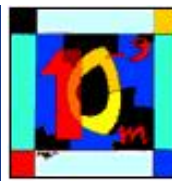


InCoCo-S

Innovation, Coordination and Collaboration  
in Service Driven Manufacturing Supply Chains

Deliverable Nr. DL 4.4

**Impact of new  
measurement system on  
the service-supply chain  
performance**



**BWI**  
ETH ZURICH

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## Executive Summary

From a service provider`s perspective, transparency on service operation performance can be seen as an essential precondition facilitating them the commitment to long-term service agreements with customers. The application of the Service Performance Measurement System (SPMS) enables service providers to measure the performance and to identify potentials for service operation improvement. Thus, it helps increasing customer satisfaction. Transparency on service activities (particularly costs) and the resulting influence on the customer's service object (e.g. packaging machines representing the packaging line) supplies providers with a strong argumentation with regard to benefits and the pricing of services.

The presented SPMS in Deliverable (DL) 4.2 addresses the integrative character of industrial service operations by highlighting the interaction between customers and service providers. The SPMS provides both, the service providers and the customers with a structured set of PIs, which are qualified for measuring service operations performance and are applicable to a wide range of industrial services.

In DL 4.4 the main objective is the validation of the developed SPMS with regards to completeness, correctness, consistency, logic and adaptability to company specific surroundings. Based on a general validation approach taken from literature, DL 4.4 presents the feedback results of the industrial partners in the InCoCo-S project covering four different service clusters. In addition, the SPMS was presented on project meetings and several partners have given valuable input from their individual perspective.

Altogether, the validation of the SPMS led to very positive feedback in regards to the structure of the SPMS with its five target areas and the differentiation between service activities and the resulting service object performance. From the industrial point of view the SPMS provides the service provider with a comprehensive set of performance indicators (PIs), covering the areas relevant for various industrial services. Furthermore, the structure offers a clear guidance for focusing on specific performance areas, according to the service provider's individual service strategy and relationship with their customer. The identified weaknesses refer to the unclear implementation methodology, the visualization style, and the description of PIs. Improvements in these areas might be helpful for a better understanding. According to the industrial partners, this would be absolutely necessary for an implementation decision.

The feedback from the five workshops and the project meetings was taken to modify the SPMS in terms of structure and visualization (see chapter 4), and to further align the SPMS with the InCoCo-S Reference Model (IRM), which helps Service Providers in selecting relevant PIs from the SPMS according to the standard service processes. The implementation methodology and the practical selection of PIs are points of interest in further research activities. All in all this DL represents the last step towards the first validated version of the SPMS Version 1.0.



# 1 Introduction

## 1.1 Validation of project results as the last step in Workpackage 4

The major outcome of Deliverable 4.2 was a standard performance measurement system for the measurement of service activities and the resulting service object conditions in the domain of industrial services.

In DL 4.4, the main objective is the validation of the developed SPMS with regards to completeness, correctness, consistency, logic and adaptability to company specific surroundings. For the validation purposes, the SPMS has not been implemented, but the validation has been done by means of five validation workshops with the main industrial partners covering each service cluster in InCoCo-S.

Based on literature research, general validation approaches have been adapted to ensure an adequate proceeding towards the validation workshops. In this connection it had been necessary to develop a structured interview guideline beside introduction presentations. One major goal was to introduce the SPMS to people who have never been involved in InCoCo, especially in the development phase of the SPMS. Following this approach it was ensured that the people had to get into the ideas of the SPMS by themselves respectively with the help of the workshop guidance.

Figure 1-1 illustrates the procedure in WP4 and shows how the tasks in WP4 are connected among each other including the belonging service clusters the project is focusing on. The input has been worked out with the help of the industrial partners in the project.

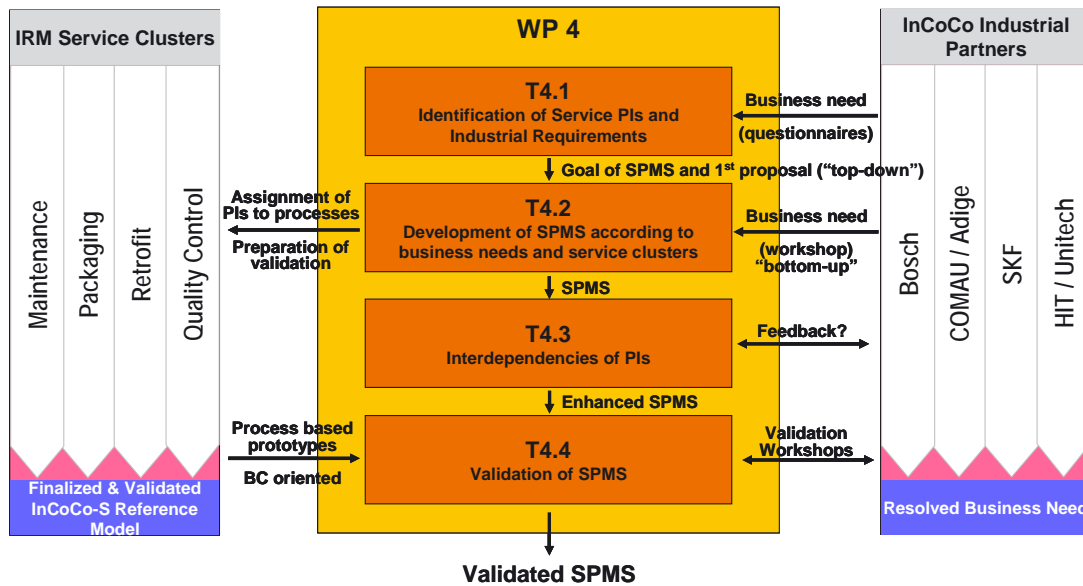


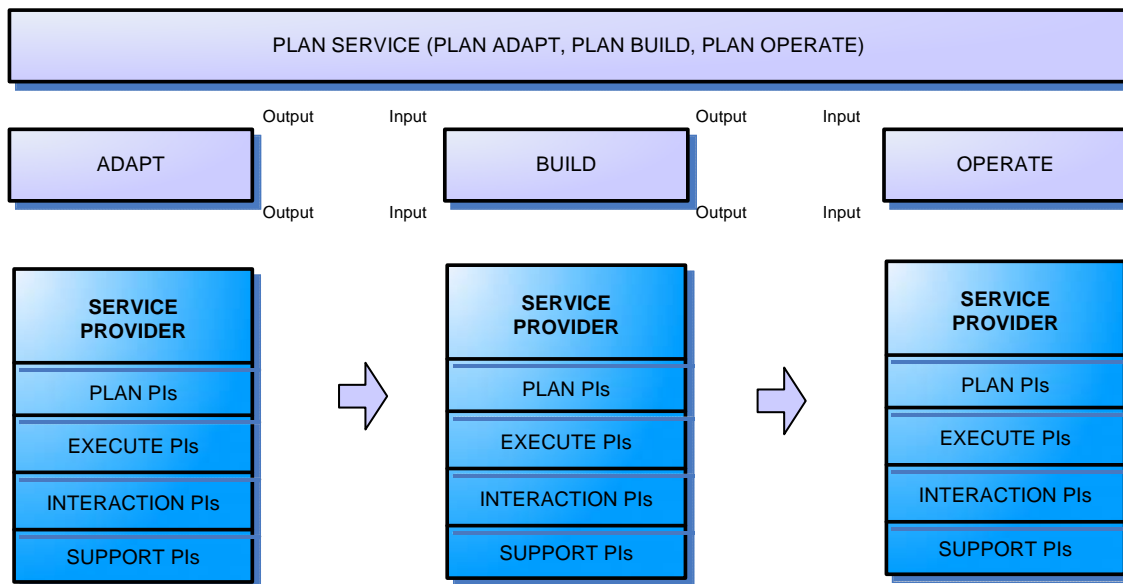
Figure 1-1: Interactions in Workpackage 4

In chapter 2 the validation approach and the procedure of the workshops are described in a detailed way. Chapter 3 focuses on the workshops results structured by a short introduction of each industrial partner, highlighting the results and ending with a conclusion. In chapter 4 the

results have been taken for the modification of the SPMS. Further research questions and activities are described. In the annex, the reader finds the original workshop results based on the structured interview guideline.

## 1.2 The connection between SPMS and the InCoCo-S Reference Model

The standardized SPMS is one of the essential parts building up the InCoCo-S Reference Model. The SPMS supplies the performance indicators for the reference processes, which allow for a measurement of process performance. The row in the middle of Figure 1-2 presents the essential service execution phases Adapt, Build and Operate in the IRM from the Service Provider perspective and illustrates their interdependent connection with input and output relations.



**Figure 1-2: Connection between SPMS and the IRM**

The Plan processes for each of these three phases are coordinated within the Plan service layer on the top. The individual phases Adapt, Build and Operate are further broken down into Plan, Execute, Interaction and Support process steps. Following the structure of the IRM, the SPMS provides a comprehensive set of performance indicators (PIs), covering all process steps within the IRM on different levels of detail. Within the Adapt phase for example, the SPMS provides PIs to quantify the service provider's activities with regards to the customization of a service package from its service portfolio, in order to collaborate with the manufacturer as a service partner. In the Build phase the PIs refer to all activities for setting up the hardware and software, establishing software interfaces, and the takeover of the functional responsibility from the manufacturer based on the service contract. In the Operate phase the PIs enable service providers to monitor their service operation activities to perform the service according to the agreements.

## 2 Validation of the Service Performance Measurement System (SPMS)

### 2.1 Validation approach

As mentioned in the introduction, the overall goal of task 4.4 of the InCoCo-S project is to demonstrate that the SPMS (including the methodology to implement and make use of it) is

- **complete** in terms of target areas, levels, perspectives, phases, and steps;
- **consistent** among levels and steps as well as to the other deliverables, in particular the InCoCo-S Reference Model;
- **correct**, i.e., reflects technically state-of-the-art and industrial requirements and does not have flaws;
- **applicable** in practice at industrial partners and is
- **beneficial** for them, i.e., is of added value with regard to transparency of performance and leads to improved decision making.

The validation will be done by means of case studies at industrial partners. However, they only serve as proof of concept, i.e. the SPMS will not be implemented, it will be assessed in terms of the aforementioned criteria.

In order to ensure validity and reliability of the case studies, particularly, the following measures have been taken (Yin, 2003; Stuart et al., 2002): Subjective judgements have been precluded by conducting several workshops and a large number of interviews as well as using multiple sources. Moreover, chains of evidence have been developed using the SPMS and the methodology to implement and make use of it. Internal validity is supported by the use of both as well as by comprehensive argumentation. External validity is sufficient but remains restricted due to the limited cases that will be described. Nevertheless, findings are expected to be more or less generalisable since the cases differ widely in terms of their characteristics of companies and their contexts. Moreover, reliability is guaranteed through detailed documentation prepared during the project.

The validation has been done in workshops using structured interviews and guidelines. This was documented by means of case study protocols (Yin, 2003).

### 2.2 Three different phases of validation

The realization of the validation was carried out in several phases:

- **Phase 1:** assess completeness, consistency, correctness, novelty of the SPMS as outlined above.
- **Phase 2:** assess completeness, consistency, correctness, and novelty of the methodology to implement and make use of the SPMS as outlined above.
- **Phase 3:** carrying out the methodology to implement and make use of the SPMS as a simulation: design phase as described, the other two phases on a hypothetical basis. In particular, the following questions should be answered:
  - Are the steps logical and aimed? Do they lead to meaningful results?
  - What is the difference to the as-is? Is this beneficial?
  - What will be the resources and efforts required in implementing it?

- What are the limitations?
- What are the overall benefits? What is the impact?

In order to facilitate these phases, a workplan has been set up, which specified workshop contents and agendas as well as detailed guidelines. The workshops have been guided by academic partners and held at industrial partners.

As a reminder, in task 2.2 the following research questions have been followed during the development of the SPMS:

- How can interactions at the interface between service provider and their customers be measured?
- Which factors are influencing service performance?
- What are challenging aspects associated with the development of an SPMS?
- How can industrial partners make use of the framework?

These questions and the basic aspects as presented in the previous chapter were taken as a basis for the development of the structured guideline.

### 2.3 Validation workshops -procedure

The workshops were guided by academic partners and held at industrial partners in the InCoCo-S project representing all service clusters. With every industrial core partner (SKF, BOSCH, COMAU, HIT/UNITECH) one half-day workshop was organized. The assigned cluster managers had been responsible for the organisation and proceeding of the workshops with a supporting hand from the task leader ETHZ and the industrial partners when it comes to selection of a workshop team.

