

The 9th CIRP IPSS Conference: Circular Perspectives on Product/Service-Systems

Approach to test a Product-Service System during Service Engineering

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Abstract

Service testing is becoming more and more important for manufacturing companies nowadays. Testing services before market launch helps to avoid mistakes and unnecessary costs. The test phase of new service development has often been neglected in business practice, but more and more its value is being fully recognised. A focus of this paper is the development of a new scientific testing approach of product-service bundles and product-service systems. The new model considers not only the service but also the product component. It is shown that there are different possibilities to combine new product and new service development – for example, products and services can be developed separately or in an interactive or integrated way – and that it is in the test phase that both components could be tested under realistic conditions before the market launch. Thereby the importance of the test phase during the development process of product-service bundle is emphasised.

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Peer-review under responsibility of the scientific committee of the 9th CIRP IPSS Conference: Circular Perspectives on Product/Service-Systems.

Keywords: service testing; product-service; product-service system; new service development;

1. Servitization in manufacturing companies

Servitization for manufacturing companies becomes more important in order to find new markets or customer [1,2,3]. Traditional product-oriented companies change step by step to being more service-oriented. This is a grand challenge for every company, for their products, services and employees. This changing process is often referred as the servitization. However, the servitization is not just a change in the business model: It involves all the aspects of the enterprise, which therefore needs methodological and technical support concerning an integrated development [4] and management of a Service Lifecycle Management [5,6] which covers the Service Engineering [7,8,9] and the Service Operations phase [10, 11] as well the interactions to the Product Lifecycle Management [12,13].

Services are complex behavioural phenomena that can be quite difficult to understand and describe. The service market has been becoming more and more dynamic in recent years. In this kind of increasingly competitive environment, high quality, low cost, and technology leadership are not enough to

provide a competitive advantage for companies; therefore, many are trying to differentiate themselves by developing innovative product-service systems in order to reach a unique selling point.

2. Test phase in different approaches of new service development

If a comparison is made among different new service development approaches, it is quickly revealed that most process models also include a test phase. But in most cases, the test phase is not described in detail. An exception is the process model by Burger [14], but even this approach has some weaknesses: for example it does not consider a product component, which is essential in testing of product-services bundles. Below, a short description of each of the compared models is provided.

Sakao and Shimomura [15]: The structure of this model is slightly different from those of the other models considered in this chapter. First, a so-called flow model with scope models for the relations between different participants in the service

process has to be generated. In the next phase, a persona (a template for a persona and an example are shown in the appendix) for a service receiver has to be generated and important state parameters described. After the completion of this phase, the concept development can be started. The concept development is divided into two phases: the description of the value and the generation of a realisation structure. Instead of a test phase, this model offers a phase called ‘modifying the flow model’. Here, the preliminary flow model is modified and a design solution generated.

Burger, Meiren & Kim [14]: This new service development model entails applying appropriately modified engineering know-how from the field of conventional product development to the development of services. The overall development is subdivided into six broad phases: idea management, requirements collection and analysis, concept development and service design, service testing, implementation, and market introduction. It has a practical value and makes explicit reference to tools and methods that could be adapted easily to the new service development process.

The main feature of Freitag’s [5,6] model is the transposition of the testing and implementation phases. The model focuses on IT services like smart services. Each phase is given three modules, whose performance is explained in detail: ‘Simulation Virtual Lab’, ‘Business Assessment’, and ‘Technical Assessment’. A service can be tested by analysing the interaction between two or more people in a virtual lab, or by checking the business model or the hardware or other technical equipment [5,6].

The model of Ojasalo [16] describes a kind of lean service development. It emphasises the importance of rapid testing and learning in an iterative service development process. The model consists of the following phases: need and problem identification, solution idea(s), solution design, experimenting and testing with users and other stakeholders, evaluation, possible implementation, and possible abandonment. The main part of this model is the ‘rapid testing and learning loop’, which refers to the phases of solution design, testing and experimenting with stakeholders, and evaluation. These phases can be repeated several times depending on the results.

3. Framework for testing of Product-Service System

This section focuses on a framework development for testing product-service systems. The framework shown in the following subchapters is based upon the approaches from [5,13] and [14].

3.1. Process model development

The fact that traditional process models for service testing are more focused on the service component does not mean that the product component is completely unconsidered. The product is often part of the service process, defining the service environment (servicescape) or affecting the interaction design. In contrast to this, there is a deeper involvement of products in product-services and product-service systems.

Product-Service System (PSS): It is a system producing a mix of tangible products and intangible services designed and

combined so that they jointly are capable of fulfilling specific customer needs. The key components of a PSS [17, 18] are:

- The System as a set of elements and their relations producing the product and delivering the service to the customer.
- The Product as a tangible commodity manufactured to be sold fulfilling user’s needs or supporting the creation of a service.
- The Service as an activity done for the stakeholders with an economic value, with intangible results ...”

In the test phase of product-services and product-service systems, the interaction of the service component and the product component has to be considered under realistic conditions. The test can have four possible results:

- Both the service component and the product component are accepted for implementation.
- The service component is accepted and the product component is not accepted for implementation.
- The service component is not accepted and the product component is accepted for implementation.
- Neither the service component nor the product component are accepted for implementation.

Figure 1 provides a visualisation of the possible results.

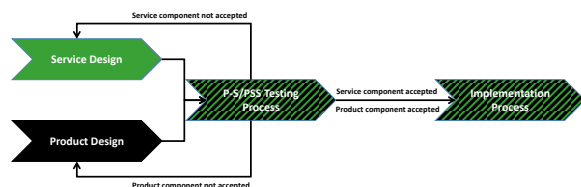


Figure 1: Global view of the test phase of product-services and product-service systems

The basis for a successful implementation and market launch of a new product-service or product-service system is the acceptance of both the service-related and the product-related results. If one of the two parts is not applicable for a market launch, a second loop of (re-)design and testing is necessary. This leads to a more iterative approach than with simple product or service testing, because either component could initiate a second iteration.

3.2. Steps for testing product-services and product-service systems

The contents of this chapter further elaborate the service testing approach from Burger, Meiren & Kim [14]. The process model of this approach is also shown in Figure 2.



Figure 2: Service testing approach from [14]

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