Preparation of a Class A certification in the field of pharmaceutical packaging through mapping and optimization of business processes and implementation of the Oliver Wight Class A Behaviors for Business Excellence.

Sebastian Matheis

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Biology Education Centre, Uppsala University, and F. Hoffmann-La Roche AG, Packaging Department Roche Kaiseraugst, Wurmisweg, CH-4303 Kaiseraugst, Switzerland
Supervisors: Ralf Zähringer (F. Hoffmann-La Roche AG) and Staffan Svärd (Uppsala University)
“Nothing is permanent except change.”

- Heraclitus
Abstract

This study investigates the preparation towards a Class A Business certification according to Oliver Wight. Class A business is based on nine basic business behaviors. If applied constantly, this neat set of principles leads to the compliance of a checklist which is necessary to receive the Class A certification. Four of these Class A behaviors where selected in this study for deeper investigations: ‘A Passion for Simplification’, ‘Shared, Aligned and Realistic Plans’, ‘Knowledgeable Workforce with Clear Roles and Responsibilities’ and ‘Business Process Performance Measures’. The study deals with business process management (BPM) and the mapping of processes, a preset governance structure and operational metrics and Production Performance (PP), which is a newly developed management key performance indicator (KPI) at Roche. In the first part of the study on BPM and ‘A Passion for Simplification’, processes were mapped using a dedicated business process management tool, DHC Vision, and harmonized with the according specialists. It was found that business process mapping is the key to continuous improvement of business processes.

The second part of the study investigated two behaviors, ‘Shared, Aligned and Realistic Plans’ and ‘Knowledgeable Workforce with Clear Roles and Responsibilities’. Therefore one main part of the preset governance structure at Roche in Kaiseraugst is studied. This part of the governance structure is called SMART, which is short for Schedule, Make, Assess, Release and Technology. SMART is a set of meetings, also called SMART meetings, to schedule the production in an aligned manner across the involved departments. The study focused here on how the SMART structure is actually accelerating decision-making and how it could be further improved to streamline the interdisciplinary communication in the production scheduling process. The case study was designed in a way that the reader can get a feeling of the SMART governance structure. This was accomplished by visualizing the interactions of sixteen observed SMART meetings and validating the subjective opinion of the observer by surveying all sixty-two observed meeting participants and by six SMART meeting participant’s interviews. Regarding the meetings, the major finding was that the participants see the importance of meeting elements which are necessary for a productive meeting, at the same time their experience from the meeting differs.

The third part of the study, which studied ‘Business Process Performance Measures’, was designed by empirically investigating a top-down developed KPI and surveying thirty-one users of operational metrics to build a first customer feedback for the usage of twenty-three metrics. The major finding lies in the necessity of input of metric users and data creators during the development and continuous improvement of operational measures and KPIs.

Key words: Class A business; Class A behaviors; Oliver Wight; F. Hoffmann- La Roche AG; business process management; pharmaceutical packaging; Key Performance Indicators; operational metrics; conference culture; governance structure
Popular Science Summary

Behaviors on the road to excellence
Sebastian Matheis

On the road to success, companies need to fulfil their stakeholders’ expectations. On the road to business excellence, companies need to exceed these expectations. Oliver Wight Inc. has established a certification called Class A Business, which shows that a company is exceeding stakeholders’ expectations and that it performs in the upper quartile in its respective industry. The Class A Business certification is awarded, once a company fulfils a certification checklist with Class A Business criteria. To get to this point, a company can design their road to business excellence by following a specific set of nine Class A Behaviors.

This study focuses on four of these behaviors, divided in three parts, and how they are implemented at a pharmaceutical packaging department at Roche in Kaiseraugst, Switzerland. In addition, through employee feedback potential areas of improvement are identified.

For a company to understand how it is running, it has to understand its underlying processes. Once the processes are in place, a process-oriented way of thinking can change a company to make decisions based on process’ needs rather than on individual preferences. Business processes and their potential for continuous improvement were the first part of the study. The second part of the study investigated the communication of different functions in the packaging process and how the flow of information could be improved. In the third part, the usage of operational metrics in the packaging department is researched by a user feedback survey.

An innovative way to visualize meeting conversations was developed in this study to make meetings more tangible for the reader. This is a newly developed and never before described method for business research colorfully showing interactions in meetings.

The results are very intriguing. Simple thought business elements seem to pose larger hurdles than would be expected sometimes.
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Companies are becoming faster, more innovative and smarter. This is independent of their business sector. To cope with this fast adapting and ever changing business world, companies have to show a winning attitude. “Excellent companies win constantly and win more than their fair share” (Oliver Wight International, 2005). Excellent companies additionally outperform in delivering what their shareholders expect in cash flow, return on assets and growth (Oliver Wight International, 2005). Therefore, the environment inside and around the company has to be satisfied. Especially, the biggest asset and differentiator of a company, the employees, have to be satisfied for a company to succeed on this journey to sustainable business excellence. Oliver Wight International (2005) argues that this journey to excellence is never ending and applies to every process in the company. They have built a rather long checklist to audit the implementation of business excellence. If a company fulfills all points on this checklist it gets accredited the Class A certification for business excellence. This means that the business performs in the upper quartile of companies in the same business sector. This in turn is a target which demonstrates business excellence to the company’s stakeholders. In the case of Roche, the checklist has been adapted to serve the company specific environment. This checklist can be seen as a tool to identify gaps between the status quo and where Roche would like to be in the future. During this master’s thesis, I had the chance to shadow the baseline assessment of two consultants from Oliver Wight International in Kaiseraugst, Switzerland. During this baseline assessment it became clear that the checklist is not so much center of focus during the early phases on the journey to business excellence. It turned out that the underlying ‘Class A Behaviors’ are the key to automatically fulfill the checklist. Table 1 shows those nine behaviors, which have been adapted in collaboration with Oliver Wight International to serve the Roche specific requirements. This master’s thesis focuses on four of nine Class A Behaviors, ‘A Passion for Simplification’, ‘Shared, Aligned and Realistic Plans’, ‘Knowledgeable Workforce with Clear Roles and Responsibilities’ and ‘Business Process Performance Measures’. The next chapters (1.1, 1.2 and 1.3) will give a more detailed introduction on each of these four behaviors in this study.
### Table 1: The nine ‘Class A Behaviors’

<table>
<thead>
<tr>
<th></th>
<th>Class A Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>One Set of Numbers to Run the Business</strong></td>
</tr>
<tr>
<td></td>
<td>- Use the system of record for data (SAP, MES), don’t use redundant systems or</td>
</tr>
<tr>
<td></td>
<td>tools (Excel).</td>
</tr>
<tr>
<td></td>
<td>- The Dispatch List drives the production activities/jobs on the shop floor, and</td>
</tr>
<tr>
<td></td>
<td>integrates them with other work that competes for the same resources (maintenance,</td>
</tr>
<tr>
<td></td>
<td>validation etc.).</td>
</tr>
<tr>
<td>2</td>
<td><strong>Shared, Aligned and Realistic Plans</strong></td>
</tr>
<tr>
<td></td>
<td>- Know your capacity and only commit within demonstrated capability.</td>
</tr>
<tr>
<td>3</td>
<td><strong>A Passion for Accuracy</strong></td>
</tr>
<tr>
<td></td>
<td>- Record shop floor data timely and accurately, including Manufacturing &amp; MQA</td>
</tr>
<tr>
<td></td>
<td>review.</td>
</tr>
<tr>
<td></td>
<td>- Ensure production master data such as BOM and Routing reflect the true process</td>
</tr>
<tr>
<td></td>
<td>requirements.</td>
</tr>
<tr>
<td>4</td>
<td><strong>A Passion for Simplification</strong></td>
</tr>
<tr>
<td></td>
<td>- Continuously look for opportunities to reduce complexity/waste.</td>
</tr>
<tr>
<td></td>
<td>- Don’t optimize locally at global expense.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Business Process Performance Measures</strong></td>
</tr>
<tr>
<td></td>
<td>- Understand and use the standard metrics and PHIs to drive performance.</td>
</tr>
<tr>
<td></td>
<td>- The metrics should reflect satisfaction of internal customer requirements.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Democracy in Planning, Autocracy in Execution</strong></td>
</tr>
<tr>
<td></td>
<td>- Speak up during problem identification and process improvement, but align and</td>
</tr>
<tr>
<td></td>
<td>support the solution even if it is not the one you would chose.</td>
</tr>
<tr>
<td></td>
<td>- Participate in process improvement, and then follow the process.</td>
</tr>
<tr>
<td></td>
<td>- Actively engage in the planning/scheduling process, make only commitments you</td>
</tr>
<tr>
<td></td>
<td>have confidence you can keep, and keep them.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Never Uncertain, Always Open</strong></td>
</tr>
<tr>
<td></td>
<td>- If you don’t know what is expected, ask. Demonstrate confidence, but remain</td>
</tr>
<tr>
<td></td>
<td>open to new ideas or ways of executing the process.</td>
</tr>
<tr>
<td>8</td>
<td><strong>Embracing Accountability and Speaking Up</strong></td>
</tr>
<tr>
<td></td>
<td>- &quot;Stop the line&quot; if you see a safety, GMP or other failure, know how and when</td>
</tr>
<tr>
<td></td>
<td>to escalate.</td>
</tr>
<tr>
<td></td>
<td>- Take ownership of your area, Production owns the shop floor and is accountable</td>
</tr>
<tr>
<td></td>
<td>for what happens there.</td>
</tr>
<tr>
<td>9</td>
<td><strong>Knowledgeable Workforce with Clear Roles and Responsibilities</strong></td>
</tr>
<tr>
<td></td>
<td>- Know your process and follow it. Know who your customers are and what their</td>
</tr>
<tr>
<td></td>
<td>expectations/success criteria are.</td>
</tr>
<tr>
<td></td>
<td>- Ensure that there is a program and system in place to ensure that sufficient</td>
</tr>
<tr>
<td></td>
<td>qualified staff is available, and that only qualified personnel are assigned to</td>
</tr>
<tr>
<td></td>
<td>work.</td>
</tr>
</tbody>
</table>
1.1 Business Process Management (BPM)

The first behavior of this study, *A Passion for Simplification*, was studied by applied business process optimization. In this part I investigated whether process visualization helps in continuous improvement of business processes.

The first step in optimizing a business process is the visualization of the process. This has been done in a tool called iBPM (integrated Business Process Management). With this tool I visualized the packaging process of the Glass/Bottles operational unit in the packaging department. Through harmonization of this process with the subject matter experts (SMEs), it was found that the evolution of this process until today leaves little room for further improvements.

But why is business process management important in today’s business world?

The economy is becoming more and more dynamic, uncertain and complex. The challenges of today’s organizations are mainly to cope with changes and complexity. For companies to be successful in this, they have to be innovative, fast, flexible and willing to change.

BPM offers an integrated way to cope with these opportunities.

The goal of business processes is to fulfill customers’ or stakeholder’s needs, expectations or requirements (Schmelzer HJ and Sesselmann W, 2013). Business processes start and end at customers which is why they’re also called end-to-end (E2E) processes.

The purpose of companies is to create goods or services, which all result from processes (Schmelzer HJ and Sesselmann W, 2013). A process is the series of activities which use defined inputs to create defined outputs. Thus, every single activity of a company is part of a process. Functional business orientation is the opposite to BPM. When improvements are done on a functional basis, another function often suffers. Improving business processes across organizational functions with BPM however benefits the customer and also helps the company as a whole.

1.2 Governance Structure

The second part of the study covered two behaviors: *Shared, Aligned and Realistic Plans* and *Knowledgeable Workforce with Clear Roles and Responsibilities*. For the first behavior a special governance structure has been set up in Kaiseraugst to align all parties participating in production planning and share the plan so that it turns out to be realistic. This governance
structure is only working properly however if the responsibilities are clear and the workforce is knowledgeable.

In this part of the study, meeting observations, interviews and questionnaires were conducted to investigate following questions:

- What kind of possibilities do the employees have to exchange information and which of these facilitate decision making?
- Does a generalized escalation scheme facilitate decision making?
- Do the Class A behaviors impact the meetings positively or negatively with regards to decision making?
- Does the preset structure of meetings lead to an improvement in decision making?
- If a network among the meetings exists, does it improve decision making?

In terms of governance structure, there are different angles to the topic. A governance structure is an appropriate structure to pass information through an organization. Secondly in terms of production planning, it is a tool to ensure a positive team ownership of a plan. The latter meaning that all roles involved in the execution of the production plan are actually taking ownership of the plan. This should lead to improved and sustainable production plan stability.