The workshop teams consisted of the cluster manager, a member from ETHZ, and representatives from the company, who were:

- Responsible production line/ plant managers (e.g. packaging, maintenance)
- Quality manager/ purchasing manger/ Logistics Controlling
- Responsible Service Sales Manager/ Director (service provider view)
- Service provider technician (if possible)

Each workshop included the following points:

- Introduction (InCoCo-S, goal of the workshop, proceeding, desired results, benefits for the participants) **20 min**
- Explanation SPMS (structure, idea behind, customized examples, description of some PIs, especially interaction related ones) **40 min**
- Practical part (involvement of participants) **60 min**
  - Strengths/ weaknesses, upcoming real world problems, limitations in practice
  - How could solutions for the identified problems look like (solution oriented)
  - Useful for the involved partners (both parties)
  - Collect ideas for improvement

- 
- Answering the questions phase 1-3 (see questionnaire) **60 min**
  - Discussion/ collecting ideas/ feel the challenges **60 min**

The corresponding service cluster managers had been responsible to document the workshop results according to the format provided by ETH.

Based on experiences with validation workshops in other projects, a set of desired benefits for customers and service providers was presented to the workshop participants within the introduction phase.

#### **2.4 Structured interview guideline**

Based on the questions as presented in chapters 2.1 and 2.2, as well as the guidelines for the development of the SPMS as described in DL4.2, a catalogue of questions was defined, in order to conduct structured interviews with the main industrial partners. This interview guideline consisted of five parts:

- Opening part
- SPMS structure
- Methodology
- Benefits of SPMS
- Discussion and ideas for improvement

These five question blocks covered the areas of validation aspects as presented in chapter 2.1, meaning it was directly and indirectly asked whether the SPMS is complete, consistent, correct, applicable and beneficial. The complete interview guideline can be found in the annex.

### 3 Workshop results

#### 3.1 Overview

Within task 4.4 five workshops were conducted with the main industrial partners. The following table provides an overview of these workshops:

**Table 3-1: Overview of validation workshops**

Validation partner (Cluster)	Date / Location	Participants
COMAU <b>Maintenance I</b>	March 15 <sup>th</sup> , 2007, Torino (I)	DI GIAMPIETRO, Fabiola SAVOCA, Angelo DE BONIS, Teodosio Heinzel, Herbert Gerosa, Marco Schneider, Oliver Lange, Ingo
HIT, UNITECH <b>Retrofit</b>	April 4 <sup>th</sup> , 2007, Chemnitz (D)	Dr. Bernd Weber Dr. Cornelia Ehlert Bernd Schaedlich Oliver Schneider Amit Garg
SKF <b>Maintenance II</b>	April 5 <sup>th</sup> , 2007, Schweinfurt (D)	Stefan Schleyer Matthias Ennulat Peter Osadsky Ingo Lange
Sigpack Systems AG <b>Quality Control</b>	April 11 <sup>th</sup> , 2007, Beringen (CH)	Roland Röschli Oliver Schneider Ingo Lange
BOSCH Packaging Services AG <b>Packaging</b>	April 18 <sup>th</sup> , 2007, Zurich (CH)	Marcello Pezzotti Oliver Schneider Ingo Lange

In the subsequent chapters the key results of these workshops are summarized. The detailed results are presented in the annex.

## 3.2 Workshop 1: Comau

### 3.2.1 Introduction

Comau has over 40 years of experience in offering a vast range of products and services in 38 locations in 19 countries to ensure a consistent delivery of world-class solutions throughout the globe while still providing the highest level of localized support.

The company is structured in different divisions. A first division offers services like Engineering, Injection Moulds & Dies to supply quality engineering services and production tools mainly to the automotive industries. The Engineering Business Line develops full projects: concept and style feasibility, product design, models and prototypes construction, virtual and physical validation, technological process study and simulation features, production start-up assistance, technical graphics. The Injection Moulds Business Line designs and manufactures moulds for the main Tier 1 and OEMs all over the world. The Dies Business Line provides stamping engineering services and press-dies for the main Tier 1 and OEMs all over the world.

Body Welding & Assembly division is a global leader in the supply of production systems for vehicle full body, body components manufacturing and complete turn-key body shops worldwide. They support customers with a complete set of services ranging from concepts development, advance engineering, simultaneous engineering, process development & validation, simulations, to the supply of complete production systems, production launch and maintenance.

Comau Powertrain Systems focuses on technology and delivering technological value to clients; in this way they develop their products: Machine Tools, Assembly centres and test stands. This helps in developing and delivering to customers systems that ensure Quality and Productivity to the highest degree, to machine, assemble and test engines, transmissions, crankshafts, or other components.

Finally, Comau, worldwide leader in the manufacturing of automatic flexible systems, always played the role of protagonist in the evolution of Industrial Robotics, offering new SMART robots, new C4G Control Unit, new Programming Terminal, new application packages addressed to all sectors of industry: from Automotive to General Industry, Foundry, Wood & Furniture, Food & Beverage, Chemicals & Plastics, Aerospace, Printing & Paper, Glass & Ceramics and so on.

In such context Maintenance Services Business Line of Comau S.p.A. is fully dedicated to the industrial equipment maintenance, offering global maintenance services contracts which cover all activities related to plant & equipments maintenances. Comau Maintenance Services may take over all maintenance resources operating in the plant, warehouse, stock spare parts thus applying innovative outsourcing policies. Global Maintenance Services includes:

corrective maintenance, preventive and predictive maintenance, week-end maintenance, material management, warehouse and storage management.

The current measurement of performance within Comau covers the monitoring of Key Performance Indicators (KPIs) in the maintenance process, in particular the maintenance performance indicators that are of greater value for the customer (that needs machinery to be down as less as possible and is interested in improvement of machine availability for continuous production) are the one measured with most attention. Examples of KPIs measured are Mean Time To Repair (MTTR), Mean Time Between Repairs (SO reliability), material delivery lead time.

This is strictly related to what is important for Comau: customer satisfaction has to be achieved using monthly questionnaire for customers to justify COMAU service operations (defense document), internal and external analyses (COMAU suppliers) failure diagnostics (MTTR, MTBF, material delivery lead time).

### 3.2.2 Results

On March 15th, the validation workshop with Mr. SAVOCA, Angelo, Maintenance Manager and Mr. DE BONIS, Teodosio, Engineering Responsible, was conducted. In the following table the main results are presented, the full questionnaire can be found in the annex.

**Table 3-2: Results of validation workshop at COMAU**

Area	Result / Feedback
Opening part	<ul style="list-style-type: none"> <li>• To measure maintenance service performance it is important to be able to measure availability of machines at the customer (KPIs: MTBF, MTTF, MTTR, MDT)</li> <li>• Customer is interested in improvement of machine availability for continuous production</li> <li>• On the other hand COMAU would like to be able to measure customer satisfaction, failure diagnostics (MTTR, MTBF, material delivery lead time), monthly questionnaire for customer for justification of COMAU service operations (defense document), internal analysis, external analysis (COMAU suppliers)</li> <li>• PIs already in use are related to MTTR, MTBR (SO reliability), material delivery lead time</li> </ul>
SPMS structure	<ul style="list-style-type: none"> <li>• Structure is considered to be really clear and understandable. It provides a helpful overview of possible PIs; good to have for selection process performance with the customer, also during the</li> </ul>



	<p>negotiation</p> <ul style="list-style-type: none"> <li>• It is considered to be very important to differentiate, internal / external perspective on service activities respectively service results (e.g. SO: meeting with customer for performance evaluation, SA: meeting afterwards for failure analysis and defining of measures)</li> <li>• 3 levels of hierarchy seems to be sufficient, logical and consistent even if time (and flexibility) is strongly related to costs, which comes out not too clearly in SPMS</li> <li>• There is a questionnaire sent out monthly to assess soft factors of the customer satisfaction</li> </ul>
Methodology	<ul style="list-style-type: none"> <li>• The introduced general measurement framework is adaptable to COMAU business goals and strategies, allowing the selection of PIs according to the goals (service operation costs)</li> <li>• All PIs in use at COMAU are covered by the SPMS, 80% of the PIs are standardized PIs</li> </ul>
Benefits of SPMS	<ul style="list-style-type: none"> <li>• The SPMS is complete in terms of different dimensions, target areas, levels, perspectives, phases, and steps. From the practical point of view there is nothing missing.</li> <li>• Very useful to get a state-of-the art in performance indicators; useful for setting up service contracts with customer as it provides a good overview in a very structured way</li> </ul>
Discussion and ideas for improvement	<ul style="list-style-type: none"> <li>• The only flaws are related to some perception measures and to the relationships between different group of indicators that may be not sufficiently independent the one from the others.</li> </ul>
Additional feedback of moderator	n/a

### 3.2.3 Conclusion

Summarizing, the workshop with Comau provided a very positive feedback. However, some ideas for improvements were collected as well. The following strengths, weaknesses and improvement potentials can be concluded:

**Table 3-3: Summary of feedback from validation workshop at COMAU**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>Comprehensive pool of performance indicators, covering the areas relevant for maintenance services.</li> </ul>	n/a
Improvement potential	
<ul style="list-style-type: none"> <li>Show the influence of service providers to improve the OEE at the customer, COMAU has no influence on the quality performance of the machine.</li> </ul>	

### 3.3 Workshop 2: SKF

#### 3.3.1 Introduction

SKF is one of the leading suppliers of products, system- and service solutions of business partners in the rolling bearing, mechatronic and engineering segment. Although being a Swedish Company, SKF considers the German market as one of their most important ones. Much operative companionships are working here. Amongst all the departments, the SKF condition monitoring subsidiary is growing as one of the strongest.

SKF condition monitoring services provide value-added solutions to assist customers in operating their assets – such as generators - in the most reliable way possible. For this purpose, SKF is utilizing advanced technology to develop services that are capable of analyzing and diagnosing complex systems. Customers benefit from these sophisticated services by vital information to optimize and enhance decision-making, and to identify and address the root cause of machines problems.

Within the scope of the InCoCo-S project, Key Performance Indicators (KPIs) are developed which measure the ordering procedure processes between the customer's machine and the reliability department of SKF. These KPIs are part of a controlling concept / Service Performance Measurement System (SPMS). KPIs of great importance are those which measure features and key figures of the customer's machine. Those are examined on a more detailed level by elaborating their interdependencies to one another. By applying the SPMS, both customers and service provider such as SKF obtain an increased performance- and process transparency of their products which lead to the application of continuous improvement processes.

#### 3.3.2 Results

- Indicators are developed which measure features and values.
- Impressionable Performance Indicators (PIs) and their interconnection to other indicators are the

result.

- A detailed description about PIs is given in units, measurement methods and processes are missing.

**Table 3-4: Results of validation workshop at SKF**

Area	Result / Feedback
<b>Opening part</b>	<ul style="list-style-type: none"> <li>• Order lead times, customer satisfaction and practice appreciability should be measured</li> <li>• SLA are gaining increased importance in the service domain</li> <li>• Cause &amp; analysis reports are requested</li> </ul>
<b>SPMS structure (phase 1)</b>	<ul style="list-style-type: none"> <li>• The SPMS is designed understandable and practical but the illustration should be improved</li> <li>• Differentiation between Service Object and Service Process very good</li> <li>• The term Level should be exchanged by the term hierarchy</li> </ul>
<b>Methodology (phase 2)</b>	<ul style="list-style-type: none"> <li>• Some SKF related key figures were missing as well as a comprehensive description of the Performance Indicators by units.</li> <li>• Leveraging aspects / interdependencies should be considered</li> <li>• Nevertheless, the SPMS is applicable and helpful for developing its own PMS</li> </ul>
<b>Benefits of SPMS (phase 2)</b>	<ul style="list-style-type: none"> <li>• SPMS is helpful in term of offering a comprehensive overview</li> <li>• Interdependencies between the Performance Indicators should be elaborated</li> </ul>
<b>Discussion and ideas for improvement</b>	<ul style="list-style-type: none"> <li>• Units are missing.</li> <li>• Some Performance Indicators have only the value “yes” or “no”</li> <li>• The assignment of Performance Indicators to Key Performance Indicators is sometimes confusing</li> </ul>

### 3.3.3 Conclusion

Summarizing, the workshop with SKF provided besides a general approval of the SPMS structure and approach some ideas for improvements. The following strengths, weaknesses, and improvement potentials can be concluded:

**Table 3-5: Summary of feedback from validation workshop at SKF**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• In general, practically useful – the SPMS suits for orientation purposes.</li> <li>• The structure is basically clear.</li> <li>• Advices which describe the reliance on the PIs in the SPMS are noticeable, e.g. Level 3 PIs influence Level 2 PIs.</li> <li>• 2 Level approach is good, e.g. „top down“-approach for the overview of the dependences between PIs.</li> </ul>	<ul style="list-style-type: none"> <li>• Better a hierarchical structure of PIs.</li> <li>• The illustration should be improved further.</li> <li>• The manner of representation was confusing. The concept should be better and easier to understand.</li> <li>• Performance Indicators (PI) tree structure should be transformed in a 2D-image so that the PIs of level 1 can be identified better.</li> <li>• Practical examples are missing.</li> </ul>
<b>Improvement potential</b>	
<ul style="list-style-type: none"> <li>• Customer satisfaction can rise</li> <li>• Potential to coordinate time, costs, reliability and flexibility.</li> </ul>	

### 3.4 Workshop 3: HIT/Unitech

#### 3.4.1 Introduction

The company Hörmann-Barkas Industrietechnik GmbH was founded 1990 in Chemnitz and was integrated into the Hörmann-Group. The starting offers comprised industrial services and activities in several building trades. The company based mainly on an experienced team of highly qualified mechanical engineers, electrical technicians and engineers and gained benefit from the experiences and potentials of the Hörmann-Group. During the following years the company continuously developed itself to a reliable and competent partner of the automotive and metal-processing industry. The company Hörmann-Barkas Industrietechnik GmbH and the subsidiary company Hörmann GmbH & Co. KG Industrietechnik merged to the company Hörmann Industrietechnik GmbH in 2001. The business location of Chemnitz became new chances to further develop its performance potentials successfully and to implement them in the frame of the whole company. The performance profile of the company with now 300 employees at the location Chemnitz comprises currently mechanical engineering, electrical engineering, steel-girder construction, maintenance and assembly as well as railway technologies.

