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Framing IxD Knowledge

Insights

→ At a recent CHI conference we discussed what forms of knowledge RtD might produce, including various forms of intermediary design knowledge.

→ We created an agenda for moving forward with two calls for action: to identify the criteria by which the work we do should be judged, and to have these criteria spread to and accepted by the community.

Interaction design (IxD) research cuts through many domains of HCI (work, leisure, games, health applications, ubiquitous computing) yet remains distinctive. There are convincing arguments that Research through Design (RtD) is a valid research method in our field. Important to these arguments is how RtD allows IxD researchers to actually do design as an empirical method to gain knowledge, rather than aligning with the user study tradition. But the early articulations of RtD did not specify how to articulate, validate, and constitute the knowledge gained through design research.

At a recent workshop at CHI [1], we asked ourselves what forms of knowledge this designerly approach might produce and, in particular, why there have been so many recent proposals of *intermediary* design knowledge forms. Here, we collect four key themes that emerged from this workshop and highlight some of the reflections and recommendations of the participants (who of course were not necessarily in agreement on any point!).

Why are we discussing intermediary design knowledge forms so intensely right now? While RtD liberated design researchers from

having to fit with the first-wave science focus of HCI, its early articulation did not tell us exactly how to turn our designerly explorations into a research method that was rigorous and well-documented enough to be shared and available for scrutiny. Nor did RtD tell us how to articulate the gained design knowledge so it could be shared and scrutinized, and allow design researchers to engage with and build on one another's contributions. While it was always obvious to anyone involved in a design process that it generates knowledge and insights of a particular kind, the HCI field was struggling with making sense of the designs that were produced and presented. To an outsider, it might have looked like a string of designs, one after another, not generating any knowledge that built on prior insights. IxD researchers had to become clearer in their articulations. Recently, a range of different intermediary knowledge forms (e.g., [2]) have been proposed: *strong concepts*, *experiential qualities*, *annotated portfolios*, *design programs*, *manifestos*, *conceptual constructs*, and *bridging concepts*. Despite these, the field is still struggling with how to express knowledge and insights that concern aesthetics, design skills, designerly knowledge, politics, values, and other intangible key ingredients in IxD practice.

At the workshop, these intermediary forms were seen both as promising and as a potential liability, given that they may undermine the importance of the designs themselves, removing some of what makes IxD research insights unique. In a sense, the intermediary forms of knowledge reflect an anxiety about how IxD fits into the order of disciplines, how it establishes legitimacy.

At the same time, there is a pressing need for us to teach what we have learned from our research. We need to train many more designers and engineers in design thinking, because digital materials pervade almost every corner of our society. Our teaching must become more substantive and relevant to research practice. That is, we need to articulate what we have learned to be able to teach the next generation of IxD researchers. All the while, design practice in industry is flourishing; we note how design practitioners have working toolkits and repertoires of solutions they carry from one design problem to another.

We need to foster a dialogue where we not only articulate knowledge but also discuss and teach reading this knowledge as part of academic endeavor. What do we mean by this? Let us make a comparison with architecture, a sister discipline. In architecture, the starting point when teaching is often an individual artifact: *look at this particular building; it is in a typical Bauhaus style*. This is then followed by a discussion on qualities, aesthetics, and functions—in other words, design criticism. Given the many IxD examples to which we have access today, we can finally start teaching ways of reading design knowledge in a similar manner in our field. To do so, we first need to recognize how a design will never "stand on its own" but rather is enmeshed with a whole range of values, politics, aesthetic traditions, and specific design schools. In industry, we see, for example, the Apple school; in academia, we note the different aesthetics carefully crafted in the different design studios. Form, materials, computation, and interactive/experiential qualities all come together in particular schools.

Hopefully this leads to more rigorous treatments of what the designs do in our lives, inviting criticism and fostering a rigorous academic dialogue. (That is, rigorous ways of thinking, not rigor in how we do design.) Extracting all this knowledge from specific designs is what is happening through the discussion on intermediary design knowledge forms—but it cannot and will not replace the need for specific design examples.