To generate and put the production plan into action, the Business Process Excellence (BPE) Team of Roche in Kaiseraugst has implemented a governance structure around the so called SMART meetings. SMART stands for Schedule, Manufacture, Assess, Release and Technology. The idea of the SMART meeting is that the participants cover the end-to-end process from scheduling, producing, quality control and quality assurance as well as the underlying technology and maintenance to run the processes.

The governance structure has been set up by several types of meetings, whereas the SMART is the main interface of information flow to give all necessary roles the ownership of the manufacturing plan. Since the packaging site Kaiseraugst has four main packaging plants, namely Blister, Glass/Bottles, Steriles and Rocephin, four separate SMART meetings are put in place for each packaging plant respectively. These four meetings are the Level 2 SMART meetings, also called L2 SMARTs. They are only one part in the governance structure at the packaging site Kaiseraugst. This governance structure of the packaging site Kaiseraugst is shown in Figure 1.
Introduction

Figure 1: Governance structure at the packaging site Kaiseraugst. The backbone of this structure is built up by the four levels of SMART meetings (blue). On the lowest level in the matrix is the L3 Coordination Team, this is on the shift level in each plant. The next level is the L2 SMART with the process team for each plant. Above the L2 is the L1 SMART, which is built up by the heads of each packaging department, the main packaging head and all department heads of the according roles which are also represented in the L2 SMART. On the top level of the matrix is the L0 built by the Site Leadership Team (Site LT). Important supporting meetings are the Packaging Material Release Track Team and the Packaging Material Exchange Meeting for each plant on Level 2; the Material Review Board, the Packaging Material Life Cycle Committee (PM LCC) and the Kaiseraugst (KAU) Change Forum on Level 1; and the Quality Review Board (QRB) and Quality Council on the highest site level (L0).

In a frequency of two meetings per week the participants talk about things affecting the production plan and its practicability. The exact content of the L2 SMART meeting is shown in Figure 2.
Introduction

**Goal:** Development and implementation of a feasible production plan

<table>
<thead>
<tr>
<th>Input:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Status of Process Orders</td>
</tr>
<tr>
<td>• Minutes of last session</td>
</tr>
<tr>
<td>• Plan changes, delays on the packaging lines (S)</td>
</tr>
<tr>
<td>• Repackaging, blocking of orders (M)</td>
</tr>
<tr>
<td>• Disruptions (M, T)</td>
</tr>
<tr>
<td>• Quality Issues (M, A)</td>
</tr>
<tr>
<td>• Status of open Deviation report/Investigation reports (A)</td>
</tr>
<tr>
<td>• Maintenance (T), qualification, validation (T)</td>
</tr>
<tr>
<td>• Status of open changes (T)</td>
</tr>
<tr>
<td>• Potential risks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agenda:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Packaging orders in red (delayed)</td>
</tr>
<tr>
<td>• Repackaging orders</td>
</tr>
<tr>
<td>• Status open manufacturing instructions</td>
</tr>
<tr>
<td>• Packaging material changes</td>
</tr>
<tr>
<td>• Are necessary shifts necessary? Provide which lines have higher priority</td>
</tr>
<tr>
<td>• Decisions on plan changes for the subsequent week</td>
</tr>
<tr>
<td>• Open points from the last meeting</td>
</tr>
<tr>
<td>• Information from L1 SMART</td>
</tr>
<tr>
<td>• Varia Demand, Planning, Packaging, QC, QA, QVM, Maintenance, Logistics</td>
</tr>
<tr>
<td>• Discussion of KPIs (if action is needed)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Necessary actions (see minutes)</td>
</tr>
<tr>
<td>• Assignment of responsibilities</td>
</tr>
<tr>
<td>• Status and priorities are harmonized</td>
</tr>
<tr>
<td>• Allocation of resources</td>
</tr>
</tbody>
</table>

**Sponsor:** Head of Packaging Operations

**Facilitator:** Head of Blister Packaging, Head of Glass/Bottles Packaging, Head of Steriles Packaging

**KPIs:**

- OEE (Process optimizer)
- Number of overdue orders (Head of SMART)
- Adherence to schedule (Head of SMART)
- Production Performance (BPM)

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>M</th>
<th>A</th>
<th>R</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Schedule (incl. CSC)</td>
<td>Make</td>
<td>Assess (QC Packaging Material – as needed)</td>
<td>Release</td>
<td>Technology (Maintenance, QVM, if needed Logistics)</td>
</tr>
</tbody>
</table>

**Figure 2:** Meeting charter for L2 SMART meetings in packaging operations. The inputs are either maintained in the appropriate list, which is also being used during the meeting then, or is brought in verbally to the meeting by the according participant. The agenda is given in form of an Excel file where all aspects of the agenda have their own sheet. This is very transparent to all participants but also quite complex. The output is very practical, an action list with responsibilities, harmonized approval statuses and priorities and resource allocation. The participants are from all different roles of the E2E process and will therefore be called the L2 Process Team. The L2 Process Team is built up by following roles: planner (Master Production Scheduler, MPS) and customer support (Customer Support Center, CSC) responsible for the scheduling, plant manager representing the Manufacture part, if necessary quality control (Assess), quality assurance (QA) for the release part and technical part consistent of technical support and quality validation and monitoring (QVM).

The focus of this study was on the L2 SMART meetings and its directly surrounding flow of information including the L1 SMART meetings.

When investigating meetings, it has to be taken into account that meetings are by very nature talk in a specific setting. That means, it is the talk which is being investigated. Talk between people is characterized by the organization of turn-taking (Sacks H et al., 1974). This organization of turn-taking can be very subtle as in informal talk or organized by one person as in formal talk. This differentiation of talk becomes important when looking at the size of meetings. Romano NC and Nunamaker Jr JF (2001) describe four sizes of meetings: meetings of two to seven, seven to fifteen, fifteen to thirty and thirty or more participants. The pros and cons of the first three cases are summarized in Table 2. Thirty or more participants are not applicable in the case study and have thus been left out at this point.
Table 2: Three groups of meeting sizes and their respective pros and contras according to Romano NC and Nunamaker Jr JF (2001)

<table>
<thead>
<tr>
<th>Meeting size</th>
<th>Pros</th>
<th>Contras</th>
</tr>
</thead>
</table>
| 2 – 7 participants | + groups assemble quickly  
+ sessions are informal and flexible  
+ any meeting type may be used  
+ detailed technical and logistical problems may be efficiently solved  
+ relatively easy to manage the group dynamics | - Only a few viewpoints are represented, which may lead to decisions of lower quality and impact than with larger groups  
- may not have critical mass needed to achieve the best creative problem-solving |
| 7 – 15 participants | + all participants may easily be involved  
+ everyone’s thoughts may be communicated  
+ small enough to be informal and spontaneous  
+ large enough to allow for a facilitator and a scribe  
+ according to Doyle M and Straus D (1977) it seems to be the size which best creates synergy | - a clear structure is required due to the complexity  
- a recorder and facilitator are both required, leading to higher costs to record everything |
| 15 – 30 participants |                                                                                                                                                   | - high complexity often requires a professional facilitator to achieve productive participation  
- increased formality due to necessary rules of order  
- decreased spontaneity |

The main difference between small and large meeting groups is that small group meetings are more flexible in terms of planning and execution than larger ones.

In a survey on around 3000 American business leaders made by Green WA and Lazarus H in 1991, some very interesting findings have been recorded. Around two thirds of the participants spent more time in meetings than they spent five years earlier and half of the participants expected at that time, to spend even more time in meetings in the subsequent five years. This means, that meetings have become more important over the years. At the same time however, on average one third of the meeting time was acknowledged to be inefficient and wasted time.

In the next step, the participants were asked to rate the following meeting elements according to their perceived importance (the elements are ranked in ascending order according to the respondents’ preference):
Introduction

1. adequate preparation,
2. agreeing on follow-up actions,
3. staying on track,
4. setting clear objectives,
5. starting on time,
6. meeting in a proper physical environment,
7. ending on time,
8. using written agendas,
and not mentioned in the ranking: appointing an effective moderator.

The survey found also, that a direct relationship exists between productive meetings and preparatory steps for the meetings (use of written agendas, agendas distributed timely, outcomes are understood beforehand, attendees are prepared). Their findings suggest, “that many meetings are simply destined to be unproductive before they even begin” (Green WA and Lazarus H, 1991).

In terms of the SMART meetings, following preparatory steps are given: written agendas are used in form of an excel file, the agenda is distributed timely, since it is accessible via intranet and the outcomes should be understood most of the time, since the meeting purpose is always the same and has been communicated. One variable still exists however, the preparedness of attendees.

Looking at the elements during a meeting (starting and ending on time, staying on track, achievement of goals, written decisions), a lack of discipline is the major factor of inefficiency. Although the majority of managers identified the most important elements of a meeting, only three to ten per cent reported the actual implementation of the respective elements in all of their meetings. Around fifty per cent reported that the elements are implemented in more than half of the meetings. By showing a lax attitude towards promptness, management conveys the idea that time is not money and that it is not even important.

To illustrate this point, the following financial analysis of meeting cost per size and duration can be helpful.
Table 3: Financial calculation of meeting costs, based on the assumption that an employee costs the company 150 CHF per hour. The highlighted part depicts the area where the L2 SMART meetings are located with around 7 to 13 participants usually ranging in time from 30 to 60 minutes. Up to 20 participants appear sometimes in L1 SMART meetings and are thus shown in the calculation table as maximum.

<table>
<thead>
<tr>
<th>Meeting duration [min]</th>
<th>15</th>
<th>30</th>
<th>45</th>
<th>60</th>
<th>75</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 CHF 75</td>
<td>CHF 150</td>
<td>CHF 225</td>
<td>CHF 300</td>
<td>CHF 375</td>
<td></td>
</tr>
<tr>
<td>3 CHF 113</td>
<td>CHF 225</td>
<td>CHF 338</td>
<td>CHF 450</td>
<td>CHF 563</td>
<td></td>
</tr>
<tr>
<td>4 CHF 150</td>
<td>CHF 300</td>
<td>CHF 450</td>
<td>CHF 600</td>
<td>CHF 750</td>
<td></td>
</tr>
<tr>
<td>5 CHF 188</td>
<td>CHF 375</td>
<td>CHF 563</td>
<td>CHF 750</td>
<td>CHF 938</td>
<td></td>
</tr>
<tr>
<td>6 CHF 225</td>
<td>CHF 450</td>
<td>CHF 675</td>
<td>CHF 900</td>
<td>CHF 1'125</td>
<td></td>
</tr>
<tr>
<td>7 CHF 263</td>
<td>CHF 525</td>
<td>CHF 788</td>
<td>CHF 1'050</td>
<td>CHF 1'313</td>
<td></td>
</tr>
<tr>
<td>8 CHF 300</td>
<td>CHF 600</td>
<td>CHF 900</td>
<td>CHF 1'200</td>
<td>CHF 1'500</td>
<td></td>
</tr>
<tr>
<td>9 CHF 338</td>
<td>CHF 675</td>
<td>CHF 1'013</td>
<td>CHF 1'350</td>
<td>CHF 1'688</td>
<td></td>
</tr>
<tr>
<td>10 CHF 375</td>
<td>CHF 750</td>
<td>CHF 1'125</td>
<td>CHF 1'500</td>
<td>CHF 1'875</td>
<td></td>
</tr>
<tr>
<td>11 CHF 413</td>
<td>CHF 825</td>
<td>CHF 1'238</td>
<td>CHF 1'650</td>
<td>CHF 2'063</td>
<td></td>
</tr>
<tr>
<td>12 CHF 450</td>
<td>CHF 900</td>
<td>CHF 1'350</td>
<td>CHF 1'800</td>
<td>CHF 2'250</td>
<td></td>
</tr>
<tr>
<td>13 CHF 488</td>
<td>CHF 975</td>
<td>CHF 1'463</td>
<td>CHF 1'950</td>
<td>CHF 2'438</td>
<td></td>
</tr>
<tr>
<td>14 CHF 525</td>
<td>CHF 1'050</td>
<td>CHF 1'575</td>
<td>CHF 2'100</td>
<td>CHF 2'625</td>
<td></td>
</tr>
<tr>
<td>15 CHF 563</td>
<td>CHF 1'125</td>
<td>CHF 1'688</td>
<td>CHF 2'250</td>
<td>CHF 2'813</td>
<td></td>
</tr>
<tr>
<td>16 CHF 600</td>
<td>CHF 1'200</td>
<td>CHF 1'800</td>
<td>CHF 2'400</td>
<td>CHF 3'000</td>
<td></td>
</tr>
<tr>
<td>17 CHF 638</td>
<td>CHF 1'275</td>
<td>CHF 1'913</td>
<td>CHF 2'550</td>
<td>CHF 3'188</td>
<td></td>
</tr>
<tr>
<td>18 CHF 675</td>
<td>CHF 1'350</td>
<td>CHF 2'025</td>
<td>CHF 2'700</td>
<td>CHF 3'375</td>
<td></td>
</tr>
<tr>
<td>19 CHF 713</td>
<td>CHF 1'425</td>
<td>CHF 2'138</td>
<td>CHF 2'850</td>
<td>CHF 3'563</td>
<td></td>
</tr>
<tr>
<td>20 CHF 750</td>
<td>CHF 1'500</td>
<td>CHF 2'250</td>
<td>CHF 3'000</td>
<td>CHF 3'750</td>
<td></td>
</tr>
</tbody>
</table>

A good comparison to the management of a productive meeting is the operation of an airplane, from take-off to landing. The pilot uses a checklist before every flight, no matter how experienced he or she is. This preparation ensures the airplane is operable. The same principle can be transferred to meetings. Thus it can be assumed, that if all points of a checklist are fulfilled, it is likely that the meeting will be productive.

