



EDITORIAL

Design Science for Business Management

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This issue of the Journal of Integrated Design and Process Science explores the connection between design science and business management. The relationship may not be obvious since it is rather subtle in some instances. However, the nature of problems that design science is confronted with is analogous to the nature of problems business management tackles. Both design science and business management, are concerned with open ended solutions rather than closed solutions and one correct answer. Also, both disciplines' approach to finding solutions is process oriented. The process may involve taking two steps forward and, after finding the outcome not satisfactory, taking one step back – simply because there may be not just one correct answer but rather several answers differing in quality. Creativity and the selection of one of a variety of options constitute the essence of product design; consequently, exploring the connection between design science and business management can benefit both of these complex disciplines and also enhance the innovation of organizations.

The first paper in this issue is entitled “Towards Formalizing and Formulating the Successful Organizational Innovation Process.” The authors, while pointing out the importance of innovation as the main factor of successful organization, present the application of a design model to a model for innovation processes. The model is able to separate two aspects of innovation, namely, the innovation process and the organizational innovative behaviour. Furthermore, the Axiomatic Theory of Design Modelling is used to analyse the organizational innovation process from a design point of view. The paper demonstrates clearly that strategic planning methods (business management) are similar to product design methods. At Concordia University in Montreal, it was shown that Design Thinking can be used as a basis for organizational innovation change (de Guerre *et al.*, 2013). The organization on which the study was performed was the School of Extended Learning. The change process that resulted had four phases, namely, Connect, Innovate, Design, and Implement. The resulting organization (School of Extended Learning) had innovation design and Design Thinking fused into the organizational infrastructure.

The second paper, “Engineering Design as Hearing,” uses the metaphor of “Hearing” to approach the teaching of design. The author presents the pedagogical challenges and opportunities related to the introduction of design into the engineering curricula, pointing out the differences between open-ended problem/solution sets (central to design) and closed problem/solution sets. By nature, the open-ended sets typical for design are more vague and abstract. Therefore, the use of metaphor is particularly effective for

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improving the understanding of design situations. It is an especially useful tool when teaching engineering design, since most design concepts are abstract. Through their images, metaphors make abstract concepts more tangible. The effectiveness of metaphors is confirmed by Hey et al. in their analysis of metaphors and analogies (Hey *et al.*, 2008). They call metaphors “effective vehicles for communication among design teams”. Their research also shows that the use of metaphors is cross-cultural. This is an important facet in a global economy, where businesses perform their design activities using multiple teams in multiple countries. The author demonstrates that learning to design is analogous to learning to hear. In learning how to hear, one must learn to focus on sounds that are important while paying less attention to less important sounds. Correspondingly, in learning how to design, one discerns only information that is important while paying less attention to less important information. The metaphor cannot only provide insight into ways of teaching design, but also into ways to approach business management.

The third paper is entitled “The Green Quality Function Deployment method for Business Management”. Here, the authors demonstrate design methods that can be used for business management. The authors present the common denominator between design and business management the fact that design is usually product design; this means design that is based on customer needs and decision making methods, while business management implies strategic planning methods to identify business needs and business concepts need to be selected. The Green Quality Function Deployment method, an integrated design method, is applied in a business management case study. For this study, three hypotheses are constructed and, after analysis, are all accepted. The authors conclude that design science can be used (1) for business management, (2) to identify business needs, choose business concepts, and create business processes, and (3) improve customer satisfaction, business quality, and business success. Another aspect where design science plays an important role in a business or an organization is in the design and analysis of information flows within the organization. All organizations aim to construct efficient information flows in order to be effective and stay competitive. An accurate setup of information flows enhances the efficiency of a value chain, which increases the fluency of the continuous decisions made in the organization. It has been shown that design science has the ability to construct a method design and to analyse, and diagnose information flows in an organization (Rosenkranz & Holten, 2011).

The fourth paper, entitled “The Evolution of Management Information Systems: a Literature Review,” also describes the application of design methodology to business management. The author starts by identifying the challenges to the traditional Management Information System (MIS). Then, using the Environment-based Design (EBD) methodology, she demonstrates how the challenges to MIS have been addressed. The author explains how design methodology caters to the complexity of MISs. She points out that the application of EBD not only transformed the classical MIS pyramid, but also shows the interrelationship of the various systems composing it. Thus in the process, EBD is coupled with the MISs evolution. The challenge of complexity of development activities in companies, especially global companies, is becoming a common problem. It is a problem that can be approached with an information systems design product theory (Käkölä *et al.*, 2011). Käkölä and co-workers (2011) developed an Information Systems Design Product Theory for requirements and release management system for global company with multi-sites and multi-partners. In the fourth paper, the author is able to provide (1) a framework that easily describes the MISs evolution, and (2) paths of how the MISs interconnect. The design influenced framework is described as possessing not just academic, but also practical meaning.

All four papers in this issue clearly illustrate the applicability of design science to business management. The complexity of both disciplines will only increase as information overflow and complex global connections and competitiveness increase. Consequently, new inspirations are necessary to tackle this development; transdisciplinary connections between design science and business management offer a solution.

References

- de Guerre, D. W., Seguin, D., Pace, A., & Burke, N. (2013). IDEA: A Collaborative organizational design process integrating innovation, design, engagement, and action. *Systemic Practice and Action Research*, 26(3), 257-279. doi: 10.1007/s11213-012-9250-z
- Hey, J., Linsey, J., Agogino, A. M., & Wood, K. L. (2008). Analogies and metaphors in creative design. *International Journal of Engineering Education*, 24(2), 283-294.
- Käkölä, T., Koivulahti-Ojala, M., & Liimatainen, J. (2011). An information systems design product theory for the class of integrated requirements and release management systems. *Journal of Software Maintenance and Evolution-Research and Practice*, 23(6), 443-463. doi: 10.1002/smr.492
- Rosenkranz, C. & Holten, R. (2011). The variety engineering method: analyzing and designing information flows in organizations. *Information Systems and E-Business Management*, 9(1), 11-49. doi: 10.1007/s10257-010-0127-3

Author Biography

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