Typology for Modular Service Design: Review of Literature

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ABSTRACT

This paper presents a typology for modular service design. The authors review engineering, manufacturing, and service research literature and develop three key concepts for service modularization: service module, service architecture, and service experience. Thereafter these key concepts are further decomposed into detailed constructs. Basing on the reviewed literature, they develop a common typology for modular services. The authors argue that their typology provides a foundation for the development of modular service design methods. The authors also expect that it is important to recognize how customers perceive the service. They propose that service experiences can be characterized by value creation, role perception, personalization, and task complexity and by how the customers experience the particular services.

Keywords: Architecture, Customer, Experience, Module, Process, Service Modularization

1. INTRODUCTION

Service oriented research has been conducted in various fields of research such as marketing, operations management, supply chain management, information systems science (Ostrom et al., 2010), industrial engineering, and service science. Vargo and Lusch (2004) have defined services as “the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself.” According to Chesbrough and Spohrer (2006), services often are the key driver of growth and profitability. Thus, it is no surprise that organizations are increasingly developing new business models and service offerings that combine services to tangible products, i.e., servitizing their products (Williams, Chatterjee, & Rossi, 2008). Service modularization has been proposed as a way to accomplish this (Bask, Lipponen, Rajahonka, & Tinnila, 2011; Böhmann, Junginger, & Kremer, 2003; Pekkarinen & Ulkuniemi, 2008; Voss & Hsuan, 2009).

Modularity of services is a new and emerging research area, and worth to closer study as the importance of services is increasing. The modularization of services has been considered...
to serve three main purposes, any of which may justify expenditures to increase modularity (Baldwin & Clark, 2000): modularity makes complexity manageable; modularity enables parallel work and improvement; modularity creates adaptivity to deal with uncertainty. Based on Hyötyläinen and Möller (2007), modularity can also lead to decreased production costs. Furthermore, complexity can be decreased for example with cross use of modules between different services. Similarly, Pekkarinen and Ulkuniemi (2008) expect that better customer value and profitability can be achieved by standardizing the service production, i.e., by using a higher volume of common parts in several services. De Blok et al. (2010) expect that more effective customization is possible to achieve when using a modular set-up of service packages. In addition, in the service-oriented architecture (SOA) literature, what is inside the modules is hidden, which means that the environment is only exposed to the service interface (Fremantle, Weerawarana, & Khalaf, 2002); the idea being that the elements within the module can be altered without affecting the interface. In this way it should be easy to replace the modules by using a variety of sourcing options (Bask, Lipponen, Rajahonka, & Tinnilä, 2011).

However, we argue that the challenges that modularization of services poses to service design have been unmet. The received view is that services should be designed as modular units and developed by mixing and matching these units to provide different combinations for meeting specific customer and market requirements (see e.g., Baines, Lightfoot, Benedettini, & Kay, 2009; Bask et al., 2011; Tuunanen & Cassab, 2011). However, the literature does not provide clear guidelines for how to accomplish modular service design and development. In this paper, we seek to fill this gap in the literature and explore how services should be modularized for the purpose of service design activities. For this purpose, we propose a typology for modular service design.

The structure of the paper is as follows. We start by reviewing the literature on service modularization in order to develop a foundation for our typology. We review the literature on service module, service architecture, and service experience. The outcome of the reviews is a typology for each of the areas. Then we discuss the implications of the work at hand for service design research and practice. Finally, limitations of the study and future research ideas are drawn.

2. FOUNDATIONS FOR SERVICE MODULARIZATION

In this section we provide the foundation for service modularization by describing three important aspects of service modularity: service module, service architecture, and service experience.

2.1. Service Module

Based on Janssen (2008), the idea of service-oriented architecture is to develop a world of services that are loosely coupled and may be combined in a flexible way. The use of modularity offers the basis for customization. It yields economies of scale and scope for the service offerings (Voss & Hsuan, 2009). The modular service offering of an organization can consist of standardized base services, customized services, and their combinations. Hence, it is important to look at the interfaces, i.e., the connectivity of service components in the modular service offering. Voss and Hsuan (2009) define a service component as the smallest module (building block) in a service system. Characteristics of these modules include standardization, uniqueness, degree of coupling, and replicability. Standardized interfaces are a prerequisite for effective mixing-and matching of service modules and, thus, there is a need to define them precisely.

Based on Voss and Hsuan (2009), there are two options for service customization or composition. First, composition can be combinational, which means that a unique service is provided by combining a set of service modules (service processes and products). Second, composition can be menu driven, meaning that
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