevilir (2009). They found that CVC not only created firm value, especially when firms undertook CVC to exploit new technologies, but also increased the innovation rates of established firms significantly. Chemmanur and Louskina (2008) have shown that CVC represents an important source of financing for the development of innovative technologies by young and risky entrepreneurial firms that would not have received financing from other sources, such as independent venture capital (IVC). CVC is believed to be beneficial for start-ups, because it allows them to benefit from synergies generated with a strategic investor. On the other hand, it may expose them to a possible conflict of interest with the firm providing the CVC (Fulghieri & Sevilir, 2009).

**Leverage Buy-out approach**

A risk capital fund can also participate in a leverage buy-out (LBO) which aims at the purchase of the target company by means of using financial leverage (borrowed money). Schematic outlay of the LBO process is depicted in Figure 2.

**Figure 2. Scheme of the LBO process**

*Source: own elaboration*
The LBO process works rather simply, but sometimes it is at the borders of the law. In the beginning, there is a private equity fund established by the support of pension funds, donors or other providers of financing. Such a fund gets together with a limited company formed by investors (which may include the target company managers as well). They found a one-off purpose company which aims to buy the target company. This company is called a “special purpose vehicle” (SPV). To raise money for these transactions, the SPV floats a loan which is collateralized by the assets of the target company. In special cases, the SPV can issue bonds, which are usually characterized by poor rating. The reason behind this is that these bonds are issued by an excessively indebted company. The debt burden may exceed 80% of the total company liabilities. Therefore they are called junk bonds. Once the SPV raises enough money, it is able to acquire the target company. At first the shareholders of the target company are compensated. In the wake of the shareholders’ compensation, the SPV is merged with the target company and all the liabilities are transferred to a newly established company which is pushed to its maximum performance so that all the debts would be repaid (senior and mezzanine debt, as well as to satisfy the claims of bond holders). It is apparent that banks are prone to finance LBOs because they can afford to charge high interest rates. When using an LBO, the investors can purchase the target company even with minimum private financial funds. It is apparent that an LBO is a very risky operation, the success of which is dependent on the target company’s operation performance, which is the condition for a timely debt repay.

**Mezzanine lending**

Mezzanine lending is used preferably for further expansion of existing firms in situations when the company needs additional financing while all company assets are collateralized. Mezzanine debt is usually provided by financial funds or by some banks. Mezzanine debt is not collateralized, and therefore it is very risky. Finance providers charge high interest rates (20% or more) to compensate for the excessive risks. In the case of default, the company may run a debt-equity-swap to minimize the potential losses. Since mezzanine debt is subordinated to the senior debt provided by the established bank. It is not exceptional that mezzanine financing is often recommended by the senior debt provider. Deferred repayment of the mezzanine debt does not expose the company to excessive risks. The term “mezzanine” means that this type of financing is in-between FFF and IPO.

**Peer-to-Peer lending**

Peer-to-peer (P2P) lending has grown in importance in recent years. This approach, which leaves out banks as financial brokers, is very promising. P2P uses the electronic marketplace to balance the supply and demand for money. Despite some initial mistrust in this concept, especially SMEs have taken interest in this model of financing. Both parties concerned (lender and debtor) benefit from the partition of the profit margin which originally belonged to the bank. This approach has inspired traditional banks to establish subsidiaries or other affiliated entities to get a stake in this
new business. The portfolio of loans offered through P2P comprises one-off repaid loans, stepwise repaid loans, overdraft loans etc.

Various platforms have been established for innovation funding. One of them is NewConnect, which has been listed in Warsaw Stock Exchange. This platform helps small and middle size enterprises (SMEs) raise capital for innovation funding. In general, NewConnect allows the companies to fund both their own innovation research and the purchase of innovation from external sources. The reason for the establishment of NewConnect was SMEs’ lack of assets which large companies usually operate with. Companies are therefore seeking for external inputs, preferably for external capital sources. NewConnect can offer innovation financing at interest rates that are lower than those of bank loans (Lewandowska, 2013).

Initial Public Offering approach

Initial Public Offering (IPO) represents the most traditional approach to raising money for further development of the company. Notwithstanding the fact that IPO was originally targeted at start-ups, this approach is usually reserved for well-established companies with proven track records which can persuade the potential investor to purchase company shares. “Going public” as it is termed in the USA, is arranged through an investment banker, who oversees preparing share underwriting. Investment banks act as a financial intermediary for businesses and other large organizations, connecting the need for money with the source of money. An investment bank helps an organization, which may be a company or a government or one of its agencies, in the issuance and sale of new securities. The most critical point is determining the initial share price to be in consonance with investors’ demand. Any overpricing or under-pricing of the shares is detrimental to the company. A good investment banker should be able to place all newly issued shares by the IPO date (Higgins, 2015). IPO is very costly, and therefore it is advantageous for big companies. There are many examples to demonstrate the effectiveness of IPO financing. A typical one concerns combined financing of company growth, which includes the sequential process of venture capital and IPO financing.

In the late 1990s, one of the biggest Central European pharmaceutical companies, Zentiva, got together with the venture capital fund Warburg Pincus, which acquired a 66.6 % stake. After the squeeze-out of minority shareholders, the stake was increased up to 99.25 %. The upcoming expansion was financed by IPO in the Prague and London Stock Exchanges in 2004. During the IPO, the company sold 11.2 M shares at more than 5.5 M CZK, which accounts for a 30.2% stake. This stake became freely tradable. The rest of the shares were kept by Warburg Pincus (53.9%), the management and employees (13.8%) and other minority shareholders (2.2%). After the IPO, the company’s market capitalization reached the value of 18.5 bill. CZK. After the exit, Warburg Pincus sold its stake to the strategic investor Sanofi-Aventis in 2009. During this period Zentiva’s share was evaluated (fixing an artificial price by governmental action) by 120% (Nývitová & Režňáková, 2007, 2008).
Bank loan

Financing innovative companies by a bank loan is one of the most favourite approaches. In Europe, bank loans remain the prevalent way of financing innovative companies (Kislingerová, 2010). This conservative approach exhibits many advantages. The loan is relatively easily accessible due to the increasing competition on the European banking market. A variety of new banks are approaching clients very aggressively by offering them relatively low interest rates. They are also able to slash bank fees purposely to attract new clients. There is also the good experience with the European bank sector which went through financial crisis almost unshaken in 2008-2012, with some exceptions (Wolf & Kain, 2016). Banks usually offer a variety of loans at conditions which can be tailored as per company needs. Moreover, global companies can resort to any bank abroad to ask for a loan, which increases the competitiveness of the European banking market.

As an alternative to bank loans, various types of a leasing can also be applied. Leasing is a special, economically attractive solution where the lessor (the financing party) gives the lessee (the financed party) a right to use a fixed asset for a specified period in return for a fee, usually paid periodically, on terms that the parties have agreed on (Lewandowska, 2013). Leasing can be further broken down into financial leasing, which gives the lessee the right to purchase the asset after the expiration of the lease, and operation leasing, which operates as simple renting of the asset. In special cases, the “sale-and-leaseback approach” can also be used, which enables the lessee to sell the asset and lease it back. In addition to other advantages, it may help improve a company’s cash-flow position. In general, the advantages of leasing are the following (Lewandowska, 2013):

• accessibility to innovative technologies,
• optimization of the lessee’s tax burden,
• the lessee can negotiate the schedule of payments to make it maximally convenient (seasonal instalments etc.),
• the on-going financial burden is minimized, because instalments become due at fixed dates,
• leasing companies expect lower collateral than banks offering investment loans,
• legal and tax security,
• leaseback releases the “locked-up” capital, and
• relatively simple procedures.

**Public Subsidies of Innovation**

Public subsidies and their effects on innovation performance

A great deal of emphasis has been already put on public subsidy of innovation. There is a consensus among professionals on the need of public stimulus for innovation, but, due to the uncertainty of its results, the increasing costs of innovation processes, and their risks the sentence is incomplete
Financial Aspects Of Open Innovation

(Heijjs, 2001). Abors-Garrigos and Rodriguez Barrera (2011) have shown that public subsidy enhances the innovation performance of companies. It also stimulates R&D. It is believed that the subsidy must have a critical mass to influence innovation behaviour. The authors have also arrived at the conclusion that, in addition to the critical mass of the subsidy, a company’s innovation intensity is influenced by its innovation structure as well as its technological intensity. Moreover, public R&D funding has a significant positive effect on innovation inputs and innovation outputs, as well as on the breadth and depth of cooperation in funded companies (Ebersberger & Lehtoranta, 2008). When going deeper into details, research has indicated that the effects of EU subsidies are significantly weaker than those coming from other public sources (Abors-Garrigos & Rodriguez Barrera, 2011). A possible explanation can be ascribed to the assumption that the subsidies provided by the EU are not treated with the same level of cautiousness and responsibility.

It is important to stress that public subsidies may either complement existing innovation funding or to substitute it. In the former case the public subsidy increases R&D expenditure, and the company can start more projects or to run projects on a larger scale. In the latter case, the company simply replaces existing private funding. This way public funding does not generate additional private investments. This effect is defined as the crowding-out effect. This effect is not rare, and it is closely combined with a firm’s permanent incentive to apply for public subsidy (Salmi, 2012).

New approach of EU to innovation financing and the implications for national economies

InnovFin - EU Finance for Innovators is a joint initiative launched by the European Investment Bank (EIB) and the European Commission under Horizon 2020. It consists of a series of integrated and complementary financing tools and advisory services offered by the EIB Group, covering the entire value chain of research and innovation (R&I) to support investments from the smallest to the largest enterprises. InnovFin targets R&I-intensive industries like ICT, manufacturing, life science/health and renewable energy (Malo, 2015).

InnovFin SME Guarantee, the first and current product, targets R&I-driven SMEs and small midcaps requiring loans of between EUR 25 000 and EUR 7.5 million. A loan of more than EUR 7.5 million can be considered on a case-by-case basis.

Another instrument is the InnovFin SME Venture Capital. It is designed to improve access to risk finance by early-stage R&I-driven SMEs and small midcaps through supporting early-stage risk capital funds that invest, on a predominantly cross-border basis, in individual enterprises. SMEs and small midcaps located in the Member States or in the Associated Countries are eligible as final beneficiaries (EC, 2016).

Access to risk financing for European innovative businesses is one of the key factors regarding the effort to improve the status of European economy. Financial resources for funding via Horizon 2020
are limited, and all the applicants for the subsidy have to face fierce competition amongst other European companies. The biggest value added of this program is the satisfaction of even SMEs’ needs for innovation funding. These companies are usually not strong enough to guarantee loans fully. That is why Horizon 2020 provides them with the Instrument program which facilitates granting loans to companies. This program is broken down into several phases. A significant level of investment under the SME Instrument program is needed in order to succeed at least in Phase 1 and receive initial funding for the purpose of carrying out the feasibility study. InnovFin is a very important tool for overcoming these obstacles and enabling companies to continue their development.

**Assessment of the economic effects of open innovation**

The distinctive emblem of Open Innovation (OI) is the effort to make use of new opportunities through external paths to the market, if a technology is not suitable for the current business model (Chesbrough, 2003, 2006). A key idea of OI is that multiple firms must often cooperate to create value for customers. The cooperation usually includes any of the potential forms of collaboration, specifically alliances, networks, communities, consortia, ecosystems and platforms (West, 2013). It is apparent that the application of the OI business model may lead to significant savings of costs. Apparent or hidden financial effects of OI can be disclosed in the following areas:

- risk and costs decrease during the development,
- risk and costs decrease upon launching the product,
- shortening both the development time and the time-to-launch,
- achieving cost savings in production, and
- support of shared learning.

All the above benefits contribute directly or indirectly to the increase of a company’s financial performance. Link, Ruhm and Siegel (2014) have examined the impact of PE investments on the interest towards the application of OI principles. They show that PE investments accelerate the development and commercialization of research-based technologies, thus contributing to the economic growth. They have arrived at the conclusion that the firms attracting PE investments are likely to adopt innovation strategies, such as entering licensing agreements and selling their technology rights, as well as engaging in R&D agreements.

Link, Ruhm and Siegel (2014) also conclude that PE investments accelerate the commercialization of publicly funded research and the diffusion of knowledge by becoming an integral part of the entrepreneurial firm’s innovation strategy. This way they prove that both public and private investments have a positive effect on innovation performance.

Salmi (2012) draws attention to the impact of public R&D funding on open innovation. This way of research financing encourages companies, as well as universities and public research institutes, to
start new research and development activities, and thus create new knowledge, competencies, and innovations. First, it is important to take into consideration whether obtaining public subsidies either extends R&D activities or simply replaces private funding. In the former case, we speak about the additionality effect of public subsidies. They are further classified as input or output additionalities, depending on their position in a linear innovation process. It is obvious that additionality effects are measurable (e.g. by the number of granted patents, productivity, and profitability).

Assuming that public subsidy increases R&D expenditures, it may have an impact on the increase in internal R&D activities and external sourcing of technologies. One of the possible effects of public subsidy is that a company can embark upon a project which would have been either too expensive or too risky. The OI concept in turn suggests that leveraging external innovations and technologies will reduce the costs and risks of R&D (Chesbrough, 2006). Therefore, it is reasonable to assume that the extent of the public funding of a project can favour internal over external execution of R&D. Consequently, additional funding is expected to lower the need for external innovation, and by contrast, drives firms to consider external sourcing of technologies seriously (Salmi, 2003). In addition to the financial effects, non-financial effects of public subsidies, like more intense collaboration and networking, are also supposed to come into effect.

KEY TAKE-AWAYS

- By reading this chapter you acquire basic knowledge about principles of financing OI projects and companies.
- In addition, the effects of public subsidies on company financial performance and boosting innovation activities is addressed as well.
- Finally, the impact of OI adoption on company financial performance is discussed and critically evaluated.

PEDAGOGICAL GUIDELINES

Interactive activities: Seminars and workshops with the providers of financial funds (bankers, financial fund managers, private investors).

Learning exercises: Case study concerning OI financing. Comparison of the suitability and economic effectiveness of various approaches to OI financing.

Self-study: The papers and books dealing with the topic referred to below.

Self-evaluation: Elaboration of an essay on a chosen topic referring to the economic aspects of OI.
3.4. Implementing Open Innovation: Tools, Methods & Processes

Evaluation questions

Individual work examples: Case study resolution

Group-work examples: Field research and group presentation of the results of the research concerning OI financing.

Teaching tips

Slides Slide presentation: PowerPoint presentation enclosed (Innovation financing)

Links to teaching material: The enclosed text dealing with the topic (Financial Aspects of OI)

Supporting case material: Case Study OI

References

Financial Aspects Of Open Innovation

APPLICATION OF CREATIVE THINKING TECHNIQUES FOR FACILITATION OF COOPERATION IN INNOVATIVE BUSINESS DEVELOPMENT

GUNDEGA LAPINA

ABSTRACT

The lecture and the related practical activity introduce students with the methodology of the game “From Idea to Money”, for the assessment of a new product, project or service idea in a company. The game is also useful in training the innovation skills necessary for open innovation. Playing a game according to defined rules, the students use a combination of different creative and critical thinking techniques to assess the new idea and to make a decision on its viability. Playing a game, a real new product, project or service idea is discussed from different viewpoints. The discussion is framed in a well-structured format and is time-effective. The outcome of the game is structured assessment of a product, project or service idea, which forms the basis of a decision on the viability of the idea. During a structured focus group discussion, the students develop a range of open innovation skills related to communication and cooperation in innovative business development.
## Prerequisite

1. Basic knowledge of innovation management, particularly the topics of new product development process, innovative entrepreneurship, creative thinking methods in entrepreneurship, and basic comprehension of open innovation (these topics have been reviewed in previous lectures).

2. Practical experience in business and/or design, new product development, technology development and application of technologies in business, business financing, manufacturing, PR and marketing, and project management.

## Objectives of the lecture

To introduce students with the methodology of the game “From Idea to Money” and apply it in the analysis of a real case – facilitation of cooperation in innovative business development.

## Workload

1.5 h teaching; 0.5 h preparation work for the game, 2 h discussion, according to the rules of the game.

## Learning outcomes

According to the OI-Net identified Los, the game refers to: Los related to creativity, entrepreneurship and innovation:

### Creativity

**LO #4:** To Apply Idea Generation Tools To Add Value To The Product / Process / Service / Business Model In An Organisation.  **LO #8:** To Develop Creative Thinking Skills And Methods.

**LO #11:** To Explore And Exploit The Role Of Creative Potential In Innovative Entrepreneurship.

**LO #12:** To Plan And Manage An Idea Generation Session.

**LO #15:** Entrepreneurship: To Make Responsible Decisions Under Uncertainty.

### Innovation

**LO #40:** To Develop an understanding of the role of creativity and innovation for value creation and competitiveness.

**LO #4:** To critically analyse case studies related to innovation.

### Knowledge

Overview of all contributors to open innovation (cooperation for innovation).

The role of team work in new product development.

Creative thinking techniques and their role in innovation management.
### Skills
- Ability to apply creative thinking methods in project planning
- Skill to organize a structured creative thinking process
- Team-working skills
- Negotiation skills
- Empathy

### Competences
- Ability to assess the role of creativity from the perspective of open innovation.
- Multidisciplinary approach towards innovation — new product/project co-creation.
- Creating a project development team.
- Matching project structures to innovation tasks.
- Risk identification and management.