On the basis of these core competencies the company offers industrial services to support outsourcing processes at the location of its customers. These services include tasks of

maintaining of factory and production plants, production support, tool management, assembly and starting ups as well as management of remaining materials. In the past years Hörmann Industrietechnik GmbH has intensified its international activities. The business location in Chemnitz has successfully participated in this process. Subsidiaries in Hungary, Slovakia, Czech Republic, Portugal, Brazil, Austria, Poland and China are starting positions to offer customers on the spot the capabilities of a local service provider proved in Germany. Above this, limited-period projects are implemented in numerous countries, e.g. investment goods business. Renowned groups in the automotive, machine, plant technology and paper production industries have relied on Hörmann IT for years to provide various industrial service. The core modernization services offered by HIT incorporates:

- Maintenance and repair
- Recurring inspections of molding and punching machines
- Modernization of control systems
- General overhaul of manipulators and robots
- Modernization of existing production and tooling machines
- Adaptation of new drives to existing machine body
- Hard- and software development and production
- Start-up and commissioning on site

Currently HIT has very limited KPIs in place which can guide them to monitor as well as control the performance. Key focus is on Time, Quality & Cost of the processes being executed and on the overall satisfaction as expressed by the customer. Owing to the lack of a structured process orientation for the business and relevant KPIs it has been rather difficult for HIT to implement a synchronized KPI structure across the organization.

### 3.4.2 Results

In the validation workshop with Dr. Bernd Weber (HIT) & representatives from the retrofit cluster Dr. Bernd Schädlich and Dr. Cornea Ehlert reflected the following regarding the SPMS. In the following table the main results are presented, the full questionnaire can be found in the annex.

**Table 3-6: Results of validation workshop at HIT / UNITECH**

Area	Result / Feedback
Opening part	<ul style="list-style-type: none"> <li>• Important for Retrofit service is the clear definition of machine performance while setting the initial contract. Therefore, performance of the final improve machine is the most important performance indicator for the company as well as the customers.</li> <li>• Internally, HIT is focused being on time and within the costs as</li> </ul>

	agreed upon with the customer. It is envisaged that a structured approach to measure these aspects will help the company.
SPMS structure	<ul style="list-style-type: none"> <li>• Structure was in general considered as logical and practical.</li> <li>• Customer perception is the most important KPI which has to be considered in this contact intensive business for which SPMS provides a good basis.</li> <li>• Interdependencies are not yet visible in the SPMS, but hard to indicate anyway.</li> </ul>
Methodology	<ul style="list-style-type: none"> <li>• SPMS is adaptable to HIT requirements – all relevant performance areas are covered</li> <li>• Implementation methodology needs to be defined more practically keeping in mind the problems related to accessing the data from the different legacy systems.</li> </ul>
Benefits of SPMS	<ul style="list-style-type: none"> <li>• SPMS provides a good structure for the development of HIT specific scorecard to measure the performance.</li> <li>• A concrete practical strategy to measure the service perception with the customers has to be defined.</li> <li>• A clear implementation methodology is missing which makes it currently difficult to perceive the structure and linkages.</li> </ul>
Discussion and ideas for improvement	<ul style="list-style-type: none"> <li>• Serves as a guidance for a strategic orientation. A tool or filtering option would be great, which filters the relevant PIs for different strategic orientations (e.g. availability vs. speed).</li> <li>• A clear representation of SPMS and a methodology to develop a company specific SPMS will also help to make this approach more practical &amp; useable.</li> </ul>
Additional feedback of moderator	n/a

### 3.4.3 Conclusion

The following strengths, weaknesses, and improvement potentials can be concluded for the workshop at HIT:

**Table 3-7: Summary of feedback from validation workshop at HIT / UNITECH**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Comprehensive pool of performance indicators, covering the areas relevant for retrofit &amp; maintenance services.</li> <li>• Structure offers a clear guidance for focusing on specific performance areas, according to the strategy of the relationship with the customer.</li> <li>• Integration of interaction PIs is most relevant to retrofit services; SPMS covers the relevant indicators here.</li> </ul>	<ul style="list-style-type: none"> <li>• The implementation methodology seems to be correct, but is not understandable enough for an easy implementation at companies.</li> <li>• Guidelines to implement the Service Perception areas will be very useful.</li> </ul>
<b>Improvement potential</b>	
<ul style="list-style-type: none"> <li>• Practical implementation guide would support the implementation in companies strongly.</li> <li>• A practical tool for the filtering / structuring of relevant PIs according to the company strategy would improve the SPMS further.</li> </ul>	

### 3.5 Workshop 4: Bosch Packaging Services AG

#### 3.5.1 Introduction

Bosch Packaging Services is the service division of a globally operating company in the packaging industry. Packaging machines are characterized by high complexity and are individually customized. Bosch Packaging Services currently offers a comprehensive portfolio of services for these machines including more than 100.000 different spare parts and additional offers like training, field service and the modernization of machines. There is a broad range of customers coming from the pharmacy, food, chemical and consumer goods industries.

The decentralized service organization of the company has four so called "service hubs", each responsible for servicing a specific region. The service organization was spun off as an independent company, in order to offer the customers a single point of contact for the after-sales services. The service hubs act as resellers, buying parts and manpower from the internal manufacturing plant, called "Centers of Competence (CoC). Please see DL2.3 for a detailed description of the business setup.

This structure has the big advantage that it is very convenient for the customers, having only one point of contact for the services for their packaging lines, with machines probably

coming from different plants of the company's group. In parallel, it offers the chance for the service provider to harmonize capacities in terms of manpower and machine utilization, and to more easily integrate external companies into the service processes. On the other hand this setup also increases the complexity of coordinating the services, resulting from following aspects:

- A split of information and material flows,
- For historical reasons different ERP-systems or releases among the plants, and
- Weak influence on the costs of internally produced parts.

Therefore the data and information exchange is hampered, resulting in a decrease of transparency about costs and operational performance. Hence, the hubs cannot always calculate appropriate prices promptly, when a customer comes up with an inquiry. Additionally, the internal benchmarking and the identification of improvement potentials also is not an easy task.

The current measurement of performance within Bosch Packaging Services covers the monitoring of Key Performance Indicators (KPIs) in the logistics processes between the customers, service hubs and CoCs. These performance measurements are part of a logistic controlling concept. It is so far only the spare parts and modernization services that are part of the performance measurement, and not the full packaging service. Examples of KPIs measured are quotation lead time, delivery lead time, and sales statistics for the different service hubs. The aim of these performance measurements is to increase the performance- and process transparency and predictability, both for service hubs, CoCs, and customers, in order to identify and create an understanding for areas of improvements, and for benchmarking between the different divisions within the Bosch Packaging group.

So in this setup the key requirement is to provide transparency on the operating performance and its costs with a broader focus. The requirement is stressed by the recent trend, that customers ask for more comprehensive service offers like Service Level Agreements or the complete coordination and operation of maintenance activities or even the packaging line itself. This requirement can be achieved through the introduction of a more comprehensive and effective performance measurement system, which also supports the provider in defining the own strategy in terms of focusing on quality, costs, or flexibility.

### **3.5.2 Results**

On April 18<sup>th</sup>, the validation workshop with Mr. Marcello Pezzotti, Modernization Manager at Sigpack Systems, was conducted. In the following table the main results are presented, the full questionnaire can be found in the annex.



**Table 3-8: Results of validation workshop at Bosch Packaging Services**

Area	Result / Feedback
Opening part	<ul style="list-style-type: none"> <li>• Important for Packaging Services is the clear definition of performance targets for the packaging machine performance at the handover.</li> <li>• Furthermore, the management and control of the personnel plays an important role.</li> <li>• Because of the different industry setups, different strategies need to be manageable through a PMS, e.g. cost leadership or market share leadership.</li> <li>• PIs already in use come from DIN 8743 ("Terms for packaging machines and packaging lines"), plus some logistical measures (lead times).</li> </ul>
SPMS structure	<ul style="list-style-type: none"> <li>• Structure was in general considered as logical and practical.</li> <li>• Interdependencies are not yet visible in the SPMS, but hard to indicate anyway.</li> <li>• Interaction PIs play an important role in packaging, e.g. reliability of planning data and stability of received products in terms of attributes and quality.</li> <li>• Customer perception is important to be clearly defined – the SPMS provides a good basis for this.</li> </ul>
Methodology	<ul style="list-style-type: none"> <li>• SPMS is adaptable to Sigpack requirements – all relevant performance areas are covered appropriately.</li> <li>• Implementation methodology needs to be defined more practically.</li> </ul>
Benefits of SPMS	<ul style="list-style-type: none"> <li>• SPMS is complete, but the management of internal resources should be highlighted more.</li> <li>• A clear implementation methodology is missing.</li> <li>• However, the SPMS provides a good basis for a strategic planning and filtering of performance targets.</li> </ul>
Discussion and ideas for improvement	<ul style="list-style-type: none"> <li>• Serves as a guidance for a strategic orientation. A tool or filtering option would be great, which filters the relevant PIs for different strategic orientations (e.g. availability vs. speed).</li> </ul>

	<ul style="list-style-type: none"> <li>The measurement of resources could be strengthened, for good personnel is the main requirement for more comprehensive services!</li> </ul>
Additional feedback of moderator	n/a

### 3.5.3 Conclusion

Summarizing, the following table represents the feedback in a conclusive manner:

**Table 3-9: Summary of feedback from validation workshop at Bosch Packaging Services**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>Comprehensive pool of performance indicators, covering the areas relevant for packaging services.</li> <li>Structure offers a clear guidance for focusing on specific performance areas, according to the strategy of the relationship with the customer.</li> <li>Integration of interaction PIs is most relevant to packaging services; SPMS covers the relevant indicators here.</li> </ul>	<ul style="list-style-type: none"> <li>The implementation methodology seems to be correct, but is not understandable enough for an easy implementation at companies.</li> <li>The weight for the measures of personnel performance and potentials needs to be strengthened, at least optically.</li> </ul>
Improvement potential	
<ul style="list-style-type: none"> <li>Practical implementation guide would support the implementation in companies strongly.</li> <li>A practical tool for the filtering of relevant PIs according to the strategy would improve the SPMS further.</li> </ul>	

