

On Tacit Knowledge in Design Research

Daniela Petrelli

Art & Design Research Centre

Sheffield Hallam University

153 Arundel St., Cantor Building, Sheffield S1 2NU, UK

d.petrelli@shu.ac.uk

ABSTRACT

In this position paper I argue that the definition of intermediate knowledge for interaction design should start from an understanding of what knowledge is, should look at the specificity of knowledge in design, at the way such knowledge develops, and what is the outcome. The format of the intermediated knowledge representation needs then to invite and uphold the rigour of research for the community to accepted design practice as research.

WHAT IS KNOWLEDGE, ANYWAY?

One place to look for a definition of “knowledge” is the literature on information and organizational studies. Elements consistent across different authors are [10]: *Data*, the outcome of observations or measurements; *Information*, it gives data a structure and a meaning in a specific context; *Knowledge*, a mix of information, understanding, capability, experience, skills and values. Knowledge is then a multifaceted concept with multi-layered meaning that, for some authors, leads to wisdom.

The general agreement is that knowledge is a “justifiable truth” supported by information and data. But knowledge is personal and subjective [5, 8], it is *tacit*, “we can know more than we can tell” [8]. Knowledge is the personal embedding of information and practices into models of the world and know-how to act upon them [5]. To capture and communicate tacit knowledge in a precise and unambiguous way it needs to be formalised in a structure. Tacit knowledge made *explicit* is codified, for example via language; it can be stored and transmitted. This process of “externalisation” has a symmetric “internalisation” process when explicit knowledge is acquired as personal, for example through reading instructions [5]. The transmission of knowledge tacit-explicit-tacit is amplified by the social dimension, i.e. the individuals involved in the transmission of knowledge are co-located [5]. When co-presence is impossible, a structure is needed for a reliable and effective communication of knowledge. Whatever the representation, a connection between the underlining data and information should be maintained for the knowledge to be justifiable. Science formalised knowledge with the scientific method.

In the late seventeen century, science was disseminated within the community via letters or as experimental reports [13]. This last, initially a form of researcher’s diary with

events described chronologically, progressively evolved into a more structured form. Alternative ways of reporting medical research, still present in the nineteen century, have disappeared. Today all published medical research follows the “introduction, method, results and discussion” structure, a format already in used by other sciences before, e.g. physics [13]. Acknowledged as ideal in communicating the knowledge produced by the logic-deductive process of the scientific method [13], IMRED is far from the diary of the observer typical of empirical science. Thanks to IMRED science is perceived as objective, the researcher an “accident” as anyone should be able to replicate the results. (The intuition, the leap of imagination from what was known toward the new discovery is sadly missing here [8].)

THE STRUGGLE OF DESIGN AS RESEARCH

On the wave of scientific discoveries, attempt to “scientise” design in the twentieth century were motivated by the desire to produce artefacts based on objectivity and rationality [3]. Key to success would have been finding rigorous “design methods” to formalise design. The outcome of this effort was limited to design engineering. Then the ‘70s brought a wave of criticism to this approach [3] and the acknowledgement that design has a different way of knowing than science. Knowledge in design “resides in people (i.e. designers), the process and in the product itself” ([3] cited in [6]). The product (or artefact) was soon acknowledged as embodying knowledge. However a debate started on which type of design can be considered research and what is just that, good design. More than the artefact, it is the process, i.e. the method by which the product is generated, that needs to be rigorous for the artefact to be considered knowledge and therefore an embodiment of academic research [1]. So in reporting their work the designer has to demonstrate the validity of a particular process in delivering the artefact as research output. This is a core point of distinction between design as practice and design as research: although for both the outcome is an artefact, to be considered research, design must explain the process in a convincing way. Seen as a process research in design and science are very similar: “The rigor in research is the strength of the chain of reasoning, and that has to be judged in the context of the question and the answer, for example, in the context of design as opposed to the context of physics or philosophy”