### Reading List

### European Qualifications Framework (EQF) Level

| Level 5 | 1 Knowledge: Comprehensive, specialized, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge; Skills: A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems; Competences: Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others. |

---

474
Lecture Content

The aim of the lecture is to introduce students with creative thinking techniques, suitable for facilitation of cooperation skills in innovative business development.

To reach this aim, in addition to the theoretical background provided in previous lectures (see the pre-requisites: new product development, basic comprehension of open innovation, innovative entrepreneurship, and creative thinking in innovative entrepreneurship), the lecture gives a review on:

1. Creative thinking methods and their benefits in new product/project development,
2. Necessary skills for managing innovation and
3. Description of the creative thinking game “From Idea to Money” – theoretical basis, method, process and expected outcomes.

Assuming that the students are familiar with the topics called as prerequisites, there is no need for additional reading. If the students are not familiar with the abovementioned topics, an additional reading list is available in the References.

Content-related materials

1. Creative thinking, vertical and horizontal thinking, T-type thinking, and divergent and convergent thinking.
3. Creative thinking methods (brainstorming and its different varieties, 6-3-5, mind mapping, combination, free entry, focus group, Six thinking hats as alternative to SWOT).
4. Skills for innovation

   1. OECD distribution of innovation skills:
      • Basic skills and “digital-age” literacy (reading, writing, numeracy; “digital –age” – skills that enable people to access and interpret information in knowledge-based society; technology fluency – for the use of digital technology, communication tools and networks).
      • Academic skills (subject matter areas obtained through the education system – English, mathematics, physics, law, etc.).
      • Technical skills (specific skills needed in occupations may include academic skills and knowledge of certain tools or processes).
      • Generic skills (problem solving, thinking creatively, ability to learn, ability to manage complexity).
      • “Soft skills” (team work, motivation, communication, and initiative, ability to manage emotions and behavior during interaction; multicultural openness; receptiveness for innovation).
      • Leadership (team building and steering, coaching and mentoring, lobbying and negotiating,
co-ordination, ethics and charisma).

2. Innovator’s DNA: the success key for an innovator is based on associating, questioning, observing, networking, and experimenting, and the ability to apply these skills in business.

**Practical part of the lesson**

In general, the game can be used mainly for two purposes – 1) to promote innovation cooperation between industry, design and university, and 2) to teach open innovation approaches to students. In the first case the players of the game are real discussion focus group participants – certain field experts. In the second case the students simulate a discussion as a role-play, which explains the basic principles of open innovation in a very simple way. Students have found this to be very useful in practice.

Let us discuss the second case in closer detail.

In order to apply the game in practice and to learn its technique, under the leadership of the teacher, the students discuss their practical problems, and new product, project and process ideas that may be solved by using creative thinking methods. The outcome of the discussion is a decision on a new product/project idea reached by using the game “From Idea to Money”.

The teacher explains the method of the game, the roles of the players, and the expected outcome. After that, the students form a team, share the roles, and prepare the board and related accessories (badges, notepaper) for starting the discussion game. Each student team finds an idea to be discussed and assessed by using the methodology of the game. Usually students come up with their own discussion ideas, very often real ones. However, the teacher should have some “standard” discussion ideas in case the students cannot find an idea of common interest. Then the discussion team divides the roles according to their expertise or experience.

This method is suitable for master level students who have some work experience.

If the student group is without working experience, this method can be used only as a “role-play” game, where the roles of the participants can be divided according to the interests of the students. In such a case the discussion topic has to be very simple, close to real life, so that all participants feel comfortable with it.

For the description and process of the game – the creative discussion “From Idea to Money”, see below.
**Pedagogical guidelines**

The game is based on a combination of well-known methods: focus group discussion, parallel thinking (six thinking hats), and a moderated discussion. In order to achieve the final result of the game, to make a summary and analyse the idea, the students have to apply also critical thinking and analytical skills.

The creative discussion game teaches those innovation skills which are usually not taught during lectures, such as generic skills (problem solving, thinking creatively), “soft skills” (team work, cooperation, negotiation, communication, time management, ability to manage emotions and behavior during interaction; multicultural openness; receptiveness for innovation), as well as leadership skills (team building and steering, negotiating, co-ordination).

Following the “rules of the game” students learn to structure their thoughts, express them clearly, defend their opinions, listen to other opinions, and negotiate. At the same time, they learn to work in a team. Every role in the game is played by an individual student or a small student group. If a small student group takes one role, they have to come to a common conclusion before they present it. When students present their opinions, they are supposed to listen respectfully to other opinions in order to come to a common conclusion.

From the pedagogical viewpoint, taking part in this game is “learning by doing”. When students discuss a particular question, they concentrate on the content of this question, but observing the “rules of the game” makes them train and learn the soft skills, that are necessary for open innovation.

In order to assess the students’ knowledge of the method, some evaluation questions can be asked:

1. In what kind of cases is the method “From Idea to Money” useful?
   • Expected answer: in cases where a new business, product, service or project idea has to be assessed, and it is important to know multiple opinions.

2. What kinds of skills does the method develop for students?
   • Expected answer: problem solving, team work, cooperation, negotiation, communication, empathy, time management, etc.

3. What can be practical examples, typical for discussion when using the method? And who would you invite for the discussion?
   • Some examples are provided in the Table 1.
### Table 1. The participants of the game “From Idea to Money”

<table>
<thead>
<tr>
<th>Practical examples, typical for discussion when using the method</th>
<th>Who would you invite for the discussion</th>
</tr>
</thead>
</table>
| Development of a new product – a new type of pie in the baking industry | Food technologist  
Food researcher  
Manufacturer  
Designer  
Financier  
PR & marketing manager  
Company manager  
Consumer  
Additionally, there could be invited:  
Dietologist  
IT specialist  
Food suppliers |
| Development of a new service – Internet shop | IT expert  
Designer  
Financier  
PR & marketing manager  
Company manager  
Client service manager (merchant)  
Consumer |
| Development of a new research project on the application of eco-technologies in the metal industry | Material scientist  
Environment scientist  
Eco-technology expert  
Company manager  
Research laboratory/institute manager  
Financier (with experience in funded research projects)  
PR & marketing manager  
Consumer |

As for teaching tips, there is no need for slides, as the rules of the game can be explained on the basis of the game board. However, there are some slides available for explaining the method (see Teaching Tips).

Supporting case material can be found in Case Study, where a real case of a discussion on a project idea is described.
GAME “FROM IDEA TO MONEY”

Rules

The creative thinking game “From Idea to Money” is meant to evaluate a new idea within the framework of a structured discussion. The new idea can be about a new product, new service, new prototype or method, new type of cooperation, etc. In the course of the game the players establish whether it is possible to implement the new idea and to sell its result.

The rules of the discussion are described step by step below under the title Process of the Game “From Idea to Money” (see below).

Players

The players are representatives of various fields related to the development of new products, services, projects, or methods. Suggested roles for a general discussion are: designer, manufacturer, financier, manager, consumer, manufacturer or merchant, scientist or technologist, and PR and marketing expert. The roles of the players are chosen according to their field of expertise. The experts, however, are chosen according to the idea which has to be discussed. To achieve practical and useful results, 4-7 players are required. The initiator and leader of the game is the author of the idea. It is possible to involve more than 7 players in the game, but in such a case two or more persons would represent one field of expertise.

Details

For this game the players need a room with table, on which they place the game board (Picture 1). The players choose their roles and attach badges according to the roles (Picture 2). To set a time limit for the game, a clock/timer is necessary. To write down important ideas and conclusions you will need notepaper, preferably in the form of Post-it notes, as well as a pencil or a pen.

PROCESS OF THE GAME “FROM IDEA TO MONEY”

1. The players take their seats around the board.

2. The players choose roles and clip on badges with field symbols of what they represent – designer, manufacturer/merchant, financier, manager, scientist/technologist, manager, PR and marketing expert, and consumer.

3. The initiator of the game or the leader presents the idea to be discussed. The idea is
written on a piece of paper and placed in the centre of the board.

4. The leader of the game reminds the players that the idea/concept will be discussed from different points of view with the purpose of ascertain its potential and feasibility.

5. The leader gives the task to all the participants to think about the idea from the viewpoint of their stakeholder expertise, according to the four thinking directions – general, positive, negative, and creative.

6. The leader provides notepaper to the participants, asking them to take notes, answering the questions on the board of the game: what do I know about it...; I like it because...; I don't like it because...; I would do it this way... The notes are put on the board of the game in the appropriate sector.

7. The leader sets the sequence of the speakers and gives the floor to the first expert. The expert expresses his/her opinion on the topic, mentioning all he knows as a field expert, positive aspects, negative aspects and creative solutions. The other participants listen and join this field of expertise and add something if there is anything to add. The expert takes notes of the ideas of the other participant, and sticks them to the relevant field on the board. Each field has a preferred time limit for discussion - 5 minutes. The leader takes care of the time limit!

8. When the idea is discussed from one viewpoint, the game moves to another field, and another expert expresses his/her opinion. This way the players, i.e. the representatives of different fields take turns to express their opinions, listen to others and contribute in all fields of expertise.

9. When all the representatives have expressed their opinions, listened to the opinions of the others and written down additional ideas, the leader of the game reads them out to the players.

10. The result of the game is a conclusion about the plusses and minuses, threats and opportunities of the idea. If the discussion leads to a conclusion that the idea is not viable, then a final decision is made by all the participants. If the final decision is positive, then a summary of the creative solutions is discussed, and a road map for next activities is developed.

11. At the end of the game it is evident for the author of the idea/the leader of the game whether the idea will be profitable and which are the best ways towards its implementation.
Picture 1. The board of the game “From Idea to Money”

Picture 2. Badges for the players
3.4. Implementing Open Innovation: Tools, Methods & Processes

CASE STUDY
APPLICATION OF THE GAME “FROM IDEA TO MONEY” IN THE ASSESSMENT OF A PROJECT CONCEPT AT RISEBA UNIVERSITY

Project concept

The project concept is based on a problem in distant learning studies at RISEBA University. RISEBA distance learning offers three undergraduate programs and one graduate program in distance learning. The students study at the university by using an e-learning platform, where they get the learning materials and study support system. The tutors (university teachers) adapt their face-to-face learning materials for distance learning and insert them into the e-learning environment. The students are supposed to study each course within a certain period of time. Their task is to read the text, watch video-lectures, do the assignments, and in the end of the course, pass an exam. The teacher’s role in distance learning differs from teaching in class. The teachers are called tutors and their basic role is to support the students. In the RISEBA case, the teachers also develop the learning materials themselves.

The distance learning studies were launched in a hurry. The teachers were asked to develop the e-learning materials and start tutoring. Some training workshops were organized for the teachers, explaining the basics of distance learning and giving instructions for the use of Moodle (the e-learning platform used in distance learning at RISEBA). However, after a few months of studies, there were multiple complaints from the students – about insufficient learning materials, lack of support and even feedback from the tutors. At the same time, the teachers were complaining that the students did not put enough effort to studying, are were lazy and expected that in distance learning they would get an “easy diploma”. After discussions with the teachers, it was realized that some tutors did not believe in distance learning; many considered that it was an easy way to earn money; many of the tutors were not able to use the e-learning platform technically; the learning materials were of inferior quality due to lack of time; some tutors did not understand the tutor’s supportive role in distance learning; and only a small part of the tutors were happy with the distance learning process.

The management of the Distance Learning Centre made the conclusion that the teachers had not received enough training, knowledge and skills about e-learning, and that was the basis of all the problems in the RISEBA distance learning process. There was an intention to organise some face-to-face workshops for the teachers, which, however, did not provide them with systemic knowledge in the field. In order to solve the problem in the long term, the decision was made to develop a project: “Distance learning course for distance learning
The project concept included the planned project activities and a vision of the project lifecycle, the expected outcome and funding opportunities. The activities included detailed needs analysis, and after that the development of a study course for e-learning tutors. The course content would include the main topics on: e-learning course development; e-learning course delivery and support for students; and IT support tools in course development and delivery. It was planned that after the development of the course, it would be piloted by some tutors, and according to their feedback, improvements would be made. When the course was ready, it would be obligatory for all distance learning teachers at RISBA. During the studies of this course, each teacher would improve his/her course content and delivery mode by implementing the learned methods and tools. After completing the course studies, it was expected that the tutors’ courses would be improved, the students would get better learning materials and study support system, and the level of students’ satisfaction would increase.

It was planned to develop the course within an international project, using the financing of the EU support programs. This way the course would benefit from international cooperation and expertise of the project partners. The time frame of the project was set for the maximum of 2 years.

After the development of the project concept, it was prepared for presentation to the participants of the game “From Idea to Money”.

**The participants of the game “From Idea to Money”**

In order to discuss the project concept, all the interested sides were invited. The participant titles of the game were adapted for the topic of the discussion object. The roles of the participants and the invited persons’ responsibilities are summarised in the Table 2.

The discussion partners were invited to the discussion 10 days before it, so that everyone could schedule the intended time (1.5 hours) in their calendars. In the invitation it was briefly explained what the discussion would be about, what was expected of them in the discussion and what would their role in the discussion be. The participants were asked to confirm their participation. All the participants did this.
The process of the game “From Idea to Money”

The process of the discussion was organised according to the “rules of the game”.

Before the meeting, the project manager had prepared a short summary on the project concept and written it on an A1 form. The project manager took the role of the moderator of this discussion.

At the beginning of the meeting all the participants were invited to take seats around a big table, and have some tea or coffee in order to feel comfortable. The moderator explained the problem statement and the planned project concept briefly, which was the discussion
object. The summary of the project concept was on view on the whiteboard during the entire discussion. Some experts made some clarifying questions on the concept.

When the discussion object was clear to all participants, the moderator told something about the discussion method, or explained “the rules of the game”. According to the rules, it was expected each of the experts to provide the opinion of his/her particular expertise on the discussion object, and come up with new, additional ideas or improvement of the concept and its implementation.

The moderator gave the discussion partners the timeframe of the discussion (15 minutes for thinking and making notes) and 45 minutes for overall discussion. Also, the moderator explained the structure of thinking (what do I know about it; what do I like about it; what I don’t like about it; I would do it this way), and explained what kind of ideas should be written on what colour notepaper. The discussion participants received four colours of notepapers for making notes and sticking them to the game board. The colours of the notepaper and the structure of thinking were also written on the whiteboard for the duration of the entire discussion.

When the task was clear for everyone, the thinking process could start. The experts thought about the project concept from their own viewpoint of expertise, and made notes. In some expert groups, where there was more than one expert, the participants discussed the topic first, and came to a common conclusion on what should be written on the notes. The thinking and internal discussion process took the planned 15 minutes.

After that the moderator gave the floor to each expert separately, starting with the designer. When the designer had explained his/her opinion, the other participants joined the role of the designer and added some ideas according to the project design. The design expert made additional notes of the suggested ideas and put them to the game board. When the design expertise part was over, the floor was given to the scientist. This way all the participants, one by one, went through the positive and negative sides of the project concept from their expertise viewpoint, and came up with new ideas and solutions.

The input of the discussion partners is summarized in the Table 3.
### Table 3. The participants of the game “From Idea to Money”

<table>
<thead>
<tr>
<th>Role</th>
<th>What do I know</th>
<th>What do I like</th>
<th>What I don’t like</th>
<th>I would do it this way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer</td>
<td>The project may be realised nationally and internationally. I am not sure that the cooperation partners need this project. I am not sure of whether a similar project has been realised already.</td>
<td>The idea is good and with high “project ability”. A well-structured concept. The project outcome would raise the study quality.</td>
<td>No need for many international partners. A too time-consuming project (planned for 2 years). It would be cheaper to develop the course with our own financing.</td>
<td>I would do pre-project needs analysis. I would find out if it is possible to find a ready-made course on the project topic. Needs analysis should be made repeatedly in the middle of the project. I would calculate the budget of the project with and without EU funding.</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>This role was not relevant for this particular discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financier</td>
<td>We do not know yet how much it will cost. We do not know what is the cost difference between an EU funded project and a self-financed project. A financially profitable project in the long term.</td>
<td>EU financial support for the project is welcome that would be more useful for the University. The EU funded project would increase the turnover of the school.</td>
<td>An unclearly pre-defined budget may cause additional expenses.</td>
<td>The budget has to be planned very carefully. A study has to be made if such a course exists already in English; then there would be only adaptation and translation costs. Will raise the profitability of distance learning. RISEBA will be more competitive.</td>
</tr>
<tr>
<td>Manager</td>
<td></td>
<td>Well-structured project.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Application Of Creative Thinking Techniques For Facilitation Of Cooperation In Innovative Business Development

<table>
<thead>
<tr>
<th><strong>Merchant - this role in this case was substituted by the role of Teacher</strong></th>
<th>Teachers lack knowledge in course development and delivery. Teachers are not familiar with the e-learning IT support tools. Most of the teachers have no time and willingness to learn.</th>
<th>An absolutely necessary course for the teachers, will raise their qualification. Will raise the satisfaction level of the students.</th>
<th>We can lose teachers if they are forced to study and meet the methodological requirements.</th>
<th>The staff of the Distance Learning Centre will participate in the project; also the Distance Association of Latvia will be involved in the course development.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scientist</strong></td>
<td>There are very many concepts and courses on how to teach. It is difficult to choose the right courses. The materials should be based on cognitive theories.</td>
<td>International intellectual input.</td>
<td>The course should be simple, user-friendly, and it should visualise everything as much as possible. In order to motivate the teachers, Good Practice cases should be prepared. Trying to utilise the available resources. Using adult teaching methods. Organising questioning of the teachers on their needs. Using ready-made courses as the basis. Receiving a state recognized certificate (plan for course accreditation).</td>
<td></td>
</tr>
</tbody>
</table>
### Technologist

IT without a support system – just hardware. If something is made in Moodle, it can be transformed to another e-environment.  

