

Product-Service Systems across Life Cycle

# A New Approach for the Development of Services for Industrial Product-Service Systems

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## Abstract

Cars and machines are developed today based on a selection of specific parameters fulfilling the requirements of targeted customers. However, this approach is not commonly adopted in service engineering. Therefore, this research approach aims to systematically develop a series of service parameters to enhance the effectiveness of industrial service systems for establishing new services. As proposed a combination of these parameters shall fulfill any demand resulting from the requirements analysis. Consequently services can be systematically designed with a tool box of parameters. Furthermore, previously designed services can have demanded adjustment to match the requirements of the new services, based on a reselection of the design parameters.

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## 1. Introduction

The discipline service engineering has undergone a sizeable number of service design development research, however they have been rarely incorporated into business practice [1]. Despite existing service development approaches in service engineering the complexity and degree of abstraction for practitioners remain high [2]. Therefore, the development of innovative services in manufacturing industries still forms an obstacle [3]. Another challenge is that even if the requirements of all stakeholders has been considered in the service design concept, a gap between specification and delivered service performance can remain, which in business practice is typically approached reactively by costly service design amendments [4].

The research aims to offer a systematic approach for the development of services, which facilitates a guided, easy and fast choice of alternatives that can be customized against the user's requirements. Thus facilitating the development tasks to be more operationalised and thereby the designer to better focus on his creativity to resolve different objectives for the development of the services. The main target is to reduce the

complexity of the service development procedure and to reach a higher efficiency in the process. Therefore, previously designed services can be reused through the required adjustments on the reselection of parameters.

The remainder of the paper is structured as follows: In Section 2 the approach is presented to systematically establish a list of service parameters as that can eventually influence the development of new services for industrial product service systems. The subsection 2.1, 2.2 and 2.3 provides information on the list of some suggested service categories that falls under the product, process and resource models of service conception phase, of the classification schema of industrial services. Furthermore, subsection 2.4 contains information on the establishment of service parameters and finally Section 3 briefly concludes the paper.

## 2. Approach

Our approach to identify the parameters for service solutions is mainly based on extending and incorporating the work done by i) Ulaga and Reinartz [5] on the classification of industrial

services and ii) Meiren Thomas [6] on the systematic development of new services.

In the initial phase of this investigation, after examining the classification schema of industrial services established by Ulaga and Reinartz, we have further refined each of the four services categories: i) Product life-Cycle Services (PLS); ii) Asset Efficiency Services (AES); iii) Process Assistance Services (PAS); iv) Process Takeover Services (PTS); by extending the existing classification by fourth and fifth level as shown in Fig. 1.

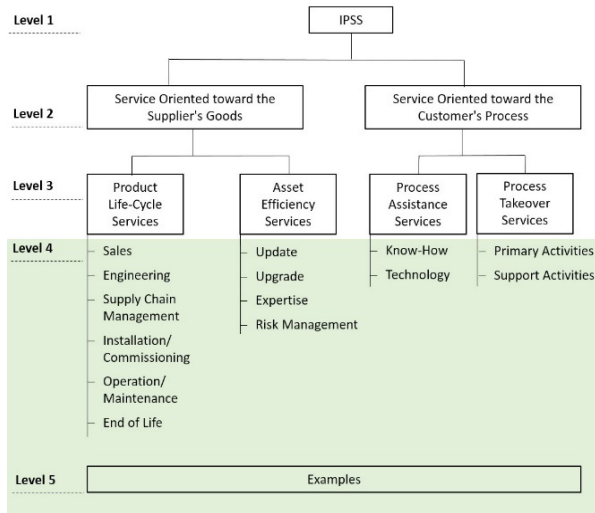


Fig 1: Extended classification schema of services.

The proposed fourth level of classification aims to address more in depth the relevant service areas, where each of the four categories of services stated in level three can be applied and thereby establishing the concrete information on the serviceable areas for industrial services. For this purpose, under the first service category on PLS, we have setup six different possible service areas, as tabulated along with the brief description in table 1.

Table 1. Product life-Cycle services - Service areas.

Level 4	Description
<b>Product Life-Cycle Services</b>	
Sales	Transformation of customer requirement into development requirement or into specification. Fixation of commercial agreement
Engineering	Transformation of development requirement into solution
SCM	Supply of products and services
Installation/ Commissioning	On-site completion and testing of product
Operation/ Maintenance	Maintain product performance
EOL	Product end of life

The second AES category is broken down into four areas, as tabulated in table 2. The third category which deals with PAS is classified further and tabulated in table 3. Finally, the fourth and the last category on PTS has seen sub classified and is tabulated in table 4.

Table 2. Asset Efficiency Services - Service areas.

Level 4	Description
<b>Asset Efficiency Services</b>	
Update	Retrofit product update
Upgrade	Retrofit product upgrade
Expertise	Information and know-how transfer
Risk Management	Managing the risk of product failure

Table 3. Process Assistance Services – Service areas.

Level 4	Description
<b>Process Assistance Services</b>	
Know-How	Know-How support in customer process
Technology	Technology support in customer process

Table 4. Process Takeover Services – Service areas.

Level 4	Description
<b>Process Takeover Services</b>	
Primary Activities	Ownership Primary Activities
Support Activities	Ownership Support Activities

The proposed fifth level of the industrial services structure is more focused on the specific service fields falls under each service area of the level four. The purpose is to pin down the key serviceable areas that falls under the classification schema of industrial services. Due to constraints of space in this paper, just one example of the three service areas of level four: Sales, Installation / Commissioning and Operation/ Maintenance are further refined into specific service fields, where these three service areas can be applied is evaluated (see table 5, 6 and 7).

Table 5. Sales – Service fields.

Level 5
<b>Sales</b> - Transformation of customer requirement into development requirement or into specification. Fixation of commercial agreement
1. Requirement Identification Product, Service
2. Requirement Specification
3. Contracting
4. Financing
5. Consultation on Product, Service

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