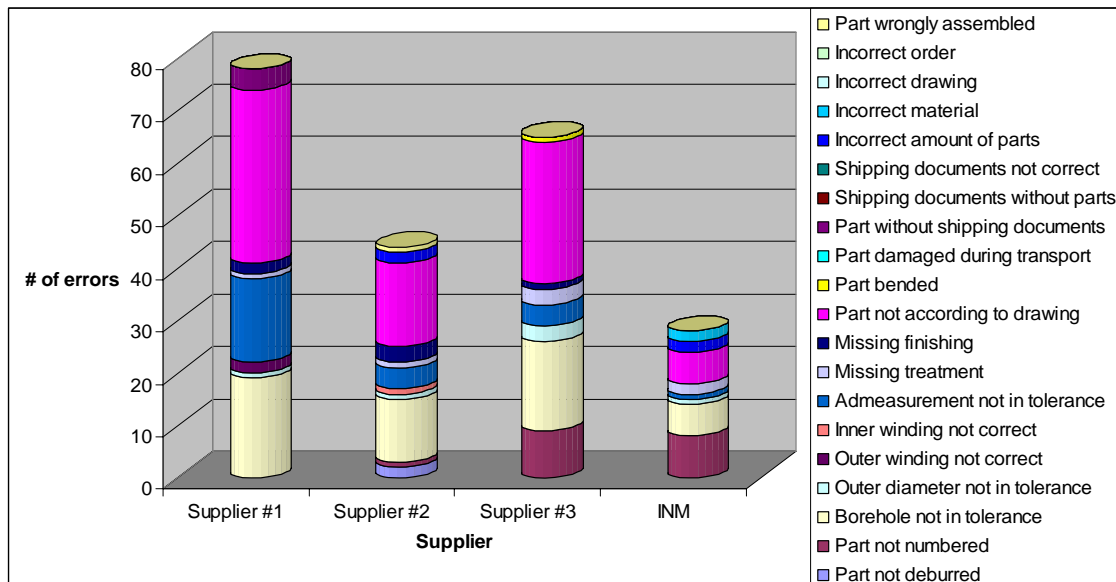
Mr. Pezzotti saw a strong potential benefit when implementing the SPMS after the requested improvements. Sigpack Systems lacked a structured approach of the performance measurement so far, although they already use a comprehensive set of performance indicators. However, these indicators were introduced due to strong customer wants, and so the focus was also on these customer related indicators. Using the SPMS, the management of the performance of service relationships according to the agreed strategy in the service contract can be strongly supported.

### 3.6 Workshop 5: Sigpack Systems AG

#### 3.6.1 Introduction

Sigpack Systems AG as a company of BOSCH Packaging Technology is one of the Centers of Competences (CoC) within the BOSCH Packaging group (see description in chapter 3.5.1). Sigpack Systems set up spares suppliers in low cost countries thus creating requirements to integrate these companies with regards to Sigpack's high level quality standards. Sigpack is providing inbound quality control services to various manufacturing organizations with greater focus on making these services available to companies in the Eastern part of Europe. Especially for smaller companies in Eastern Europe, Sigpack would like to improve a framework with the proper matrix of performance standards, targets, monitoring mechanism and risk identifiers that result in an environment of true cooperation. In this environment inbound quality control service provider and Sigpack can better address all the important logistical improvement opportunities with tools that help both of them create, access and share critical performance information. The challenge of sourcing spare parts from Eastern Europe can be met by establishing a collaboration relationship where both the partners can learn the business activities and be more sensitive to issues that will impact cost, service, quality and inventory accuracy.

The service provider (platform) in Hungary is currently operating with the following set of performance measures to guarantee high quality products shipped to Sigpack in Switzerland (see right column in Figure 3-1).



**Figure 3-1: Quality performance chart of selected Hungarian suppliers**

The measures in general are not taken as ratios, but only in numbers of incidents. The only ratio is the error rate, i.e. the total number of errors divided by the number of order positions.

Figure 3-1 is providing an overview of quality performance measures of some Hungarian suppliers exemplarily. INM as a representative of small companies in Hungary (9 people engaged) in the InCoCo-S project is part of this assessment.

Following the description, Sigpack Systems already has a basic performance measurement system which consists of quality performance indicators. As these PIs are very detailed, they are not represented in the SPMS on level 1-3.

### 3.6.2 Results

In the validation workshop with representatives of Sigpack Systems AG the tables below reflect the main results.

**Table 3-10: Results of validation workshop at Sigpack Systems**

Area	Result / Feedback
Opening part	<ul style="list-style-type: none"> <li>• As BOSCH Sigpack Systems is interested in the reduction of expenses the most important thing for the Hungarian Platform as a non-profit service provider is to ensure delivery and quality of products</li> <li>• The focus area of BOSCH Sigpack Systems is delivery reliability and quality of delivered products</li> <li>• Please see Figure 3-1 to get an overview of PIs which are already in use</li> </ul>
SPMS structure	<ul style="list-style-type: none"> <li>• The structure of the SPMS (especially the target areas) is logical and understandable</li> <li>• The differentiation between Service Activities and the resulting Service Object is really good</li> </ul>
Methodology	<ul style="list-style-type: none"> <li>• SPMS is generally adaptable to Sigpack Systems requirements – but it would be necessary to differentiate between different sales volumes ordered by the Hungarian suppliers for example</li> <li>• The Performance Indicators do not differ between make-to-order and make-to-stock parts/ orders; it would be good to have PIs which are specific to various companies, branches, products and production processes</li> </ul>
Benefits of SPMS	<ul style="list-style-type: none"> <li>• The structure within the SPMS is appropriate to the requirements given in the domain of industrial services</li> <li>• There are processes and activities regarding the co-operation</li> </ul>

	<p>between Hungarian suppliers and the platform driven by Sigpack Systems which can not be measured with PIs</p> <ul style="list-style-type: none"> <li>Decision making is sometimes just based on emotional feelings of involved people and there is no chance of taking the relevant data in PIs for external persons</li> </ul>
Discussion and ideas for improvement	<ul style="list-style-type: none"> <li>It would be necessary to include a mentality indicator to point out the differences in behaviour and mindset; the information received sometimes does not reflect the actual situation and are interpreted with a difference from BOSCH employees based on experiences</li> </ul>
Additional feedback of moderator	<ul style="list-style-type: none"> <li>“It is better to have no PIs for some activities or resulting object conditions than a lot of PIs which are misinterpreted”</li> </ul>

### 3.6.3 Conclusion

Summarizing, the workshop with Sigpack Systems provided a very positive feedback. However, some ideas for improvements were collected as well. The following strengths, weaknesses, and improvement potentials can be concluded:

**Table 3-11: Summary of feedback from validation workshop at Sigpack Systems**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>Comprehensive pool of performance indicators, covering the areas relevant for quality control services.</li> </ul>	<ul style="list-style-type: none"> <li>The implementation methodology and the description of PIs need some rework to get a better understanding and is absolutely necessary for an implementation decision</li> </ul>
Improvement potential	
<ul style="list-style-type: none"> <li>Practical implementation guide which considers different branches, products and company specific targets is required</li> </ul>	

## 3.7 Additional Feedback

### 3.7.1 TECHIND

Prof. Vesa Salminen from the Lappeenranta University of Technology represents the

Technology Industries of Finland as a dissemination partner within the InCoCo-S consortium, provided very valuable feedback on the SPMS in the current state. Being involved in the Finnish BestServ forum, he has a deep insight on the needs of different kinds of service providers.

The general feedback was that the structure of the SPMS with the three dimensions of service perception, service activity (SA) and service object (SO), is very clear, logical and consistent. The presented indicators in the service encounter area (SA and SO), including the metrics measuring the interaction, represents a very comprehensive set and seems to be complete. However, the area of service perception has improvement potential. Main feedback is that the "definition" of customer satisfaction, meaning the composition of different performance indicators, is really dependent on the kind of service and the specific relationship. So a provision of just one valid definition will not be possible.

Two key aspects are important for the customer satisfaction:

- the business outcome
- the emotional aspect

In the understanding within the BestServ forum the *service satisfaction*, representing a wider understanding than only customer satisfaction, is compound of five elements:

- customer satisfaction (repetitive measure of emotional aspects)
- customer value (impact on customer's revenue and profitability)
- customer offering (innovativeness of service provider)
- service network (capabilities of service provider, e.g. forecasting)
- service assets (know-how of personnel, knowledge gathering)

With regards to the presented SPMS most of these areas are covered. Some areas just need a clearer way of representation, at least within the methodology. This aims at the aspect of the customer value, which is measured in the service encounter area, but needs a clear definition for the transition to the customer's terms of value. Prof. Salminen stated to this: "make more seeable the customer value - it is already covered, but not clear enough". Additionally, the measurement of the customer satisfaction in terms of measuring the emotional aspect is not very clear yet.

### 3.7.2 Feedback from DL4.2

One reviewer of the DL 4.2, Dr. Bernd Weber from Hörmann Industrietechnik, provided very valuable feedback from a practical perspective not only to the deliverable, but also to the SPMS itself. The major aspects are to be found in the following table:

**Table 3-12: Feedback from DL 4.2 review**

Major strengths/ weaknesses	Strengths: Methodological approach for the development of the SPMS; the application of SPMS to the service clusters with PI assignments.  Weaknesses: Presentation of SPMS in order to be an applicable tool for the service provider – the application to a concrete service process is only possible with a strong support in regards to the methodology (the service provider cannot apply the SPMS alone).
Recommendations for improvements	Develop a toolset which is application oriented, meaning that it is usable by the service provider (guideline, handbook, transparency in regards to methodology).

### 3.7.3 Feedback from Technical Steering Committee (TSC) Meetings

During the runtime of task 4.4 several TSC meetings took place, in which the InCoCo Reference Model (IRM) was further aligned and improved. One aspect of this activity also is the population of the IRM with performance metrics, which are taken from the SPMS.

During the integration and alignment of the reference processes, it turned out that the structure of the SPMS was not fully matching the level structure of the IRM. The hierarchy levels of the SPMS need to be in line with the logic of the process hierarchies, meaning that all level three indicators need to be consistently assignable to level three processes, and, summed up, automatically calculate the performance of the level two processes through the according level two indicators.

So the SPMS needs a realignment in terms of the hierarchy structure, which applies mainly for the area of the Service Activity metrics, for these are the metrics which will be assigned to the IRM processes. The metrics of the Service Perception and the Service Object areas do not necessarily be that strict in the level structure, because they do not need to match the process hierarchy.

### 3.7.4 Conclusion

The additional feedback provided by Prof. Salminen and Dr. Weber provided valuable aspects from both the academic as well as the practical perspective.

Prof. Salminen pointed out the attention towards the customer satisfaction and how it can be measured by using the SPMS. The statement is that the SPMS provides a basis for measuring it, but how it practically is done is not clear and visible enough. So this feedback aims at both the SPMS structure and the implementation methodology, where this aspects needs a clearer focus.

The feedback by Dr. Weber aims directly at the implementation methodology, when he says

that a concrete toolset needs to be developed, which supports the service provider in implementing and using the SPMS.

Both aspects will be taken into account for the further improvement of the SPMS. Additionally the TSC's feedback regarding the hierarchy levels of the Service Activity indicators also will be considered.



## 4 Conclusion and outlook

### 4.1 Conclusion

#### 4.1.1 Summary of results: Strengths and weaknesses, improvement potential

In total, the feedback of the five validation workshops, plus the additional feedback, can be summarized in the following table:

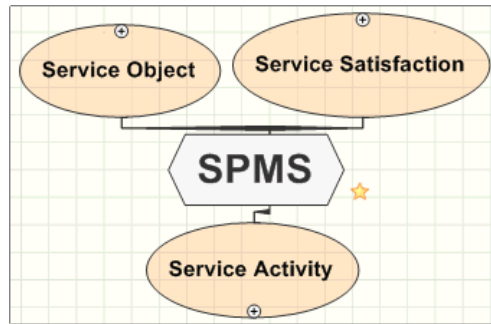
**Table 4-1: Consolidated feedback from validation phase**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Comprehensive pool of performance indicators, covering the areas relevant for all covered industrial services.</li> <li>• Structure offers a clear guidance for focusing on specific performance areas, according to the strategy of the relationship with the customer.</li> <li>• Integration of interaction PIs is most relevant to packaging and retrofit services; SPMS covers the relevant indicators here.</li> </ul>	<ul style="list-style-type: none"> <li>• The implementation methodology and the description of PIs is weak with regards to a good and easy understanding. This is absolutely necessary for an implementation decision.</li> <li>• The weight for the measures of personnel performance and its potentials does not meet the importance of this aspect.</li> <li>• It is not really clear how to deal with the Service Perception area.</li> </ul>
Improvement potential	
<ul style="list-style-type: none"> <li>• Practical implementation guide and toolset which considers different branches, products and company specific targets is required. A practical tool for the filtering / structuring of relevant PIs according to the company strategy would improve the SPMS further.</li> <li>• Show the influence factors of service providers to improve the overall equipment effectiveness (OEE) at the customer, show the link of factors the service provider can improve the OEE through his performance.</li> <li>• The link to the value creation at the customer (Service Perception) should be made more visible.</li> <li>• Strengthen the area of service satisfaction in terms of the emotional aspects.</li> <li>• Realign the hierarchy levels according to the structure of the InCoCo Reference Model.</li> </ul>	

This feedback was taken into consideration and integrated if feasible. The following subchapters describe the changes made.



