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Modular path customization and knowledge transfer: Causal model learnings

Wilfrid Azan[a,*], Silvester Ivanaj[c], Olivier Rolland[b]

[a] Faculty of Economics and Business of Lyon, COACTIS and UMR BETA CNRS, Quai Claude Bernard, 69000 Lyon, France
[b] Faculté de droit, de sciences politiques et de gestion, 1, Place d'Athènes, 67000 Strasbourg, France
[c] Department of SCM and IS, ICN Business School, CEREFIGE, 13 rue Michel Ney, 54000 Nancy, France

1. Introduction

Does a modular path customization improve the knowledge transfer output for Information System (IS) users? In 2018, the French prime minister hired a brain knowledge expert in order to forecast the coming (artificial) intelligence and knowledge revolution. The objective is to translate it into public policy. The forthcoming changes will be so important that the knowledge as well as its creation and spread within organizations will be a major challenge in terms of industry competitiveness and economic growth. Scientific publications addressing company fusion and acquisition initiated the analysis of the challenges, but there is need now to understand the mechanism both on an individual and organizational level.

On the one hand, in neurology, the modular organization of the human brain is well established (Kandel, 2013), where this cognitive characteristic is central for the development of new software (MacCormack et al., 2006). On the other hand, some questions remain in regards to mechanisms at work during knowledge transfer and software characteristics that should be met to enable an efficient transfer from a knowledge source to its recipients.

We can define knowledge transfer as the predominant factor in firm performance according to knowledge-based view theory (Villasalero, 2016; Hapeslagh and Jemison, 1991; Inkpen, 2000; Narayanan et al., 2009; Azan and Sutter, 2010). The literature has already provided insights into inherent convergence between human brain decision cognitive aspects, biologically based brain cognitive modularity, product development and usage of modular industrial products fitted to customers modular-based decision cognitive processes (development, use and impact, Baldwin and Henkel, 2015). Nevertheless, due to the limitations of IT technology, the expected modularity of software, applied for a long time to industrial products, has been very slow to reach the expected level required for efficient customization of the cognitive path of users (MacCormack et al., 2017). For Chen and Lee (2003), IS helps users to build mental models of their environment by providing a consistent, layered and standardized information framework, but they provide little help in adjusting this framework for an efficient knowledge transfer from the source to the user mental models. A human-computer interactive environment is ideal when the computer plays a more active role in facilitating a relevant and adaptive knowledge transfer.

Despite numerous scholarly publications in the field of Management Information Systems (MIS), few knowledge transfer concepts and customized path design studies have been put forward. Thus, the development of modular paths that guide user knowledge sourcing decisions in the face of abundant information seems to be a necessity. The development of these predefined cognitive paths is *terra incognita*.

A solution to the user knowledge sourcing issue is to take into account human brain modularity and user diversity, which creates uncertainty. According to Voss and Hsuan (2009), modularity refers to the schematic by which interfaces shared among components in a given architecture are standardized and specified to allow greater reusability and commonality (or sharing) of components among product families. It can also be seen as the degree to which a system's component can be recombined (Schilling et al., 2003).

Personalization is different from customization. Sundar and Marathe (2010) indicated that personalization is system tailored whereas customization is user tailored. In this study, we introduce the concept of Degree of Modular Path Customization (DMPC). The modular bundling of knowledge content enables a steeper learning curve, which relies on the capacity of the individual to decompose the perceived complexity of the knowledge to be acquired in small elements (Cohendet et al., 2005; Eom, 2011; Langlois, 2002; Von Hippel, 1990).

In the literature, modularity of products has been widely studied and is mostly associated with a drop in uncertainty (Baldwin and Henkel, 2015; Sanchez and Mahoney, 1996). According to this, modularity is primarily organizational, while the cognitive aspects are secondary. Therefore, the cognitive dimension is seldom taken into account (Cohendet et al., 2005; Davenport and Prusak, 1998).

Customization of modularity-based knowledge transfer implies user-specific page generation and/or user profile-adjusted software development (Azan et al., 2017; Cohendet et al., 2005). In that case, the knowledge transfer cannot be standardized and should incorporate

* Corresponding author.
E-mail addresses: wilfrid.azan@univ-lyon2.fr (W. Azan), silvester.ivanaj@icn-artem.com (S. Ivanaj).

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