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Introduction to This Special Issue on Understanding Design Thinking

Scott R. Klemmer\textsuperscript{a} & John M. Carroll\textsuperscript{b}

\textsuperscript{a} University of California, San Diego  
\textsuperscript{b} Pennsylvania State University

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Introduction to This Special Issue on Understanding Design Thinking

Scott R. Klemmer¹ and John M. Carroll²

¹University of California, San Diego
²Pennsylvania State University

The design of artifacts and how designers make them have garnered renewed societal interest as interactive technologies create new opportunities and challenges. The world we experience has never before been as diverse, socially and materially, or as malleable as it now. Increased computation and interactivity are changing the appearance, evolution, and interactions of the personal and collective artifacts that shape our everyday experiences, family and community life, and learning and work activity. These digital artifacts increasingly leverage sensing and physical interaction to provide information at our fingertips and connect us to people around the globe. This new generation of digital technologies gives people a great deal of discretion as to what artifacts and services they use and how they use them (Grudin, 2005). Adoption and appropriation of new digital artifacts is increasingly part of everyday life, and this change draws our attention—and sense of curiosity—to how these artifacts are designed.

When we talk about designing, we share Herbert Simon’s (1969) broad view that “everyone designs who devises courses of action aimed at changing existing situations into preferred ones” (p. 129). The articles in this special issue can usefully be read with that broad view of design. That said, we and the authors focus on design professionals, students, and researchers as canonical instances.

As computational artifacts take on new shapes and play new roles, so do designers (Moggridge, 2007). Designers of digital artifacts face more complex constraints than, say, furniture designers a century ago. Their work must integrate diverse considerations, physical and mechanical engineering, software engineering, user interface design and user experience, and aesthetics, as well as diverse culture and human values (Dreyfuss, 1955). The position of design and designers at the nexus of so many complex...
issues has led to designers playing larger leadership roles in many organizations (Kelley, 2007). Furthermore, designerly strategies—such as brainstorming, prototyping, and storytelling—are being used and advocated as a means for organizations to manage this complexity (Brown, 2007). Design programs in universities are expanding; and new programs, some focused specifically on digital design, are emerging. Student demand for such programs is growing. As design thinking strategies are adopted and adapted globally, the endeavor and value of design is interpreted differently across cultures (Irani, Dourish, & Mazmanian, 2010).

This current wave of enthusiasm gives design practices a tremendous opportunity for impact, and herein lies the challenge. Currently, many espoused design practices are faith based rather than research based (Pfeffer & Sutton, 2006). Although the design fields have had enormous impact, we think nearly everyone who has taught design has wished for more and better principles of effective design practice to help guide students. Why the gap? First, some see design as a mystical endeavor, because creative work is clearly complex and multifarious (Fallman, 2003). This complexity leads many people to give up on creating, applying, or adapting existing theory. Second, much of the theory that bears on design is really social science (Norman & Klemmer, 2014). At many universities, the social and behavioral sciences are across campus from the arts and engineering programs that house design, and even further away intellectually.

Design practice is also changing through the increasing availability of data about how people use digital tools. Network-connected software, especially network-hosted software, is the major catalyst for usage logging. This provides designers with a previously unavailable window into human behavior at scales from the individual level to that of the crowd (Kohavi, Longbotham, Sommerfield, & Henne, 2009).

Furthermore, design is traditionally viewed as a means of reducing entropy and ambiguity through problem solving (Simon, 1969). This order-creating view of design is being creatively repurposed and upended by design activities that use artifact creation as a means of revealing hidden assumptions, invoking surprise, increasing ambiguity, and/or engaging in political activism (Zimmerman, Forlizzi, & Evenson, 2007).

We seek descriptions and theories that can guide design practice and explain design outcomes. What new connections can we draw between existing, but currently disparate, design knowledge? What parts remain relevant, and which are outdated? What new research is needed? These questions have led to “water cooler” discussion and academic investigation in human–computer interaction and other fields, including business, psychology, education, and computer science. Some of these conversations address enduring fundamental issues in design (Cross, 2006). Where do ideas come from? How do designers develop expertise? What role do/might physical, digital, and conceptual tools play in designers’ individual and collaborative practices? Other conversations explore how design is changing or could change in light of new technical capabilities, social contexts, and reconceptualizations of design’s role. These changes also open new possibilities for reimagining design tools, places, and practices—such as how might one “sketch” embodied and social experiences and how the design studio may change in the age of the Internet and pervasive computing (Klemmer,
Hartmann, & Takayama, 2006). Given these trends, it is timely to revisit fundamental thinking about design, and the articles in this special issue address these questions and more.