The main structure of the SPMS remains the same, with the three performance areas of Service Perception, Service Object, and Service Activity. Figure 4-2 displays this generic structure of the SPMS in the new visualization style, using a mind map. This display form makes it easy to understand and follow the structure within the different areas, because a mind map allows, even forces, to include hierarchy levels. Please note that in the Figure the term *Service Satisfaction* is used instead of Service Perception – both are considered as synonyms.



**Figure 4-2: The three areas of service performance in the SPMS**

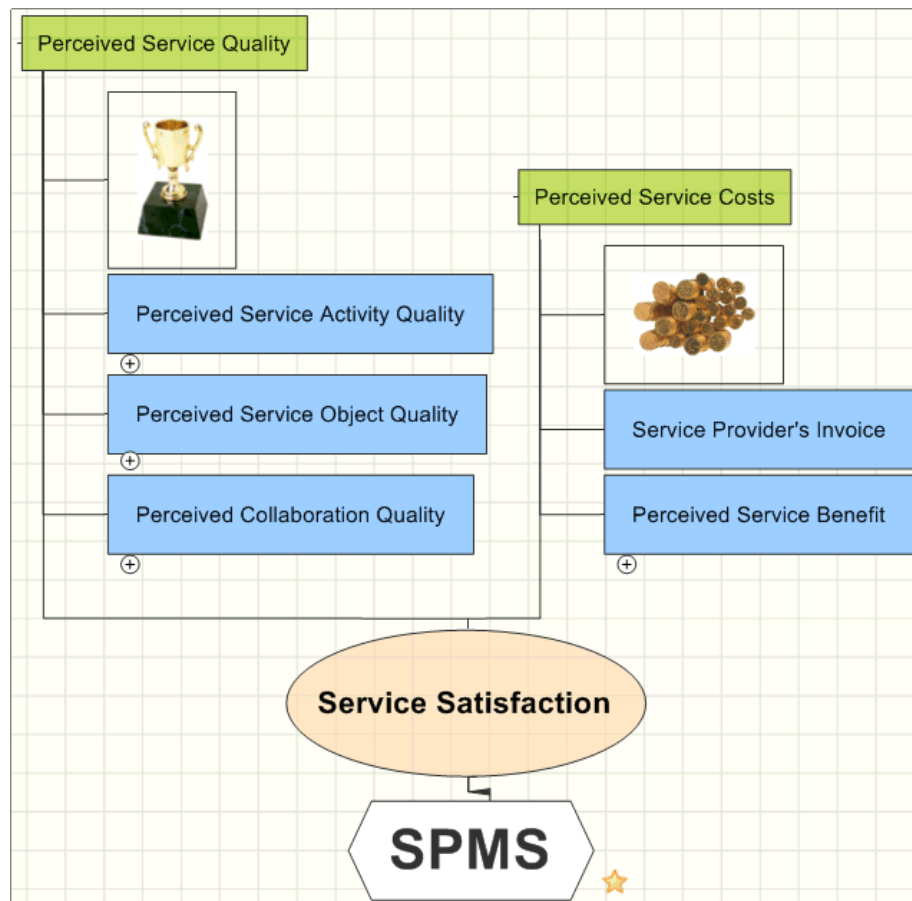
When looking on Figure 4-1, the most obvious change is the removal of the target area structure within the **Service Perception** dimension. The main thought behind this is that it is not really possible to differentiate between different targets, when it comes to a perception of *quality*. Depending on the industry and the specific business relationship quality can be understood completely different. So it is to be defined in every case, of what specific performance indicators the understanding of quality is composed. So a level 1 indicator of this area is the Perceived Service Quality, which needs to be defined individually. We see only one other level 1 indicator important for the satisfaction about a service performance, which is the comparison of the (perceived) service quality with the (perceived) costs the customer has to pay. This basic structure of the Service Satisfaction area is displayed in Figure 4-3.



**Figure 4-3: The Service Satisfaction area with level 1 indicators**

As already indicated, the Perceived Service Quality is a composition of several indicators of different kinds. The customer sees and experiences not all the performances which are

measured in the Service Encounter Interface (areas Service Activity and Service Object), which provide a pool of indicators from the service provider's perspective. However, there certainly are performances in this area, which he directly gets aware of, e.g. the time until a machine is repaired in case of a failure, or whether the packaging service provider can cope with the production schedule. From these two areas the relevant indicators are assigned to the level 2 indicators of Perceived Service Activity Quality and Perceived Service Object Quality (see Figure 4-4).



**Figure 4-4: The Service Satisfaction area with level 2 indicators**

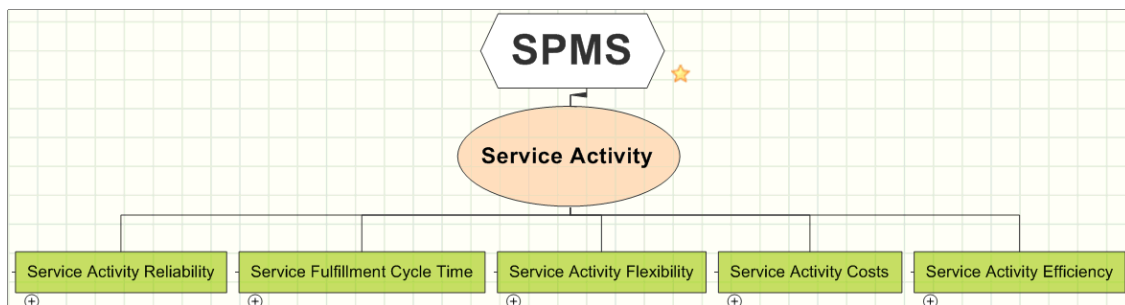
The addition of "Perceived" now plays an important role. At the first place, the (objective) performance indicators are directly taken from the Service Encounter Interface. But the objective measures are not necessarily the performance as the customer perceives them, because in all business relationships the factor time plays an important role. A constant and stable performance, e.g. material delivery reliability, or short-term performance problems, lead to a different perception of service quality. For instance, having the reputation of always delivering high quality products may support the excuse of short-term quality problems. So there is the need to adapt the objective measures with corrective factors, covering the time and stability aspects of long-term performance.

Another important, but very subjective performance area is the quality of collaboration. Especially in services, the human aspect needs to be considered as strongly contributing to customer satisfaction, because people interact and mutual trust needs to be developed. It is the emotional aspect, which gets a higher importance than it has in only physical supply chains.

A problem occurs with the measurement of the subjective performance indicators. Most of them can be only estimated by for instance using questionnaires on a regular basis, where the customers can give a feedback on their satisfaction on these soft factors like empathy, accessibility, or friendliness.

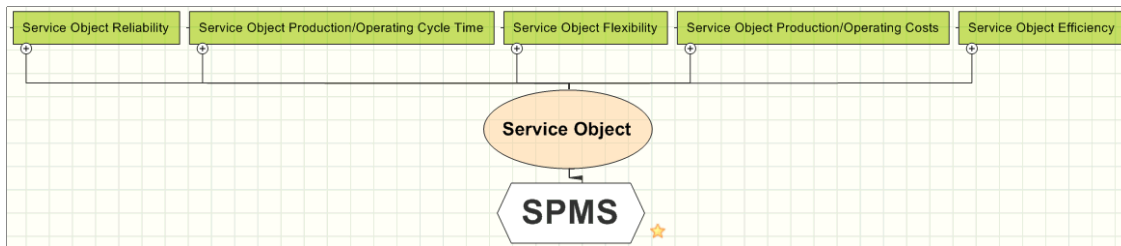
The second level 1 indicator in the area of Service Satisfaction is the Perceived Service Costs. This indicator covers the business value, i.e. the monetary quantification, of the service relationship. Here the hard factor of the invoice of the service provider, which the customer has to pay, is put into relation to the benefit the customer perceives by maintaining the service relationship. This perceived benefit is directly influenced by the other level 1 indicator of perceived service quality, which is transformed into a monetary value like the economic value added (EVA). The methodology to come to this value was described in DL 4.2. However, this indicator can be considered as optional, because in many cases the requirements arising from a quantitative and monetary evaluation of the service benefit are not fulfilled. These requirements are mainly that a real quantitative measurement needs to be possible, in addition to the problem of getting the needed data from the customers on a regular basis.

As already indicated, the main changes in the hierarchy structure were made in the area of **Service Activity**. However, on level 1 the structure remained same, with the five target areas of reliability, cycle time, flexibility, costs, and efficiency. Figure 4-5 displays this structure.



**Figure 4-5: The Service Activity area with level 1 indicators**

The same structure also still applies on level 1 to the area of **Service Object**. Figure 4-6 displays this fact.



**Figure 4-6: The Service Object area with level 1 indicators**

However, from the model perspective the relevant area is the **Service Activity**. This is the area with all the indicators which will be assigned to the processes of the InCoCo Reference Model (IRM). From the structure of the reference processes several requirements apply to the system of indicators. During the TSC meetings it turned out, that the inner logic of the five phases Plan, Adapt, Build, Operate, and Support, did not allow the assignment of indicators in the way it was presented in DL 4.2. This is mainly due to a new understanding of the Support and Plan processes, as well as the introduction of the level 2 processes and the resulting modeling requirements. So in the structure of indicators on levels 2 and 3 changes had to be made. In Figure 4-7 these changes become obvious for the level 2 indicators, which now are consistently structured according to the five process phases. Please note that for Support processes no cycle time was defined. Additionally, the fifth target area of Service Activity Efficiency is dealt with differently, because this target area only uses indicators from the other four basic target areas, and calculates relationships between them. These indicators can only be assigned to level 2 processes, so that there are no new level 3 indicators defined. The indication of the metric dimension defines the understanding of the level 2 indicator.

We will not present the detailed level 3 indicators in detail in this deliverable. In DL 6.1 there will a comprehensive description of the complete IRM, covering also detailed descriptions of the PIs. However, according to the feedback of the TSC, a basic structure on level 3 was defined for the different target areas. All relevant PIs as presented in DL 4.2 in most cases were moved a level deeper, and can be found below the new defined level 3 indicators. So the assignment of PIs to the processes, as presented in DL 4.2 as well, is still true and important, but the assignments will be replaced by the according newly introduces level 3 indicators. The following basic structure for level 3 indicators was defined:

- Reliability:
  - Interaction: Cooperation Reliability
  - Interaction: Information Accuracy
  - Adherence to Schedule
  - Process Accuracy
  - Availability

- Cycle time:
  - Process Lead Time
  - *Indication of relevant level 2.5 indicators (sum of several level 3 process lead times)*
- Flexibility:
  - Process Intensiveness Flexibility
  - Scheduling Flexibility
  - Interaction Flexibility
  - Resource Adaptability
  - Interaction Adaptability
- Costs:
  - Direct process costs
  - Indirect process costs
  - Resource management costs
  - *Indication of relevant level 2.5 costs (sum of several level 3 process costs)*
- Efficiency:
  - *Indication of which target areas to combine (according level 3 indicators)*

Please note that not all level 3 indicators were assigned to the every phase, because they do not apply to all the process phases Plan, Adapt, Build, Operate, and Support.

To the area of the **Service Object** the requirement arising from the process modeling does not apply. So when compared to the description of this area in DL 4.2 the changes are not as substantially as in the Service Activity area. Only minor alignments were conducted, which are displayed in Figure 4-8, showing the defined level 2 indicators for this area. However, these indicators are not assigned specifically to service processes within the IRM, but still are very important to assess the service quality. So these measures need to be taken, which takes place within the Support processes of the IRM, which take care of the management and maintenance of resources, facilities, and production processes.

