

Activity as the Object of Design

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It is common to think of design as problem-solving directed at the creation of artifacts, and to think of the artifacts created as the outcomes of design. Thus, one “designs” a database, and the database is (or is an instantiation of) the “design”. This narrow view may be a useful simplification when one is buried in the inner loops of rendering a specification into code. But it is highly problematic as a definition or scoping of the concept of design, particularly as applied to interactive systems.

When one is designing an interactive software system, one is designing the human activity that is afforded by that system. The intermediate technical artifacts that are created, like specifications and code, are of consequence only insofar as they enable activity that is desired and desirable, and curtail activity that is unpleasant, dangerous, or otherwise undesirable. All that matters in the design of interactive systems is the impact on end users and other human stakeholders.

This is not merely a re-labeling of what was “always” called requirements, because requirements are still typically just lists of functions to be achieved by code. Requirements, understood narrowly, are also merely intermediate design artifacts with no independent significance.

“Requirements” could be reconsidered more fundamentally of course; the terms and concepts of systems design and engineering are in perpetual contention. In particular, it has been argued widely in contemporary requirements engineering that a broader notion of requirements is needed – for example, couching requirements as user and organizational scenarios to be achieved by the system. Scenario-based approaches to requirements development are a current example of how design practices are beginning to systematically embrace a broader view of what the design of interactive systems is about.

My position is that an NSF program for the science of design with respect to software-intensive systems should take seriously the broad view of what design is about, namely, enabling new possibilities in human and organizational activity.

Note that this position is entirely different from a stance that construes the real business of design science narrowly (in the sense I use above), but appends commitments to evaluate the usability of designed systems or to assess the impacts of designs on society. My position is that the broad view of design should be engaged proactively and formatively as an integral part of design conception and development, and not merely as part of gauging design outcomes.

On my position, understanding people, their contemporary work activities and tools, and their organizations is where effective design interventions must begin. It is important to bear in mind that most new designs are not adopted, and those that are adopted are frequently also adapted (that is, redesigned to some extent by the users). Successful design interventions transform work activities and tools; in a longer timeframe, they transform people and organizations as well. Ultimately, successful designs are incorporated into human activity systems. And the cycle can begin again: Assessing and understanding the adoption, utilization, and impacts of new activities and tools on people and their organizations is primary data for a science of design.

Many research implications follow from adopting this position. Thus, taking activity as the object of design highlights possible relationships between behavioral and social science, on the one hand, and design science, on the other. How can behavioral and social science results be applied in the design of software intensive systems? And how can the design process be a source of new insights into behavioral and social science? At what levels of detail should human activity be described for various purposes in analysis and design? When and how is it useful to create rationales for design decisions grounded in social and behavior science?

This position also raises many engineering and pedagogical issues. What quality measures are enhanced by taking user activity as the object of design? What design process costs are increased? How does technical (aka narrow) design benefit from being embedded within an activity-driven design context? Do we get better technical (aka narrow) designers if we expose students to a broader view of design at an early point in their training?

Author's Background Relevant to the Workshop.

I have been interested in understanding and supporting software design work for 25 years. I have worked to apply the insights and methods of cognitive science to the problems of emergent requirements in design. I developed the minimalist model for information design (as in my 1990 book *The Nurnberg Funnel* and my 1998 book *Beyond the Nurnberg Funnel*) and the concept of usability specifications (as in my 1991 book *Designing Interaction*). In my 1996 edited book – with Tom Moran, *Design Rationale*, I developed the proposal that better integrated and more analytic documentation practices might be instrumental in developing a science of design. My recent work continues this theme, investigating the identification and management of specific consequences for users in key scenarios of interaction. This has become the foundation for scenario-based design (as in my 1995 book, *Scenario-Based Design*, my 2000 book *Making Use*, and my 2002 book – with M.B. Rosson – *Usability Engineering*).