How do we document and rigorously scrutinize design processes? It has been argued that design constitutes a particular paradigm of inquiry, and that a researcher's engagement in a design process can therefore bring about distinct ways of knowing. The experiential knowledge obtained through engaging in design activities we may label first-order knowledge: subjective insights and understandings pertaining to particular situations. This knowledge may to some extent be communicated and represented, for example, through written accounts. However, such representations, which can be considered second-order knowledge, are inherently of a different nature. This is well known in design education, where Donald Schön, among others, has argued for learning through a reflective practicum [3], in which an aspiring designer builds up a personal repertoire of knowledge through engagement in design projects.

While first-order knowledge is crucial to design practice, it should not overshadow the need for our IxD research community to articulate the many forms of design knowledge that can be extracted from design processes. This includes knowledge about the object that is being designed, the situation into which it will eventually be introduced and the process to establish a proper fit between the two, the acts and considerations of designers, and the interrelations among all these components.

IxD is unique in that it represents a distinctive way of knowing about the relationship between the concept of a potential product and how it might fit with the world, but as a research field it still lacks the means of exploring, documenting, and discussing this knowledge. We need to develop both better ways of capturing the specificity and richness of design processes beyond anecdotal evidence, and better formats for communicating, contesting, and developing this knowledge in academic fora. The development of novel formats such as pictorials, which are now accepted as an archival format at events such as the Designing Interactive Systems conference, represents an important

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step in this direction.

Yet beyond these initial attempts at format changes, IxD knowledge remains broad. It is unclear exactly what the outcomes can be and how wide the scope of those outcomes is.

Communicating IxD research knowledge to others. The workshop's third discussion theme picked apart how the different forms of knowledge outlined here are communicated to others. Setting the problems of representational forms aside for the moment, there are many who could potentially benefit from IxD knowledge. This knowledge can have relevance to designers, design researchers, researchers in other disciplines, and design and design research educators. The challenge is ensuring that such knowledge (or *knowing*) has utility to each of these practices or, more particularly, is understandable to them.

IxD research knowledge is typically shared via what is made, reflective accounts of design and use, and discussions relating these elements to other design research (within and outside the same program) to develop nascent theories such as strong concepts, mappings, frameworks, and annotations. How, then, can designers, researchers, and educators understand the knowledge/knowing expressed in such artifacts, accounts, and theories? We suggest that misunderstanding the nature of these knowledge forms, particularly by researchers less familiar with design, is a barrier to IxD knowledge being more widely accessed.

Designed artifacts cannot "contain" knowledge as if it were a magic ingredient. Yet academic papers, for example, do seem to contain knowledge and artifacts can encourage action and reflection, and inspire further design work. The answer to this apparent contradiction is that neither contains knowledge; rather, their makers express and develop their knowing/knowledge in their creation. An appropriately skilled audience can appreciate this knowing/knowledge and develop their own. Just as readers of academic papers approach them based on their familiarity with the epistemological and methodological positions presented, the conventions of academic writing, and the medium of printed text, so too do "readers" of artifacts understand them based on their familiarity with the products of design and how they are used and designed. Artifacts make sense within the language game of design and use but can be problematic when used in the language game of scientific research.

Written accounts of design and use have a further complication in that they are unable to capture the tacit knowing present. This is not to say that such knowledge cannot be communicated—rather, that it depends on expression through the practice itself. Tim Ingold makes a distinction between knowing and telling in this respect, describing how a maker's ways of knowing and doing can be told by hand [4]. Artifacts have another role here in explicating the process of design in terms familiar to the design language game.

Intermediate knowledge forms such as strong concepts and annotated portfolios then also make particular sense within the language games of design and design research. They depend on a particular appreciation of what such theory is *for*—generative principles combining understandings of the real, true, and ideal [5] to support investigations of *what may be* rather than simply *what is*.

It is no surprise that intermediate knowledge from IxD research (and its constituent artifacts and accounts) is then more readily understood in design practice and design research practice. The challenge is thus in making it understandable in other practices/ language games.

The legitimation of IxD knowledge in HCI and beyond. Every scholarly discipline operates with a set of criteria by which its potential for doing good is socially recognizable. For example, philosopher of science Harold Kincaid identifies several "symptoms" of good science: It is *evidential* (i.e., based in evidence), *explanatory* (i.e., getting at causes, as opposed to offering mere descriptions), and *formal* (i.e., organized axiomatically into theories) [6].