1.3 Key Performance Indicators (KPIs)

In the third part of the study I worked with the Production Performance (PP) KPI which is fairly new to the KPI landscape at Roche and, being a tool for management, it can be seen as a top-down developed KPI. The development efforts of such a KPI should not be underestimated since often a lot of time and cost intensive data mining is necessary to program the KPI. Thus I wanted to investigate the implementation of such a newly developed KPI and its qualitative return on investment. Secondly, in this part of the study, I used
questionnaires to collect customer feedback for internal packaging metrics and the respective degree of satisfaction. As all parts of the study, the KPI part was also based on a Class A Behavior.

The Class A Behavior Business Process Performance Measures aims on understanding the standard metrics and Process Health Indicators (PHIs) and to use them to drive performance. Furthermore, it implies that the metrics should reflect the satisfaction of internal customer requirements.

This involves two sides which have to be harmonized to use the metrics to the best degree possible. On the one hand, the management needs to measure the process performance to achieve goals and drive performance improvements. On the other hand, these metrics should be of value to the people generating the inputs to the metrics. This means that a metric which is developed from top-down in the organization might not reflect the satisfaction of the people delivering the inputs since the work environment contains interferences natural for the processes which might not be obvious to the upper hierarchical levels.

This approach depends however on the companies’ viewpoint. Chae B (2009) suggests a hierarchical organization of key performance indicators (KPIs) for supply chain management. One way to set up the KPI landscape is to group top tier, mid-level and ground level metrics (Hofman D, 2004). Figure 3 shows this hierarchical approach of supply chain metrics (adapted from Hofman D, 2004).
Introduction

Figure 3: Hierarchy of supply chain metrics adapted from Hofman D, 2004. The top tier is used to assess the health of the supply chain. The Demand Visibility is a predictor for the responsiveness of the supply chain. Evidence for this is the Perfect Order rating. To ensure that the Perfect Order is not reached by excessive cost in Supply Chain Management (SCM), the balance between Perfect Order fulfillment and SCM cost has to be controlled. The observation of how well the company is managing its cash flow is the next lower level in the hierarchy, the mid-level, which is used to diagnose the supply chain. The DPO (Days Payables Outstanding) and DSO (Days Sales Outstanding) metrics show if the balance is given between the time it takes to pay the suppliers and the time it takes the customers to pay. The Inventory Total is directly linked to the costs and Perfect Order and can show if the inventory metrics need further analysis. The ground level ensures supply chain effectiveness. Once a problem in the higher levels is identified and drilled-down on, the detailed metrics on the ground level help implementing specific interventions to the identified root cause. This level includes indicators for supplier effectiveness (i.e. percentage of supplier receipts which have passed quality and on-time standards), raw material inventories, purchasing operating costs and direct material costs as well as the level of operational effectiveness (i.e. SCM cost details, production schedule variance, plant utilization, work in process (WIP) and finished goods (FG) inventories, order cycle time and details about the Perfect Order fulfillment.

According to Gunasekaran A et al. (2001), companies often fail to understand performance measures in a balanced framework. Thereby financial performance measurements are of good use for external reporting and for strategic decisions. On the other hand, non-financial measurements are better for the day-to-day control of manufacturing operations as well as for distribution operations. Since the performance measurement metrics differ in the area where they influence decisions, it is important to make a clear distinction between the metrics at strategic, tactical and operational levels. This ensures an effective supply chain management, where measurement goals are set which take into account the overall supply chain goals as well as the metrics to be used. In Gunasekaran A et al.’s (2001) description, Production Performance is dominated by operational level metrics.
The Production Performance (PP) KPI, also called PP report, is meant to compare the agreed upon production plan, i.e. the actual produced quantity for a specific timeframe. The PP shows whether the plant has fulfilled its primary purpose and serves as the driver for improvement in plant reliability. The KPI is defined and required by the internal policy documentation of Roche associated with the Produce Quality Product (PQP) business process. The Produce Quality Product business process describes all key requirements to produce product at the interfaces with processes outside of PQP. It is placed in the Demand to Supply process stream of the value chain processes of Roche as can be seen in Figure 4.

**Figure 4: The Pharma Technology (PT) Business Process Model.** This figure represents the top level, i.e. Level 0 (L0) process within Roche PT. The Demand to Supply business process is next lower level, the L1 business process. This study had its focus in the L2 business process Produce Quality Product.
Methodology

1.4 Business Process Management

To show a passion for simplification as it is expected by one Class A behavior, the underlying processes should be understood. To understand the processes, it is necessary to visualize them in a first step. Here one could use simple flowchart software to visualize the process. As this has been done frequently there have also problems been observed. Using decentralized non-integrated software and saving the process flowcharts on individual spaces or just storing them in form of paper makes it hard to see the bigger picture as usually no E2E process is looked at. A newly introduced tool will help preventing the latter and will bring the Roche Kaiseraugst site an E2E process view, the so called integrated business process management (iBPM) with the underlying software DHC Vision. The software is based on a database and works with MS Visio as a front end. It is a very powerful tool to visualize and foster processes as well as the according documents, systems and roles. The latter are differentiated by the RACI method, dividing the roles in responsible, accountable, consulted and informed. Even though it is very powerful if all functions are used, at its very simplest level it is providing an immense advantage to the way it used to be. The processes are now stored in one database which is readily accessible for every employee in the organization. This fosters the E2E idea by giving the employees the possibility to look at downstream and upstream processes from their point of view to understand the functioning of the organization they are acting in.

For this study, DHC Vision was used to visualize the Glass/Bottles packaging process from material supply and packaging planning to QA (Quality Assurance) release of finished goods. I have drawn existing documents for the processes as well as the input from subject matter experts (SMEs) to visualize the process. Once completed, the draft was harmonized again with SMEs to ensure the correct as-is process map. I analyzed the process and gave suggestions for improvement and analyzed it again in detail with the SMEs to identify potential areas for improvement.
1.5 Governance Structure

As stated earlier, this part of the study was guided by two Class A behaviors, *Shared, Aligned and Realistic Plans* and *Knowledgeable Workforce with Clear Roles and Responsibilities*. The methods included meeting observations, questionnaires and interviews.

1.5.1 Meeting Observations

The subject of investigation is a preset structure of meetings. These meetings are built up in such a way, that they are intended to facilitate an E2E spirit in which all necessary parts of a packaging operation sit at one table. This sort of meetings is scheduled twice a week. In two cases the meetings were each facilitated by the same person for every event. In the third case, the facilitator role was changed every two weeks, i.e. after every four events, among the Head and two Deputy Heads of the department. In the latter case, the facilitator would only be present in the meetings during his facilitator assignment, not however, when it is someone else’s turn.

The above described three cases are the ones of the L2 SMART meeting in the departments Blister, Glass/Bottles and Steriles Packaging. In each case, 4 randomly picked meetings were observed. During the observation, an observation scheme has been used to record a code consisting of the topic number (noted in ascending order), who interacts with whom, what is the interaction (e.g. question to an individual, question to group, answer to individual, comment, etc.), what is the mood of the interaction (i.e. positive, negative or neutral). The scheme also provided a field for extra notes, if applicable. The evolution to this scheme is described in chapter 1.5.1.2. Each new discussion point was counted as a new topic. For instance, if the priority list was discussed as an agenda point, each article of this list the attendees talked about was counted as a new topic. In all cases, except one, the agenda points were recorded when they were talked about. This walls an analysis of how long the group spend on one agenda point and how many topics they treated during this time.

In matters of time, every 1 min (later changed to 20 seconds) the above described code was recorded. One minute was at the beginning enough time to write the code. In this early phase, the code was much larger and thus needed more time to record it. Once the code has been shortened to the above described form, it was possible to record a code every 20 seconds which is very representative in case of individual talk time proportions. In other words, it
allows recording the changing interaction start points during discussions (the change in the person talking).

1.5.1.1 Visualization of meeting observations

To represent the data of the meeting observations and to better be able to analyze it, a circular visualization method for interactions is used in this study. This visualization tool is called Circos. It has been developed by Martin Krzywinski from Canada’s Michael Smith Genome Science Centre and is typically used in genetics to show relationships between different genes. It could be used for example to collect data from several people about their hair and eye-color and then show, how many people with blonde, black, red or brown hair have brown eyes, blue eyes, green eyes or hazel eyes. This is a very simple example and used in Tom Schenk Jr’s (2012) book “Circos Data Visualization How-to”. The circus diagram from Tom Schenk Jr (2012), Figure 5, shows the quantity of relationships between different hair and eye colors of a set of studied persons. This is just intended to give an overview of the Circos data visualization and thus no exact data is outlined. It is simply sufficient to understand, that the width of the ribbons correspond to the quantity of data points. If a ribbon starts from Brown_Hair and leads in the same color to, e.g. Blue_Eyes, this means that a particular amount of people studied have brown hair and blue eyes.
Figure 5: Circos diagram showing the quantity of relationships of hair and eye colors. The respective hair colors lead to the matching eye colors. The width of the ribbons corresponds to the quantity of data. Picture adopted from: Circos Data Visualization How-to (Schenk Jr T, 2012)

Circos is thus a very good tool to visualize the quantitative relationships between two or more things. Talk during meetings can also be analyzed in a quantitative way by showing how many seconds or minutes one person talks to another.

The Circos diagrams in this study look slightly different as they possess percental scales around the diagram. A detailed legend of how to read the Circos diagrams can be found in the chapter 1.5.1.3. These show the outgoing, incoming and total interactions (inward to outward) of the respective person.
1.5.1.2 Evolution of the observation scheme

In the first phase, the observation scheme to record the meeting interactions consisted of eight elements and extra notes which were recorded in a one minute interval. The elements were the topic number, the person starting the interaction, the type of action, the receiving person, the mood of the interaction, how prepared the acting person seems, the past of the discussion point and the outlook of the point.

**Topic number:** Ascending numbers of topics, where each new discussion point is counted as a new topic, i.e. each new article discussed on the priority list counts as a new topic number as well. If a previous topic of the meetings is brought up again, this means the previous topic number is recorded again. This permits a time-wise visualization of the discussed topics.

**Person Start:** The person starting the interaction.

**Action:** One of the following types of interactions. *Asking the group, asking an individual, responding to group, responding an individual, presenting a new idea, presenting a basic idea/explaining basics, silence/reflecting on the conversation* (an answer is awaited by this person), *interrupting, writing a decision in minutes, writing open points in minutes and commenting.* (Interrupting was never noted. Instead, if an attendee started talking even though not asked to, this was noted as a comment.)

**Person End:** The receiving person or the PC, notebook or cellphone, receiving attention by the attendee.

**Mood:** The mood in which *Person Start* talks with *Person End*. This means positive, neutral or negative.

**Preparedness:** If *Person Start* is responding to *Person End*, how prepared does he seem: excellent, good or bad. In the case it is no answer, N/A was recorded.

**Past:** What is the history of this topic, was it already discussed previously and has it thus be postponed, or is it a new topic. (Divided in New Topic and Old/Postponed topic.)

**Outlook:** Intended to note, if this point has been decided upon or has it been postponed. Divided in Decision and Postponed.