Transforming of previous education processes.  

All information about the intended IT is not available.  

Select a proper IT platform. No need to make a new e-learning environment, use existing ones – Skype, Adobe Connect.  

Select modern IT solutions. Include SCORM (set of technical standards for e-learning software products) to ensure mutual correspondence. I would call it OER (Open Educational Resources), which is a beginning stage for MOOC (Massive Online Open courses). For MOOC – organise short videos.

### PR and marketing expert

There are a lot of good courses in MOOCs (e.g. Coursera), raising the visibility of the university. Current e-learning courses cannot be widely advertised. The course will have possible attraction for all good teachers willing to work in

The project is a chance to sell and gain profit. The distance learning program will improve and become more popular. Will raise students’ satisfaction. Courses will be in all 5 project languages, if it is an international

The course is not directly linked with the university’s main target group – students. There is a feeling that we are inventing a wheel, because such courses should exist and we can buy them. Students will not appreciate the

There should be very short and concrete instructions. Enough time and financing, and knowledgeable partners would lead to excellent results. Paying teachers during the piloting. Organising the course as training.
The outcome of the discussion

1. All the experts agreed that there was a need for a Tutor training course that would raise the e-learning quality, the satisfaction of students and the image of the University.

2. The question about the need of an international project would have to be reviewed. One group of experts expressed the opinion that it might be simpler and cheaper to adapt a ready-made
course. It would be possible to develop the course by utilizing the available resources of the university.

3. The course should be simple, user-friendly, with short videos and lots of visual aids.

4. The target group of the course is teachers. Adult teaching methods should be used in the course; the course should be based on cognitive theories. In order to motivate the teachers, Good Practice cases should be prepared.

5. From the methodological and technical viewpoint, the course should be of high quality. SCORM (set of technical standards for e-learning software products) should be included to ensure quality and mutual correspondence. In the future the course could become an OER (Open educational resources) and a MOOC (Massive open online courses), this way also raising the international visibility and recognition of RISEBA.

6. The practical part and exam of the course could be the development of the teacher’s (tutor’s) own course during the learning process, exploiting the methods and tools acquired in the learning process.

7. In the case of successful course development, this course could be considered as a certification course for the e-learning tutors not only at RISEBA, but at the national scale.

**Conclusion**

- The discussion participants enjoyed the structured, time-limited and productive discussion, giving their own contributions. The discussion partners came up with some new ideas about the course quality, content, technical solutions and teaching methods.

- After the discussion, the decision was made that the course “Training for Distance Learning Tutors about e-learning” has to be developed.

- The project group has summarized the discussion results and outputs, and is on the way of developing an international project application. If the project application will not be funded, the project group will adapt the project to a “national scale” project, and the course will be developed at RISEBA, attracting some international level experts at the national scale.

- The discussion results and ideas will be part of pre-project needs analysis. The ideas of the experts will be used for further development of the project concept, and for filling in the project application.
KEY TAKE-AWAYS

• The game “From Idea to Money” is a well-structured discussion format about a new product, project or service idea that leads to a decision about the viability of this idea.
• The game “From Idea to Money” is used to use the creative potential of innovation stakeholders and to facilitate the cooperation between them in the assessment of a new product, project or service idea.
• The game “From Idea to Money” is suitable for the assessment of real ideas by real experts from different areas. However, in order to develop innovation skills for students, a role play can be applied, where the students take different roles of innovation stakeholders. This way the game is a learning tool for open innovation skills.

TEACHING TIPS

Teaching materials

The game "From Idea to Money" has been developed within a BSR project “Baltic Fashion” (2010-2013) (http://eu.baltic.net/Project_Database.5308.html?contentid=50&contentaction=single).

The creative thinking game "From Idea to Money" is a method for fostering discussion between different innovation stakeholders, with the focus on assessing an idea of a new product, project or service. The method includes both analytic and creative elements.

Links to teaching material

http://oi-net.eu/m-public-library-front/open-innovation-handbook

ACKNOWLEDGEMENTS

The game from «Idea to Money» is developed within an EU project «Baltic Fashion», implemented in the Baltic Sea Region Programme 2007-2013. Especial thanks to Ms. Mara Adina and prof. Aigars Bikse from Art Academy of Latvia, who implemented the project in Latvia, and actively participated the development process of the game.
3.4. Implementing Open Innovation: Tools, Methods & Processes

References

TEACHING OPEN INNOVATION USING A GAME: SOME LESSONS AND RECOMMENDATIONS

MARCEL BOGERS, HENRIK SPROEDT

ABSTRACT

This chapter presents how to use a game to teach open innovation, based on a particular experience from which lessons and recommendations are drawn. The focus is on playing a board game in a graduate course of the international engineering program with a focus on innovation and business. We identify several important themes related to the process of learning through playing and the social dynamics of open innovation, while we also highlight possible caveats of “playing” and practicing open innovation.

This is a revised version of the original manuscript entitled “Playful Collaboration (or Not): Using a Game to Grasp the Social Dynamics of Open Innovation in Innovation and Business Education” and published by Journal of Teaching in International Business on October 3rd, 2012 (http://dx.doi.org/10.1080/08975930.2012.718702).
### Prerequisite

Basic understanding of open innovation concept.

### Objectives of the lecture

Providing knowledge of the process of open innovation, with specific emphasis on the tension between collaboration and competition;

Developing the social skills and competences in the context of open innovation.

### Workload

4h preparation; 4h teaching, including evaluation.

### Learning outcomes

#### Knowledge

**Lo #2:** to explore concepts of collaborative innovation and make them actionable.

#### Skills

**Lo #38:** to identify the nature and characteristics of the innovation process.

**Lo #3:** to recognise and evaluate the creative process in individuals and teams and how it contributes towards increased innovation.

#### Competences

**Lo #89:** to apply management practice in order to promote innovation.

### Reading List


Lecture Content

Introduction

This chapter describes how a playful game was used to students about relevant innovation management concepts and practices with particular reference to open innovation — a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model (Chesbrough & Bogers, 2014: 17). More broadly, this process is related to challenges of complex social interaction, e.g. at the intersection of business and engineering where different disciplines such as management, engineering, and design typically have to collaborate across boundaries in order to create something together. We believe that this is a particularly relevant area to apply this pedagogical approach given that open innovation (and related areas) is an increasingly important topic within academia, practice and education (Bogers & West, 2012; Chesbrough, Vanhaverbeke, & West, 2006; Dahlander & Gann, 2010; West & Bogers, 2014).

Games and play are deeply rooted in human beings as a way to learn how to cope with a complex environment. They are a source of creativity, a support for the development of social competence, and a trigger for innovation (Dodgson, 2017; Thomas & Brown, 2011). Playing can be a source of imagination and fun, as well as being conducive to deep learning (Biggs & Tang, 2007; Kolb & Kolb, 2010; Ramsden, 2003). Games give play a direction, and feed into the general theory of learning because playful games can offer students a platform to interact with their environment and acquire/recombine relevant knowledge through addressing the cognitive, emotional and social dimensions of learning (Illeris, 2002, 2003). Furthermore, games allow for the design of elements of active, collaborative, cooperative and problem-based learning (cf. Prince, 2004), into a complex but graspable experience. Moreover, playing games in a teaching setting, also including reflective activities, can address various levels of Bloom’s taxonomy and the SOLO-taxonomy of intended learning outcomes (Biggs & Tang, 2007).

We propose that playing a game that includes both co-operative and competitive elements is well suited to approach the complexity of open innovation (cf. Bouncken, Gast, Kraus, & Bogers, 2015). Using such a game can create a shared experience through iterations of relating that enable reflection on intangible social interaction across boundaries. This helps with the teaching of open innovation, because it can increase the understanding of the relevant theories and concepts through application in practice (cf. Schön, 1983). At the same time, it can also contribute to the development of the practical, social competencies that are essential for open innovation — which are until now not completely understood (Du Chatenier, Verstegen, Biemans, Mulder, & Omta, 2010). In this chapter, we therefore address the question of how playing a game, in a teaching
setting, can contribute to the understanding and development of social competencies to cope with the social dynamics of open innovation. Based on our results, we inductively identify five main themes that are important for teaching and coping with the social dynamics of open innovation: 1) social dynamics in playful games; 2) exploring and developing social competencies; 3) managing co-opetition; 4) participation in open innovation; and 5) knowledge as a resource in flux.

BACKGROUND

Innovation Processes Across Boundaries

Innovation implies the recombination of knowledge and thus implies boundary-crossing knowledge flows (Bogers & Horst, 2014; Galunic & Rodan, 1998; Leonard-Barton, 1995), which in the context of open innovation specifically refers to organizational boundaries even though these boundaries may be considered at multiple levels (Bogers et al., 2017; Chesbrough & Bogers, 2014). When firms open up their boundaries to work together with other stakeholders, including their competitors, many strategic issues arise. In particular, the simultaneous cooperation and competition — co-opetition — with other stakeholders within a value network both enables and constrains firms' abilities to create and capture value through innovation (Afuah, 2014; Bouncken et al., 2015; Brandenburger & Nalebuff, 1996; Nalebuff & Brandenburger, 1997). Open innovation processes also affect the individual level as shown by Du Chatenier et al. (2010) who examine the competencies that professionals need for working in open innovation teams, and to cope with the challenges they face. Their study reveals the importance of brokering solutions, and being socially competent within a context that is inductive to knowledge creation, trust building, and low reciprocal commitment within the open innovation. In other words, social competence is strategically important for collaborative innovation, which links well to the importance of collaborative learning as shown in the educational psychology literature (Kirschner, Paas, & Kirschner, 2009).

The strategic role of social competencies for open innovation is to enable utilization and recombination of existing knowledge within or outside an organization’s boundaries, and the generation of new knowledge across boundaries. There is typically different common and domain-specific knowledge within each boundary. This means that managing knowledge creation across boundaries represents challenges related to the different interests and to understanding of meaning between the involved and often interdependent actors (Carlile, 2004). Consequently, a central dimension of open innovation is learning to relate across boundaries in social interaction, and to cope with the inherent challenges. These challenges can be understood as the interplay of complex processes of creating, maintaining, destroying, and recreating rules, use and meaning. We propose to call this social dynamics, and argue that it entails a number of intangible elements, which are accessible only through experience in action. For example:
• continuous (re-) negotiation of power and meaning through local interaction of people (Stacey & Griffin, 2005);
• cognitive social capital such as shared language emerging in practice (Adler & Kwon, 2002; Nahapiet & Ghoshal, 1998);
• institutions as socially constructed frameworks for the justification of knowledge, depending on the acceptance of involved actors (Rolfstam, 2009; Searle, 2005; Tell, 2004).

Thus, strategically important social competencies — the ones our students need to understand in order to grasp open innovation — are context-specific. This implies a need to relate to a co-opetition context in order to understand, and cope with social dynamics of open innovation.

Using Games in Higher Education Courses

Social dynamics, as we described them above, can be understood as an iterative process of perspective making, perspective taking (Boland & Tenkasi, 1995), sense giving, and sense making (Hill & Levenhagen, 1995). During gameplay, relations and shared understanding emerge where the players either take the given perspectives, or give new sense to what and how they do, thus changing their perspectives and what is justified to be true. And while play is free (Huizinga, 2009), games can give play a direction because they are goal-oriented and purposeful (e.g. winning, or leveling up). Mäyrä (2008) argues that games allow designing (learning) experiences in a given contextual frame, through their close relation to simulation, the domestication of information and communication, and interaction. Further, games can provide the closed, limited space, and the complete order that are necessary for play to happen. Thus, games (and board games in particular) can provide a ludic space that is conducive to the development of social competences needed to cope with social dynamics. Related approaches include Brandt and Messeter (2004) who show how design games can facilitate collaboration, while Habraken et al. (1987) explore games as tools for research in design theory and methods. Iversen and Buur (2002) moreover illustrate how games can help to develop design competencies.

As a pedagogical tool and mechanism, playful games fit into a more general theory of learning, as for example proposed by Illeris (2002, 2003), because they integrate internal (psychological) learning, and external interaction with the social, cultural, and material environment (cf. Lave & Wenger, 1991). This is also in line with Thomas and Brown (2011), who propose play, and games as suitable means to enable a new culture of learning (as opposed to the old culture of teaching) that is important for the ability to innovate. This culture, they say, enables learning from within an always emerging and changing environment, and is more about finding the right questions to inquire novelty than about providing right answers. Also, games can put different types of knowledge (e.g. old and new) in relation in order to create a detailed understanding of complex concepts, and underlying processes (rather than only aiming at completing particular task requirements on the surface level).
Further, games are potentially conducive to deep, rather than surface learning (Biggs, 1999; Biggs & Tang, 2007; Ramsden, 2003). Furthermore, games allude to both the cognitive dimension of learning particular content, and the emotional dimension of mental energy, feelings and motivations, while it also relates to the social dimension of external interaction with the environment (e.g., participation, communication and co-operation) (Illeris, 2003).

**CROSSROADS: A CASE OF A PLAYFUL GAME**

**The Goals of the Game**

We argue that the opportunities and challenges of social interaction in open innovation processes can be better taught through experience and active involvement rather than through simple transfer of abstract information. Learning and teaching processes of social interaction such as the ones we encounter in open innovation is difficult, because given the high level of uncertainty, both students and teachers have to feel safe to fail. It is important to feel safe to fail (and free to try again), because this allows complex learning in iterations of exploring novelty. Games can provide a ludic space that is conducive to the development of social competences needed to cope with uncertain social dynamics.

Games are moreover a way to introduce activities into the lecture and promote student engagement (active learning). They allow students to go beyond individual work (collaborative learning), to introduce co-operation among the students (co-operative learning), and to address or solve the problem of what needs to be done to play the game together: This also leads to a better understanding of the inherent challenges of open innovation at large (problem-based learning) (Prince, 2004).

By using the game Crossroads, we aim to understand how players make sense of rules in social interaction, and how they create group-specific ways to reach the goals they negotiated. In our approach students are not encouraged to learn memorizing a solution. We aim for deep learning social competences in open innovation through relating, reflection, and inquiry into a shared experience where failure and conflict are welcome sources for learning. Thus, the goal of using Crossroads was not to teach the students a specified way that they must memorize in order to reach a specific outcome. Rather, we aimed for a deeper understanding of the emerging processes when facing the social dynamics of co-opetition as a central element in open innovation by:

1. Creating a shared experience of social dynamics and the paradox of co-opetition for the students:
   a. Sense-making in local interaction: emerging in relation to the context (rules, roles, identity and team spirit within and across groups);
   b. Creating social capital: negotiating meaning, goals, and collaboration;
2. Enable critical reflection on social dynamics of co-opetition based on this experience:
a. The role of rules, and norms when facing novelty across boundaries: perspective-making and perspective-taking;
b. Roles, and turn-taking: sense-making and sense-giving across boundaries;
c. The role of power, and local interaction: conflicts as a resource or problem?

3. Experience-based learning - enable the students to apply what they learned from their reflection and experience through iteration:
   a. Learning to confront failure as an opportunity to learn individually and together;
   b. Learning how to cope with conflict as an opportunity to learn individually and together;

4. Create deeper understanding of open innovation:
   a. Linking experiences and theory.

THE DESIGN OF THE GAME

The format

The game (see Figure 1) is a board game for four players, and ideally one has at least two games and two groups of four playing against each other. It was designed at our institute and we use it to address the social dynamics that emerge when facing the dilemma of conflicting interests between individuals, the group they are in, and the group their group is competing against. We chose to develop a board game because the materiality creates both a physical ludic space and it enables natural, personal interaction, especially the use of verbal and non-verbal communication (cf. Bürgi, Jacobs, & Roos, 2005).

The physical and intellectual engagement allows the players to experience the complementing interplay of knowledge (the rules of the game) and knowing (how the players put the rules into action or not), as described by (Cook & Brown, 1999). The game consists of a game board, and 36 pieces (nine for each player) in four different colors (one for each player). The pieces differ by the number of holes and fittings, which make it possible to connect them and build a construction. The less connective a piece is, the higher is its point value (e.g. a five-point piece has just one hole, and no fitting, while a one-point piece has three holes and four fittings). Further, there are four action

Figure 1. Students playing the game
cards (one for each player) that allow players to manipulate the game play. The players can force a player to take back a piece, swap a piece with another player, steal a turn, or force a player to skip a turn. The players can, but do not have to use the cards. Furthermore, there is a rulebook that provokes the players to negotiate whether to start with only the core rules, or the full set of rules, including the detailed scoring. Players can win in two ways, either as a group by having the most valuable construction (i.e. you need at least two groups), or as an individual by having the least points.

