

A NeuroDesign Model for IS Research

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Little NeuroIS research has studied the cognitive tasks of performing the design Build activities (vom Brocke et al. 2012). While we recognize the existence of a vast neuroscience literature examining the locations in the brain that are activated by the processes of creativity, insight, design, communication, collaboration, and control (e.g. Dietrich 2004; Srinivasan 2007), our aim in this presentation is not to exhaustively plumb such depths but rather to initiate an investigation on how to apply this extensive neuroscience knowledge base to design research activities of building innovative IS artifacts. We propose a conceptual model of the design activity that highlights four key cognitive constructs essential to successful design research. The model strives to align the epistemological challenges evident in mainstream neuroscience with the specific opportunities that neurophysiological imaging techniques present the design researcher.

We posit that *Build* remains the most ill-defined and ‘arbitrary’ activity in design research. Here is where human cognitive (e.g. complexity, creativity, control) and social (e.g. collaboration) traits work together to design novel artifacts to improve the human condition. As shown in Figure 1, we model the design activity as an iterative process with three key flows:

1. From an external problem space to an internal problem space via problem requirements;
2. From the internal problem space to an internal solution space via candidate designs; and
3. From the internal solution space to an external solution space via use artifacts.

The human design team performs within this process through cognitive interactions at critical points in the flow as illustrated in Figure 1:

1. Structure Problem – What cognitive strategies are used to deal with the *complexities* of the problem space? How does the brain search the problem statement for potential solution patterns while finding effective representations of problem structure?
2. Produce Novelty – How does the brain *create* new ideas for the production of innovative design candidates?
3. Manage Refinement – How does the brain *control* the assessment of candidate designs and search for the ‘best’ designs to instantiate as use artifacts?
4. Achieve Consensus – How do humans *collaborate* with others on the design team and with design stakeholders throughout the design process?

The model emphasizes the iterative interplay of action and interpretation (doing and making sense) rather than merely the influence of evaluation on choice (Weick et al. 2005, p. 409). The model provides a basis to ‘broker’ and realign neuro-scientific theory and IS design research. The emphasis on the design Build process provides a tenable empirical focus but without the dependence on reified artifacts-in-use – as has been the case to date in NeuroIS. The emphasis in the model on the interplay of ‘doing’ tasks and ‘making’ sense focuses directly on the task at hand and in mind. These iterations are manifest in four interactions, each of which has a set of important cognitive challenges which we explore. Use of the model to guide NeuroDesign research presents a number of fruitful opportunities to extend the use of neuroimaging techniques in design research beyond the evaluation of IT artifacts. The model also highlights the potential of design as an empirical context to identify, frame, and address some of the limitations of prior studies of complexity, creativity, control and collaboration that, to date, have stymied mainstream neuroscience.

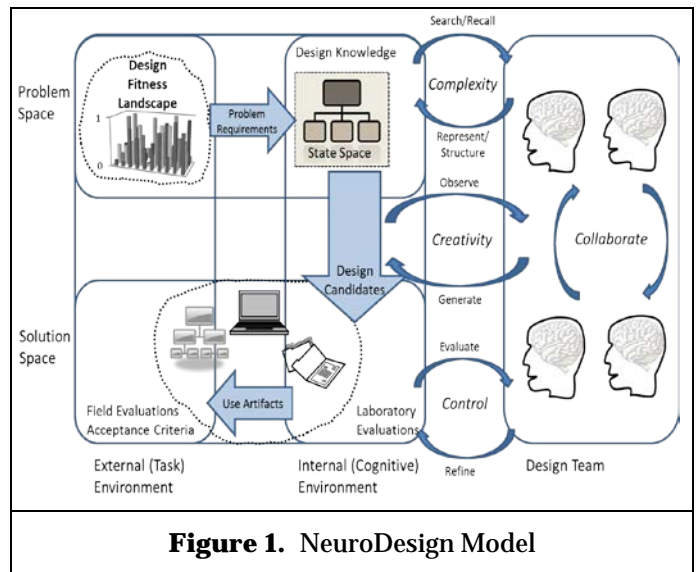


Figure 1. NeuroDesign Model

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