After some rounds of meeting observations, it turned out that the code was not working as intended. It is difficult to estimate if a person is prepared for a point and it would only be the
observer’s very own subjective view. However, it was appropriate to the priority list of the SMART meetings, which itself was a known topic before each meeting whereupon attendees should be prepared for. In that case, it can be said, that a person is not prepared, if a point on the list seems unknown to the person. In this study however, the preparedness of the attendees will be studied by means of questionnaires which are covered in chapter 1.8.2.1. Even more difficult in the case of the SMART meetings is to understand as an observer in a lot of cases, which topics have been postponed in previous meetings and for how many times they have been postponed. Since most points are just covered as they appear on the list, there is no obvious trace of their past.

In terms of decision making and outlook of discussed points, it was difficult in most cases to understand when a decision was reached or if the point was silently postponed to the next meeting without agreeing on a due date or a responsible person or most simply without writing an agreement in the minutes.

Because of the three above mentioned drawbacks, the observation scheme to five elements: *Topic Number, Person Start, Action, Person End* and *Mood*.

During the first observations it became clear, that within one minute the interaction partners could change a few times which would not be represented in the observation data. The fact that the scheme has been reduced to five elements, and the necessity of better representing the interactions, led to a shorter time interval of twenty seconds to record the code. This time interval allows to record changing interaction partners when they exchange complete sentences. Single word answers are thus not fully reflected in the data and this makes sense proportionally in the overall picture of the meeting interactions.

### 1.5.1.3 Circos Legend

It is rather simple to understand the structure of a Circos diagram in this study.

Most important is to understand the outgoing actions. If Person A (in this example in black) makes outgoing actions, as shown in Figure 6, those will also be colored in black. Outgoing actions are furthermore tightly linked to the color representation of the respective person, in this case the black circular band starting at 12 o’clock. The same applies for all other persons in the diagram.
Figure 6: Outgoing action from Person A

If Person A is receiving an action as highlighted in dark grey in Figure 7, the ribbons will not be completely linked to Person A. There will always be a gap between incoming actions and the person who receives them. The color of the incoming action ribbons corresponds to the color of the person who starts the action (as shown in the previous example of outgoing actions).
Figure 7: Incoming actions to Person A.

The percental scales at each person represent the following attributes. Most inward (Figure 8, highlighted in black) is the percentage of outgoing actions. The colors depict to which person this percentage of outgoing action is directed.
Figure 8: Percental scale of outgoing action from the respective person.

The bar in the middle represents the incoming action to this person, as highlighted in black in Figure 9. The colors show here, from whom how many percent of actions arrived.

Figure 9: Percental scale of incoming actions to the respective person.

The most outward bar, highlighted in black in Figure 10, is the total percental scale of interactions. Here the outgoing and incoming percentages are added and thus shows how many percent in total this person had interactions with whom (color-depicted).
1.5.2 Questionnaires

To support the data from the interviews and from the meeting observations, I surveyed 62 SMART meeting participants from all observed SMART meetings, L2 and L1 SMART. Table 4 shows the detailed list of numbers of participants and respondents as well as the response rate.

Table 4: Participation details of questionnaires on SMART meetings

<table>
<thead>
<tr>
<th>SMART meeting</th>
<th>Participants</th>
<th>Respondents</th>
<th>Response rate [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>22</td>
<td>18</td>
<td>82</td>
</tr>
<tr>
<td>L2 Blister</td>
<td>8</td>
<td>7</td>
<td>88</td>
</tr>
<tr>
<td>L2 Glass/Bottles</td>
<td>14</td>
<td>12</td>
<td>86</td>
</tr>
<tr>
<td>L2 Steriles</td>
<td>18</td>
<td>12</td>
<td>67</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>49</td>
<td>79</td>
</tr>
</tbody>
</table>

The surveys were built to investigate the necessity of overall meeting elements, how specific meeting elements are actually implemented in the respective SMART meetings, the escalation channels through the SMART meetings and their perceived effectiveness in terms of time and quantity and a personal appraisal regarding the information quality. Most of the survey questions in the part on meeting elements are adopted from a study by Green WA and
Lazarus H (1991) who surveyed around 3000 business leaders about their meeting experience and perceptions.

More details to the actual questions and the answers can be found in the result chapter 1.8.2.

1.5.3 Interviews

One element of this study was conducting interviews with subject matter experts (SME) to support the meeting observations and the questionnaires with non-representative qualitative opinions from six employees in the studied organization.

The subjects of the interviews were six employees of different hierarchical levels and functions.

Table 5 shows the interviewees by their roles and the dates of the according interviews.

<table>
<thead>
<tr>
<th>Interviewee by role</th>
<th>Operational Unit</th>
<th>Date of interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC Specialist</td>
<td>Steriles</td>
<td>01.05.2014</td>
</tr>
<tr>
<td>QA Manager</td>
<td>Glass/Bottles</td>
<td>01.05.2014</td>
</tr>
<tr>
<td>Production Planner</td>
<td>Blister</td>
<td>29.04.2014</td>
</tr>
<tr>
<td>Head Maintenance Parenteralia</td>
<td>Steriles</td>
<td>30.04.2014</td>
</tr>
<tr>
<td>Head of Glass/Bottles Packaging</td>
<td>Glass/Bottles</td>
<td>30.04.2014</td>
</tr>
<tr>
<td>Deputy Head of Blister Packaging</td>
<td>Blister</td>
<td>06.05.2014</td>
</tr>
</tbody>
</table>

To find out about the information channels from the users themselves, the interviewees were asked the following questions:

- What kind of information do you need in your day-to-day business?
- Who are your customers (who wants information from you?) and your suppliers (who do you want information from?) in your day-to-day business?
- Who is on your horizontal level and who is vertically above or beneath your level?
- If you want to communicate a problem or other information, how do you do that? (If the answer is ‘Meetings’: And besides meetings?)
- To investigate the decision-making in more detail, the interviewees were asked these questions:
  - How would you assess your effort/benefit ratio in hours for the L2 SMART meetings?
  - How does the organization (SMART meetings) support you in resolving problems or in the implementation of changes/actions?
Methodology

- With regards to decision making, what has changed compared to 2-3 years ago (before the implementation of SMART meetings)?
- How could the flow of information be improved? Would that facilitate decision making?
- What could be improved about the feedback-loop? (When something is decided and needs to be implemented. Is it ensured, that the implementation takes place and also that it happens in time?)
- How do you feel about your level of empowerment? What do you think about the level of empowerment of other people in the decision chain?

1.6 Key Performance Indicators

To have sustainable business process performance measures, they should reflect the satisfaction of the internal customers, so the users of the metrics. This is the statement of the Class A Behavior. This statement was challenged by looking at two sides. On the one hand, PP, which is a management KPI and thus a top-down implemented metric where the packaging department is the data creator. On the other hand packaging specific metrics, which I expected to mostly be bottom-up metrics and thus satisfactory for the packaging employees.

Regarding the PP, I investigated whether the metric makes sense from the data creator’s point of view. This was done by simply extracting the resulting PP data and applying a root cause analysis. At the same time of the investigation, the site management started to demand PP reports and targets for the year 2014. This significantly enhanced the importance of right data in the tool and its correct usability.

In terms of the packaging specific metrics I performed a survey in the packaging department asking different levels in packaging operations (as shown in Figure 11) about the given metrics, their publicity, their level of usage and benefit as well as their degree of satisfaction. The respondents were also asked to indicate the actions they derive from the metrics and give ideas for improvements or new metrics. This survey can be seen as a customer feedback. So if the metrics were developed in conjunction with the metrics users and the data creators, this survey should reflect a positive feedback.
Figure 11: Participant map for the survey on operational metrics in the packaging department. Green parts represent responding participants and red parts depict non-responding participants. The survey covered five levels across all packaging related operational units, with the Head of Packaging Operations on top and Shift Leaders at the bottom.
Results

In this chapter a summarized version of results is presented. The detailed results can be found in chapter 0.

1.7 Business Process Management

During the analysis for potential optimization areas in the Glass/Bottles packaging process my proposed improvement area turned out to be a necessity by evolution of the process. In that specific case, the same control, i.e. two camera controls for presence of the label on the bottle after the labeling process, happens twice subsequently even though the product is not changed in any way in between. Since the product enters a new machine part after the labeling process, both parts control the same thing to see that the bottle has been properly labeled and the second control to see that the move to the new machine has not detached the label. In the harmonization process with the experts it became clear that right now there is no optimization potential.

1.8 Governance Structure

The results of the governance structure part are divided in three parts. These are meeting observations, questionnaires and interviews.

1.8.1 Meeting Observations

To study the governance structure of the packaging department, four SMART meetings of each packaging unit were observed as well as four of the L1 SMART meetings. Table 6 shows when the L2 meetings were observed, how many attendees they had and the average number of attendees of the observed L2 SMART meetings per operational unit. In the following chapter, the results of this investigation are presented ordered by packaging units (Blister, Glass/Bottles and Steriles) and ascending dates of observation. The subsequent detailed results show the Circos diagram of interactions for each meeting as well as the
progress of topics during the meetings. In the Circos diagrams each color specifies a person over all diagrams – e.g. yellow is always the same person, green is always the same person and so on. In the progress of topics the grey line indicates the planned time of 60 minutes for each meeting, the yellow dotted lines and arrows indicate the agenda points which were discussed and the blue lines show the actual progress of topics. The topic rate is not representative in means of meeting effectiveness but more in how structured the meeting moderation is.

Two consistencies across all observed meetings in all three observational units is that the moderator had outgoing interactions with the group and made notes in the Excel based SMART meeting tool on the PC.

To be able to compare the different meetings with one another, the results of the meetings in each operational unit have been summarized. With these summaries of meeting data, a Circos diagram of the average L2 SMART meeting in each operational unit was created. The colors in these summary Circos diagrams should not be mistaken for the colors of the individual meeting Circos diagrams (see chapter 1.13), where each color was assigned a separate person. The colors in the summary Circos diagrams represent the roles found in the labels. This way the diagrams can easily be compared across the operational units. One Circos diagram was created summarizing all four observed L1 SMART meetings. There many more functions are attending, making it unable to compare on one level with the L2 SMARTs.

Following are the three Circos diagrams of each operational unit, Blister, Glass/Bottles and Steriles.
## Results

Table 6: Overview of observed L1 and L2 SMART meetings.

<table>
<thead>
<tr>
<th>Operational Unit (OU)</th>
<th>Observation Date</th>
<th>No. of attendees</th>
<th>Average Number of meeting attendees per OU</th>
<th>Topic rate [topics/min]</th>
<th>Average topic rate [topics/min]</th>
<th>Duration [hrs]</th>
<th>Average duration of meeting per OU [min]</th>
<th>Late Start [min]</th>
<th>Average start delay of meetings per OU [min]</th>
<th>Early end [min]</th>
<th>Average early end of meetings per OU [min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 Blister</td>
<td>24.02.2014</td>
<td>7</td>
<td>6.5</td>
<td>0.80</td>
<td>0.71</td>
<td>0:25:00</td>
<td>26:50</td>
<td>00:04</td>
<td>00:07</td>
<td>04:00</td>
<td>31:00</td>
</tr>
<tr>
<td>L2 Blister</td>
<td>13.03.2014</td>
<td>7</td>
<td></td>
<td>0.55</td>
<td></td>
<td>0:27:20</td>
<td></td>
<td>00:07</td>
<td></td>
<td>25:40</td>
<td></td>
</tr>
<tr>
<td>L2 Blister</td>
<td>24.03.2014</td>
<td>8</td>
<td></td>
<td>0.68</td>
<td>0.71</td>
<td>0:40:00</td>
<td></td>
<td>00:00</td>
<td></td>
<td>20:00</td>
<td></td>
</tr>
<tr>
<td>L2 Blister</td>
<td>27.03.2014</td>
<td>4</td>
<td></td>
<td>0.80</td>
<td></td>
<td>0:15:00</td>
<td></td>
<td>00:05</td>
<td></td>
<td>40:00</td>
<td></td>
</tr>
<tr>
<td>L2 Glass/Bottles</td>
<td>30.01.2014</td>
<td>7</td>
<td>7.5</td>
<td>0.89</td>
<td>0.87</td>
<td>0:47:20</td>
<td></td>
<td>00:03</td>
<td></td>
<td>11:40</td>
<td></td>
</tr>
<tr>
<td>L2 Glass/Bottles</td>
<td>03.02.2014</td>
<td>7</td>
<td></td>
<td>1.00</td>
<td></td>
<td>0:38:00</td>
<td></td>
<td>00:01</td>
<td></td>
<td>18:00</td>
<td></td>
</tr>
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<td>06.02.2014</td>
<td>9</td>
<td></td>
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<td>1:02:40</td>
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<td>00:00</td>
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<tr>
<td>L1 SMART</td>
<td>13.05.2014</td>
<td>17</td>
<td></td>
<td>0.18</td>
<td></td>
<td>0:54:40</td>
<td></td>
<td>00:00</td>
<td></td>
<td>05:20</td>
<td></td>
</tr>
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</table>
The average observed L2 SMART meeting in the operational unit Blister had 6.5 attendees, started 4 minutes after the scheduled time and took 26:50 minutes.