The challenge

The players play two rounds (each seven minutes) and are supposed to take turns in order to put pieces and build a construction with as many points as possible together. Players are not allowed to connect two pieces of the same color. This means they are dependent on other players to provide opportunities and at the same time provide opportunities to others in the form of connective pieces. So far, this is an incentive to collaborate within one group in order to win. However, it is also possible to win as an independent individual of both groups. In order to achieve this, players have to have fewer points in the form of remaining pieces than the other players, i.e. there is an incentive to be competitive and play the high-point pieces first. For example, it is not possible to connect another piece to the piece with the highest point value. If a player would put this piece it would make it difficult (or impossible) for fellow players to add to the construction, leaving the competitive player with an advantage. However, to become the individual winner, the player does not only compete within his group but also with the individuals of the other group(s) that he cannot influence.

Therefore, the players experience the paradoxical challenge of cooperating and competing at the same time. On the one hand, there are incentives for collaboration, because players are interdependent and have to cooperate to build a complex construction. The group with the biggest and most valuable construction wins (this is why you should have two groups playing against each other). This means players have an incentive to provide opportunities for other players to contribute. On the other hand, each individual player has an incentive to play competitive and become the individual winner of all groups by decreasing chances for the group through opportunistic behavior. The complexity of different players and paradoxical goals makes the gameplay uncertain and unpredictable, but when we let the students play the game in iterations (at least two rounds), the dilemma is to find a way to cope with the social dynamics of co-petition. Table 1 illustrates how the complex theoretical aspects related to open innovation are represented in the game challenge.
Table 1. Presence of Open Innovation Challenges in the Game

<table>
<thead>
<tr>
<th>Open innovation concept</th>
<th>Game Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-opetition</td>
<td>Coping with the dilemma of having an incentive to compete, and to collaborate at the same time.</td>
</tr>
<tr>
<td>Business model</td>
<td>Establishment of a strategy to create maximum value (individual vs. group).</td>
</tr>
<tr>
<td>Co-creation</td>
<td>Being dependent on each other to create something together, and win the game (both individual and group); Mutual/collective engagement in stabilization of construction.</td>
</tr>
<tr>
<td>Institutions</td>
<td>Class arrangement, game rules, different cultural backgrounds.</td>
</tr>
<tr>
<td>Social capital</td>
<td>Development of shared meaning (cognitive), norms and trust (relational), and sub-group building (structural).</td>
</tr>
<tr>
<td>Relations</td>
<td>Obligation to interact to play; emerging in interaction during play.</td>
</tr>
<tr>
<td>Social skills</td>
<td>Development of group awareness, flexibility, adaptiveness, empathy.</td>
</tr>
<tr>
<td>Motivation</td>
<td>Intrinsic: mastering the game, and winning; extrinsic: winning the group/individual prize.</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>Each action taken by a player has consequences for the following players, and is a reply to previous actions.</td>
</tr>
<tr>
<td>Power and Control</td>
<td>Who determines how the game is played?</td>
</tr>
<tr>
<td>Negotiation</td>
<td>The course of action has to be negotiated between the players with their different interests, and backgrounds.</td>
</tr>
</tbody>
</table>

The Framing

The particular experience presented here is based on an international Masters-level course on open innovation within interdisciplin ary engineering program with emphasis on innovation and business. The game was used at the beginning of the course, after the students were introduced to some basic notions in the context of open innovation — also to serve as background for playing the game the next class. After a recap of basic open innovation concepts (including co-operation and competition, knowledge inflows and outflows and incentives and motivations, this class then offered an introduction to the game before the students actually played it. In the introduction, we also presented the prizes for the individual winner (a book in the case of our example) and the
group winner (a copy of the game for each member of the group in our case). In our exemplary case, there were 13 students who were put into three teams of four, with one team having an extra member who served as an observer and did not play the game (this role shifted between the two iterations).

We let the students play two rounds. In the first round, students got a feel for the way the game was played. After that we ran a quick reflection round before the second round started, in which the students could win prizes. After the second round, we gave the students some time to discuss their experiences among each other before we started a reflection. We closed the session by tallying points and distributing prizes.

The physical and intellectual engagement of the interdependent players distinguishes the game from other more abstract learning experiences that typically focus more on transfer of explicit knowledge. Originally, the game was developed to explore group dynamics under novelty and uncertainty within one group of players with regard to the role of rules, power, participation and sense-making. Moreover, in our particular case we believe that the design of the game corresponds to the goals of teaching open innovation when it is used with at least two groups at the same time and played in two rounds:

• Playing the game with different groups creates a shared experience of social dynamics and the paradox of co-opetition within and across groups.
• Discussing the experiences between and after the two rounds enables critical reflection on the social dynamics of co-opetition.
• Running a second round enables the students to apply what they learned from their reflection and experience through iteration.
• The discussions after the game session among and with the students, during which we also inquire theory on the basis of our shared experiences, create a deeper understanding of open innovation.

See also Table 1 for an illustration of how some of the complex theoretical aspects are represented in the game challenge.

**Learnings and Attention Points**

**The First Round and Reflection**

The first round was intended to allow the players to explore the game without competing for the individual or the group prize. In the first round, we could observe several social dynamics of open

---

1 This chapter is drawn from the results of our earlier study as presented in Bogers and Sproedt (2012) where there is also more information about the data collection and analysis.
innovation and we iteratively identified four categories of results: physical interaction, social capital, power and rules, and creativity and communication. Table 2 shows similarities and differences between the three groups who played the game. For all groups, the physical interaction with the material in the context seemed to be important for the ability to make sense and grasp the novel situation. Moreover, this physical interaction together with existing social capital is important for negotiating meaning and the creation of new social capital in the form of a shared language and meaning. However, the three groups differed significantly in terms of hierarchical power relations, which dominated the gameplay in groups 1 and 3, while group 2 displayed no hierarchy. While the power built on the control that one group member took over the rulebook in group 3, it emerged from the power of the speaker role to shape perspectives through articulation of own interpretations in group 1. The gameplay of group 2 in contrast, can be characterized by creative exploration and making of perspectives.

**Table 2. Observations from Round 1**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical interaction:</strong> Exploring perspectives and making sense of novelty in a complex situation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All students interacted physically with the game material while listening to the instructions given by the teacher.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drawing on and building new social capital:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All students negotiate, and create a shared understanding of the game material, and the rules in social interaction with at least one other player. This happens through talking, gesturing, and actively playing the game in a try-and-error manner. For group 1, for example, the shared insight that pure competition leads to gridlock.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within the three groups, we found that there emerged sub-groups that formed on the basis of existing social capital, e.g. friendship, nationality, or first language. If there emerged conflicting perspectives, or uncertainty in the larger group regarding how to play, this was discussed in the sub-groups before negotiated with the rest of the group.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power and rules:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One player took the speaker role without any resistance from the other players. The rules served as a rough reference point for this group’s exploration of the gameplay. Through articulating what happened, and how the speaker interpreted that, he got the power to moderate the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power, and control were in flux in this group. All group members participated equally engaged when they took control over the game board with the emerging construction in order to put their pieces, and also when they pushed it over to the next player to invite him to put his.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In contrast to the other groups with four members, this group had five members. Player five was assigned to observe the gameplay. The observer took ownership of the rulebook, and claimed the power to manage, and lead the other players. The fifth player used the</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
discussions. He led the making of the emerging perspective in the course of sense-making, and sense-giving in this group.

rulebook to justify his legitimacy to tell the other players how to play right. Gameplay was led by the fifth player, because if players explored actions that turned out to go wrong (e.g. play competitive), they increased the authority of the fifth player.

Creativity and communication:

The group did not take the perspectives given by the rulebook. Instead they negotiated their own perspectives as a result of exploring opportunities in the emerging gameplay: e.g., by playing counter clockwise instead of clockwise, or by moving the game board over the table.

The group talked, pointed, and gestured a lot while moving the game board, and putting the pieces.

This group had a very active, and fluent gameplay.

In the short reflection that followed the first round, the members of groups 1 and 2 said they realized the paradox related to the need to cooperate when they actually had competitive intentions. Further, they expressed that the more they got in the flow of playing, the less the rules mattered. Group 3 was mostly concerned about what was done wrong by certain players (according to the observer who also led the gameplay). Further, this group said that a competitive move of one player in the beginning of the game (despite the other players’ protest) determined the rest of the gameplay.

The Second Round and Final Reflection

In the second round, the groups were competing for the group prize and all players competed for the individual prize. When the groups prepared for the second round after the first reflection,
they referred to their experiences from the first round and they negotiated how to play in order to win one of the prizes. There were different opinions within the groups regarding which prize is more valuable and desirable. Table 3 presents our observations during the second round, where we iteratively identified four categories of social dynamics in the gameplay: grasping; social capital and strategy; conflict; and creativity and motivation. In the gameplay of groups 1 and 2, we found evidence for the social dynamics of open innovation regarding the role of social capital for coping with conflict, creativity and perspective-making. The gameplay of group 3 provided evidence for how rules and strategy can take the playfulness out of social interaction, disturb the flow and exclude group members, leaving them frustrated and less motivated to further participate.

**Table 3. Observations from Round 2**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grasping novelty through experience:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The experience of the first round and the following reflection provided knowledge about the gameplay, and developed social capital that allowed the groups to negotiate a group-strategy for how to play the second round.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Social capital and strategy: | | |
| Engaged in strategic discussion until the game started again. A flying start with almost no conversation, and very quick interaction. Few difficulties, but the players helped each other by supporting the construction, or pointing to possibilities for how, and where to put pieces. | Rapid interaction, and strong invitations to take over. Strong relations, and empathy: players anticipated other players’ moves, and preselected possible pieces. Continuous readjustment of choice in relation to the emerging flow of the gameplay. | The group has a new observer, but the players continue the intense discussion about how to put pieces right while they start playing. Each piece is discussed regarding where to put it at which hole, or fitting to use. |

| Conflicts: | | |
| Parts of the construction fell apart, and the rule that the player who caused it has to take all fallen pieces was ignored. After being reminded about that rule, the group seemed astonished and the particular player was unhappy, but the | The more complex the structure on the game board, and the more the players engaged, the more they negotiated possible moves, and helped each other. | Gameplay leads to the exclusion of the blue player, because he cannot put any more pieces. After this happens for the second time, there is a break in, and a discussion emerges about the use of action cards. However, nobody uses them in |
group members then followed
the rule.

When parts of the construction
again fell apart for 2 players, the
group consciously subordinated
that rule to the goal, and the
group members all covered-
up the cheat, and immediately
added the fallen pieces to the
construction again.

All players’ efforts increased to
stabilize the construction when
one player added a piece.

Creativity and motivation:

The group playing speed caused
the yellow player to add his last
piece (after being encouraged
by the group) before five
minutes have passed, i.e. two
minutes ahead of time.

While waiting for the other
groups, an intensive discussion
emerged about gameplay, and
what could have been done
differently (e.g. using action
cards).

The group modified the set-up:
they put the game board on a
bag to make it slide better over
the table when they moved it
around when taking turns.

The players literally exchanged
their perspectives: when the
construction became too
complex to be moved across
the table, the players started
to move around the table to
find the best opportunities for
themselves, or the group.

During the game, we saw that no player used his or her action card. After counting the points and
discussing what happened during the game within the respective groups, the different groups were
asked to share their experiences, observations and insights in a general reflection. Group 1 said
they were not aware of all the rules and they just wanted to finish as quickly as possible. The players
said they had a good collaboration and were happy to “at least have won the individual prize.” For
the players in this group it was important to “create opportunities for everybody to connect.”
Group 3 said that they had the goal to create value together. Specifically, one group member said:
“We didn’t have any competition within our group. We helped each other. So, I guess, if you put it
in some theory […] we were able to appropriate the value among the members of our group.”

Another player in group 3 said that they had a strategy but did not really think about how the
game would end. The group mentioned that there was a positive correlation between group and

order to avoid conflicts.

Shortly before the time of the
second round runs out, the blue
player starts challenging the
group strategy after realizing
that he will be the loser. Time
runs out during this discussion,
leaving the blue player losing
the game. When offered the
possibility to put one last piece,
because the discussion stole
too much time, he refuses with
a short “No!”.
individual performance. However, one player was left as the loser, because he was excluded when he could no longer connect his pieces to the construction. The group claimed this could have been resolved if communication between them had been better. The player who lost said he realized the problem before it was happening, but he was not sure whether he did not say anything or if the others did not listen. In either case, he did not consider interfering by playing a card (and risk provoking a conflict). Finally, group 2 mentioned that after this round they think they got a feel for the game and how to finish it in time. They said they learned that they “were too greedy for the group prize, we started with the ones that had more points,” which in their case meant that they lacked opportunities to connect pieces in the end.

**LESSONS FROM A PILOT OPEN INNOVATION GAME**

**Social Dynamics in Playful Games**

The outcomes of social processes underlying innovation across boundaries and different units of analysis are uncertain and the ways to succeed are largely unpredictable, because the context changes continuously along with the actors and how they participate in the process (Bogers et al., 2017). For this game, which intends to explore the social process of innovation, this means that we cannot know (and teach) how the students should play, because we have no perfect information about the players’ motivation, disposition and how they relate to each other. The players have to learn together through exploration.

This kind of learning, as we explained earlier in this chapter, is enabled through play. As we showed in Tables 2 and 3, our playful game allows us to explore how players negotiate a context-specific strategy in emerging social interaction and how they make sense of rules. Instead of monitoring if they comply to a predefined “right” strategy, our game allows to inquire the context (e.g. rules and constellation of players) and interactions of players in relation to each other and to other groups. As we can see in Tables 2 and 3, in group 2 this means that players might find new or unexpected ways of dealing with the challenge of the game - i.e. they can learn social dynamics of collaborative innovation through exploration and reflection on own experiences.

**Exploring and Developing Social Competencies**

In the game, which addresses the social dynamics when facing the paradoxical dilemma of co-opetition, it is not clear whether cooperation or competition is fully rational. The players have to negotiate what makes sense while the gameplay unfolds in iterative social interaction. In other words, when they make sense of rules and negotiate meaning, the players negotiate what is justified to be true across the boundaries of their different backgrounds and intentions in relation to their new context of interaction (e.g. Table 3, groups 1 and 3). In our conception of games, rules can
3.4. Implementing Open Innovation: Tools, Methods & Processes

be changed by the players through negotiation of meaning and improvisation (e.g. Table 2 and 3, groups 2 and 3). The game invites to explore and to challenge boundaries and understanding, as it is often necessary for innovation. Thereby, playing the game enables students to explore the unknown and test communicative and social processes of interaction through pushing of rules, roles and turn-taking and through cycles of experimentation and reflection (Iversen & Buur, 2002).

This approach aims to enable deep learning through a complex experience with iterations of relating, as it is enabled through play (Illeris, 2002, 2003; Kolb & Kolb, 2010). In this approach, there are rules, but our aim is not to teach the students to follow the rules slavishly in order to achieve a predefined goal in a predictable way. Rather, we aim to understand how players make sense of the rules in social interaction, and how they create group-specific ways to reach the goals they negotiated. Instead of encouraging students to memorize a solution, we aim for deep learning of social competencies in open innovation (Du Chatenier et al., 2010) through reflection, and inquiry into a shared experience where failure, and conflict are welcome sources for learning.

Managing Co-opetition

The game shows that when people enter a collaborative effort that entails motivating a joint production (Lindenberg & Foss, 2011), and openness to external stakeholders (Bogers, 2011; Laursen & Salter, 2006), they might be challenged to balance certain dimensions. All social dynamics categories were related to the dominant theme of the study — the challenge to compete and collaborate at the same time. In round 1, physical interaction was important to make sense of the game and the challenge it represented in relation to and with the other players. In their sense making, the players were drawing on existing, and building new social capital.

This process led to different relations regarding power and rules within the different groups. For example, group 1 explored how far to get on the lane of competition, and they learned that focusing on the individual goals meant ending in a gridlock situation. Based on that shared experience, they smoothly turned to a more cooperative mode. In group 2, we could neither observe any competitive behaviors, nor did the players neglect their own interest in contributing. Interestingly, this group showed social dynamics that we categorized under creativity and communication, because they negotiated their own balance of co-opetition in a surprisingly fluent gameplay. The gameplay was characterized by intense communication (talking, pointing, gesturing) and moving the game board between the players. In doing so the players competed for the best chances to put their pieces, and at the same time they cooperated to create opportunities for the next player. Group 3 was interesting because here the rulebook played a dominant role for co-opetition. After one player justified his role as a leader by taking ownership of the rulebook, the group turned to a collaborative strategy that did not tolerate competitive behavior.
Participating in Open Innovation

Open innovation depends on sustainable participation of the involved stakeholders. It is therefore important to understand the social dynamics of participation. Participation was rather intense in all groups and we believe that physical interaction facilitated grasping the situation and thus participation. However, the nature of participation was very different. We find that whether all players are motivated to participate – or rather feel obliged to do so – depends on the social dynamics of power and rules, social capital and strategy, and conflicts. Only where the gameplay was explorative and cooperative (groups 1 and 2) could we find evidence for creativity and eagerness to explore further.