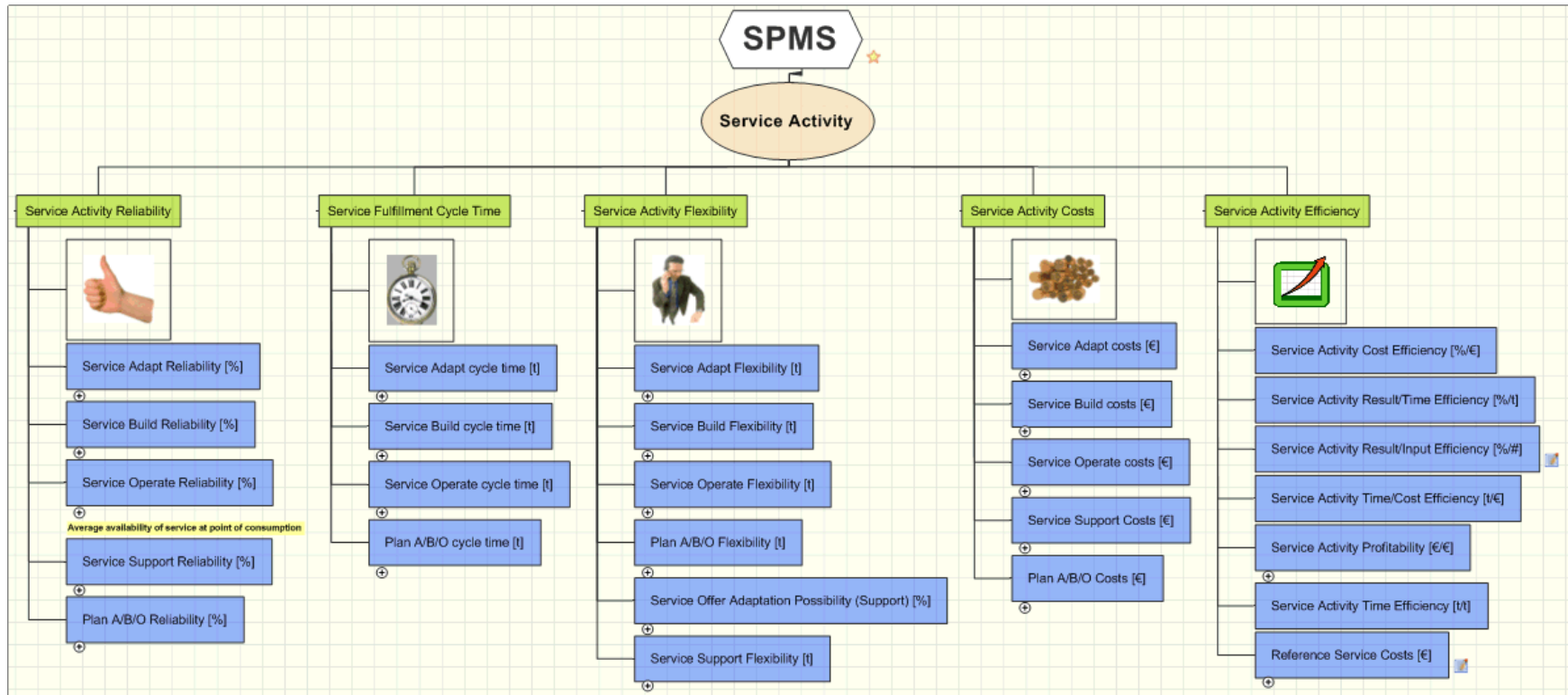


Figure 4-7: The Service Activity area with level 2 indicators



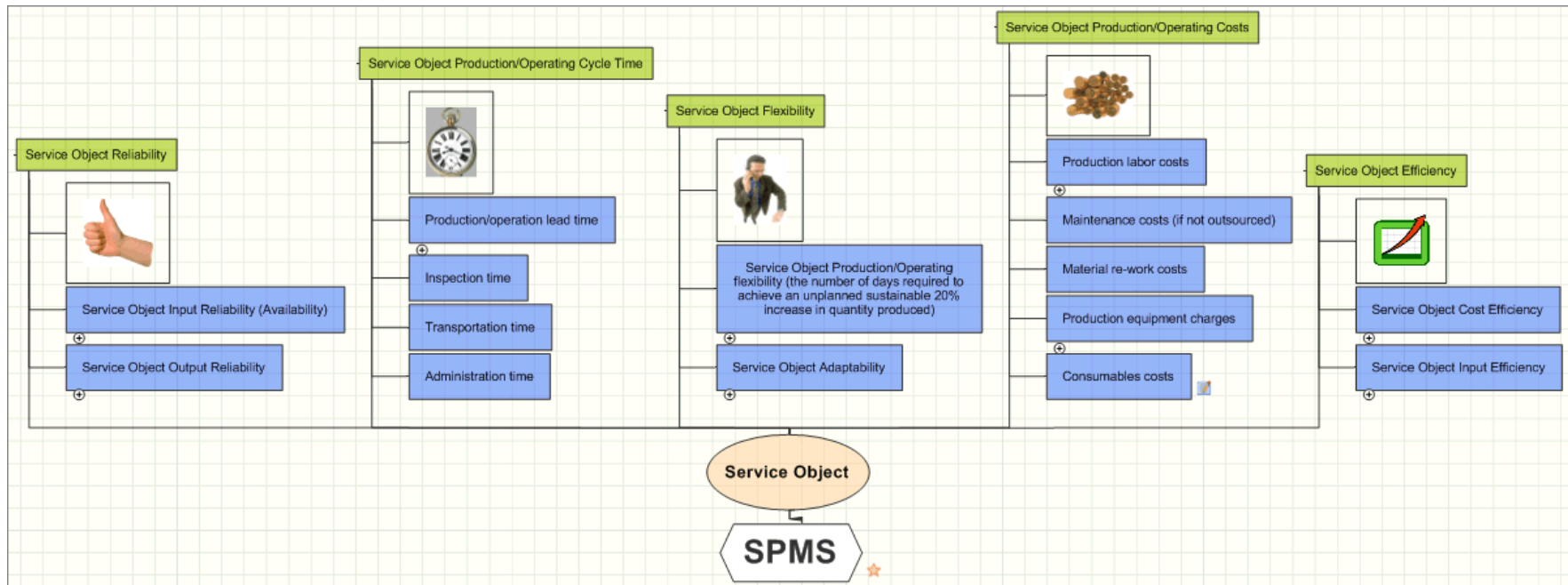
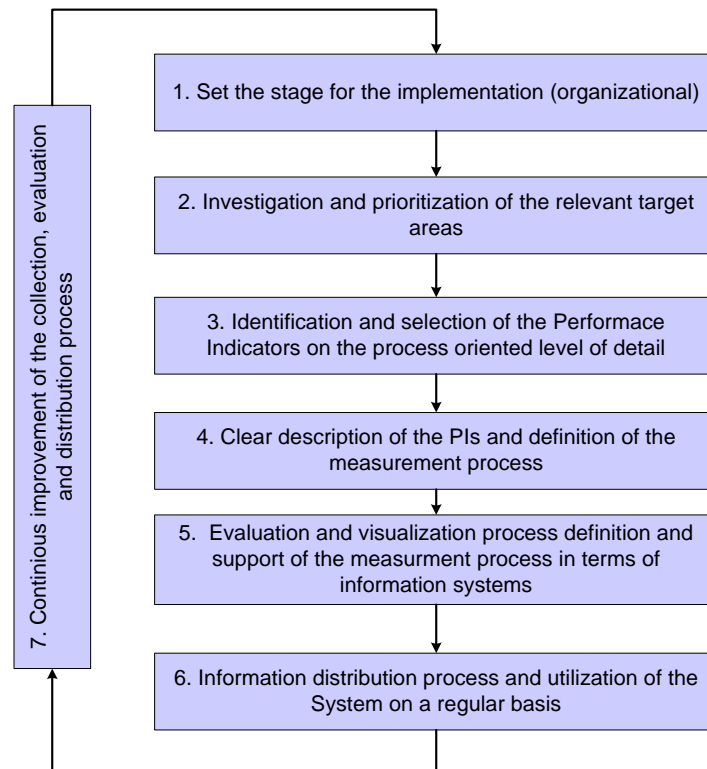


Figure 4-8: The Service Object area with level 2 indicators

### 4.1.3 Impact on methodology to implement SPMS

The need for a methodology for the practical implementation of an assortment of PIs from the SPMS has been identified as the most interesting point of industrial interest. Figure 4-9 illustrates the general SPMS implementation approach.



**Figure 4-9: SPMS implementation approach**

For a better understanding of the hierarchical structure of the PIs, a new visualization style has been chosen (see Figure 4-7 and Figure 4-8). This simplifies the assignment of PIs to the underlying standardized service operation (execution) processes of the InCoCo-S Reference Model. The PIs in the SPMS version 1.0 are strongly related to the existing execution process steps and therefore support the service provider in selecting the appropriate PIs according to their individual service operation processes. The detailed description of PIs has been sorted out as another precondition before implementing PIs in industrial practice. This will be done within the complete description of the IRM in DL 6.1. Within the research activities of Task 4.3, the interdependencies and correlations between PIs have been investigated by using Interdependency Matrices (IM). The IM is based on the so-called paper computer according to Vester (Ninck et al. 2004; Gomez & Probst 1999) and depicts the interdependencies among the PIs. These cluster specific classification of PIs will help interested parties to select relevant PIs for monitoring their service business. In the IM each PI is analyzed in terms of their significant influence on the PI of the corresponding column. The PIs can be positioned

in a Interdependency Portfolio (IP) according to P and Q, see example in Table 4-2. The positioning of the PIs in the IP can be used to determine the appropriate use of the PIs (Ninck et al. 2004; Gomez & Probst 1999) in the framework of the SPMS and to develop improvement strategies.

**Table 4-2: Use of PIs and generic improvement strategies**

	<b>Q &lt; 1 (passive)</b>	<b>Q &gt; 1 (active)</b>
<b>P = high (crosslinked)</b>	<p><b>Passive and crosslinked PIs: Indicators, Monitoring</b> Such PIs should primarily used as indicators for monitoring the status of a system on a mid or long term basis. In order to improve them, drivers have to be identified and interventions should be primarily made there.</p>	<p><b>Active and crosslinked: Accelerators, selective interventions</b> Selective interventions here are crucial and may be used as accelerators of trends. There may be feedback loops that intensify the impact. Therefore, such interventions should be used with precaution in order to prevent undesired side effects by analyzing the interdependencies thoroughly. In particular, such PIs may be influenced via their drivers.</p>
<b>P = low (isolated)</b>	<p><b>Passive and isolated: Stabilizers, Monitoring</b> Since such PIs show influences with delays, they are stabilizers and should be used for long term monitoring. Interventions in order to improve the whole system do not make much sense here. In some cases, isolated measures can be used in order to improve a certain PI in this area.</p>	<p><b>Active and isolated: Intervention, Controlling</b> Interventions here can have a huge impact on other PIs. Therefore, they are levers that can be used to influence a system in a targeted way. For a targeted intervention, the interdependencies should be analyzed thoroughly in order to assess its impact.</p>

These considerations support the better understanding of the appropriate use of a certain PI and its role in a cross linked system as well as the development of improvement strategies (where and how to intervene in order to improve certain PI). Examples and related descriptions to the different cluster situations can be found in DL 4.3, where this analysis represents a major part of work done.

## 4.2 Outlook

Besides all the improvement measures already taken within task 4.4, there are some aspects from the feedback that could not be taken care of. This is due to the structure of the project, where some activities necessary to fulfil the requested improvements are and will be part of upcoming tasks. The following activities will or may be performed, to strengthen the result of WP 4 further:

- *Description of PIs within WP6:* Task 6.1 will develop the detailed description of the whole InCoCo Reference Model (IRM), including the display of the reference processes, and the according best practices and performance indicators. It will contain a detailed glossary with definitions of all relevant terms. Initial steps were already taken in T 2.6, T 3.3 and T 4.2. However, all documents need a realignment, according to the changes made within the Technical Steering Committee, which integrated all work done so far and aligned the structure to a common model. The indicators as defined here generically, will be described in detail here as well.
- *Realignment of interdependency matrices of T 4.3:* A parallel task of the detailed description of the PIs is a realignment of the interdependency matrices as developed in task 4.3. This will give indications about whether the metric can be used for steering purposes or just as a passive indicator. This supports in the phase of selecting appropriate indicators for the specific company situation.
- *Dissemination toolset in WP 8:* An opportunity, but no must, is the development of a comprehensive toolset for the introduction of the SPMS in companies. The requirements coming from Annex I are already fulfilled with the definition of the SPMS, the methodology to use it and the assignments of indicators to the IRM. However, an extra "implementation guide", which does not necessarily need to be dependent on the IRM, provides additional exploitation potential.