Summarizing the first three meetings with the same moderator, they look very similar in the interaction structure. The moderator has around 60% outbound actions with a similar distribution across the attendees each time. During the observation it was found that subjectively the meetings were very structured. All attendees were prepared and the moderator was asking for information in a much targeted way. The fact that the other attendees seemed prepared as well led to fruitful discussions to answer individual questions from attendees.

The fourth observed meeting in the Blister operational unit was quite different to the others in that it consisted only of four attendees due to overlapping administrative meetings some of the group members had to attend. In addition, one of the usual group members was assigned to moderate this meeting.

The L2 SMART meeting in the Blister operational unit is structured, in terms of agenda topics, that they start with the priority list to communicate the urgent orders and articles. After that, they had a Varia round where every attendee has the chance to bring up a new topic to discuss or to put as an action item for someone.

Figure 12 shows the average L2 SMART meeting in the Blister operational unit.
The major interaction share comes from manufacturing, partly because this role facilitates the meetings. When an interaction is self-directed as in the case of manufacturing for example, this means that this role was represented by two people who interacted as well (in this case the Head and Deputy Head of Blister Packaging). The outbound interactions of manufacturing account for roughly 56%. The other major interaction partners in this average meeting are Production Planner and QA Manager. The Production Planner has an outbound interaction share of roughly 63%. The QA Manager in contrast has an inbound interaction share of roughly 58%. This can be attributed to their roles. The production planner tells the QA Manager, when they need certain products and that some are urgent to be released. Manufacturing tells the QA Manager what will soon be released from manufacturing side for subsequent QA release. Manufacturing, too, has most interaction towards the group due to prepared facilitation of the meeting and presentation of necessary facts for the group. Maintenance, the QV Specialist and CSC show the fewest interactions. Maintenance has interactions to all group members except CSC. The QV Specialist has interactions to Maintenance and Manufacturing (which they also have in other meetings besides SMART). CSC shows the fewest interactions. They are directed towards Manufacturing and QA. CSC conveys them the urgency of some orders which is also visible in the priority list before the meeting, thus probably not necessarily noteworthy.

The average Glass/Bottles L2 SMART meeting had 7.5 attendees, a topic rate of 0.87 topics per minute, started fairly punctual with an average start delay of 1:15 minute and took 45:35 minutes. The way the meeting is held is similar to the Blister operational unit. The moderator
structures the meeting by specifically asking for the information. This can be seen by the around 40 to 60% of the moderator’s outbound interaction share. All attendees seemed prepared for what they wanted to share with the group. The first three meetings were built up in terms of topics that they started out with a mixture of going through the action items and doing a Varia round for possible new topics. This way the completed action items were presented and if new topics came up, they could quickly be assigned and noted in the Action List to not discuss them in more and unnecessary detail. This set-up has one distinct advantage. This way, the QV Specialist and the Head Maintenance can leave once the action items have been discussed and the Varia gave room for new topics. These two roles are mostly not interested in the urgency of orders or articles. If they need to discuss possible time slots for maintenance work or validation work, they can do so in the beginning. This is a distinct feature of some of the Glass/Bottles L2 SMART meetings and was not observed in the other operational units.

The fourth observed meeting in the Glass/Bottles operational unit was facilitated by another moderator. This meeting shows the highest topic rate. In this meeting the Action Items and the Varia round were separated. This meeting started with the Action Items where the moderator asked, one after the other, for the progress of each action item. Subsequently, the attendees had the opportunity to raise new topics in the Varia round.

It should also be noted that the QA Manager was fairly new in this role and still familiarizing with the new job. Thus, a consultation with her colleagues or line manager was often necessary but not due to a lack of preparation.

Figure 13 shows the average L2 SMART meeting in the Glass/Bottles operational unit.
Figure 13: Circos diagram of the average Glass/Bottles L2 SMART meeting. The major interaction share comes from manufacturing, partly because this role facilitates the meetings. The outbound interactions of manufacturing account for roughly 52%. The other major interaction partners in this average meeting are the QA Manager and Production Planner. The QA Manager has an outbound interaction share of roughly 62%. The Production Planner has an outbound interaction share of roughly 64%. This can be attributed to the facilitation of the meeting. Manufacturing, in its role as moderator, asks the QA Manager for the status of urgent orders. Manufacturing is as well receiving more interactions from planner side then the QA Manager does. The moderation of the meeting might be the main reason for this. The moderator proactively asks for the urgent orders from planning side which would otherwise be addressed directly from the Production Planner to the QA Manager. Manufacturing tells the QA Manager what will soon be released from manufacturing side for subsequent QA release. Manufacturing, too, has most interaction towards the group due to prepared facilitation of the meeting and presentation of necessary facts for the group. The Shift Leader shows also a considerable interaction share, mainly to Maintenance and Production Planner, for example to coordinate maintenance times at machines. CSC, Maintenance and the QV Specialist show the fewest interactions (Figure Summary1 is very similar in this regard). CSC has outgoing interactions only with Manufacturing. In return they get interactions from Manufacturing, the Shift Leader and the Production Planner. CSC usually conveys them the urgency of some orders which is also visible in the priority list before the meeting, thus probably not necessarily noteworthy. Maintenance has interactions to the group, but mainly only with the Shift Leader and Manufacturing. The QV Specialist shows the fewest interactions and these only to Manufacturing (which they also have in other meetings besides SMART).
The average L2 SMART meeting in the Steriles operational unit had 9.75 attendees a topic rate of 0.28 topics per minute, started 5:15 minutes late and took 48:25 minutes. The way the meetings in the Steriles operational unit were held differed to the other two operational units. The first difference comes from the fact that the group consists of more people (usually more than 10 people). The second difference comes from the style of moderation. In the first, second and fourth observed Steriles L2 SMART meeting, the moderator did not seem well prepared and could not moderate in an efficient manner. The third difference, maybe due to the size of the meetings, was that most of the group members seemed bored and used their laptops or other devices to write emails or work in another way. Some group members were not even taking part at the meeting at all which is shown by the self-directed actions. It should not be unmentioned, that each observed Steriles L2 SMART meeting started late.

The fourth and major difference to the other operational units is that the Steriles L2 SMART meeting never seemed to have a set-up structure in terms of topics. The topics and the according electronic documents were raised at random depending in which direction the discussion went. This included that most of discussions were quite long which in turn reflected on the topic rate.

Figure 14 shows the average L2 SMART meeting in the Steriles operational unit.
Figure 14: Circos diagram of the average Steriles L2 SMART meeting. The major interaction share comes from Manufacturing closely followed by the Production Planner. The outbound interactions of Manufacturing account for roughly 30% depicting a humble moderation style. The second major interaction partner in this average meeting is the Production Planner. The Production Planner has an outbound interaction share of roughly 70%. When an interaction is self-directed as in the case of the Production Planner for example, this means that this role was represented by two or more people who interacted as well (in this case up to three Production Planners). This looks like the Production Planner takes control of the meeting by giving every other role (except CSC and QA Steriles SCC) information. The next big interaction shares come from Maintenance, the QV Specialist and the Shift Leader. Maintenance uses the meeting to coordinate the planning of maintenance work and validation on machines together with Manufacturing, the Production Planner and the QV Specialist. The QV Specialist coordinates in turn validations on machines together with Manufacturing, the Production Planner, and Maintenance. The group in this case gets interactions from all sides except CSC and QA Steriles SCC. This shows the humble moderation and supports the many undirected discussions during the meeting, which subjectively were often not followed by clear follow-up actions. The QA Manager has an outbound interaction share of roughly 70%. But given the considerable small interaction share, this is a drop in the bucket compared to the QA Manager interaction share in the other operational units. This is especially severe considering that up to three QA Managers attend this meeting, who are counted as one in this average view. MES Master Data, CSC and QA Steriles show the fewest interactions. MES Master Data has outgoing actions towards Manufacturing and inbound interactions from Manufacturing and the QA Manager. CSC has only outgoing interactions with Manufacturing, the Shift Leader and the QA Manager. CSC usually conveys them the urgency of some orders which is also visible in the priority list before the meeting, thus probably not necessarily noteworthy. QA Steriles SCC does not show any interactions to or from any group member. Being an average of four meetings, this means that this role never actively contributes to the meeting.
Figure 15 shows the average L1 SMART meeting. This average was summarized from four L1 SMART meeting observations.

Figure 15: Circos diagram of the average L1 SMART meeting. The major interactions come from the BPM Packaging, the Head of Packaging Operations, and the guest presenters. Especially the latter shows, that the L1 SMART is commonly used as an information platform where packaging related topics are presented. It can also be noted that escalated points, especially from Glass/Bottles and Blister packaging, account for a significant part. The rather mazy looking parts show that there was interaction between all parts in the 4 observed L1 SMART meetings. Since the group is the major point of contact in this meeting, it shows that this meeting is mostly used for informing, reporting and the resulting decision making.
1.8.2 Questionnaires

The survey was divided in three parts. The first part was about the perceived importance of meeting elements and the experience on meeting elements in the SMART meetings. The second part was about inter-meeting communication, i.e. escalation decision-making and feedback-loop as well as general informing over the hierarchy of SMART meetings. The third part was about the perceived quality of information in the SMART meetings.

1.8.2.1 Meeting Elements

During the meeting observation I was curious why some obvious meeting elements in some cases were not kept, seen from my point of view, e.g. starting on time or assigning due dates to follow-ups. Hence, with the first set of questions I wanted to find out, whether the meeting participants see the meeting elements for productive meetings as important or not. This part of the survey was adopted from a study by Green WA and Lazarus H (1991) and amended by some elements to properly serve the investigation of the SMART meetings. The participants were asked to rate each of the following meeting elements according to their perceived importance (Green WA and Lazarus H, 1991): adequate preparation, setting clear objectives, starting on time, ending on time, staying on track, agreeing on follow-up actions, assigning due dates and responsible a responsible person to follow-up actions, checking progress of action items, appointing an effective moderator, meeting in a proper physical environment and using written agendas.

Figure 16 to Figure 19 show the results for each operational unit.

All participants agreed in the importance of the meeting elements even though they differed per SMART meeting in the ranking of the importance. The physical environment during the meetings and the usage of written agendas as preparatory element count to the least important elements in all SMART meetings. I also found that in all L2 SMART meetings, ‘ending on time’ is seen as the least important meeting element. In contrast, this element is seen more important in the L1 SMART meeting. During the SMART meeting the worst element is that discussions are too detailed in some cases. This seems especially severe in the L1 SMART and the L2 Steriles SMART meetings. When looking at the empirical values in the preparatory elements it is noticeable that due dates are not met all of the time, in all of the meetings. Even though the progress of the action items is checked satisfactorily in the L2
SMART meetings, this seems to be a lack in preparation. Overall, an adequate preparation of the meeting participants is seen as very important element for a meeting, there is a big gap between perceived importance and actual implementation in the L1, L2 Glass/Bottles and L2 Steriles SMART meeting. In the same set of meetings, another large gap was found between the importance of setting clear outcomes for a meeting and that the participants actually know the outcome at the start of the meeting. In all meetings, the participants find it more important to stay on track during the meeting than they actually do in the meetings.

Figure 16: L1 SMART. Perceived importance of meeting elements versus the actual experience during the meetings.
**Figure 17:** L2 SMART Blister. Perceived importance of meeting elements versus the actual experience during the meetings.

**Figure 18:** L2 SMART Glass/Bottles. Perceived importance of meeting elements versus the actual experience during the meetings.
Figure 19: L2 SMART Steriles. Perceived importance of meeting elements versus the actual experience during the meetings.