Group 1 showed eager interaction with a focus on speed and ad-hoc reacting to the previous player. There was a leader but power and control were shared during the gameplay. In group 2, we observed how the players continuously took control and ownership over the game board for their move (pulling it closer) but also inviting the next player (pushing it over) right after they finished. Further, the players closely followed each move of the other players to anticipate the best way to contribute and adapt their choice for the next piece to put in adjustment to the gameplay. We argue that this shows that the players actively took part in what was going on also when it was not their turn. This could also be observed later when it was no longer safe to push the construction around and all players stood up to better follow and contribute. Group 3 showed a more rational-minded way of participation where moves were discussed and decided from a strategic perspective to try to find the right way. Power and control were organized through the strategy they followed. This is noteworthy, because in that group the game ended with the exclusion and frustration of one player. Even though the group achieved its goal to win the group prize it is questionable how much trust to submit to a group strategy and readiness for collaboration there would be next time. Further, it is interesting that the only way for the group to avoid the frustration of a member would have been to use the more competitive action cards, which would have allowed to exchange pieces.

Knowledge as a Resource in Flux

We identify limits to the traditional understanding of knowledge as something one can possess and which essentially only comes in one kind, thus emphasizing a relational view of knowledge. We found that using playful games is in line with an epistemology of practice, as proposed by Cook and Brown (1999) who see knowledge and knowing as mutually enabling instead of competing. Also Neck and Green (2011) support the argument that teaching complex, dynamic phenomena requires practice-oriented methods. Our evidence supports the argument that knowing emerges in iterative interaction with the social and physical world (grasping), and that interplay between knowledge and knowing can be a source of innovation – e.g., new ways of dealing with challenges (see Table 3, group 2).
In our summarized observations in Tables 2 and 3, we can see the different knowledge conceptions at work in the gameplay. In each group the players engaged in physical interaction with the material and the other players. The players grasped the situation in iterative interaction and developed new social capital while drawing on existing social capital during their sense-making process. They developed a contextual understanding of meaning within their group and different (endogenous) norms how to play, which sometimes diverged significantly from the rulebook (exogenous) – e.g. in group 1 and 2. This happened through continuous negotiation of meaning through talking, pointing, and gesturing – helping them to bridge challenges (mutual helping in group 1 and 2) or causing frustration (rule of strategy in group 3). As mentioned above, we only found evidence for creativity - understood as the development of new knowledge or the recombination of existing knowledge in unexpected ways - in groups 1 and 2. We believe that the reason for this can be found in the different quality of interaction compared to group 3. More concretely, the groups that showed creativity displayed explorative interaction, and they took failure and conflict as a motivation to mutually support each other (group 1) and as an opportunity to learn (see Table 3, group 2). In contrast, group 3 negotiated each step in detail before taking action and put effort in making sure everybody did what was planned (see Table 3, group 3).

**Conclusion**

This chapter provided a playful and explorative perspective on teaching open innovation concepts and practices. We argued that play can be a source of creativity, imagination and fun in a teaching setting (cf. Kolb & Kolb, 2010). We found indications that playful games can help to create such an experience through interactive experience and simple simulation - thereby helping the students to better understand the theory behind open innovation (Bogers, 2012; Chesbrough, 2003; Chesbrough & Bogers, 2014; Dahlander & Gann, 2010). Moreover, playful games allow understanding open innovation as interplay of complex processes of relating, social capital, and institutions (Adler & Kwon, 2002; Nahapiet & Ghoshal, 1998; Rolfstam, 2009; Searle, 2005; Stacey & Griffin, 2005). They thus allow us to get a more holistic understanding of the complex social dynamics that emerge when people have to deal with novelty.

We used the game Crossroads to create a shared experience of social dynamics of co-opetition for our students. The shared experience enabled reflection on complex social dynamics such as sense-making and the creation of social capital that were experienced in iterations of playing, and enabled experience based learning, and a deeper understanding of theory. The playful game helped the students finding questions to inquire the complexity of open innovation through reflection. Our evidence indicates that the shared experience of playing iterations of the game helped students to relate to, and to develop social competencies that are required for professionals working in open innovation teams (Du Chatenier et al., 2010).
We found that a shared experience of emerging social dynamics during collaborative sense-making and dealing with novelty creates an awareness among the students that facilitates teaching intangible aspects of open innovation. The playful game thus allows to discuss how social dynamics emerge, and how they can lead to differences in co-opetition, participation, and knowledge. For example, we found that creativity is linked to a collaborative gameplay that is open for exploration of competition. Gameplay controlled by strategy was linked to frustration, despite the respective strategy’s focus on collaboration, raising the question whether there was too much (strategic) collaboration. Furthermore, knowledge and knowing emerged interdependently in iterations of grasping novelty through iterative interaction with the game material, and other players.

Finally, we hope that this chapter provides valuable insights for educators who would like to use playful games (or play more generally) in their teaching within open innovation. Moreover, we propose that it is important to focus on and explore the process of learning - thus going beyond a simplified input/output perspective. More generally, in the context of innovation and collaboration, our experience so far gives some relevant lessons to consider when coping with novelty across boundaries in a teaching setting, such as that too much strategy can hamper creativity, physical interaction can foster grasping of novelty in dynamic contexts, planning can prevent playfulness and thus exploration, and forced collaboration can prevent sustainable participation. These implications may not only apply directly to an education setting but also have implications for how individuals and groups connect and develop knowledge as a form of social capital in a corporate setting - the ultimate professional space for many students - in which a more playful approach to innovation can provide great opportunities as well as challenges (cf. Statler, Roos, & Victor, 2009).

KEY TAKE-AWAYS

- Playing a game develops the social dynamics of open innovation.
- Games provide an opportunity to engage in negotiation, improvisation, and exploration of boundaries.
- Certain games require managing co-opetition, i.e., the simultaneous pursuit of cooperation and competition.
- Participating in open innovation depends on the social dynamics of power and rules, social capital and strategy, and conflicts.
- In open innovation as a complex and dynamic phenomenon, knowledge can be seen as a resource in flux.
References

Teaching Open Innovation Using A Game: Some Lessons And Recommendations

3.5 SKETCHING THE NEW FRONTIERS OF OPEN INNOVATION

CIVIC OPEN INNOVATION

ELENA CASPRINI, ALBERTO DI MININ

ABSTRACT

This module looks at how governments and governmental institutions use open innovation strategies in public-related issues (e.g. mobility, energy and security). The module is divided into four parts. The first part is about defining open civic innovation. The second part looks at the role of governments and citizens in civic open innovation. The third part looks at toolbox. Finally, the fourth part presents examples from the world.
### Civic Open Innovation

#### Prerequisite
Basic knowledge of Innovation Policy, Public Policy and Public Administration is preferred.

#### Objective of the lecture
This lecture aims at providing an overview of what we mean with civic open innovation.

#### Workload
8 h teaching (2hr/topic); 16 h self-study (paper readings and project work assignment)

#### Learning outcomes
LO #69: To identify external sources of innovation; To identify intervention strategies leading to successful services and appropriate responses to citizens in general.

#### Reading List

#### Lecture Content

The aim of this lecture is to provide an overview of civic open innovation. In particular, it looks at the role of the government and citizens in public sector-related activities. The lecture will cover four main topics: defining civic open innovation, the role of governments and citizens in civic open innovation, a toolbox for civic open innovation, and examples from the world.

The core suggested reading list is:

3.5 Sketching the New Frontiers of Open Innovation

Depending on the hours available, each topic may be treated as a separate lecture (2 hr) or may be merged.

Defining civic open innovation

The content of this module will (un)cover the definition of civic open innovation. There is no single accepted definition of civic open innovation.

Civic open innovation may be considered as a part of social open innovation (Chesbrough and Di Minin, 2014). Social open innovation is in fact defined as “the application of either inbound or outbound open innovation strategies, along with innovations in the associated business model of the organization, to social challenges” (Chesbrough and Di Minin, 2014:170) and it can be applied by organizations operating in the public sector and in the non-profit sector (ibid.). Civic open innovation is applied specifically by governments and governmental institutions, i.e. institutions supported and managed by the government. In particular, civic open innovation has been investigated with respect to cities (Almirall et al. 2014).

Civic open innovation involves multiple actors (Almirall et al. 2014; Feller et al., 2011): city departments, citizens and developers; companies that use open data in their applications, consultants, policy makers, venture capitalists, and intermediaries (Lee, 2015). In particular, attention has been paid to the role of citizens. Citizens may be integrated in the public sector in different forms. The paper of Hilgers and Ihl (2010) provides several examples of what the existing literature has termed as “collaborative public management”, “citizen engagement”, “wiki government”, “coproduction with public sector clients” or “open government”. In particular, as Mergel (2015:601) says, “OI is seen as part of the open government initiative to move from a closed innovation paradigm that relies on preselected vendors and contractors to an OI paradigm encouraging citizens to increase their participation and collaboration with government”.

Civic Open Innovation may run projects in different domains, such as administrative and political domains as well as urban planning, mobility, energy and education (Arnold and Barth, 2012; Feller et al., 2011; Katsonis and Botros, 2015; Lee et al., 2012).

Civic Open Innovation has taken advantage of digital technology, which has improved “the efficiency and productivity of government agencies and allow citizens to transact with government anytime, anywhere. It can also deepen the democratic process, empowering citizens to participate in policy formulation” (Katsonis and Botros, 2015:42).
The teacher may use the following sources for an overview:


Activity 1. Due to the blurred nature of the term, the teacher may ask the students to give a definition of their own. What is civic open innovation? Open questions for classroom brainstorming: what is meant by civic open innovation? The teacher could generate a list with the definitions provided and look for similarities and differences in order to identify the dimensions of civic open innovation.

Highlights

- The lecture provides a definition of civic open innovation.
- The lecture identifies the actors involved in civic open innovation.
The role of governments and citizens in civic open innovation

This module aims at answering the question of what is the role of governments and citizens in civic open innovation. Citizens represent a great source of knowledge (Arnold and Barth, 2012; Lee et al., 2012), albeit they may not always have the due knowledge or expertise to contribute to public sector projects. Governments are increasingly opening up their boundaries via, on one side, improving citizens’ engagement in their activities, and on the other side, giving them (and external partners) access to their data (Almirall et al., 2014; Eskelinen et al., 2015). Governments’ aims are mainly linked to gathering citizens’ knowledge to improve public administration, obtaining citizens’ support in daily public administrative tasks as citizen developers and in political decision processes (Eskelinen et al., 2015; Hilgers and Ihl, 2010; Wijnhoven et al., 2015). These objectives are usually referred to as citizen ideation and innovation, citizen sourcing, and collaborative democracy (Hilgers and Ihl, 2010; Wijnhoven et al., 2015).

The teacher may use the following sources for an overview:


Activity 2. The students may identify which are the characteristics that citizens may possess for contributing to pursuing civic open innovation. After having selected a specific context (e.g. school, healthcare, etc.), the students might list the pros and cons of a specific group of citizens, which may serve as a baseline for delineating who should be involved in civic open innovation and which are the mechanisms to be used for involving them.
Highlights

- The lecture focuses on the role of citizens and governments in civic open innovation.
- The lecture provides examples on how to involve citizens.

Toolbox for civic open innovation

This module aims at providing an overview on the tools and approaches that governments may use for pursuing civic open innovation and motivating the students in finding new tools and approaches. Examples as developed and described in existing literature are hackatons, urban labs, crowdsourcing (Almirall et al., 2014; Eskelinen et al., 2015; Lee et al., 2012; Seltzer and Mahmoudi, 2013) as well as more conscious use of social media (Stamati et al., 2015) and online platforms (Mergel & Desouza, 2013; Mergel, 2015). For example, Stamati et al. (2015) provide an overview of the role of social media in government, describing the properties of social media that afford openness and accountability.

The teacher may use the following sources for an overview:


Activity 3. In groups, ask the students to develop a specific program to solve a specific problem.

Option 1. The problem is identified by the students themselves or proposed by the teacher. Ask the students to find a list of examples of civic open innovation tools and approaches and classify them.
3.5 Sketching the New Frontiers of Open Innovation

in terms of the dimensions developed in (1) and (2).

Option 2. The problem is suggested by a third party (such as the speaker of the seminar). Ask the students to find a list of examples of civic open innovation tools and approaches and classify them in terms of the dimensions developed in (1) and (2).

Highlights

• The lecture focuses on the tools governments may use to pursue civic open innovation.
• A specific role is played by crowdsourcing.
• Interesting solutions may come from the social media.

Examples from the World

This module aims at providing an in-depth case description via analysing the tools/approaches used, the stakeholders involved, the benefits and the costs of having implemented such kind of tools/approaches. Several empirical examples will be provided, with the aim of providing insights into how civic open innovation has been implemented. For example, Stamati et al. (2015) describe five initiatives taken by Greece, while Almirall et al. (2014) describe civic innovation approaches taken in several cities. Similar to Wijnhoven et al. (2015), Hilgers and Ihl (2010) provide an additional example of successful citizen collaboration and participation in the public sector; Lee et al. (2012) describe some open innovation practices applied in the USA, Canada, Denmark, the Netherlands, the UK and Japan, among others.

The teacher may use online resources as well as the cases in:

Activity 4

Option 1. Ask the class (or a single student) to draw a specific example. Ask each group (student) to present its/his/her example. These examples may be local or not.

Option 2. Ask the class to compare open civic innovation practices across countries. This activity may require a lot of time, but it would be useful in order to identify similarities/differences across countries (e.g. you can compare cases of civic open innovation in developed and developing countries).

KEY TAKE-AWAYS

- Within the open innovation field of research, civic open innovation represents an emerging topic of interest;
- Civic open innovation refers to open innovation applied specifically by governments and governmental institutions (institutions supported and managed by the government);
- Civic open innovation has mainly been studied with respect to cities, and it focuses mainly on the role of governments and citizens;
- This topic might be very appealing for students, as civic open innovation may be evident in local examples, resulting in good material for project work;
- The topic may also be of interest to local authorities looking for new ways of finding ideas for solving local problems.

PEDAGOGICAL GUIDELINES

The lecture leverages on a frontal lecture and interactive activities. During the hours of frontal teaching, the teacher will remind the students of basic concepts (such as “open innovation”) in order to reactivate previous knowledge and then introduce the peculiarities of civic open innovation through brainstorming and round table discussion, as well as individual/group activities and presentations.

Guest lecturers may be invited in order to present problems to be solved and/or solutions they have developed.

The students will be divided into groups in order to solve specific problems and provide (existing) civic open innovation -related solutions. The problems may be real problems faced by the local municipality (and explained during the guest lectures), as well as new problems identified by a single group.
3.5 Sketching the New Frontiers of Open Innovation

Online sources may be used in order to collect and be inspired by examples.

**EVALUATION QUESTIONS**

The lecture may contain self-assessment questions for each student.

The teacher may evaluate students by two main methods:

1. Written exam, based on the arguments presented in class;
2. Project work, based on individual and/or group project work made either in class or outside the class. An example for a project work may be (i) finding examples of civic open innovation in one’s own country, (ii) analysing whether they work or not and why, and also (iii) proposing possible solutions.

**OTHER ACTIVITIES**

**Activity 5.** Students are consultants of the national government. Ask the students to search for information about a specific governmental programme of open innovation. The first task of the working group is to create a map of civic open innovation via:

a. defining the problem,

b. defining the involved actors,

c. identifying the tools, and

d. drawing a link between who is doing what.

In the second step, you ask the students to modify the map of civic open innovation. Which are the current drawbacks of the civic open innovation programme? How may they solve them? The students will present possible alternative approaches to meliorating the civic open innovation initiative. They list the ways in which the alternative initiatives might work better and why – what aspects are likely to appeal to the government? What features are likely to be more suitable for citizens?

**Activity 6.** Existing research provides successful examples of civic open innovation. Ask the students to find not successful examples. The students should provide:

- a description of the open civic innovation activity,
- the actors involved,
- the tools applied,
- the reasons why the civic open innovation project failed.
REFERENCES


ADDITIONAL READING

3.5 Sketching the New Frontiers of Open Innovation


OTHER MATERIALS

- https://civic.io/ [last accessed on September 27th, 2016].
OPEN INNOVATION IN WECONOMY

MIROSLAV SPACEK

ABSTRACT

This chapter deals with a new concept of economy which is commonly termed as sharing economy or collaborative economy. This approach is based on quite a new business model which enables entrepreneurs and users to benefit from a new type of business. Sharing economy offers several advantages which rank it among the most powerful tools of creating competitive advantage. Sharing economy is believed to win enormous business potential over the next years, which will promote it to important value drivers. It is apparent that sharing economy will become attractive not only for start-ups but for established and reputable firms as well. The latter have ventured to embark upon various entrepreneurial activities that have enabled them to collect money from the business areas originally reserved to small companies or even start-ups. Apart from sharing economy, WEconomy represents a concept aiming at the enhancement of the living standards in poorly developed countries. WEconomy appears usually in places where people strive to improve the current economic system and offer a new solution which draws attention to the environment and human community. The WEconomy concept is closely tied to the development of a new business model which brings value to all parties concerned. This business model, which is driven by a group or community of people helps various social communities resolve their social and economic problems.
## Part 3.5. Sketching the New Frontiers of Open Innovation

<table>
<thead>
<tr>
<th><strong>Prerequisite</strong></th>
<th>Basic knowledge of OI.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective of the lecture</strong></td>
<td>To explain key features and principles of functioning WEconomy and Sharing economy. To make students familiar with the stepwise process of WEconomy application and implementation.</td>
</tr>
<tr>
<td><strong>Workload</strong></td>
<td>26h teaching; 52h self-study.</td>
</tr>
<tr>
<td><strong>Learning outcomes</strong></td>
<td>Understanding the key underlying principles of WEconomy.</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td>To be familiar with the key characteristics of WEconomy, including principles of operating WEconomy and assessing effects of WEconomy.</td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td>Acquiring knowledge and know-how about establishing and running WEconomy business. Capability to profess and disseminate WEconomy as a newly established concept.</td>
</tr>
<tr>
<td><strong>Competence</strong></td>
<td>To acquire expertise in WEconomy and Sharing economy. To master the process of implementation of the key building blocks of WEconomy.</td>
</tr>
<tr>
<td><strong>Reading List</strong></td>
<td>Enclosed.</td>
</tr>
<tr>
<td><strong>European Qualifications Framework (EQF) Level</strong></td>
<td>Level 7.</td>
</tr>
</tbody>
</table>
Lecture Content

Definitions: WEconomy and Sharing Economy as new phenomena facilitating social interactions.

