Recombination in the open-ended value landscape of digital innovation

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ABSTRACT

Digital innovation introduces a new open-ended value landscape to anyone seeking to generate or capture new value. To understand this landscape, we distinguish between design recombination and use recombination, explore how they play out together, and redirect the attention from products and services toward digital resources. Digital resources serve as building-blocks in digital innovation, and they hold the potential to simultaneously be part of multiple value paths, offered through design recombination and assembled through use recombination. Building on this perspective, we offer the value spaces framework as a tool for better understanding value creation and capture in digital innovation. We illustrate the framework and offer the early contours of a research agenda for information systems researchers.

1. Introduction

Recombination is at the heart of innovation. The idea that novel products and services derive from the carrying out of new combinations of components is enduring across disciplines. This is also the case in information systems, where recent and well-cited work on digital innovation such as Yoo, Henfridsson, and Lyytinen (2010) broadly follows Schumpeter's (1934) view on innovation as recombination. While a significant assumption in seminal innovation research is that firms carry out the recombination, however, the emerging digital innovation literature recognizes that firms are not the only actors mixing and matching. In fact, firms are increasingly anticipating that their design will be recombined at the point of use.

At a time when digital resources are readily editable (Kallinikos, Aaltonen, & Marton, 2013), re-programmable (Yoo et al., 2010), and functionality can be procrastinated until the point of use (Eaton, Elaluf-Calderwood, Sørensen, & Yoo, 2015; Henfridsson, Mathiassen, & Svahn, 2014), it makes considerable sense to extend the firm-centric view on recombination to include recombination performed in use. Consider that use is no longer defined by products with clear and pre-defined boundaries (Yoo et al., 2010), but hosts digital resources that come together and assemble a whole from the ground-up (cf. DeLanda, 2006). For instance, a user in need of cloud services does not need to adopt Google's offer as a whole but can conveniently combine Google Drive with Microsoft Office apps, and services on Amazon's AWS platform. We use the term "use recombination" to refer to this activity of generating an individual value path by connecting digital resources in use. Individuals carry out use recombination but so do firms and sometimes software agents such as bots. We contrast this type of recombination from design recombination, which denotes the activity of

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generating a value path by connecting digital resources as a value offer to users. Design recombination is typically done by firms,[1] operating as stand-alone entities or recombining on top of other actors' digital platforms.

We argue that this distinction between design recombination and use recombination is pivotal to addressing the call for new perspectives on the business value of digital innovation (Kohli & Grover, 2008). In particular, it supports our ability to map an "open-ended" value landscape in which the value of a specific digital innovation needs to be viewed not as fixed but as fluid over time, dependent both on connections to assemblages of digital resources and on the relative engagement of individuals, firms, and bots. A focal point in such an analysis is defined by "digital resources"; that is, entities that serve as building blocks in the creation and capture of value from information. Instead of notions such as products (Yoo et al., 2010) or services (Barrett, Davidson, Prabhu, & Vargo, 2015; Lusch & Nambisan, 2015), the notion of digital resources increases the granularity by which the creation and capture of value can be studied in digital innovation.

Such granularity is needed since the digital resource is not a self-contained unit with fixed meaning and relations. It rather hosts the potential to simultaneously be part of multiple value paths, as offered through design recombination and assembled through use recombination. Future business value research needs to better understand the meeting-points of both these types of recombination, thereby making digital resources a new and much needed level of analysis which contrasts with the conventional focus on products or services. In addition, this shift in attention to digital resources and their connections is also necessary because of their product-agnostic nature. Digital resources are agnostic in the sense that their meaning in the use situation is largely defined by their relationships to other resources. Rather than being defined by logically necessary relations (cf. modularity: Baldwin & Clark, 2000; Garud, Kumaraswamy, & Langlois, 2003), the agnosticism of digital resources makes these relations obligatory in a contingent fashion (DeLanda, 2006; Um, 2016).

Existing perspectives such as the layered-modular architecture (Yoo et al., 2010), digital controls (Lee & Berente, 2012), architectural frames (Henfridsson et al., 2014), service innovation (Barrett et al., 2015; Lusch & Nambisan, 2015), the cocreation of value (Grover & Kohli, 2012; Sarker, Sarker, Sahaym, & Bjorn-Andersen, 2012), and network effects (Parker, Alstyne, & Choudary, 2016), all offer valuable insights on how to address the open-ended value landscape of digital innovation. However, as we will argue in this paper, it is essential to think of recombination in design and use in digital innovation concurrently, rather than tilting too much toward the design or use end of value. To this end, we develop a new perspective, which we term *the value spaces framework*, which can be applied to better understand value creation and capture in digital innovation. We illustrate the framework and outline the early contours of a research agenda with the purpose of both stimulating intellectual debate on this important topic and providing some initial conceptual apparatus for future research.

2. The open-ended value landscape

Economists often refer to technologies as means of production (Arthur, 2009). In this vein, Schumpeter viewed innovation as the recombination of means of production (see Langlois, 2007). Technologies process something in order to achieve an end, and innovation as recombination therefore involved the idea of rethinking how different functions could be reintegrated in ways that create novelty (Arthur, 2009; Galunic & Rodan, 1998). This view of innovation has been adopted in influential theories of modularity and competition (Baldwin & Clark, 2000; Garud et al., 2003; Sanchez & Mahoney, 1996).

The view on recombination adopted in this research differs from the classic view of recombination in at least one important way. Recognizing the agnostic nature of digital technology (Yoo et al., 2010), we adopt a non-essentialist view of the nature of digital resources. Consistent with the view of ontology proposed by DeLanda (2006), a digital resource can be seen as characterized by relations of exteriority, meaning that its function and significance is influenced by its relations to other digital resources in the form of value paths.[2] If a digital resource is part of multiple value paths, it can then assume different functions depending on the way it relates to other resources. Compared to the modular system in which a part relates to the whole in terms of a logically necessary relationship (DeLanda, 2006), such as in a hierarchy-of-parts frame (Henfridsson et al., 2014), the relationships between digital resources are only contingently obligatory (DeLanda, 2006; Um, 2016).

Necessary relationships between the parts and the whole imply a bounded product where each part exhibits certain qualities that necessitate its place and function in the design hierarchy (cf. Clark, 1985). It has a ready-made shape offered by a firm as a discrete entity to a customer adopting or rejecting it in use. Novelty, which might increase the number of users adopting it, is achieved through changes to the product through recombination done by the firm. However, while "the relationships between the product and its components are nested and fixed" in a modular architecture (Yoo et al., 2010, p. 728), the agnosticism of digital resources makes such relations only contingently obligatory (DeLanda, 2006; Um, 2016). Contingently obligatory relationships imply that any digital resource, when provided as part of a firm's offering, may become a constituent of many different user value paths as it is recombined and made meaningful by different users. Novelty thus emerges around the digital innovation through recombination of digital resources performed by both firms and the users.

This reasoning paves the way for making a distinction between design recombination and use recombination.

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[1] We refer to firms in a broad way here. Examples are service innovators, third-party developers, and platform-based businesses.
[2] DeLanda's (2006) more encompassing term is "assemblages".