1.8.2.2 Inter-meeting communication

To investigate the flow of information between the SMART meetings and the coherent decision-making process, I asked the survey participants two questions regarding escalation of unresolved issues, decision-making and the feedback loop (i.e. the higher hierarchical meeting giving feedback about the decision to the escalated issue to the lower meeting). The participants were asked to estimate when and how often these three actions happen. To identify the self-perception and the perception by the lower hierarchical level, L1 and L2 SMART participants from the observed SMART meetings asked to state these estimations about their meeting and the meeting one level above them (i.e. L1 for themselves and the KAU LT and L2 for themselves and the L1 SMART). The arrows in the figures show the direction of the information flow between the meetings. The yellow background color depicts from whom point of view the answers are.

Figure 20 and Figure 21 show the perception of when the flow of information and the decisions happen. The highlighted oval shows the respective SMART meeting’s opinion. I found that the self-perception and the perception of the other hierarchical level differ in all
Results

three cases. The L1 respondents answered that the L2 SMART escalates most issues timely and some are escalated too late. Still, they believe that some issues are escalated too early. In contrast, the L2 SMART respondents do not think that issues are escalated too early, only timely or too late. This perception of the L1 SMART team of things happening too early is carried on to all upstream parts. This stems from the belief that things could have been decided upon in a lower level already. In the case of decision-making, a little more than half of the L1 participants believe that they decide things on time whereas another big part believes they decide too late or even never and most answered that they give timely feedback on those decisions down to the L2. A higher percentage of the L2 participants however thinks that their escalated issues are decided upon too late or never and that feedback is not given as timely as the L1 SMART participants believe. The L1 SMART respondents think about the Kaiseraugst Leadership Team (KAU LT) in a similar way as L2 thinks about L1. Only around half of the people answered in this regard that the decision-making and feedback happens timely.

![Diagram](image)

**Figure 20: L1 Opinion on when the following scenarios happen.** Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C), escalation of issues from L1 SMART to the Kaiseraugst Leadership Team (KAU LT, D), decision-making in the KAU LT on issues escalated from the L1 SMART meeting (E) and feedback from the KAU LT to the L1 SMART meeting on decisions on escalated issues from the L1 SMART (F).
Results

Figure 21: L2 Average Opinion on when the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C).

Figure 22 and Figure 23 show the average opinions of the L1 and L2 SMART respondents (respectively highlighted) on how often the surveyed cases happen. Only half of the L1 SMART respondents think that the KAU LT decides on escalated issues in an appropriate quantity and communicates the decisions back. Almost the other half of the people from the L1 SMART thinks that they decide too late and give late feedback or even none at all. Comparing the escalation-decision-feedback loop from L2 to L1 SMART, a large gap in the perception can be seen. The majority of L2 thinks they escalate in an appropriate manner whereas L1 tripartite, some think L2 is doing it appropriate some think too little and the others think too often. Some L1 respondents commented that they did not know there were escalated points from L2, which could be a reason for the latter observation. Interestingly, the majority of L2 participants responded that L1 is deciding an appropriate amount of escalated issues, where in contrast the L1 self-perception is much lower in that the same amount of people answered appropriate and too little. When it comes to L1 giving feedback about the decisions, they believe that they do it mostly properly, where in the L2 perception they have room for improvement to give more feedback.
Figure 22: L1 Opinion on how often the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C), escalation of issues from L1 SMART to the Kaiseraugst Leadership Team (KAU LT, D), decision-making in the KAU LT on issues escalated from the L1 SMART meeting (E) and feedback from the KAU LT to the L1 SMART meeting on decisions on escalated issues from the L1 SMART (F).

Figure 23: L2 Average Opinion on how often the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C).

Table 7 shows what the respondents answered on the same two questions (when and how often) regarding general informing in the SMART meetings. One respondent commented that the L2 SMART meetings are not thought for general information, this might result in the cases where never was answered.
Results

The major findings in this regard are that almost a quarter of the L2 Glass/Bottles and L2 Steriles respondents said that too little is being informed.

Table 7: General informing in SMART meetings

<table>
<thead>
<tr>
<th></th>
<th>L1</th>
<th>L2 Blister</th>
<th>L2 Glass/Bottles</th>
<th>L2 Steriles</th>
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<td><strong>When</strong> are topics informed about in general in the SMART meetings?</td>
<td><img src="image1" alt="L1" /></td>
<td><img src="image2" alt="L2 Blister" /></td>
<td><img src="image3" alt="L2 Glass/Bottles" /></td>
<td><img src="image4" alt="L2 Steriles" /></td>
</tr>
<tr>
<td><strong>How often</strong> are topics informed about in general in the SMART meetings?</td>
<td><img src="image5" alt="L1" /></td>
<td><img src="image6" alt="L2 Blister" /></td>
<td><img src="image7" alt="L2 Glass/Bottles" /></td>
<td><img src="image8" alt="L2 Steriles" /></td>
</tr>
</tbody>
</table>

1.8.2.3 Perceived quality of information

In the third part I wanted to dive deeper into the information flow inside the SMART meetings. Figure 24 shows how much on average a participant in the respective SMART meeting receives valuable information, how much unnecessary information and how much a participant informs others. This shows that L1 includes the biggest part of necessary information on average. On the other end, the L2 Steriles SMART meeting seems to have one third of unnecessary information on average.
Figure 24: Percentage of average individual SMART meeting time used for receiving information necessary and unnecessary for own daily business and for informing others.

Figure 25 depicts the opinions about the information quality in each SMART meeting. In all SMART meetings, except for L2 Blister, insufficient information is presented. By all means should a shift happen erasing the red bars and increasing the green and orange bars. It’s better to get too much information than too less.
1.8.3 Interviews

The interviews covered two parts, the information network and the respective flow of information as well as the decision making in the L2 SMART meetings.

1.8.3.1 Information network and the flow of information

In the interviews six members of the L2 SMART meetings answered question on the network of communication and the according information flow as well on decision making through the L2 SMART meeting.

The first five questions of the interview aimed for investigation of the information network and the flow of information. The three operational units differ in this regard.

From the interviewees from the Blister packaging unit the flow of information has been roughly described as depicted in Figure 26.
Figure 26: Described flow of information in L2 SMART meetings in the Blister operational unit. The Production Planner gets the information about urgent orders from CSC on a bilateral basis outside the SMART meeting. Inside the SMART meeting the Production Planner then conveys the urgent orders to the Deputy Head of Blister Packaging (Manufacturing) and to the QA Manager. These two functions have to take care of according release, manufacturing and QA release. To exchange when orders will be released from Manufacturing, the QA Manager also talks to Manufacturing directly. If there is maintenance work on lines to plan, Maintenance directly talks to Manufacturing and Production Planner to clarify it in a quick manner. The QV Specialist doesn’t have direct contact to the Production Planner but to Manufacturing and Maintenance. Manufacturing is also represented in the L1 SMART meeting through the Deputy Head or the Head of Blister Packaging. This is the route for escalation of topics.

The interviewees from the Glass/Bottles operational unit, the Head of Glass/Bottles Packaging and the QA Manager, described to information network as shown in Figure 27.
Results

Figure 27: Described flow of information in L2 SMART meetings in the Glass/Bottles operational unit. In Glass/Bottles, the L2 SMART is located in the hierarchy between the L3 SMART meeting and the L1 SMART meeting. To the lower level, the L3 SMART, the Shift Leader is the link. He takes information from L2, e.g. that an order has to be repackaged and takes it to L3 where he has to organize the details for this repackaging order directly with his manufacturing team. On the other side, the Head of Glass/Bottles Packaging is the link to the L1 SMART which has established as the common route for escalation of topics. The Head of Glass/Bottles Packaging also carries information to two other meetings in manufacturing, the Team Meeting and the Project Coordination Meeting. Especially the Project Coordination Meeting seems interesting since it has two members from the L2 SMART group, Maintenance and the QV Specialist. The Head of Glass/Bottles Packaging plays a central role in the L2 SMART meeting. CSC to some extent tells the moderator about the urgent orders. The QA Manager explains when orders of high priority will be released or have already been released recently. The Production Planner is mostly conveying the urgent orders or discussing possible changes in the production schedule with the Head of Glass/Bottles Packaging. If Maintenance or the QV Specialist is planning maintenance work or validation work respectively, they can do this together with the Shift Leader and the Production Planner to find the right time slot. The Shift Leader is representing the shop and responsible to plan downtime for machines for maintenance or validation work and for repackaging orders on the part of the Production Planner.

Figure 28 shows the information network of the Steriles packaging unit constructed on the basis of the descriptions of two interviewees from this operational unit, Maintenance and CSC.
Figure 28: Described flow of information in L2 SMART meetings in the Steriles operational unit. The escalation route to the L1 SMART meeting is the same in the other operational units, through the Deputy Head or Head of the operational unit. CSC only shares information with the moderator in special cases, when there is a recent stock out and orders become really urgent. This is then only supporting the priority list in the meeting, where this information is already stated. Other than that, CSC communicates outside the SMART meeting on a bilateral level with the Production Planner and the QA Manager to convey them the urgent orders. The Production Planner passes this information on in the meeting to manufacturing (i.e. Deputy Head or Head of Steriles Packaging) and in some cases to the QA Manager. Maintenance and the QV Specialist discuss planned maintenance or validation work with manufacturing and the Production Planner. Roles which have been left out in the descriptions are QA Steriles SCC, the Shift Leader and MES Master Data. This means that Maintenance and CSC do not interact on a regular basis with these three roles in the L2 SMART meeting.

1.8.3.2 Decision making

The second part of the interviews was about decision making in the L2 SMART meetings.

Table 8 shows the non-representative answers of the interviews, when being asked to state their effort/benefit ratio in the L2 SMART meeting.
Table 8: Effort vs. Benefit in the L2 SMART meetings (non-representative, including comments).

<table>
<thead>
<tr>
<th>Role/Function</th>
<th>Operational Unit</th>
<th>Effort / Benefit Ratio in hrs</th>
<th>Comments from interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC Specialist</td>
<td>Steriles</td>
<td>2 vs. 0</td>
<td>CSC is just there to say what they need, not to solve the problems.</td>
</tr>
<tr>
<td>QA Manager</td>
<td>Glass/ Bottles</td>
<td>3 vs. ?</td>
<td>3 hrs effort are a good investment compared to the resulting structured tasks which make things faster in daily business</td>
</tr>
<tr>
<td>Production Planner</td>
<td>Blister</td>
<td>N/A</td>
<td>“The invested time is not lost time but won time. […] The decision making and the ‘pushing’ on the phone became unnecessary.”</td>
</tr>
<tr>
<td>Head Maintenance Parenteralia</td>
<td>Steriles</td>
<td>2 vs. 1</td>
<td>Maintenance benefits from QV information on validation planning or packaging material changes. Other than that it’s just ‘nice-to-have’ information and not necessary.</td>
</tr>
<tr>
<td>Head of Glass/Bottles Packaging</td>
<td>Glass/ Bottles</td>
<td>2.5 vs. 1.5</td>
<td>“One benefit for example is that the firefighting is omitted, which is usually produced because someone forgot to inform someone else. […] The benefit for us is that we have more knowledge now. All members are on the same page. This prevents all sorts of issues, which might not cost me time personally but which shouldn’t happen anyways.”</td>
</tr>
<tr>
<td>Deputy Head of Blister Packaging</td>
<td>Blister</td>
<td>1.5 vs. 0.5</td>
<td>Described Benefits: The background information helps in decision making. Direct, face to face agreements possible Cultivation of close contact to interfaces</td>
</tr>
</tbody>
</table>

All interviewees have mentioned the benefit of having all members on one table providing a persuasive tool to for fast agreements, which usually would take long time with emails or phone calls. Also to see the other members of the demand to supply process chain nurtures the understanding of the E2E process and the implications of one’s actions on the part of others in this chain. This in part already answers other questions. The SMART organization supports the group by the overall information it provides for all adjoining functions. This overall information is mostly seen as unnecessary but still a benefit to understand the other
departments and their issues. Still, this information might subtly help in the decision making in all departments.

The interviewees said that compared to before the organization with SMART meetings, they have a better knowledge of the surrounding departments, which reduced the finger-pointing when something hasn’t worked as expected. Problem solving is done in common, building very strong decision foundations with the support of all departments. On the other side, as one interviewee pointed out, the courage to make decisions has decreased.

“There is always this group who can decide. This is some kind of wafting cloud, which needs to support this decision, and that is of course elegant. If the decision turns out to be wrong, the wafting cloud is to blame for it and not me. […] Many problems which are resolved in the L1 SMART could have been solved in L2 if not even on a bilateral level.”