Theoretical background: Advanced knowledge on functioning Open innovation principles. Awareness of open business models.

Practical implication: The student will be able to either design a new business model or adapt an existing one to the conditions of sharing economy/WEconomy.

Content-related material: Books by H. Chesborough, Linkegaard and Osterwalder.

Additional reading material for students: see the list of references below.

Sharing economy

The concept of sharing economy penetrates systematically the lifestyle of current generations (preferably generation Y) and influences their social behavior. The Economist (2013) suggests other synonyms for sharing economy like collaborative consumption, asset-light lifestyle, collaborative economy, peer economy, or access economy. Notwithstanding previous definitions, other authors see slight differences between these terms (Leon, 2015). Sharing has been subjected to continuous re-imaging and positioning throughout the history of the networked culture. Specific emphasis has been recently put on user-generated content and social media platforms. Particular social actors, such as social media platforms attempt to cultivate an image of sharing in the networked culture. They do this by appropriating positive social values associated with common understandings of sharing, such as community, generosity, shared values of cooperation, and participation (Kennedy, 2016).

Sharing economy is a suite of emerging software platforms acting as an intermediary between private buyers and private sellers, allowing them to share their existing resources (Allen, 2015). Generating new sources of revenue is only one form of profiting from the collaborative consumption movement. Another approach is to align with peer-to-peer sharing as a platform to promote one’s products and services to potential customers. Sharing economy requires the involvement of physical assets and services among individuals: technological systems, platforms and marketplaces back the exchange of belongings and services in sharing economy. Individuals distribute assets to augment their income and utilize each other’s goods to make economies. Sharing economy platforms enable individuals within and across communities to link with people to supply and gain from fundamental skills and services (Nica & Potcovaru, 2015).

Instead of buying and owning products, consumers are increasingly interested in leasing and sharing them. Companies act as matchmakers, allocating resources where they are needed and taking
a small cut in return (The Economist, 2013). Companies can benefit from the trend towards “collaborative consumption” through creative new approaches to defining and distributing their offerings (Matzler; Veider & Kathan, 2015). The central concept of collaborative consumption is simple: obtain value from the untapped potential residing in goods that are not entirely exploited by their owners. Having access to goods and skills is much more important than their ownership (Sacks, 2011). Similarly, there is an imperative to “sell the use, not the product” (Matzler; Veider & Kathan, 2015). In today’s connected economy, knowledge comes for free but experiences are unique. Status is no longer derived from things the people own but from things that people share. Individuals and companies with the best ability to share knowledge and create experiences are the ones that gain viability and thus build reputation and authority (Appel, 2015). The uniqueness of sharing economy consists largely of its ability to exchange the underutilized capacity of resources that individuals already own. The economics is quite simple: sharing economy provides users with faster, cheaper and deeper access to knowledge, which makes existing resources divisible through time and space in more efficient ways (Allen, 2015).

The concept of sharing economy originates from the American economist John Kenneth Galbraith, especially his opus The Affluent Society. According to him, it is necessary to look for social balance which cannot be secured by a free market (Galbraith, 1998). There are several specifications of this concept. Typically, it deals with a social-economic ecosystem which is based on sharing human and natural resources. It includes value creation, production, distribution, and trade, as well as the consumption of goods and services by various people and organizations. It has become commonplace that people are willing to share not only their lives in the Facebook, their standard of living through Airbnb and their services (Uber), but also their opuses (YouTube) (Sacks, 2011). Another way for established companies to participate in sharing economy is to recognize and support their customers’ desire to resell products. The furniture manufacturer IKEA has set up a platform to enable customers to exchange their used IKEA products. In a broad sense, sharing can be anything to which access is enabled through the pooling of resources, products or services (Bardhi & Eckhardt, 2012). An almost identical way is pursued by the California-based firm Patagonia, Inc. which sells apparels. The firm has established the Common Threads Partnership with eBay. This partnership facilitates the buying and selling of used Patagonia products and thus makes them more visible to customers. Customers who are enabled to sell their old apparel for cash have now both liquidity and closet space to buy and accommodate new items from Patagonia (Lowitt, 2011).

Inventory sharing and coordination among independent retailers is widely used in practice to improve profitability and reduce risk which may originate from the shortage of inventory. Such a sharing may also prevent from losing valuable customers who could defect to a competitor if the product or service is not properly delivered (Lampinen, Huotari & Cheschire, 2015).

Sharing assets or services is complemented by sharing people. This practice is commonplace especially in agricultural business. This sector is characterized by low utilization of labour during
the winter. Therefore many farmers have entered a personnel leasing system to offer their skills to other companies. It has been reported that more than 55% of farmers in Germany have applied to personnel leasing schemes (Matzler, Veider & Kathan, 2015).

Sharing economy is effectively propelled by disruptive technology and innovation. Sharing economy was also indirectly supported by the financial crisis. It is surely no coincidence that many peer-to-peer firms were founded during the years 2008-2010 as the aftermath of the global financial crisis (The Economist, 2013). Peer-to-peer (P2P) lending platforms that emerged as the Lending Club managed to partially replace traditional banks as finance providers.

Similarly, during the Irish bank crisis in the 1970s, the local pubs in Ireland became de facto banks which lent money to their customers despite the intimidation from bankers that without traditional banks the society will not be able to survive. Currently, P2P banking will be hugely disruptive to the banking industry. One of the main advantages which stands in the heart of sharing economy is the resilience of distributed systems (Sacks, 2011). In order to respond effectively to the challenges of sharing economy, companies have to either adapt their business models (like Daimler or IKEA) to the existing situation or create quite new business models (Kuhleasing). It has become evident that newly established or adaptive business models have become not only a threat to established business models and revenue streams, but they also offer variety of profitable paths by which companies can benefit (Matzler, Veider & Kathan, 2015).

Sharing economy is gaining a foothold, altering fundamentally the ways how people own and consume. Network technologies, social and collaborative software and the changing habits of consumers are all abetting this growing movement. Modern ICT technologies have slashed the costs of coordinating resources dramatically (Allen, 2015). From the company perspective, ICT and cloud computing help open up and create ecosystems. By the support of these ecosystems, a company’s products and services can be strengthened further (Appel, 2015).

People’s access to “sharable” products is easier than ever before. It is almost free of charge to find an unused car or an empty flat. The sharing economy is thus operating as a platform which acts as an intermediary between private buyers and sellers, allowing them to share their resources. The rise of sharing economy offers new opportunities that many people are keen to take up. The task now is to allow them to do so with a reasonable degree of security. That is why various ratings provided by customers have become a part of the value creation chain. The user and provider ratings used by the applications and other platforms reduce the risks of interacting with strangers, and motivate people to be likeable (Leong, 2015).

Sharing economy places great emphasis on innovation and technologies which would be friendlier towards exploiting natural resources. In general, the concept of sharing economy accentuates
a social model where people will need less but will lead a better and happier life. As for the motivation to sharing economy, the original idea that there is an environmental argument that favors sharing economy to other business models has been already abandoned. It has been shown that the inclination towards sharing economy was triggered neither by ecological awareness nor by ideological motivation (Garcia, 2013). In fact the research suggests that the major consumer motivation is self-oriented. Specifically, consumers prefer lower costs that the leading companies in sharing economy tend to provide (Devinney, Auger & Eckhardt, 2010). In addition to swapping resources, there are other common features assignable to sharing economy. In the business sector it is the creation of a user experience that is better; quicker; easier; and cheaper. As opposed to the business sector, the non-profit world strives at increasing communality and enhancing sustainability (Leong, 2015).

Work-sharing has also grown in importance. It has been proven that work-sharing can be an important factor in supporting sustainable economy by means of driving employment. This opinion was corroborated by the results obtained during the Great Depression in the U.S. and the Great Recession in Europe, where work-sharing contributed to reducing employment losses. In contrast, the perception of the work-sharing reforms implemented between the 1980s and early 2000s was more ambivalent (Zwickl, Disslbacher & Stagl, 2016).

Sharing economy also interferes with the social life of the community. Families that suffer from shortage of social contacts can socialize effectively through sharing platforms and exchange opinions, experiences or help. There are exchange systems for community networks of single parents who are in need of goods, services and social support in their local neighbourhoods (Lampinen, Huotari & Cheschire, 2015).

Originally, community projects that became popular either through the number of users or cash flows had to opt eventually between two alternatives: to be either devoured by competitors or to accept competitors’ rules in approaching customers (especially in terms of quality guarantees). They could remain successful only if they differed from their competitors by pricing or types of suppliers. From the point of view of customers, the corporate image of companies operating on the sharing economy platform does not dramatically differ from those of traditional companies. Airbnb applies a similar order process as Booking.com, and the Uber application bears similarity to established taxi companies. As opposed to the original visionaries, sharing economy does not represent such a breakthrough as they foresaw.

According to Matofška (2016), sharing economy consists of ten building blocks:

1. People. They are the basic driving force of sharing. Without them sharing economy would not come into existence.
2. Production. People, organizations and communities as active participants in the sharing economy produce or co-produce products or services. Production is open and accessible for those who want to produce.

3. Value and the system of exchange. Sharing economy is a hybrid system where various variants of exchange proceed. It typically deals with counteroffers of services, various exchanges, and social capital. The value cannot be perceived exclusively in terms of finance but has to be seen more broadly. This hybrid motivation system motivates people to participate in productive activity.

4. Distribution. Means and resources are distributed through a system which is simultaneously effective and righteous at local, regional, national and global level. Shared ownership models like cooperatives, collective purchasing and consumption are key features of sharing economy. At the same time, they offer righteous distribution of assets, which offers benefits for the entire society.

5. The Earth. Sharing economy pays respect to the Earth and the protection of the environment. The values should be created in consonance with renewable resources and not harm the planet.

6. The power. Through sharing economy, people can become socially and economically independent. Power is shared or distributed, with the infrastructure enabling people to have access to power and decision making. Systems which enable and support righteous remuneration and reduce inequality and poverty, like Fairtrade, are supported and preferred.

7. Shared law. The mechanism of legislation development and various legal rules should be created by means of a democratic system. Such a system facilitates and promotes broad participation of people on all levels.

8. Communication. Information and knowledge are shared, open and accessible. It is one of the building blocks of sharing economy. Well-functioning and open communication is essential for the flow, efficiency and sustainability of this system.

9. Culture. All the values of the shared economy offer benefits to both individuals and the whole.

10. The future. The entire system of sharing economy should have robust and sustainable nature with a long-term vision for the future.

Sharing economy is growing faster than Facebook, Google and Yahoo combined. The former has been valued at 15 Bill. USD, the latter at 11 Bill. USD over the past seven years. The figures which confirm the accelerating pace of the penetration of sharing economy look very interesting (Business Insider, 2016). 35% of Unicorns (startups the value of which exceeds 1 Bill. USD) have based their business models on the principle of sharing economy. The global sales of companies some way involved in sharing economy accounts for 15 Bill. USD. Moreover, collaboration at work generates 46 Bill. GBP. Another public survey showed that 51% of people prefer to share rather than own (Mafolska, 2016). In addition, the research performed by PwC in Germany in 2015 showed that 64% of the people had already used or planned to use some forms of sharing economy. Half of
the respondents considered offering some service or product which had something in common with sharing economy, such as sharing unused meals or cooking an additional meal to invite other guests to a dinner.

It is a positive feature that sharing economy has caused a significant drop in the prices of services offered through this platform. Typically, Helping.de charges an almost humorous 12.9 USD for one hour of cleaning. It is not surprising that the current valuation of peer-to-peer business models are over 75 Bill. USD (Allen, 2015).

Table 1 contains a list of the most important Unicorns which have based their business models on the sharing economy principle.

Table 1. List of biggest firms in the branch of sharing economy

<table>
<thead>
<tr>
<th>Company name</th>
<th>Company value (Bill. USD)</th>
<th>Branch</th>
<th>Ranking among Unicorns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uber</td>
<td>51</td>
<td>Passenger traffic</td>
<td>1</td>
</tr>
<tr>
<td>Airbnb</td>
<td>25.5</td>
<td>Accommodation</td>
<td>3</td>
</tr>
<tr>
<td>Didi Kuadidi</td>
<td>15</td>
<td>Passenger traffic</td>
<td>6</td>
</tr>
<tr>
<td>WeWork</td>
<td>10</td>
<td>Office renting</td>
<td>11</td>
</tr>
<tr>
<td>Lufax</td>
<td>10</td>
<td>Financial services P2P</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: fortune.com

The perception of sharing economy varies across the European Union. For instance, the ride-hailing company Uber has been tolerated or even welcomed in the UK, but in other countries, like e.g. Germany this service has been subject to strict regulation or even banned. That is why Brussels has criticized the attempt of the German government to crack down Airbnb hosts by introducing fines of up to 10,000 EURO for people who rent out their entire apartments on the home-letting website. Especially incumbents have an incentive to convince regulators and lawmakers that the sharing economy start-ups are something “illegal” (Basulto, 2013).

Since shared economy represents a challenge for the European business sector, there is an intention to harmonize the regulation, which would help boost this type of business. Currently companies operating in the sharing economy business are confronted by 28 different regulators, which hampers them from doing business effectively (Robinson, 2016).
WECONOMY AND COLLABORATIVE CONSUMPTION

The term WEconomy can have different meanings. Friedman (2014) sees WEconomy as a new economic model where communities of prosumers (producing consumers) share, swap and rent goods and services, as opposed to just owning them. According to a Finnish WEconomy portal it concerns sharing know-how with underdeveloped countries (WEconomy, 2016). WEconomy is also defined as “a global movement, connecting online, in order to establish a new form of consumerism and economic activity. In the WEconomy everyone does business with one another and everyone profits from one another” (weCONOMY, 2016).

 Needless to say that by some authors the term of WEconomy is used in a different sense. It means a universal world economy with one monetary system which will in the future replace the contemporary state, continental and national economies. In the same meaning, terms such as WEcology, WEsources, WElegion, WEmembers etc. are used as well (Daily News, 2000).

In WEconomy, everyone does business with one another and everyone profits from one another (PDMTN, 2015). Social systems enable shared access to goods, services, data and talents. These systems leverage information technology to empower individuals, corporations, non-profit organizations and governments with information that enables distribution, sharing and reuse of excess capacity in goods and services. In this respect Markova and McArthur (2015) have coined the term collaborative intelligence (CQ), which is a measure of our ability to think with others on what matters to us all.

WEconomy usually appears in places where people strive to improve the current economic system and offer a new solution which draws attention to the environment and the human community. This way the most agile users set up non-profit web hubs which allow sharing almost anything. Among others, the hub Sharable provides individuals and groups with a playbook for how to build a system for sharing everything from baby food and housing to skills and solar panels. Noticeably, the first marketplaces like “Freecycle” or “CouchSurfing” operated exclusively on a non-profit basis, but the currently set up sharing platforms are based on the commercial principle. Sharing economy thus gains support from financial communities (Sacks, 2011).

The new business models applied in WEconomy are understood as value creating models that contribute to resolving social and economic issues simultaneously and are not purely driven by one organization but by a group or community of people (WEconomy Index, 2015). Companies should therefore understand and manage this emergent system in order to adapt the current and future business models to provide new sources of revenues within this growing area of the economy (Matzler, Veider & Kathan, 2015).
The nature of WEconomy is related to the concept of psychological value (Carvalho & Jonker, 2015). It influences and transforms an individual’s mentality (mind set value). This type of value is dominant in what can be referred to as social products. This value is related to individual self-realization, enhancement of skills or new knowledge and experiences that influence a person with new perceptions and how to behave. There are many examples in new business models linked to a healthier lifestyle, an ecological way of dealing with waste, different understanding of human problems or easier utilization of technology, etc.

In order to foster WEconomy, it is necessary to start with a redefinition of our understanding of the market from being providers of goods to become purveyors of services and experiences. It also requires a new language: “access” beats “ownership,” “social value” becomes the new currency, “exchanges” replace “purchases,” and people are no longer consumers but users, borrowers, lenders, and contributors (Sierra, 2011). By means of WEconomy, a new global market, where money has surprisingly stopped being the only valuable currency, has been set up.