The question of legitimation for knowledge in IxD research, then, is to identify its symptoms of excellence. Such qualities will help this community of researchers pursue their own projects while guided by the highest standards, help peer reviewers assess the quality of paper/grant submissions, help identify the best of what we do, and help the research community build on one another's contributions to foster a research culture and to advance knowledge within the domain.

Our view is that legitimation in IxD research is an ongoing challenge. At present, we understand this as both an internal and an external challenge. The internal challenge is for those who identify as IxD researchers to form as a community around a set of widely recognized criteria. The external challenge is for members of that community to speak more broadly to other closely related research communities, for example, human-computer interaction (HCI), design theory, and media studies, among others.

Central to both of these challenges is the highly interdisciplinary position of IxD research. For example, this article emerged from a workshop at ACM CHI, an HCI conference whose epistemological commitments are interdisciplinary but historically scientific. Yet the composition of the participants was more diverse than the label "CHI workshop" might suggest: In the room, in addition to social scientists and computer scientists, were also designers and humanists—all self-identifying as IxD researchers in the CHI community. We view this intellectual heterogeneity not as a problem to be solved by "purifying" the label, but rather as an asset. And yet, somehow, as a research community, we must build at least broad consensus in the criteria by which we recognize IxD research as such (in the first place) and as a good or bad instance of it (in the second place).

A similar but not identical problem is how we legitimate this research beyond our immediate community, for example, to computer scientists in the CHI community, designers in industrial design or architecture, social scientists in science and technology studies (STS), humanists in digital media studies, and so on. The need to do so is a reflection of IxD research's situatedness in other communities— where we publish our research, apply for research grants, hold institutional affiliations, and so forth.

All of this raises another problem, however, which is the extent to which this inside/outside distinction between what we consider our immediate community and what we consider beyond it is warranted or desirable. On the one hand, participants agreed that this distinction intuitively reflected our daily life. For example, in seeking research grants, many of us apply to agencies in computer science, and therefore, as a practical necessity, we have to legitimate our methods and outcomes in terms recognizable by that discipline. Practically, this means that in addition to presenting our research processes and outcomes, we often have to do additional bridging work to articulate how our research is legitimate and contributing according to the prevailing standards of the external field—an almost defensive move that can serve as a distraction. On the other hand, we hope to contribute to the research agendas of computer science, design, digital media studies, and science and technology studies—not as outsiders but as full-fledged members of the community. Yet to assert that full-fledged member status before it is justified is to invite misunderstanding.

The impact agenda we identified for IxD research, therefore, is to transition from our present sense of inside/outside, in which we are a micro-community speaking to a broader research community that does not quite understand us, toward a more full-fledged integration into those research communities. In some ways, this is a common trajectory of interdisciplinary researchers engaging the CHI community, for example, the rise of ethnography in HCI and the issues of legitimation it faced [7].

To get from here to there will require two key developments:
• We (the internal we) still need to do some work to identify the criteria by which the work we do should be judged. This agenda item is well underway, with studies on various forms of *design-based research practice*, including RtD, annotated portfolios, critical design, speculative design, design fictions, and studies of *design-based knowledge*, including strong and intermediate concepts, design thinking, design criticism, and so forth.
• The criteria developed/identified in the previous item need to be communicated to and absorbed by the broader research community. Such a process is more likely to succeed through collaboration and integrative practices, rather than defensive speech acts written as if from the outside. There is evidence at least in HCI that there is curiosity and sympathy—but also a fair amount of confusion—about what design research looks like as a practice and what sorts of knowledge outcomes it can produce. As a community, we can leverage that interest to foster interdisciplinary collaborations in which design-based research is one methodology among others, and strong/intermediate concepts and/or annotated portfolios constitute one research outcome among others.

Our sense is that the legitimation agenda is already in progress, with the first key development appropriately a few steps ahead of the second. We hope that work such as this helps clarify and lend momentum to that agenda.

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ENDNOTES
1. These authors summarized the discussions at the workshop on behalf of all the participants.
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