– Head of Glass/Bottles Packaging

CSC however is still communicating a lot with emails to secure that they did everything right to bring the product to the customer. They benefit from the SMART organization as pointed out before already in that they have a persuasive platform where something said has more power of persuasion than one in hundred emails.

Even though all interviewees agree in the reduction of email communication by the SMART organization, it was also mentioned that urgent problems should still be communicated earlier than waiting to inform the corresponding person in the next SMART meeting when it has become even more urgent.

One improvement wish was noted by the Deputy Head of Glass/Bottles who acts also as moderator during the L2 SMART meeting. The wish is that issues which need to be escalated to the L1 SMART should be escalated through the respective line instead through him. Only through the respective line can the information be delivered with the appropriate and necessary high quality so that the L1 SMART team can decide upon the issue in the right manner with enough high quality information at hand. This approach was already tested but did not work then.

In terms of the feedback loop in the L2 SMART meeting, no interviewee seemed to have a problem with the feedback loop. Only for the L1 SMART has it been mentioned that the Word based minutes lack the feedback loop for implementing things to trace if they are actually on track. Here an Excel tool as used in the L2 SMART could be useful.
In terms of empowerment, all members have been said to be the right function for the meeting for the daily business. Only in special cases, when it comes to strategic decisions (e.g. to abolish one complete night shift), the production planner as present in the set-up is not the right point of contact. There the line manager would be more appropriate. This is seen as a drawback. One missing member was seen in the logistics department. It was mentioned that the logistics department would help immensely by joining the L2 SMART to solve the issues directly there instead to do this in the L1 SMART.

1.9 Key Performance Indicators

The survey results on the operational metrics show German metrics names, as the actual metrics are not subject to this study. The intention of this investigation was to find out whether a general good effort/benefit ratio exists for the existing metrics or if in specific cases further improvements are necessary. Thus, the overall picture is sufficient for the first step, to see whether some metrics need deeper investigation in the future or not.

Figure 29 to Figure 32 show the questionnaire results regarding the popularity, the usage time, the benefit and the degree of satisfaction of the metrics across all surveyed levels. To explain one metric and the affecting results in detail, the Overall Equipment Effectiveness (OEE) gives a good picture of how to read the results. The OEE is a metric comparing how well manufacturing equipment is running compared to the ideal plant. The result is expressed as the ratio of the actual output of the equipment divided by the maximum possible output of the equipment under ideal conditions.

OEE is known among all respondents, as shown in Figure 29. The usage time of OEE varies from once per day to once every week in around half of the respondents over minimum every two weeks to once per quarter and even never, even though the metric is known. This variation (Figure 30) stems from the variety of roles and levels in the survey. This is shown in Figure 31, where three respondents answered that only others have a benefit from this metric. It also shows that the degree of personal benefit is quite high in the case of OEE. Figure 32 depicts that OEE is ranked in the lower half among the metrics regarding the degree of satisfaction of the metrics with three respondents answering that they are not satisfied at all with it. Here it would make sense to dig deeper to find out what could be improved about OEE from the customer’s (i.e. the user) point of view. Here the part on improvement
suggestions of the survey contains already suggestions for what some respondents would wish in this specific case.

Figure 29: Popularity of operational metrics among all 17 surveyed respondents in the packaging department. OEE which is showing the line efficiency is the most known metric in the packaging department since it is present at every packaging line.
Results

Figure 30: Usage time of the operational metrics in the packaging department.

Figure 31: Distribution of benefit of the operational metrics in the packaging department.
Figure 32: Degree of satisfaction of the operational metrics in the packaging department.
Discussion

This study resulted in a vast number of interesting findings. The following discussion focuses on the major findings.

1.10 Business Process Management

Even though the investigation for potential optimization was not successful, we could establish a potential for process improvement in the future. Since the process has been mapped, a new round of optimization discussions could be initiated at any time. The discussions with the SMEs have also built awareness that it is important to show a Passion for Simplification.

The next step in business process management would now be to identify the operational metrics for the process. This allows measuring it from a process point of view.

According to Liebert, T (2012), the degree of process orientation correlates with the efficiency of the organization, i.e. the higher the degree of process orientation, the higher the efficiency of the organization. This was found in a study on process orientation in German industrial organizations.

The degree of the process orientation is defined and measured by the following dimensions:

- “design and documentation of business processes;
- management commitment towards process orientation;
- the process owner role;
- process performance measurement;
- a corporate culture in line with the process approach;
- application of continuous process improvement methodologies; and

Comparing these dimensions with the findings in this study, it can be noted that the Kaiseraugst site of Roche is on a good way towards a process oriented business. The design and documentation of business processes is implemented to a large degree. Room for improvement lies here in the IT interfaces abundant in the packaging unit in Kaiseraugst. If the flow of data is implemented in the existing operational processes, it would complete the picture and give an opportunity for detailed continuous improvement. So whenever new
systems are integrated, it could happen in a sustainable way and in accordance with given strategic goals and ongoing projects. The management commitment is given in Kaiseraugst through which the implementation of the iBPM could be realized in the first place. The process owner role in my opinion should be as close to the process as possible accompanied by the functional business process manager of the operational unit. The latter is very tightly linked with necessity of a process-oriented organizational structure. In terms of process performance measurement, there are many metrics available at the site already. Linking these metrics to the given processes and identifying performance measurement gaps would be the next logical step towards a process orientation. Underlying to the previous points are a corporate culture in line with the process approach and continuous process improvement. Both are based on one core principle, process goals should always be aligned with the customer requirements and business requirements. Thus, the business process management team should be aware of the business requirements and goals, meaning that they need access to the leadership team, as well as its customers’ requirements, including the internal customers, requiring close contact to both ends.

1.11 Governance Structure

The governance structure part of the study was based on the two Class A Behaviors Shared, Aligned and Realistic Plans and Knowledgeable Workforce with Clear Roles and Responsibilities.

Through this study I found that the SMART meetings are a very good tool to have a shared ownership of the plan, which is aligned and realistic. However, the successful and efficient usage of this tool is very dependent on the usage of basic meeting elements. The L2 SMART meetings of Blister and Glass/Bottles show a similar topic rate in contrast to Steriles with a quite low topic rate. From all SMART meetings the survey respondents of the L2 Steriles SMART responded with the biggest gap between the importance of adequate preparation to meetings and how it actually is done for the SMART meetings. At the same time there is an obvious gap that the respondents wish to have clear outcomes set for the meeting. Green WA and Lazarus H (1991) argue that “many meetings are simply destined to be unproductive before they even begin.” With more preparation, the due dates might be met more often as well. The worst point during the meetings has been responded to be that discussions are too
detailed sometimes. This is a point of discipline and facilitation. An effective moderator should suppress detailed discussions and propose other solutions to have more detailed discussions outside the SMART meetings with the appropriate persons. If someone is appointed to be the moderator, it would be money well spent to give this person a course on effective moderation if desired. As shown in the financial analysis of meetings in the introduction, 15 minutes less in an effective meeting can save up to CHF 500 per meetings. Roche offers courses on professional facilitation of meetings, costing CHF 800. After only two more effective meetings this investment would be amortized. By setting clear outcomes for the meetings and an effective moderation, the meeting would stay on track as well. This was also a point where a gap was found in all SMART meetings. In the L2 SMART meetings ending on time is not seen as important as other elements. Anyways, the facilitators should show an appreciation of time to make it clear that the SMART is set up to streamline the planning in a shared way. As mentioned earlier already, showing a lax attitude towards promptness conveys the idea that time is not money and that it is not even important. This was especially found in the case of the L2 Steriles SMART meeting, which was observed to start on average 05:15 minutes late. In the survey the answers indicate however that those meetings start nearly always on time. This is again a point of discipline and moderation. The facilitator should always start on time and make it clear to late arrivers that the meeting already started and that being late is undesired. Additionally, it should be noted that Green WA and Lazarus H (1991) found that there is a positive correlation between the actual use of the survey elements of this study and the ultimate effectiveness of meetings.

The survey respondents on the escalation-decision making-feedback-loop show that there is a different perception on when things are escalated from the L2 to the L1 SMART and subsequently decided and given feedback on down to the L2 again. The same picture is present in terms of how often these things happen. L1 could thus decide faster and give more feedback down to the L2 again. On the other side, L2 could try harder first to decide some issues themselves before escalating them too early and too often. When things are escalated, this should be made clear to the L1 team so that the importance of a decision is obvious. Some respondents noted that they did not know that things get escalated from L2 to be decided in the L1 SMART team. Here a clear communication could be the key to successful decision making in this round. In this regard, a suggestion for improvement was given during the interviews. One interviewee mentioned that it would make more sense, if unresolved issues would actually be escalated through the respective line. So if for example a planning issue could not be solved, the planner should communicate it to his line manager who in turn
Discussion

should bring it up in the L1 SMART meeting. That way the case would be supported by the actual functional knowledge of the line in contrast to when the issue gets escalated by the L2 meeting moderator who does not know all the necessary background facts. It was said that this would immensely help the decision making process in the L1 SMART meeting. This in turn means that the generalized escalation scheme as it is right now, i.e. the facilitator has the escalator role, does not necessarily facilitate decision making. Also, since there is this scheme it is easy to escalate issues too early even though they could have been solved on a lower level. This was supported by the survey results and interview comments.

Through the survey I also found that some respondents feel that in the L1 SMART meeting things are informed about too late. L1, L2 Glass/Bottles and L2 Steriles SMART meetings were said to inform too little in some cases. My suggestion is to rather inform too often than too little.

In the survey around 15 to 32 % of the meeting time in the respective SMART meetings was found to be filled with information unnecessary for the average participant. Of course, the more people from different departments come together in one meeting, the more unnecessary information starts to appear due to the different interests. But on the other hand, if a high level of unnecessary information occurs it should be discussed if certain roles could leave after they informed the others with valuable information. A significant portion of the information content in all SMART meetings, except L2 Blister SMART, seems to be insufficient. It is very important that a shift happens here away from insufficient information towards more information. This is especially important since decision-making is based on a previous information gathering. Insufficient information leads to ambiguity which leads to decreased courage for decisions.

It has been mentioned in one interview, that through the preset structure of the SMART meetings the courage for individual decision-making has decreased, since it builds a platform where decisions can be made as a group and no one gets blamed individually if it turned out to be wrong. On the other hand, many interviewees noted that an interdisciplinary exchange of information occurs giving everybody background knowledge. This might lead to faster decisions outside the SMART meetings, which could however not be proved however.

The SMART governance structure is only linked vertically. This means also that horizontal information exchange only happens in the L1 SMART meeting. This was not found to have an impact on decision-making since no operational unit mentioned a necessity to exchange with the other operational unit in this governance structure.
1.12 Key Performance Indicators

In the KPI analysis I took a closer look on the Production Performance (PP) KPI. Acting from the data creator side, we challenged the PP report by first extracting the data and doing a root cause analysis on the materials with a low PP. By redoing the same exercise we found that the report was changing in results over time. We noted all the problems we faced and communicated them with the developer of the report. This way, step by step, the report becomes more stable. Soon we moved on from the offline approach to an integrated approach by doing the root cause analysis (RCA) in the actual report, using its RCA function. The PP report is still improving. Once the report is working as expected, it will be a very neat manager report. It then will show management which products have a good PP and which do not. If a product shows a low PP value, it is then easy to drill down in that product and use other lower metrics, for example bottom-up developed metrics for the RCA. The PP investigation nevertheless proved that the data creators should have a stake in the implementation of new metrics.

The continuous improvement principle also applies to metrics. As done with the survey on operational metrics in the packaging department, such customer feedback helps improving the metrics to be as close to reality as they can be. A survey is a good tool for improvement suggestions from the actual metrics users. One drawback of this survey was that the participants were asked to respond on a large number of metrics which they possibly don’t even know. For a first picture this makes sense. However, once metrics are linked to the business processes and the users are known, as argued earlier in the BPM part, customer feedback can be surveyed in a more channeled way. In my opinion it would make sense to do this on a regular basis at least every year to see if new influencing factors have an impact on the usability of the metric.

The qualitative effort/benefit ratio for the existing metrics in the packaging unit is difficult to describe. The metrics are very complex in their development. And still some users find them not satisfactory at all. If the customers would be brought in the development process early on already, this could turn out to have a higher benefit for the customer and thus for the metric itself too. In other Roche sites other development approaches are utilized. Before even developing a metric, the users are asked to give specifications for the metrics. Once they are harmonized, the users have to sign those specifications just like a contract. Thereupon the metric is being developed and programmed in alignment with the user requirements and
specifications. This should then lead to a highly satisfactory metric and to a winning situation for both, the users and the business process managers who need to implement metrics in the processes which reflect internal customer requirements.