## 5 References

- Gomez, P.; Probst, G.J.B., 1999 Die Praxis des ganzheitlichen Problemlösens: vernetzt denken, unternehmerisch handeln, persönlich überzeugen. Bern [u.a.]: 3. Aufl. Haupt, 1999
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## 6 Annex

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**company. validation workshop**  
**address**  
**date, time**

Participants names	Function	email address

#	question	answer	note
	<b>Opening part</b>		
1	What would you like to measure?		
2	What is important for you as a service provider?		
3	What might be important for your customers?		
4	Which PIs are already in use? (following the introduced target areas?)		
	<b>SPMS structure (phase 1)</b>		

5	Is the structure of different target areas understandable and practical?		
6	Is it understandable what we would like to cover within the Service Encounter Interface?		
7	From your point of view; does it makes sense to differentiate between the service object and the service activities? (example!)		
8	Following the hierarchical structure the overall target areas are broken down to e.g. 3 level of details. Is this logical? Is this helping you in understanding the interdependencies among the PIs?		
9	Is the hierarchy among the performance indicators within the target areas logical? Is it consistent?		



10	Is it important for you to measure the performance of processes at the interface with your customers? Do you think it is helpful for <b>company</b> to highlight these interaction activities with PIs? (examples!)		
11	Do you already measure some interaction activities between <b>company</b> and your customers?		
12	Are you interested in getting to know how your customer perceives the performance of service operations delivered by <b>company</b> ?		
13	Are there already instruments implemented to measure the customer satisfaction)?		

14	Does the SPMS reflects technically state-of-the-art and industrial requirements and does not have flaws?		
	<b>Methodology (phase 2)</b>		
15	Is the introduced general measurement framework adaptable to <b>company</b> business goals and strategies?		
16	Is it applicable in practice at industrial partners for your kind of industrial services?		
17	Is the structure helpful in selecting specific PIs according to your companies strategic goals? Are the steps logical and aimed? Do they lead to meaningful results?		
	<b>Benefits of SPMS (phase 3)</b>		

18	Is the SPMS complete in terms of different dimensions, target areas, levels, perspectives, phases, and steps?		
19	What would be the difference to the as-is? Is this beneficial for <b>company</b> ?		
20	What will be the resources and efforts required in implementing it?		
21	What are the limitations? (entering real business environment) Where are upcoming real world problems?		
22	What are the overall benefits? What is the impact?		

	<b>Discussion and ideas for improvement</b>		
	Where are strengths/ weaknesses, Is it useful? Where can you make use of it?		
	How could solutions for the identified problems look like (solution oriented)		
	Collect ideas for improvement		
Additional space for writing:			

Interviewers ideas during the workshop:
Interviewers comments/ major problems / feedback concerning guideline:
How is the weather outside?

**COMAU S.p.A. validation workshop**  
**Via Rivalta, 30 – 10095 Grugliasco TO (Italy)**  
**15.03.2007 15.00h-17.30h**

<b>Participants names</b>	<b>Function</b>	<b>email address</b>
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<b>DE BONIS, Teodosio</b>	<b>Engineering Responsible (AVIO)</b>	teodosio.debonis@comau.com
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<b>Gerosa, Marco</b>	<b>Research assistant</b>	marco.gerosa@polimi.it
<b>Schneider, Oliver</b>	<b>Research assistant</b>	oschneider@eth.ch
<b>Lange, Ingo</b>	<b>Research assistant</b>	ilange@eth.ch

<b>#</b>	<b>question</b>	<b>answer</b>	<b>note</b>
	<b>Opening part</b>		
1	What would you like to measure?	Availability of machines at the customer (KPIs: MTBF, MTTF, MTTR, MDT)	
2	What is important for you as a service provider?	Customer satisfaction, failure diagnostics (MTTR, MTBF, material delivery lead time), monthly questionnaire for customer for justification of COMAU service operations (defense document), internal analysis, external analysis (COMAU suppliers)	
3	What might be important for your customers?	Customer is interested in improvement of machine availability for continuous production	
4	Which PIs are in use? (following the introduced target areas?)	MTTR, MTBR (SO reliability), material delivery lead time	
	<b>SPMS structure (phase 1)</b>		

5	Is the structure of different target areas understandable and practical?	Structure is really clear and understandable. It provides a helpful overview of possible PIs; good to have for selection process performance with the customer, also during the negotiation	
6	Is it understandable what we would like to cover within the Service Encounter Interface?	Related to TPM at COMAU	
7	From your point of view; does it makes sense to differentiate between the service object and the service activities? (example!)	Very important differentiation, internal / external perspective on service activities respectively service results  SO: meeting with customer for performance evaluation SA: meeting afterwards for failure analysis and defining of measures	
8	Following the hierarchical structure the overall target areas are broken down to e.g. 3 level of details. Is this logical? Is this helping you in understanding the interdependencies among the PIs?	3 levels are sufficient  remark: time (and flexibility) is strongly related to costs, which comes out not too clearly in SPMS	
9	Is the hierarchy among the performance indicators within the target areas logical? Is it consistent?	Yes, the hierarchy between indicators seems to be logical and consistent	

10	Is it important for you to measure the performance of processes at the interface with your customers? Do you think it is helpful for COMAU to highlight these interaction activities with PIs?	<p>Yes, as the reliability of customers has an important impact on the service operation activities and results</p> <p>At COMAU there are some customers who said they would do preventive maintenance, but do NOT, and this affects the service performance of COMAU negatively</p>	
11	Do you already measure some interaction activities between COMAU and your customers?	Not yet	
12	Are you interested in getting to know how your customer perceives the performance of service operations delivered by COMAU?		
13	Are there already instruments implemented to measure the customer satisfaction)	<p>Yes, a questionnaire sent out monthly</p> <p>aim: to get the "feeling" of the customer strong correlation between MTBF and customer's "feeling" feeling is perceived personal relationship</p>	



14	Does the SPMS reflects technically state-of-the-art and industrial requirements and does not have flaws?		
	<b>Methodology (phase 2)</b>		
15	Is the introduced general measurement framework adaptable to COMAU business goals and strategies?	Yes, it allows the selection of PIs according to the goals (service operation costs)  Example: realize flexibility with low costs through frame contracts with suppliers	
16	Is it applicable in practice at industrial partners for your kind of industrial services?	All PIs in use at COMAU are covered by the SPMS, 80% of the PIs are standardized PIs	
17	Is the structure helpful in selecting specific PIs according to your companies strategic goals? Are the steps logical and aimed? Do they lead to meaningful results?		
	<b>Benefits of SPMS (phase 3)</b>		
18	Is the SPMS complete in terms of different dimensions, target areas, levels,	Yes, it is complete. From the practical point of view there is nothing missing.	

	perspectives, phases, and steps?		
19	What would be the difference to the as-is? Is this beneficial for COMAU?		
20	What will be the resources and efforts required in implementing it?		
21	What are the limitations? (entering real business environment) Where are upcoming real world problems?		
22	What are the overall benefits? What is the impact?	Very useful to get a state-of-the art in performance indicators; useful for setting up service contracts with customer as it provides a good overview in a very structured way	
	<b>Discussion and ideas for improvement</b>		

	<p>Where are strengths/ weaknesses, Useful for the involved partners (both parties)</p>	<p>The only flaws are related to some perception measures and to the relationships between different group of indicators that may be not sufficiently independent the one from the others.</p>	
	<p>How could solutions for the identified problems look like (solution oriented)</p>		
	<p>Collect ideas for improvement</p>		

Additional space for writing:

Interviewers ideas during the workshop:

Show the influence of service providers to improve the OEE at the customer, COMAU has no influence on the quality performance of the machine.

<p>Interviewers comments/ major problems / feedback concerning guideline:</p> <p>Sent SPMS and structured interview guideline well in advance to the workshop participants for preparation purposes.</p>
<p>How is the weather outside?</p> <p>Fine, 23 degrees</p>

**SKF GmbH (Reliability Systems). validation workshop**  
**Gunnar-Wester-Str. 12, D-97421 Schweinfurt**  
**April 5<sup>th</sup> 2007, 11.30h-14.00h**

Participants names	Function	email address
Stefan Schleyer	Vibration Specialist	Stefan.schleyer@skf.com
Matthias Ennulat		
Peter Osadsky	Research assistant	Peter.Osadsky@fir.rwth-aachen.de
Ingo Lange	Research assistant	Ingo.Lange@ethz.ch

#	question	answer	note
	<b>Opening part</b>		
1	What would you like to measure?	Order lead times, customer satisfaction and practice appreciability.	
2	What is important for you as a service provider?	Customer satisfaction, fresh orders, Efficiency & effectivity of service activities	
3	What might be important for your customers?	Information about the SLA in contract. Services like Tracking Tools. Reports and statistics about breakdowns and their reasons of facilities/assets	
4	Which PIs are already in use? (following the introduced target areas?)	Causes analysis reports	
	<b>SPMS structure</b>		

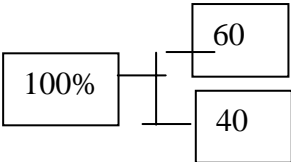
	<b>(phase 1)</b>		
5	Is the structure of different target areas understandable and practical?	Yes it is. Appreciable are especially time, costs, reliability and flexibility.	
6	Is it understandable what we would like to cover within the Service Encounter Interface?	The illustration is basically clear, but the manner of representation was confusing. Conceptuality should be better. PI tree structure should be transformed in a 2D-image. So the PIs of level 1 could be identified better. Examples in practice are necessary.	
7	From your point of view; does it make sense to differentiate between the service object and the service activities? (example!)	Absolutely sensible, because customer is only interested for service object features.	
8	Following the hierarchical structure the overall target areas are broken down to e.g. 3 level of details. Is this logical? Is this helping you in understanding the interdependencies among the PIs?	Advices which describe the reliance on the PIs in the SPMS are noticeable, e.g. Level 3 PIs influence Level 2 PIs.  Level 1 and Level 2 PIs are good as orientation.  2 Level approach, e.g. „top down“ for the overview of the dependences between PIs. Cause and effect is firm-specific.	
9	Is the hierarchy among the performance indicators within the target areas logical? Is it consistent?	Mainly it is logically, but the notion “Level” is confusing. →  Better a hierarchy structure.  Level 1-3 structure is not the same like	

		the Level 1-3 structure in the IRM  The dependency on the PIs are not be considered → Only in Task 4.3	
10	Is it important for you to measure the performance of processes at the interface with your customers? Do you think it is helpful for <b>company</b> to highlight these interaction activities with PIs? (examples!)	At SKF it is only refers to condition monitoring of wind turbines.	
11	Do you already measure some interaction activities between <b>company</b> and your customers?	Not measured yet	
12	Are you interested in getting to know how your customer perceives the performance of service operations delivered by <b>company</b> ?	Yes, the customer satisfaction is very important for SKF.	
13	Are there already instruments implemented to measure the customer satisfaction)?	No	

14	Does the SPMS reflects technically state-of-the-art and industrial requirements and does not have flaws?	XXX	
	<b>Methodology (phase 2)</b>		
15	Is the introduced general measurement framework adaptable to <b>company</b> business goals and strategies?	Key figures are missing. A detailed description about PIs given in units, measurement methods and processes are desirable. Before that a detailed description about the processes are necessary. Identification of “Hebelgrößen”	
16	Is it applicable in practice at industrial partners for your kind of industrial services?	Yes, when PIs with key & measurement figures and units are defined.	
17	Is the structure helpful in selecting specific PIs according to your companies strategic goals? Are the steps logical and aimed? Do they lead to meaningful results?	Yes!	



	<b>Benefits of SPMS (phase 3)</b>		
18	Is the SPMS complete in terms of different dimensions, target areas, levels, perspectives, phases, and steps?	It is complete, but it should be able to change features of service activities and service objects. Another option could be the integration of key figures, which describe the problems.	
19	What would be the difference to the as-is? Is this beneficial for <b>company</b> ?	Great overview.	
20	What will be the resources and efforts required in implementing it?		
21	What are the limitations? (entering real business environment) Where are upcoming real world problems?	Mainly important are Indicators, which measure only features and key figures of useful fields. Influencable key figures and their interconnection to other indicators are interesting.	
22	What are the overall	God overview about the totality of PIs.	

	benefits? What is the impact?		
	<b>Discussion and ideas for improvement</b>		
	Where are strengths/ weaknesses, Is it useful? Where can you make use of it?	<p>There are no units in the SPMS → Communication problems → bad understandings.</p> <p>Yes or No Answers only possible by some PIs, they are not definite to PIs with units (e.g. material availability)</p> <p>The dependency from PIs to KPis on lower levels is confusing.</p>	
	How could solutions for the identified problems look like (solution oriented)		
	Collect ideas for improvement	<p>It should be exist logically rules which describe the dependency between the different levels. Result of that is a specific deflection of every level.</p>  <pre> graph LR     A[100%] --- B[60]     A --- C[40]     </pre>	
Additional space for writing:			

Für SKF wäre es interessant einen kritischen Prozesspfad für Service zu erstellen und dann insbesondere die PIs zu analysieren, die den Prozessen auf diesem kritischen Pfad zugeordnet werden können.