The concept of WEconomy demonstrates how many seemingly unconnected movements are paving the way for a new economy that is sustainable and circular by nature. In this respect, the term “WEconomization” has been coined. WEconomized organizations are more valuable and more effective, and empower themselves, other individuals (their prosumers: producing-consumers) and the entire community. WEconomized organizations are oriented towards the future. Success in today’s WEconomy means doing it together, for the good of the many, not just the few. It means returning to a hand-made, one-of-a-kind world, where profit is also purposeful, and where creativity, socialization and trust are core competencies. It deals with the establishment of collaboration with poor countries with the aim to solve economic, ecological and social problems. The core vision is to interconnect the needs of underdeveloped countries with the profits of multinational companies. One of the principles of operating WEconomy is no reliance on state support.

Surprisingly, even mergers and acquisitions (M&A) can be WEconomized. Friedman (2014) points out that we know different people, different investors and different target organizations. We have distinct ideas. This could be a reason for sharing this knowledge.

Generation Y (people born in the 1980s) is believed to be much more inclined towards adopting WEconomy principles than the preceding ones. Generation Y, which did not experience the Internet bubble took quite a different standpoint to crisis. The way they approach our so called crisis is much more balanced, adopting the new economy in a completely different way. They practice WEconomy, which means doing things together, first to share to multiply or replicate in a later stage. They are often resigned to having a regular job but they form connections in an organic way on a temporary basis to create and develop. Their status is not derived from a formal authority but from one’s ability to show off, to share. They even do not care about being unemployed many
times a day since they have the ability to find work many times a day (Apple, 2013). According to Botsman and Rogers (2010), collaborative consumption can be divided into three main types:

1. The first mode represents product service systems which allow members to share multiple products that are owned by companies or private persons. Examples of product-service systems are car-sharing services like Zipcar and peer-to-peer sharing platforms such as the website Zilok.com.

2. The second type concerns redistribution markets. Peer-to-peer matching or social networks allow the re-ownership of a product. Examples of redistribution markets include the online platforms NeighborGoods.com and ThredUP.com.

3. The third type concerns access that can be derived through collaborative lifestyles in which people share similar interests and help each other with less tangible assets such as money, space or time; this sharing is mostly enabled through digital technology. This category covers a wide variety of collaboration systems. Examples range from garden sharing (landshare.net) to systems of skill sharing, such as Taskrabbit (taskrabbit.com).

Well-known examples of successful start-ups built on collaborative consumption systems include Airbnb Inc., a San Francisco-based online accommodations marketplace, and Zipcar, a car-sharing brand that is now part of the vehicle rental services company Avis Budget Group Inc., based in Parsippany, New Jersey. Companies can support consumers’ collaborative consumption efforts. The car-sharing brand Zipcar is a well-known example of a business built around the collaborative consumption system (Matzler, Veider & Kathan, 2015). There is no doubt that the clear-cut trend directing towards collaborative consumption has definitely surfaced. Companies, no matter if they want it or not, have to respond to this trend in the best possible way to create value out of it. There are at least six options of how companies can respond to the concept of collaborative consumption (Matzler, Veider & Kathan, 2015):

1. by selling the use of a product rather than ownership,
2. by supporting customers in their desire to resell goods,
3. by exploiting unused resources and capacities,
4. by providing repair and maintenance services,
5. by using collaborative consumption to target new customers, and
6. by developing entirely new business models enabled by collaborative consumption.

WEconomy and its effects are studied through observing and analysing the world. It is bound to change how people work, trade and live. Topics explored in the connection with WEconomy are (Friedman, 2014):

1. Research of WEconomized organizations and specifically their business models,
2. Establishing a WEconomizing leadership think tank,
3. Formulating courses and workshops for corporations, students and entrepreneurs, and
4. Launching consulting methodologies to enable organizational WEconomization.

WEconomy consists of seven trends, six different views on a modern economy, and a wildcard connecting the other trends within WEconomy. The seven trends include (Weconomy index, 2015):

1. circular economy,
2. functional economy,
3. bio-based economy,
4. collaborative economy,
5. e-sharing economy, and
6. self-production (or 3D economy).
7. Internet of Things (IOT).

Collectively, these are labeled as WEconomy. Figure 1 illustrates the mutual dependencies among the trends in WEconomy.

![Figure 1: Outlay of mutual dependence of trends in WEconomy](image)

Source: WEconomy Index (2015)

One example which illustrates the social impact on the society within the framework of WEconomy is food sharing. The evolution of widespread food sharing has helped to shape cooperation, family formation, life history, language and the development of economies of scale (Crittenden & Zes, 2015).

WEconomy plays an important role even in helping farmers in developing economies to share knowledge. Models enabling farmers to be enriched by shared knowledge have been developed
already. These models offer farmers knowledge learning and knowledge sharing. The models enable heterogeneous groups of farmers to be endowed with their initial production capabilities and posting questions in the platform for help. A representative expert regularly monitors the forum and provides the farmers with answers to their questions. (Chen, 2015).

**WEconomy Index**

The WEconomy index is a self-audit tool developed for organizations by Prof. Dr. Jan Jonker (Radboud University, 2016). The aim of the index is to help organizations gain insight into their performance on seven trends. The trends flow from academic material that has not been applied in business before and thus offers new insights for organizations. It aims at triggering organizations to be self-critical, set targets for future (strategic) development and help them identify opportunities for working towards a more sustainable way of manufacturing and organizing.

The benefits of the WEconomy index for the organization are:

- The company will gain insight into what its current position in the new economic movement is.
- They will get an indicator score of how well they are doing in several economic areas.
- The index gives risk identification.
- The index provides the company with industry benchmarks.
- The index can increase internal communication about this topic in the company.

**Case Studies**

**WEconomy Start**

WEconomy Start is an initiative launched by several institutes like World Vision Finland, Aalto University School of Business and Finpro. It is a global innovation program for companies and entrepreneurs in search of new paths towards sustainable growth. WEconomy Start aims at solving wicked problems of the world by fostering new kinds of partnership between the private sector, academia and the civil society. The program builds bridges and facilitates rights-based collaboration between companies, low-income communities and other relevant stakeholders. The whole idea is combining expertise from different sectors, bringing together development work and business, and involving the academia actively in the process. It fosters new, innovative and sustainable solutions to economic, ecological and social problems identified by low-income communities, such as lack of opportunities, unemployment, poor sanitation, malnutrition etc. (Seppälä, 2012). Within this program Finnish companies co-create innovations together with poor communities in India, Sri Lanka and Kenya. Later on the
program should be scaled up through World Vision’s network in almost 100 countries. During the one-year program companies will be able to identify new business opportunities, do fast-prototyping, innovate together with end users, and make implementation plans for starting a business in new markets. The program of this initiative is focused on boosting collaboration with underdeveloped countries to improve the living conditions of the inhabitants. The founders of this program are convinced that the most viable innovations are co-created on site with the prospective end-users. The local people are thus extremely motivated to learn new things. Typically, WEconomy Start helps combine different competencies with new understanding of local opportunities to establish new business and innovative solutions to problems in developing countries. Some other activities are targeted at the development of an innovative ecosystem combining education, technology export and international business, or development of new methods for the utilization of renewable energy and environmental technology (WEconomy, 2016/1). In the meantime, the concept of Weconomy Start has been extended to countries like Kenya where GoSol plans to launch a project dedicated to the utilization of cheap solar energy. The idea behind GoSol and the WEconomy project is to train local producer groups and businesses in the assembly and use the Sol5 device that can be used for multiple purposes in the communities, like cooking, baking, drying, sterilizing water by boiling etc. GoSol has already raised funds to start this project in Kenya. The objective is to connect communities, entrepreneurs and makers, and push them towards using solar energy, which might result in 2/3 reduction of energy prices and thus change the standard of living (WEconomy, 2016/3).

When involved in WEconomy Start, companies can gain various benefits, such as (WEconomy, 2016/4):

• developing an innovative business idea and testing it in the target country,
• in-depth knowledge on the target areas and the special features on BOP (Bottom of the Pyramid) markets and business,
• familiarizing themselves with grassroot-level needs and capabilities,
• channels to local communities and other stakeholders,
• new competence in responsible business operations and co-creation,
• scaling-up company business globally, and
• involvement in an international network of experts that increases wellbeing in the world.

Similarly, the Finnish company Palmroth Consulting has gone to Indore with WEconomy Start to develop a concept of importing handicrafts produced by Indian women to the Finnish business-gift market. They set four key targets:
1. to learn about BCP (Business Continuity Planning) business opportunities and methods in India,
2. to find out how the co-creation process between community members and the company could work,
3. to develop a business model around the concept and to start a new business, and
4. to generate employment for local artisans; people living in the slums of Indore lack employment opportunities and skills.

The founders of Weconomy Start endorsed mutual enrichment in terms of knowledge and know-how. They have now a good basis to develop their concept of sustainable development together with the locals to fit the local conditions (WEconomy, 2016/2).

**FIGHTME CASE**

As part of a new wave of social platforms, the FightMe app has championed the concept of challenges and social movements. Skateboarders, parkour enthusiasts, rappers and poets are all part of an engaged community currently using the platform, with the company wanting to harness this community in order to drive WEconomy. FightMe is thus a collaborative platform which enables the participants to be part of everything that the company is doing, from the development of new features for the platform to raising global finance to fund company activities.

How FightMe fits into WEconomy is the way in which it will not rely on only likes or comments, but on finding different revenue streams instead, in which to monetize its audience - although the company does not yet offer any specifics on what these ‘different revenue streams’ may be (PDMTN, 2015).

Through the smartphone app, FightMe gives users 30 seconds to create a video about whatever they want, and they can either start their own video challenge or join one that is already live - like PETA’s latest anti-fur protest. Jamie Lorenz, chairman and founder of FightMe states that “FightMe focuses on ‘real’ social interaction online. FightMe creates a friendly environment based on its “joining in” mechanics, giving purpose and context to each video. Strength comes in numbers, and the support of others participating in a challenge gives freedom of expression away from judgment”.
**NOVY BOR CITIZENS AND CRIMINALITY**

**Time: approx. 1 hour**

The aim of this study is to point of the effectiveness of sharing economy. This study describes the effort of Novy Bor citizens who made decision to improve the systems of shared security in town streets and public places.

In one of Novy Bor quarters (the town approx. 120 km northern wards of Prague) which is notorious for rampant criminality, the state or municipal administration promised potential remedial measures which would take place over next several years. They wait until this provision is approved and funded from state resources. So far it hasn’t come into existence. In the meantime the citizens living in the quarter to be impacted by an excessive criminality established own council which makes decision on the execution of a common approach. Most of the riots and disturbances were committed during the weekends mostly under the influence of alcohol abuse. The council agreed on the procedure to deploy riot patrols composed of young men in town streets on Fridays and Saturdays. Each of Novy Bor citizens provided a financial subsidy amounting 550 CZK (20 EUR) for the development of the application which can be downloadable to any personal smartphone.

All the persons which wanted to help improve the town quarter security status logged in the application. Young men were logged in automatically in dependence of their time availability and righteously as per the number of hours to be devoted to safeguarding. On average each person was scheduled to take charge of this service 1.5 times per two months. Furthermore older citizens, women on maternity leave and other persons supporting this system also logged in the application to help night watch discharge its duties. They split themselves among smaller groups to be of assistance to safeguard patrols. These citizens are assumed to provide the safeguard patrols with necessary technical assistance like washed warm underwear, small motivation present and finally symbolic remuneration 800 CZK (27 EUR) per night.

Moreover all the citizens who are afraid of their personal safety and need the assistance of the patrol like aged people during the walk, single young women coming home from dancing parties and other people of this sort would be also logged in the application. The application is equipped with a GPS chip which enable citizens, in the case of apparent danger, to send a signal to be received by the night watch. It was testified that the patrol, providing that all 10 patrol members keep predefined placement, is able to get to the scene within 70 seconds to help safeguard the victim. This signal is also transmitted to the Police of the Czech Republic which collaborates with a local patrol. When balancing cost/benefit ratio then 3000 citizens (approx. 25% of a total citizen headcount in Novy Bor) to be involved in the program bring
1,650,000 CZK (approx. 61,100 EURO). This money is spent for the application development as well as for the remuneration of the patrols. This would ensure above standard safety in this critical location for almost six months. If the originators of this concept manage to get the subsidy from local entrepreneurs this period could be commensurably extended. Rough estimates to be made by municipal experts indicate that the level of crime in the area in question can be reduced by 50%. Quite similar approach was pursued in another Czech town Jicin. So called “civilian assistants” who were laid off are offered to help municipal constabulary maintain public order.

This case study demonstrates how the collaborative work of citizens can improve the quality of life in the town by means of the control of criminal behavior of certain groups of citizens.

Such a simple disruptive innovation which solves the problem of a local community enhances value of life upon tolerable finance expenditures.

When assessing this model from the point of view of sharing economy criteria, it can be confirmed that:

- The model is based on all basic principles pertinent to sharing economy: its works collectively, all parties are sharing profit (both financial and non-financial) and nobody is harmed.
- The model was designed in such a way both to help widest possible community and be easily mastered.
- Beside this value the new community that employs large group of volunteers was established and new association in social networks was formed (e.g. a group on Facebook).
- The success is measurable by the decrease in criminality ratio as well as by the establishment of new groups of people which became friends. Many aged and solitary people feel that their lives go in different directions. They recognized they are useful for the rest of society.

**The questions:**

1. What would you improve the service in question so as to bring additional value to the citizens?
2. What are the strengths and weaknesses of the proposed open business model?
3. How would you assess ethical aspects of the service in question?
4. How would you calculate the value to be generated out of this service? What is the value propositions?
5. Is this business model easily transferable to another locations?
6. What are the critical success factors of the implementation of this service?
WECONOMY

There is a platform called WECONOMY in Germany which aims at fostering partnerships between start-ups and established market players. With many opportunities for open and intensive exchange, WECONOMY is a platform for interaction between start-ups and companies, and it promotes mutual understanding and lays the foundation for possible collaboration. For start-ups the establishment of partnerships between start-ups and corporates is of interest for several reasons:

1. gaining know-how from industry experts, cooperating in R&D projects,
2. acquiring pilot customers,
3. building supplier relationships, and
4. establishing market credibility.

WECONOMY is aimed at budding startups and young entrepreneurs. It looks for innovative, technology-oriented ideas and convincing founder personalities. The companies to be involved in WECONOMY should not be older than five years and they have to be headquartered in Germany. Handelsblatt, Wissenfabrik and UnternehmenTUM are eager to enable such partnerships by fostering valuable industry/start-up collaboration (KINEXON, 2014). In addition, the most innovative start-ups are yearly awarded the prestigious WEconomy award. The winning start-ups receive a one-year mentoring scholarship including a networking weekend with leading executives of German Corporates, as well as specific workshops and events.

EXAMPLES OF SHARING ECONOMY

Uber and shared economic value

The Uber Company was founded in 2009 and its business model is based on the sharing economy principle (Uber ČR, 2016). The company uses a mobile application to interconnect drivers with customers to bring joint satisfaction to both parties. The main objective is to change the way of people’s transportation in the city. The company does not have the ambition to offer the quickest or the cheapest service but to change the service to the better. The success of this business depends on mutual satisfaction, optimum balancing of supply and demand, etc. This way the company generates value added for the customers. Uber has managed to increase the daily number of taxi rides up to one million. Uber operates in an environment which is characterized by a very low barrier of entry in Porter’s terminology (Magretta, 2012). Everybody who is older than 21 and possesses a valid driving license may become a partner of Uber taxi. This certainly causes intolerance from licensed taxi drivers, for whom Uber represents unfair competition. On the other hand, Uber makes the effort to compensate for the controversial part of its business by other social activities, like organizing regular food collection for the Food Bank. Any user of the Uber platform is allowed to make a free call to a car driver and drive the food to the collection point.
Airbnb and purposeful demand creation

The establishment of a sharable accommodation service was not easy at all at the beginning (Sacks, 2011). Since the idea of shared accommodation has come into light, the founders of Airbnb have faced the problem of how to persuade potential customers to look for accommodation preferably in private flats and apartments. Unfortunately, this business started to flourish only when an occasional event took place in the town and the hotels were fully booked. Chesky and Gebbia, the founders of Airbnb, put in a lot of effort to meet and visit flat, house and apartment providers and spend a night in the venues. They learned that people were not willing to pay for a room they could not see. That is why they insisted on posting wide-angle high-resolution photos of the accommodation. The host’s reputation communicated by his online review scores had no effect on the listing price or the likelihood of consumer bookings (Ert et al., 2016). The Airbnb managers believed that posting photos might have an impact on guests’ decision making (ibid.). Early on, they placed an artificial cap on the price, but they experimented with lifting it. All of a sudden the hosts began renting out entire apartments and the experiment became the norm. Airbnb usually cuts a 9-15% margin from the rental fee (The Economist, 2013). At preset Airbnb is growing with a staggering 45% average rate. Airbnb operates now in more than 8,000 cities and rents houses, castles, cars, yachts, and even igloos. From 2008 to 2015, over 25 M guests chose to sleep in one of the 800,000 Airbnb-listed properties (Allen, 2015). The future of Airbnb is not only in monetizing the houses but in monetizing all the stuff in the houses, such as front yards, backyards and driveways.

