Chapter 45
Dynamic Capabilities of Decision-oriented Service Systems

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ABSTRACT

A new class of information system architecture, decision-oriented service systems, is spreading more and more. Decision-oriented service systems provide services that support decisions in business processes and products based on the capabilities of cloud-computing environments. To pave the way for the creation of design methods of business processes and products based on decision-oriented service systems, this article introduces a capability-oriented approach. Starting from technological capabilities, more abstract operational and dynamic capabilities are created. The framework created is based on an integrated conceptualization of decision-oriented service systems that allows capturing synergetic effects. By creating the framework, the gap between the technological capabilities of technologies and the strategic goals of enterprises shall be narrowed.

INTRODUCTION

Economy and society undergo a phase of disruptive change, often summarized with the term digitization (Schmidt et al., 2015). Enterprises that had been successful for a long time cease to exist (Fortune, Inc., 2015). Technological infrastructures enable a quick evolution. Starting points are cloud-computing and Big Data. Cloud-computing (Mell & Grance, 2009) is the provisioning of computing, storage, and

DOI: 10.4018/978-1-7998-5339-8.ch045

networking resources at a low cost, easily accessible and easily scalable manner. Many cloud-computing services are provided by cloud-computing environments (Schmidt, 2011) and service systems (Alter, 2008). Big Data enables to capture, store, process and analyze data, which has high volume, velocity, and variety (Bughin, Livingston, & Marwaha, 2011). The strategic alignment of cloud-computing and big data become important issues for many enterprises (Schmidt & Möhring, 2013).

Recently, cloud-computing and big data are combined to so-called decision-oriented service-systems providing analytical capabilities for supporting decisions in business processes and products. Examples are Azure ML (Barnes, 2015) and Analytics Services with AWS ('Amazon Web Services (AWS) - Cloud Computing Services', 2017) ('Data Analytics Products', 2017).

Capabilities are abilities of active elements of enterprise architectures, such systems, and organizations (Josey, Lankhorst, Band, Jonkers, & Quartel, 2016). Capabilities are addressing a set of procedural patterns to handle resources (Teece, Pisano, & Shuen, 1997). Capabilities and resources are key success factors to achieve competitive advantage and support the digital transformation of next digitized products, services, and processes. The intention of current capability modeling is to abstract from complex behavior and the relating architectural structure. Different resources lead to different capabilities (McKelvie & Davidsson, 2009). Capabilities are layered, that means, by activating one or several lower-level capabilities a higher-level capability can be created. The top-level capabilities allow implementing different strategic options. We use the differentiation into operational and dynamic capabilities introduced by (S. G. Winter, 2003).

Unfortunately, an integrated framework of the capabilities of decision-oriented service systems is missing up to now. The basic technological abilities of cloud-computing and Big Data have been investigated separately (Bughin et al., 2011). There is research on identifying the capabilities that lead to the usage of cloud computing (Rockmann, Weeger, & Gewald, 2014, 2015). However, this research does not consider the capabilities created by cloud-computing. In Iyer & Henderson (2010) seven basic capabilities are identified. But they are not put into relation with more abstract capabilities.

As a first step towards a generally applicable framework, we will investigate the capabilities (Josey et al., 2016) to enhance business processes and business models by combining cloud-computing and data-oriented architectures.

We followed a conceptual research approach (Mora, Gelman, Paradice, & Cervantes, 2008), which is often applied in information systems research as well as computer science (e.g. Alavi & Leidner, 2001; Mora et al., 2008) regarding the recent literature (Cooper, 1998). In the conceptual domain of Cloud-based architectures for Big Data, we used a conceptual analysis and knowledge to cover the gap of a missing framework of the capabilities of decision-oriented service systems. The developed framework can be seen as an artifact (Mora et al., 2008).

We will proceed as follows. First, we will depict capabilities in general. Then we will investigate which capabilities are provided by cloud computing and big data. Based on them we identify the capabilities provided by decision-oriented service systems. They are separated into predictive capabilities and operational capabilities. In the following section, we show, how the capabilities of decision-oriented service systems are influenced by the underlying service- and deployment model. Based on these steps, we identify dynamic capabilities that impact business processes and products. Related work is presented afterward, and finally, an outlook and conclusion are given.