Benötigt werden konkrete Beispiele für Level 1 Indikatoren

Uebersetzung der Zielbereiche ins deutsche manchmal schwierig; Zielbereich 1: Dienstleistungserbringungszuverlässigkeit (Effectiveness/ Reliability (Quality))

Warum heisst Input unter Service Object? Warum heisst es scheduled downtime und dann unscheduled downtime? Besser einfach downtime; kann auch positive formuliert werden: z.B. Verfügbarkeit

Ideas during the workshop:

Zusätzliche PIs für MA Qualifizierung (bereits unter Flexibility), Zertifizierungen der MA

MA- Umsatz (pro Service MA) könnte im Zielbereich Effizienz/ Produktivität aufgenommen werden

Konventionalstrafen können unter Effizienz/ Produktivität / Service Operate Costs aufgenommen werden

Interviewers comments/ major problems / feedback concerning guideline:

How is the weather outside?

Sunny, 18 degrees

**HIT, UNITECH, ICM  
CHEMNITZ  
4<sup>th</sup> April 2007**

<b>Participants names</b>	<b>Function</b>	<b>email address</b>
<b>Dr. Bernd Weber</b>		
<b>Dr. Cornelia Ehlert</b>		
<b>Bernd Schaedlich</b>		
<b>Oliver Schneider</b>		
<b>Amit Garg</b>		

<b>#</b>	<b>question</b>	<b>answer</b>	<b>note</b>
	<b>Opening part</b>		
1	What would you like to measure?	Cost, Time, Quality  measuring the customer benefit is not so important for retrofit, because of project character	
2	What is important for you as a service provider?	Cost, Time, Machine Performance, Service Reaction Time, Service Level Agreement, time/effort to create service offer Methodology: should support to put focus on performance areas (achieved in SPMS)	
3	What might be important for your customers?	Fulfillment of Service Contract / Service Offer	
4	Which PIs are already in use? (following the introduced target areas?)	See DL 4.2	
	<b>SPMS structure (phase 1)</b>		

5	Is the structure of different target areas understandable and practical?	<p>Practical yes. Structure supports in deciding on strategy.</p> <p>An overall light structure with a hierarchy build should help to understand &amp; use the SPMS better.</p>	
6	Is it understandable what we would like to cover within the Service Encounter Interface?	With some explanation and thinking it gets clear. Some ideas for improvement in according section later)	
7	From your point of view; does it makes sense to differentiate between the service object and the service activities? (example!)	Yes – focus, processes & KPIs are different in the 2 scenarios	
8	Following the hierarchical structure the overall target areas are broken down to e.g. 3 level of details. Is this logical? Is this helping you in understanding the interdependencies among the PIs?	<p>Yes the hierarchy helps to find out the performance of lower level &amp; high level processes and link the low level PIs with high level PIs.</p> <p>It is complex to understand the hierarchy &amp; relate it in some cases. Presentation &amp; visualization of the model is a bit problematic.</p>	
9	Is the hierarchy among the performance indicators within the target areas logical? Is it consistent?	<p>Impact of KPIs and their interdependencies should be included in the SPMS</p> <p>The 2<sup>nd</sup> level PIs are also relevant for every service domain.</p>	

10	Is it important for you to measure the performance of processes at the interface with your customers? Do you think it is helpful for <b>company</b> to highlight these interaction activities with PIs? (examples!)	These KPIs – interaction PIs are already a part of the service contract. At least these aspects are covered indirectly through an internal evaluation of customers (you know the good and the "bad" customers, in terms of reliability)	
11	Do you already measure some interaction activities between <b>company</b> and your customers?	No – but a perception about the performance & company image / prestige is mostly relevant & helpful.  some indirect measures are taken during the post calculation (vs. the pre calculation), which show why profit targets were not achieved	
12	Are you interested in getting to know how your customer perceives the performance of service operations delivered by <b>company</b> ?	There are few extreme scenarios here. 1 <sup>st</sup> - Machine must run irrespective of the behavior of the mechanic. Other extreme, behavior / culture is important for the customer to assess the service performance perception.	
13	Are there already instruments implemented to measure the customer satisfaction)?	None.  Surveys are not the optimal method to find the customer satisfaction, since the customer might be receiving too many such surveys. Or the surveys are filled out by "wrong" persons.  Easy to use survey with very few	

		questions might serve the purpose. Optimal method here is still the personal talk.	
14	Does the SPMS reflect technically state-of-the-art and industrial requirements and does not have flaws?	Not discussed.	
	<b>Methodology (phase 2)</b>		
15	Is the introduced general measurement framework adaptable to <b>company</b> business goals and strategies?	Yes, it matches the aspects important for retrofit.	
16	Is it applicable in practice at industrial partners for your kind of industrial services?	Not yet, there is manual or easy-to-understand guide missing.	
17	Is the structure helpful in selecting specific PIs according to your companies strategic goals? Are the steps logical and aimed? Do they lead to meaningful results?	Yes.	
	<b>Benefits of SPMS (phase 3)</b>		

18	Is the SPMS complete in terms of different dimensions, target areas, levels, perspectives, phases, and steps?	Yes.	
19	What would be the difference to the as-is? Is this beneficial for <b>company</b> ?	<p>Can frame the company specific goals → and break them into PIs at different level which can be beneficial for the company performance measurement.</p> <p>Supports in identifying own process improvement potentials (when PIs are strongly related to a process element) Supports in developing an improved contract (in terms of mutual understanding of performance targets)</p>	
20	What will be the resources and efforts required in implementing it?	It would be easy to implement when the ERP- and PPS-systems provide the necessary data. Otherwise a big effort is needed.	
21	What are the limitations? (entering real business environment) Where are upcoming real world problems?	<p>Concrete methodology to use &amp; implement the SPMS Concrete linkages to the processes would help in implementing the SPMS and would support the responsible employees to see what they are doing and how to improve themselves.</p> <p>Some PIs are hard to quantify. SPMS at current state only implementable with coaching.</p>	
22	What are the overall benefits? What is the impact?		



	<b>Discussion and ideas for improvement</b>		
	Where are strengths/ weaknesses, Is it useful? Where can you make use of it?	It supports in finding a strategy, controlling it and steering it (when linked to processes and BPs) It supports in benchmarking activities	
	How could solutions for the identified problems look like (solution oriented)	Some ideas for structure & methodology, supporting the user: <ol style="list-style-type: none"> <li>1. Display raw structure of SPMS</li> <li>2. Get into more detail only then (link to company's processes)</li> <li>3. Show impact and relation of PIs to processes (together with best practices) → performance management</li> </ol> With a link to the OKE-methodology it could support in finding weak spots in the company.	
	Collect ideas for improvement	Start with the SPMS at very high abstract level, identify the gap, build the processes and analyze the specific challenges there. KPIs help us to analyze the weaknesses in the process flow. Improving the process then helps us to harness the improvement potential. There is the need for a practical guideline for the implementation and use of SPMS.	
Additional space for writing:			

- Steps to be followed in implementing such SPMS integrated shall be specified
- Handbook / Guidelines to – self usable – use the SPMS
- KPIs interlinked with Processes help to analyze the challenges / opportunities
- 

Interviewers ideas during the workshop:

Interviewers comments/ major problems / feedback concerning guideline:

How is the weather outside?

Cloudy and only 15 degrees. But our cars were nice.

**BOSCH Packaging Services AG. validation workshop**  
**Industrieplatz 1, CH-8212 Neuhausen**  
**April 18<sup>th</sup> 2007, 13.30-15.30h**

Participants names	Function	email address
Marcello Pezzotti	Manager Modernization	Marcello.pezzotti@sigpack.com
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#	question	answer	note
	<b>Opening part</b>		
1	What would you like to measure?	PIs from DIN 8743  Handover needs to be agreed on in terms of performance targets of packaging machines. Further, the internal resources needs to be managed in terms of competencies etc.	
2	What is important for you as a service provider?	To be able to focus on a certain strategy, e.g. "cost leader", oder "market share leader"	
3	What might be important for your customers?	Depends on the customer: either it is availability in terms of effective run-times, or it is the machine speed (output rate). In the case of e.g. pharma: to proof that you have a good risk and crisis management. Additionally: packaging quality (it is not enough to have just "closed" packages, they have to be vacuum sealed!	
4	Which PIs are already in use? (following the introduced target areas?)	PIs from DIN 8743, plus some logistical measures (order lead time, quotation lead time. delivery lead time).	
	<b>SPMS structure (phase 1)</b>		
5	Is the structure of different target areas	yes	

	understandable and practical?		
6	Is it understandable what we would like to cover within the Service Encounter Interface?	yes	
7	From your point of view; does it makes sense to differentiate between the service object and the service activities? (example!)	yes	
8	Following the hierarchical structure the overall target areas are broken down to e.g. 3 level of details. Is this logical? Is this helping you in understanding the interdependencies among the PIs?	Interdependencies are not visible, but this is hard to indicate anyway. "Every performance area is influencing the other areas as well".	
9	Is the hierarchy among the performance indicators within the target areas logical? Is it consistent?	yes	

10	Is it important for you to measure the performance of processes at the interface with your customers? Do you think it is helpful for <b>company</b> to highlight these interaction activities with PIs? (examples!)	With customers from pharmacy it got important in the last years, they are now a role model (tracking). Other branches are (not yet) critical. Measuring the reliability of planning data of the customer is necessary for a reliable service provision. Additionally: the quality of the products to be packed has to be stable, for adjusting the packaging machines appropriately (e.g. density). The transfer process is as critical as the "receive products" process.	
11	Do you already measure some interaction activities between <b>company</b> and your customers?	Some customers want scenarios on how Bosch reacts in case of quality problems. Also, the criteria for handovers gain importance (also internally). There it needs to be clearly defined of what the roles & responsibilities are of all the players, especially in terms of expected performance. Scenario: handover run – material, products, availability of machines has to be guaranteed.	
12	Are you interested in getting to know how your customer perceives the performance of service operations delivered by <b>company</b> ?	yes, see Q11.	
13	Are there already instruments implemented to measure the customer satisfaction?	no	
14	Does the SPMS	yes, from Bosch perspective.	

	reflect technically state-of-the-art and industrial requirements and does not have flaws?		
	<b>Methodology (phase 2)</b>		
15	Is the introduced general measurement framework adaptable to <b>company</b> business goals and strategies?	yes, the two main areas are covered (availability and speed), the PIs from Din 8743 are covered.	
16	Is it applicable in practice at industrial partners for your kind of industrial services?	Implementation methodology should be defined more practically (e.g. scenario configurator)	
17	Is the structure helpful in selecting specific PIs according to your companies strategic goals? Are the steps logical and aimed? Do they lead to meaningful results?	yes	
	<b>Benefits of SPMS (phase 3)</b>		
18	Is the SPMS complete in terms of different dimensions, target areas, levels, perspectives, phases,	yes, almost: indicators measuring the personnel resources should be more highlighted.	

	and steps?		
19	What would be the difference to the as-is? Is this beneficial for <b>company</b> ?	the SPMS clearly supports the strategic orientation.	
20	What will be the resources and efforts required in implementing it?	Not discussed	
21	What are the limitations? (entering real business environment) Where are upcoming real world problems?	The clear implementation methodology is missing.	
22	What are the overall benefits? What is the impact?	Supports the strategic orientation.	
	<b>Discussion and ideas for improvement</b>		

	<p>Where are strengths/ weaknesses, Is it useful? Where can you make use of it?</p>	<p>With a clear implementation methodology it may serve as a clear guidance on selecting appropriate PIs, according to the strategic orientation of the relationship with the customer (focus on availability or output rate?)</p>	
	<p>How could solutions for the identified problems look like (solution oriented)</p>	<p>A "scenario configurator" would be great (depending on the strategic orientation the relevant PIs are automatically filtered).</p>	
	<p>Collect ideas for improvement</p>	<p>Strengthen the measurement of resources: map of knowledges (also future oriented), transfer of know-how → pyramid of knowledge (Personnel) Resources are the main requirement for offering more comprehensive services! Needs to be added: flexibility of SP to react to changes in the planning data.</p>	

Additional space for writing:

The process of dealing with complaints needs to be added in the IRM!

Interviewers ideas during the workshop:



Interviewers comments/ major problems / feedback concerning guideline:
How is the weather outside?