[1] and “building an argument that is valid, transparent and well grounded, to have sufficient base for conclusions and that conclusions follow inevitably from arguments”[2]. The process-centred definition of design research seems to question intermediate-level knowledge intended as an explanation in between theory and practice. Knowledge developed in design, particularly tacit knowledge, integrates hand and head, theory and practice [11][12][9]. Intermediate-level knowledge attempts to translate it into explicit knowledge by locating it in between theory (head) and practice (hand). But the theory-practice dichotomy has been long questioned as design develops practice-oriented knowledge [7] through an iterative process of problem setting (theory) and problem solving (practice) [11] [12]. Research through design deals with ‘wicked problems’ where the solution and the framing of the problem emerge gradually through the argumentative process of continuous judgement and readjustment [9]. It seems then artificial to attempt to separate theory, practice and knowledge in between as they compose an organic body that develops and changes together until the optimal, stable configuration is reached. The challenge is to find a way for expressing the complex bundle of tacit knowledge designers develop in the process. Schön [11] talks about “reflection in action” the ability of a practitioner to consciously construct a new description of an elusive phenomenon and test it by an experiment of the spot. “When someone reflects-in-action, he becomes a researcher in the practice context. He is not dependent on the categories of established theory and technique, but constructs a new theory of the unique case.” “He does not separate thinking from doing, ratiocinating his way to a decision which he must later convert to action. Because his experimenting is a kind of action, implementation is built into his inquiry.”[11] The answer could be to go back to the origin of science when experiments were reported as diaries and the researchers’ reflection were one with the experiments.

THE GIST

I share the view [9][11][12] that practice and theory, hand and head, are as one in design and that the framing of the problem cannot be fully defined as distinct from the solution. Therefore any attempt to describe design knowledge needs to be holistic and comprehensive of the designer, the artefact, and the process followed. The process is key if the knowledge produced has to be recognised as research. As for science, it is the rigorous process that justifies the production of knowledge as research. However, how to represent the process of design is not straightforward as ‘wicked problems’ need each a specific approach and therefore elude standardisation. Science could be an inspiration, looking a long way back to how science was reported in observational diaries and how it is formalised today in such a way that the components are clearly defined while each researcher is free to move within those agreed boundaries. In addition, as for science, research through design should show the progression of the

argument. For design it is the description of the continuous reframing of the problem as new knowledge is acquired and a solution attempted. Details are needed not to enable reproduction, but to pass the tacit knowledge embedded within design practice. To really capture the knowledge and demonstrate research one has to describe: the process followed, the artefact at different stages in the process, and the reflection of the designer as interpreter of their own work. The first attempts to define a new format, in the same way as science developed IMRED, have been made in CHI with the “Case Studies” and at DIS with the “Pictorials”, this last designed to be academically recognised as equal to a paper. Now it is time to define what the inside structure should be. We then need to convince our peers that this new form of reporting research is legitimate, this last, I bet, not an easy task.

REFERENCES

1. Biggs, M., Büchler, D. Rigor and Practice Based Research. *Design Issues*, 23, 3 (2007), 62-69.
2. Brix, A. Solid Knowledge: Notes on the Nature of Knowledge Embedded in Designed Artifacts. *Artifact*, 2, 1 (2008) 36-40.
3. Cross, N. Designerly ways of knowing, *Design studies*, 3, 4 (1982) 221-227.
4. Cross, N. Designerly Ways of Knowing: Design Discipline Versus Design Science. *Design Issues*, 17, 3 (2001) 49-44.
5. Nonaka, I. A Dynamic Theory of Organizational Knowledge Creation. *Org. Science* 5, 1 (1994), 14-37.
6. Mäkelä, M. Knowing through making: the role of the artefact in practice-led research. *Knowledge, Technology and Policy*, 20 (2007) 157-163.
7. Melles, G. An Enlarged Pragmatist Inquiry Paradigm for Methodological Pluralism in Academic Design Research, *Artifact*, 2, 1 (2008) 3-13.
8. Polanyi, M. *Personal Knowledge: Towards a Post-Critical Philosophy*. Rutledge (1962)
9. Rittel, H., Webber, M. Planning problems are wicked problems. In N. Cross *developments in design methodology*. Wiley (1984) 135-144.
10. Rowley, J. The wisdom hierarchy: representations of the DIKW hierarchy. *Journal of Information Science* 33, 2 (2007) 163-179.
11. Schön, D. *The Reflective Practitioner*. Ashgate (1983)
12. Sennet, R. *The Craftsman*. Yale University Press (2008)
13. Sollaci, L., Pereira, M. The introduction, methods, results, and discussion (IMRAD) structure: a fifty-year survey. *J. Med Libr Assoc* 92, 3 (2004), 364-371.
14. Stolterman, E. The nature of design practice and implications for interaction design research. *Int. j. of Design*, 2, 1 (2008) 55-64.

The columns on the last page should be of approximately equal length.
Remove these two lines from your final version.