Educating engineering designers for a multidisciplinary future

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Functional Product Development (FPD) and Product Service Systems (PSS)

- Different names…
  - Similar intentions!
    - A product development view
    - Support engineering designers and teams
      - Knowledge
      - Process
      - Methods
      - Tools
  - Integrating a service perspective
    - For the purpose to
      - Develop FPD/PSS offerings
      - Life cycle perspective/life cycle commitment
      - Need fulfillment drives the development process
      - Take additional aspects into early phases, e.g., environmental
What? Why? How?

- Education of engineering designers
- FPD/PSS trigger a new role
  - Extended responsibilities
- An engineering design curriculum which integrates the domains of
  - Socio-technological analysis
  - Synthesis
  - Technical skills

Requirements on future engineering designers

- Growing importance of
  - Information technology in supporting the life cycle performance of products
  - Worldwide collaboration
    - In enterprises and between enterprises/actors in
      - Development
      - Manufacturing
      - Delivery
      - Services & Support
- The engineering designer as a coordinator and integrator
  - Guiding communication between different professions
  - Extracting/analyzing and drawing conclusions on user needs and offering potentials
  - Driving business development by synthesis of PSS offers
And now...

- Examples from education of engineering designers from:
  - LTU – lecture course
    - A process view
      - A challenge to extend the perspective
      - Another challenge collaboration in design teams
  - DTU – project course
    - A product life synthesis view
      - Understanding a product’s utility and providing it in a more efficient manner
      - Design of not just the physical artefact, but also the product life system
A deep dive, an example...

- Lego exercise
  » To experience what can be problematic
    • Lecturing is one thing, make things happen another
  » Go from needs to product very fast, approx 10 min exercise
    • Task – what is at hand?
      - Shared vision
    • Roles – who is going to do what?
      - Assign a team
    • Collaboration – do what with whom?
      - Team competences
    • Communication – from one point of view to another
      - Tacit knowledge
      - Complicated
  » = a bit more prepared for the project part
    • Have a sense of what will be

Lecture course @ LTU

- ‘Live as we learn’
- Education
- Industry
Case course @ DTU

- The student teams are first guided through an analysis of the initial product's product life cycle, yielding insights into four aspects of product design:
  - identification of current environmental impacts,
  - life phase systems the product encounters,
  - activities that involve the human actor (i.e. customer) and the product,
  - actor-network that support and supply these activities throughout the product’s life.
- Based on the analysis, goals are set for the improved solution and concepts are developed for a new product/service-system.
- This way the students are lead through
  - engineering and
  - socio-technical analysis tasks and thereby laying the foundation for their
  - synthesis work
in the concept development phase of the project

Product life gallery
Actor-networks and Actors activity cycles
Our message...

- FPD/PSS an interest in industry today
  - Importance of socio technical competences in future education of engineering designers
- Challenge traditional engineering design curriculum
  - Not only problem-solving, also problem definition
  - More tacit aspects into concept phase
  - Extended responsibilities for engineering designers
- A new role in real product development projects