**ARTICLES IN THIS SPECIAL ISSUE**

This special issue solicited articles that reposition our understanding of design thinking. We received more than 50 thought-provoking abstracts that convey a groundswell of interest from diverse fields, involving discussions and theories that integrate ideas across multiple disciplines and literatures. Methodologically, submissions included controlled experiments, field studies, participant observation, case studies, and new tools that instantiate and investigate theories of design creativity.

With the guidance of excellent external reviewers, we have selected four articles for publication that illustrate this breadth, exploring the knowledge and practices of interaction design; strategies for designing interactions (with artifacts and with people), and empirically investigating the relationships between variables that influence design processes and outcomes.

The first half of this special issue explores current and potential design practices through retrospective interviews and case studies. One major shift in design has been the concept of context (Moran, 1994; Moran & Dourish, 2001)—both the setting that designs are embedded in, and the sensing and inference that computing systems enable. Bauer, Newman, and Kientz report on interviews with designers of context-aware systems, finding that shifts in both types of context transform prototyping practices, and the authors use these data to refactor the developer–designer relationship. To our opening questions, this article provides one example of how design practices have changed to take advantage of new technological opportunities.

Sketching and prototyping—the externalization of ideas in “rough” artifacts—are central to design (Buxton, 2007). Snyder and colleagues provide three case studies illustrating the use of visual narratives in the design process. They highlight how sketches, photographs, and visualizations facilitate conversations with design stakeholders. By describing how visual media help design teams think, and comparing this to visual media usage in other fields, their article helps articulate some broader opportunities for impacting design thinking. This article surveys existing practices of visual scholarship, and highlights interesting connections between traditional uses of visual media and new possibilities enabled by information visualization and smart, sensor-rich devices like mobile phones.

The second half of this special issue empirically explores design ideation and feedback, especially for helping students learn. It is often difficult to assess the efficacy of a design. It can be even more difficult to articulate the yardstick for success, and clear yardsticks are important for effective design teaching. Absent clear principles, novices (like students) are especially reliant on the guidance and feedback of teachers and experts. Integrating students into the evaluation process can increase student
engagement and decrease the staff’s grading burden, especially for large classes. However, peer assessment systems often suffer from uneven student diligence. To address this, Miller, Bailey, and Kirlik introduce a peer-assessment scheme that increases reliability by asking student raters to estimate the distribution of their peers’ responses. Their article shows the application of their “truth serum” approach in a design class. This approach shows great promise for increasing student engagement and peer review quality. In doing so, this work provides new avenues for building expertise in creative fields.

Where do design ideas come from? Which ones get followed up on? How does this ideation-evaluation dialectic vary with expertise? Kim and Ryu’s article also looks at assessment but focuses on the ideation aspect of the design process. They explore differences between the way professional designers and design students evaluate and revise design ideas as they create them. Design comprises a problem framing and a problem-solving component, and Kim and Ryu shed light on expertise differences in both parts of the process.

These articles also take a valuable step forward in synthesizing a literature on design. When you read the articles, we encourage you to check out the references as well as the contents. You’ll see diverse fields represented and integrated—from philosophy to the social and behavioral sciences, business, and engineering. All four of these articles do an impressive job drawing new connections between previously disparate literatures, and in doing so provide us with a much richer understanding of design.

A better understanding of sensitive and creative design practice—in the form of empirical investigations, theories, and design tools—has a tremendous opportunity for impact on people, organizations, and society. With your help, this special issue aids gathering and extending our knowledge of these important issues. We encourage you, the readers, to have your own conversations about design. We hope that practitioners and researchers will find in these articles useful frames for reflecting on design as it is, and providing guidance for design as it might be.

Creative professionals make many decisions about how to allocate time, money, attention, personnel, and other resources. Practical theory can help design professionals and teachers predict outcomes, choose more wisely, and be more creative. Although we have a long way to go, there is also a lot we can draw on, and we hope you’ll find that this special issue brings you—and the field—one step further along the journey.

REFERENCES


**ARTICLES IN THIS SPECIAL ISSUE**