Ford Company joint leasing

Ford Company introduced a new service called Ford Credit Link at the Detroit Moto Show in February 2016. The company offers joint car leasing for up to six people. This is very similar to TipCar or Car2Go. Via the website or an application, the customer can book a car to be found exactly in the place which they request. The car can be unlocked either by a mobile or a special card. After using the car, the customer returns it to the original place. The charge is automatically debited either from a registration account or bank account.

BlaBlaCar expansion

BlaBlaCar was originally a French start-up founded by Frédéric Mazzell in 2003. The incentive for the establishment of the company was the frustration from his inability to get home just before Christmas when all the buses and trains were sold out. As opposed to fully-booked buses and trains there were plenty of semi-occupied cars driving around. In the meantime the analyses showed that the average occupancy was 1.7 persons per one car. Mazzell quickly recognized that cars are not utilized in an optimum way. Then he stroke upon the idea of sharing empty cars by passengers who originally opted for cars or buses. BlaBlaCar has managed its growth through acquisitions. In the Czech Republic and Slovakia it has acquired a majority stake in Jízdomat and Jazdomat,
Part 3.5. Sketching the New Frontiers of Open Innovation

respectively. The company has managed to raise money amounting 300 M USD. The current start-up valuation is estimated at 1.5 bill. USD. The BlaBlaCar business model is based on mutual car sharing, the company charging a 10% commission on each transaction. Currently BlaBlaCar employs 100 employees in 15 offices around the world.

IKEA Family exchange platform

The home furnishings company Ikea Group launched an online platform in Sweden in 2010, allowing customers to resell their used IKEA goods. In Sweden, members of the company’s loyalty program, IKEA Family, are able to post and sell their items for free. Membership in IKEA Family is free. Seemingly IKEA launched this platform without any financial benefit to be reaped by the company; In the worst case the company’s own initiative might have cannibalized new product sales. The launch of the used furniture marketplace has actually had multiple advantages for IKEA. First, the redistribution initiative supports the company’s environmentally friendly ethos, enticing customers who are serious about environmental stewardship. Moreover, the company has established a marketplace that does not cannibalize new sales but allows customers to create space in their homes for new IKEA items (Matzler; Veider & Kathan, 2015).

Maschinenring personnel leasing scheme

Maschinenring, a Bavaria-based firm, dealt originally with sharing agricultural and forestry facilities. Later on the company entered the personnel leasing industry as well. The idea was quite simple and workable: in winter many farmers are underemployed. On top of that, many farms are too small to support the farmers fully, and they need additional income. Since farmers are generally hard workers, many companies have an interest in hiring them for temporary work. Thus, the match was made: businesses found that Maschinenring personnel provided them with a pool of skilled, hard-working short-term workers. Today, more than 258 Maschinenring affiliations serve Germany, comprising around 193,000 farmers — more than 55% of all farmers in the German economy (Matzler; Veider & Kathan, 2015).

LiquidSpace as a tool for facilitating office sharing

The LiquidSpace app helps freelancers and others seeking office space to find workspaces tailored to their needs, time requirements and geographic preferences. The app also relies on a “how I work” profile, in which the users list the type of work environment and the size of the work crowd in which they can feel productive. Examples of the environment range from a “room with a view” to a “corner of silence.” Examples of crowd size range from one to 50 people. LiquidSpace exemplifies how almost any company with office space can profit from collaborative consumption. Excess capacity can be managed easily, and capacity shortages can be addressed flexibly through virtual marketplaces (Matzler; Veider & Kathan, 2015).
Variety of car-sharing business models

In the biggest European cities, due to problems with finding parking lots, people are more willing to swap car ownership for car renting. For this reason, various business models have been developed within the car sharing business (Sacks, 2011). Car-sharing schemes are divided into peer-to-peer car rental services in which the customer pays for borrowing someone else’s car (Buzzcar, Getaround, RelayRides, Tamyca, Wheelz or WhipCar) and taxi-like services. There is evidence that people’s shifting from ownership to renting implies more efficient decisions on when they actually need to drive. Typically, an average car sharer drives 40% less than the average owner. In 2010, the Peugeot Company rolled out a mobility rental service called “Mu”. The membership provides customers with access not only to customizable Peugeot cars (optionally equipped with bike racks, snow tires, or TVs) but also to electric scooters and bikes. Mu has managed to expand from six cities to almost 70.

Opposed to Peugeot, the German car producer Daimler launched a car sharing initiative in a more sophisticated way. They launched the Car2Go service which bears similarity to that of Zipcar’s, except that it does not require a reservation or a two-way trip. The Car2Go application enables the service users to locate unused cars operating within the Car2Go network and access them by means of a windshield card reader and PIN code. The user can drive the car anywhere in the location and leave it there for someone else to use. The fuel-efficient Smart car is equipped with a 100 Watt solar roof which powers the telematics of the car and its battery. In a short perspective, this application should serve for any additional cars in addition to Daimler. Nowadays Car2Go Daimler has already started piloting Car2Gether, which offers an application to match local drivers with people looking for a ride. The principle is rather simple, as the rider submits a request to the driver and both parties involved in this business are linked through social networks (Facebook and Twitter). After the end of the ride, the rider compensates the driver for a proportionate part of the driving costs. Such peer-to-peer rental schemes provide handy extra income for car owners and can be less costly and more convenient for the borrowers. Some rental schemes focus on particular types of customer, such as students, or particular types of vehicles, such as high performance cars. Variations on these models include DogVacay and Rover, both being dog-kennel services (The Economist, 2013). It is worth mentioning that P2P models are not supposed to outplay traditional B2C models completely. The latter, ranked among asset-centralized ones still possess certain viability. What is shared in B2C is access to goods and customers. The enterprise CarShare came with the idea of community–based car-sharing models even decades ago (Leong, 2015).

The sharing of electric vehicles is also on the rise. This service is promoted by the elimination of the necessity to build a network of charging stations, which would be quite expensive (Wang and Yan, 2016).
The Czech Republic-based automotive company SKODA has embarked upon a car-sharing project as well. In conjunction with local Czech universities, like the University of Economics in Prague, Czech Technical University in Prague and Czech University of Life Science in Prague, SKODA has prepared a project of car-sharing to be launched under the name Škoda 4 Now. The nature of this project is car-sharing between students. The project has been prepared by students themselves. A marketing specialist of SKODA automotive company states that at least in the beginning it dealt with a marketing tool which should help cover the costs of the project partially. They emphasize that the aim of this project is not to challenge current commercial projects like Car4way which was launched by one of existing SKODA dealers. They reckon on using six cars at the beginning, and depending on the demand for this service, the scope of this project could be extended. The impetus for the execution of this project was the change in Prague municipal legislation where cars involved in car-sharing would be allowed to use upcoming paid parking zones for the minimum fee of 100 CZK (approx. 4 Euro) per year (Pecák, 2016).

Kuhleasing’s swap of selling cheese for leasing cows

Kuhleasing.ch, a cow-leasing website, illustrates how conventional industries like farming can establish new business models by moving away from traditional revenue streams. Confronted with decreasing milk prices and the abolition of a cheese export union in 1999, including the discontinuation of a selling guarantee for cheese, Swiss farmers faced the challenge of selling large amounts of cheese to survive. Acting from necessity, a Swiss farmer started leasing his cows to customers instead of solely selling the cheese. The lessees pay a fee to sponsor a cow for a season. The arrangement includes a photo of the cow and a certificate, plus the option to visit the farm to help out as a volunteer or to watch the daily farm work. The leasing cost does not include the cost of the final cheese product, but it guarantees a special price for a minimum purchase of 30 kilograms of cheese from that cow. The farm also offers additional leasing options that are available as gifts, such as short-term packages (Schwegler, 2011).

Boat sharing

Not only cars but also boats are sharable. Harboring, operating and maintaining yachts and boats is very costly. That is why four Hawaiian families share the cost and use of one boat for weekend fishing trips and fun outings. It not only reduces the number of boats that need to be produced and purchased, it reduces the storage space needed, and can foster trust and camaraderie among neighbors. For the purpose of facilitating boat sharing, the Boatbound was founded. The firm offers short term peer-to-peer boat rental (The Economist, 2013).

ThredUp social business

ThredUp is a venture-backed startup that helps people unload or swap children’s clothing and toys which have become obsolete or unused. The founders of ThredUp have partly copied the business
model of eBay, which in the early years enabled people to list the goods free of charge and thus help create demand. In contrast, ThredUp decided to fund the supply by means of the purchase of hundreds of boxes of clothing before the launch, so as to create an inventory. ThredUp gives the users a credit every time they post a box of stuff which their kids can no longer use. They can use the credit to acquire a box of goodies more in line with the current age of their children. Boxes that are unsold after two weeks are either given a fire-sale price or donated to a charity (Sacks, 2011).

Van Moof and the transformation of traditional business

It is always inspiring when “traditional” companies have the courage and flexibility to change and adopt new economy principles. The Dutch bike builder Van Moof is a typical example. They have just released a new concept of sharing bikes. This model is supported by the mobile application Spinlister which facilitates the search for an unused bike. The bikes are equipped with a GPS chip which enables finding its location, and a Bluetooth unlocking system. After execution of payment it is possible to book a bike to be situated wherever in the town. A combination of the app and Bluetooth enable (un)locking the system integrated in a Van Moof bike. During the ride the GPS chip updates the location of the bike continuously. Having used the bike, the biker locks it and leaves it anywhere. Then the bike is available for any other user.

A short story from the Silicon Valley

It has become customary within the communities that have taken fancy of sharing economy to use this principle on a daily basis. They commute to work by shared cars borrowed for a few hours from City CarShare which is a non-profit and thus relatively cheap version of Zipcar. They also share nannies with neighbors, and occasionally they take small loans from peer-to-peer Lending Club, and finally they work in a shared office (Sacks, 2011).

Benefits of sharing economy

Sharing economy enjoys growing popularity because of solving problems the solution of which is expensive or even impossible. The concept of sharing economy benefits from an aura that seems to combine convenience with a patina of revolution. Notwithstanding the fact that the term “sharing” is a bit fuzzy, the idea of a «sharing» economy sounds groovy and tempting because it is:

- environmentally correct,
- politically neutral,
- economically competitive,
- anti-consumerist, etc.
Sharing economy has proved its worth thanks to its ability to build on existing social-economic arrangements and psychology of people, and not vice versa. The optimum working of sharing business is contingent upon building mutual trust. Almost all subjects involved in sharing require profiles for both parties and feature a community rating system. It is of advantage if these ratings can travel with the user across the web. In conjunction with the need to have customer rating at disposal, start-ups like TrustCloud have been set up. These start-ups have the ambition to become a portable reputation system for the web. They collect data of the customer’s reliability, consistency and responsiveness. The customer is then assigned a contextual badge which indicates his trust rating, which customer carries to any website (Sacks, 2011). Sharing economy is powerful enough to penetrate branches which are even out of reach for Adam Smith’s “invisible hand” (Basulto, 2013).

**Shortcomings of sharing economy**

It stands to reason that sharing economy can neither solve all the problems of the market economy nor outplay traditional ways of supplying customer demand. Sharing economy involves a portfolio of risks. The most significant are the following (The Economist, 2013):

- Income instability (the worker, rather than the firm, has to absorb the brunt of demand shocks or price cuts);
- Irreversible capital investments (Uber and Lyft have infamously pushed drivers to buy new cars by promising high returns that never materialized);
- Insurance and legal liability, as some services are falling short of industry-specific regulation, possible tax evasion of incomes coming from shared business practices; and
- Unforeseen criminal liabilities (what happens if an Airbnb guest turns your home into a brothel!?); to less protection in the event of a catastrophe (no access to programs such as workers’ comp).

The Economist points out a paradox of using Uber service in New York. The entry of Uber in the market increased the number of taxi rides from 14.7 M to 15.8 M between the years 2013-2015. This implied a drop in taxi prices by 30% upon simultaneous increase in demand by 7.5%, which impacted New York public transport negatively. Similarly, Uber lured away the customers from City Bike, which promotes greener and healthier cycling. This way, Uber affected indirectly the ecological impact of vehicular traffic towards a higher ecological burden, instead of the support of its sustainability (Rebound effect).

There are certainly limitations to sharing business. It has been experienced that sharable objects have to fit specific criteria: they must cost more than 100 USD but less than 500 USD, be easily transportable and frequently used. It is no surprise that most workable things from the point of view of sharing are sporting goods and outdoor gear. On the other hand, it has been proven that sharing expensive electronics would not work (Sacks, 2011).
It is needless to mention that there may be other impediments to effective implementation of sharing economy. A research done in R&D environments showed that employees, in addition to social production, were willing to share excess of material capacity but not data. In the latter case, competitive pressures amongst scientists tend to play a bigger role (Dedeurwaerdere, Melindighidi & Broggiato, 2016).

Another disadvantage of sharing economy is its combination with higher risks of freelance activity. Some of the opponents are calling for stricter regulations of sharing economy since it devastates entrepreneurial activities. Trade Unions also argue that the underlying internet platforms cannot secure sufficient protection of employees.

The prospects of sharing economy

Companies that produce products or services are fully aware of the growing potential of sharing economy, which will flourish no matter if they join or not. The following figures speak for themselves: the expected growth of the sales is estimated at 335 Bill. USD by the year 2025. Currently 7,500 sharing platforms exist globally (Mafolska, 2016). Car sharing revenues in North America are expected to hit 3.3 Bill. USD by 2016 (Sacks, 2011). Similarly, Botsman & Rogers (2010) deem that the consumer peer-to-peer rental market will achieve 26 Bill. USD in the same time. This unprecedented increase in revenues is also driven by the support from financial communities. For instance, the venture capital Collaborative Fund was deliberately founded by Craig Shapiro to invest preferably in collaborative-consumption businesses. Therefore, traditional companies like car manufacturers or big-box retailers should get on alert. Even if it is not probable that sharing platform-based companies will swallow traditional ones, it is probable that they cut a part of their market share. If people begin consuming 10% less and peering 10% more, the effect on the margins of traditional corporations is going to be disproportionally greater. This means that certain industries have to rewire themselves or prepare to sink into the quicksand of the past (Sacks, 2011).

Sharing economy is becoming more influential in the non-profit sector as well. It accentuates the nonfinancial benefits of sharing economy, like resource sustainability, individual empowerment, the building of interpersonal community, and trust. Sharing economy may be the way forward for humankind, but it may or not be monetizable in the long run. The non-profit sector should provide sharing economy with stewardship (Leong, 2015).

Conclusions

Sharing economy is one of the most challenging junctures where no one knows how big it might be. Sharing economy is gaining ground, fundamentally altering how people own and consume. It goes without saying that sharing economy is a socio-economical phenomenon which enables customers
to barter some advantages for new comfort. Even if people appreciate all the features and benefits of sharing economy, they are still inclined to consider sharing economy as a complementary business model to the traditional model which is based on ownership. People are still reluctant to get rid of their assets and embark upon the sharing economy model. Shared products or services will become attractive to customers as long as they manage to retain certain acceptable quality standards. Companies can also participate in collaborative consumption economy by thinking in terms of excess capacity, including office space, unused production capacities, staff, and specialized knowledge. On top of this, the contribution to the “community” still plays an important role even if it is not the focus for global companies. Shared services may be an opportunity in regions with high levels of unemployment. From this point of view, they can be ranked among social innovations as well. By connecting people and helping to make sharing more efficient, companies have potential to profit from sharing economy. Despite this, the future of sharing economy remains dependent on breaking the strong relationship between regulators and the industries under the constraints of regulators. The disruption of highly regulated industries by companies like Uber and Airbnb have given rise to reversing questions about the efficacy of industry regulation (Allen, 2015).

**KEY TAKE-AWAYS**

- By reading this chapter you get familiar with the principles of WEconomy and sharing economy principles.
- You recognize key benefits of collaborative approach to innovation within the framework of current highly competitive environment.
- Moreover the chapter addresses WEconomy concept as the operable tool to be conducive to the alleviation of hardship of underdeveloped countries inhabitants.
- In addition the chapter clarifies functionality of open business models in both business and non-profit sector.

**PEDAGOGICAL GUIDELINES**

**Interactive activities:** Seminars and workshops with external representatives from sharing economy firms.

**Learning exercises:** Discussion of business models in companies engaged in sharing economy. The list of companies can be extracted from the teaching material and the papers referred in the list of references.

**Self-study:** The papers and books dealing with the topic referred below.

**Self-evaluation:** Elaboration of an essay on a chosen topic referring to sharing economy/WEconomy.
EVALUATION QUESTIONS

Individual work examples: Case study resolution
Group work examples: Field research and group presentation of the results of the research concerning sharing economy/WEconomy.

TEACHING TIPS

Slide presentation: Powerpoint presentation enclosed (Sharing Economy and WEconomy)
Links to teaching material: The text dealing with the topic enclosed (Sharing economy & WEconomy)
Supporting case material: Case Study: Novy Bor citizens and criminality

REFERENCES

• The Economist (2013, March 9). All eyes on the sharing economy. The Economist.
The European Academic Network for Open Innovation (OI-Net) is an EU co-financed project designed to promote cooperation on open innovation (OI) topics in European Higher Education curricula and institutes for the benefit of EU competitiveness. The aim is to facilitate European cooperation by outlining and exchanging up-to-date concepts, and good practices in open innovation and open innovation education.

More information: www.oi-net.eu