Conclusion

This study successfully investigated interesting features underlying the Class A Behaviors ‘A Passion for Simplification’, ‘Shared, Aligned and Realistic Plans’, ‘Knowledgeable Workforce with Clear Roles and Responsibilities’ and ‘Business Process Performance Measures’. Since Class A Business is supposed to be very customer oriented, also towards internal customers, this study primarily focused on the employees. Special focus was on their behavior in a preset meeting structure and in the usage of operational metrics. Questionnaires and interviews were used to gather a kind of ‘user feedback’ in the employees’ roles as users of the meeting structure and metrics. Interesting results came up showing gaps between their perceived importance of meeting elements and their actual experience from the implementation of these elements in the meetings. Regarding the operational metrics it was found that the employees appreciate the operational metrics and would wish some customization in a few cases.

This study describes a debut where Circos data visualization, normally used for visualization of genomic interactions, was used to visualize interactions between meeting participants. This innovative way of meeting visualization makes this study tangible and literally fills this thesis with color.

Several benefits were achieved by this study which have all in common that they build the foundation for continuous improvement:

- A key packaging process is mapped, harmonized and implemented in a process data base.
- Meeting participants can now implement targeted actions to make the SMART meetings more efficient.
- Potential areas for improvement regarding the operational metrics have been found.

The major benefit which arose through the previous points is that awareness of the Roche Kaiseraugst has been raised, even outside of the packaging department where the focus of the study was. Awareness of customer oriented behaviors towards Class A Business.
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References


Appendix

1.13 Detailed Results - Meeting Observations

Detailed results of meeting observations
In the following chapter the results from all meeting observations in L2 SMART meetings are presented according to the operational unit. Each meeting is depicted in an individual Circos diagram.

1.13.1 Blister

The first observed meeting in the operational unit Blister was conducted on 24.02.2014. It started 4 minutes late and took 25:00 minutes. Figure 33 shows the interactions of the 7 attendees towards each other, the group and to the PC. The meeting was structured in the sense that the moderator went through the topics by asking the specific attendees to give their input on their specific topics. This is visible by the roughly 60% of his share which the moderator talked to the group and with individuals. This scheme of interaction shows a prepared way of information gathering.
Figure 33: Circos diagram of the first observed L2 SMART meeting in the Blister operational unit

Figure 34 shows the progression of topics with a rate of 0.8 topics per minute.
The second observed meeting in the operational unit Blister was conducted on 13.03.2014. The meeting started 7 minutes late and took 27:20 minutes. Figure 35 shows the interactions of the 7 attendees towards each other, the group, the PC and in one case to the cellphone. The second observed meeting was structured in the same way as the previous one, in the sense that the moderator went through the topics by asking the specific attendees to give their input on their specific topic.
For the second meeting no agenda topics were noted. Since the set-up of the meeting was however the same in the other Blister SMART observations, it can be assumed that the increase in topics until around minute 13 (Figure 36) is the priority list and that the subsequent and much slower increase shows the Varia where the group discussed new topics. Due to two longer lasting discussions at the end of the meeting, the topic rate for this meeting was 0.55.
The third observed meeting in the operational unit Blister was conducted on 24.03.2014. It started on time and took 40:00 minutes. Figure 37 shows the interactions of the 8 attendees towards each other, the group and to the PC. This meeting was structured in the same way as the previous two, in the sense that the moderator went through the topics by asking the specific attendees to give their input on their specific topics. Again, the outgoing action of the moderator is at around 60%. In the third meeting, a guest was attending to observe the meeting. He was introduced by the Head of Blister Packaging and subsequently all other attendees introduced themselves.
The topic rate of the third observed meeting was 0.68. This is due to two longer discussions during the meeting, as can be seen in Figure 38.
The fourth observed meeting in the operational unit Blister was conducted on 27.03.2014. The meeting started 5 minutes late and was with 15:00 minutes quite short. Figure 39 shows the interactions of the 4 attendees towards each other, the group, to the PC and to the notebook to make handwritten notes. This time the moderator was the QA Manager responsible to inform the others about the status of the articles on the priority list. Usually this happens through the moderator asking the QA Manager for the specific status. This time, the meeting was structured in the sense that the moderator went through the topics and articles by presenting the status of the articles on the priority list. This is visible by the roughly 70% of his share which the moderator talked to the group and with individuals. This scheme of interaction shows a prepared way of information presenting. The QA Manager was prepared and had handwritten notes with the status of each article he wanted to present. It is also visible that one person was not actively contributing to this meeting. This can be due to the fact that now maintenance work needed to be communicated during this session or that the right people to communicate with weren’t attending.
Figure 39: Circos diagram of the fourth observed L2 SMART meeting in the Blister operational unit

Due to the structured and prepared way of presenting the topics and status of the articles to the group, this meeting had a topic rate of 0.8 topics per minute, the progress of topics can be seen in Figure 40. Since three attendees were missing, the meeting time was very short and the number of topics low.
1.13.2 Glass/Bottles

The first observed L2 SMART meeting in the Glass/Bottles operational unit had 7 attendees, started 3 minutes late and took 47:20 minutes. It was structured in a way that can be seen in Figure 41 and is very similar to the meetings in the Blister operational unit. The moderator and the other attendees seemed very good prepared. The moderator had a very structured way of asking for the necessary information.
Figure 41: Circos diagram of the first observed L2 SMART meeting in the Glass/Bottles operational unit

Figure 42 shows the topic progress of the first observed Glass/Bottles L2 SMART meeting. The first observed meeting in this operational unit had a topic rate of 0.89 topics per minute.
The second observed L2 SMART meeting in the Glass/Bottles operational unit had 7 attendees, started 1 minute late and took 38:00 minutes. It was structured in a way that can be seen in Figure 43 and is very similar to the other meetings in this operational unit. The moderator and the other attendees seemed very good prepared. Using around 40% of his talk share for outbound interactions, the moderator had a very structured way of asking for the necessary information.
Figure 43: Circos diagram of the second observed L2 SMART meeting in the Glass/Bottles operational unit

Figure 44 shows the topic progress of the second observed Glass/Bottles L2 SMART meeting. This meeting had a topic rate of 1 topic per minute.
The third observed L2 SMART meeting in the Glass/Bottles operational unit had 9 attendees, from whom 2 were guest presenters who presented an extra topic in the beginning of the session. The meeting started 1 minute late and took 58:00 minutes due to the additional extra topic in the beginning. It was structured in a way that can be seen in Figure 45 and is very similar to the other meetings in this operational unit. The moderator and the other attendees seemed very good prepared. Using around 50% of his talk share for outbound interactions, the moderator had again a very structured way of asking for the necessary information.

Figure 44: Progress of topics during the second observed L2 SMART meeting in the Glass/Bottles operational unit
Figure 45: Circos diagram of the third observed L2 SMART meeting in the Glass/Bottles operational unit

Figure 46 shows the topic progress of the third observed Glass/Bottles L2 SMART meeting. Due to the two guest presenters (Head Packaging Operations and Production Planner) and their extra topic, which needed more time to present, the topic rate was 0.47 topics per minute for this meeting.
The fourth observed L2 SMART meeting in the Glass/Bottles operational unit had again 7 attendees, started on time and took 39:00 minutes. It was very structured in a way that can be seen in Figure 47 and is very similar to the other meetings in this operational unit. Especially the moderator seemed very good prepared in this meeting. Using around 60% of his talk share for outbound interactions, the moderator had a very structured way of asking for the necessary information.
Figure 47: Circos diagram of the fourth observed L2 SMART meeting in the Glass/Bottles operational unit.

Figure 48 shows the topic progress of the third observed Glass/Bottles L2 SMART meeting. By asking for decisions or new action items if something couldn’t be decided, the moderator was able to prevent longer, unnecessary discussions. This way the highest recorded topic rate with 1.1 topics per minute was recorded.
Figure 48: Progress of topics during the fourth observed L2 SMART meeting in the Glass/Bottles operational unit

1.13.3 Steriles

The first observed L2 SMART meeting in the Steriles operational unit was conducted on 11.02.2014, had 10 attendees, started 8 minutes late and took 32 minutes. As shown in Figure 49, the moderator started the meeting by addressing one question to the group to check if there is any news. The rest of the time the moderator was only noticeable by typing discussed points in the Excel based SMART meeting tool. Other than that, the meeting was a not facilitated discussion. The Circos diagram shows the Production Planner with the major interaction share in the discussion.
Figure 49: Circos diagram of the first observed L2 SMART meeting in the Steriles operational unit

The first observed Steriles L2 SMART meeting had a topic rate of 0.44 topics per minute. As depicted in Figure 50, it was divided in a Varia round and then discussions about repackaging.
The second observed L2 SMART meeting in the Steriles operational unit was conducted on 13.02.2014. It had 14 attendees, started 5 minutes late and took 33 minutes. As shown in Figure 51, the moderator started the meeting again by addressing one question to the group to check if there is any news. The rest of the time the moderator was only noticeable by typing discussed points in the Excel based SMART meeting tool. Other than that, the meeting was a not facilitated discussion. The figure also shows the two Production Planners with the major outbound interaction shares in the discussion. Three participants weren’t participating in the conversation at all, indicated by the self-directed actions.
The second observed Steriles L2 SMART meeting had a topic rate of 0.24 topics per minute. As depicted in Figure 52, it started with discussions about repackaging, followed by packaging material changes and a final Varia round. During the Varia a point was raised again which has already been discussed during the repackaging discussion showing that this point wasn’t decided on before. The two gaps in the line indicate interruptions of some sort which weren’t part of the discussion or the SMART topics at all.
The third observation in the Steriles L2 SMART meeting was conducted on 25.02.2014. At this point the group decided to exclude the QA representatives from the L2 SMART meetings in the Steriles operational unit which are responsible for goods release. This was due to an increasing number in overdue orders which they couldn’t do much about during the SMART meetings. This way they got those two hours per week for 6 weeks to work up the abundance of overdue orders and to solve the issues which block them from market release. Because of this, the meeting now had 7 attendees. It started 2 minutes late and took 49 minutes. The change in moderator brings an interaction structure very similar to the other two operational unit L2 SMART meetings. As shown in Figure 53, the moderator has a similar interaction profile compared to the other two operational units described above. The moderator has the biggest interaction share in the meeting with around 50% outbound interactions.

Figure 52: Progress of topics during the second observed L2 SMART meeting in the Steriles operational unit
Still, with a topic rate of 0.29 topics per minute it is quite low in terms of handled topics compared to the similar interaction profiles. Again, the topic progress shown in Figure 54 shows a seemingly random order of topics. First the group talked about master batch records, secondly about repackaging orders, thirdly about packaging material change and finishing with a Varia round and action items.
The last L2 SMART meeting observation was conducted on 27.03.2014. The fourth Steriles L2 SMART meeting had 8 attendees, started 6 minutes late and took 79:40 minutes adding up to an end time of 25:40 minutes over the scheduled end time. The 40% outbound interaction share of the moderator (Figure 55) have to be credited for discussion participation, not for facilitation. The discussions in this session were very long and didn’t lead to any decisions in the end.
As can be seen in Figure 56, the meeting started with a 37 minutes discussion about packaging material change. The next 20 minutes were spent on one repackaging order. Once the actual meeting time was over, the meeting was finished with a Varia round. The discussions were extremely long for that no decision was reached. Facilitation was not happening leaving room for these kinds of discussions. This led to the lowest topic rate of all observed meetings with 0.16 topics per minute.
Appendix

1.14 Detailed Results – Survey Results on Governance Structure

The following figures show the detailed results of each SMART meeting’s opinion about when and how often the scenarios (escalation, decision-making and feedback) happen.

Figure 56: Progress of topics during the fourth observed L2 SMART meeting in the Steriles operational unit

Figure 57: L2 Blister Opinion on when the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C).
Figure 58: L2 Glass/Bottles Opinion on when the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C).

Figure 59: L2 Steriles Opinion on when the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C).
Figure 60: L2 Blister Opinion on how often the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C).

Figure 61: L2 Glass/Bottles Opinion on how often the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C).
Figure 62: L2 Steriles Opinion on how often the following scenarios happen. Escalation of issues from L2 to L1 SMART (A), decision-making in L1 SMART on escalated issues from L2 SMART (B), feedback from L1 to L2 on decisions on escalated issues from L2 SMART (C).