

# Reflective Practitioners and Unselfconscious Cultures of Design

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## INTRODUCTION

The Center for LifeLong Learning & Design at the University of Colorado in Boulder [L3D, 2004] has focused its research over the last two decades on *conceptual frameworks* and *system building* efforts characterized by the following global objectives:

- not building expert systems, but *systems for experts*;
- supporting reflective practitioners by *increasing the back-talk* of the design artifacts;
- putting owners of problems in charge by supporting *human problem domain interaction*;
- creating open, evolvable systems facilitated by *meta-design* and the *seeding, evolutionary growth, reseeding process model*; and
- supporting *social creativity* among reflective design communities.

My workshop contribution will try to put these efforts into perspective, assess where our research efforts are today, and analyze specifically the mutually defining roles of reflective practitioners in unselfconscious cultures of design.

## A CONCEPTUAL FRAMEWORK FOR DESIGN

**The Nature of Design Problems.** The primary challenge for designers is how to make sense out of “*situations that are puzzling, troubling, and uncertain*” [Schön, 1983]. Design requires reflective practitioners. Simon’s description of a painter provides an example of design as a conversation with the materials of the situation: “*in oil painting every new spot of pigment laid on the canvas creates some kind of pattern that provides a continuing source of new ideas to the painter. The painting process is a process of cyclical interaction between the painter and canvas in which current goals lead to new applications of paint, while the gradually changing pattern suggests new goals.*” [Simon, 1996].

**Integration of Problem Framing and Problem Solving.** Design problems are not analyzed in one step and then enacted in the next. The process of problem framing and problem solving has to be intertwined, and therefore the role of designers cannot be restricted to solving problems but needs to include the framing of problems. One cannot understand a problem without having a concept of the solution in mind: “*one cannot gather information*

*meaningfully unless one has understood the problem but one cannot understand the problem without information about it*” [Rittel & Webber, 1984]. If one cannot begin one without the other, then the only way to proceed is with both simultaneously.

## UNSELFCONSCIOUS CULTURES OF DESIGN

Large-scale design projects are inherently collaborative, ongoing, and evolving. The artifacts produced in these projects must function for years, long after the initial design phase is complete. During this time, the environment in which the artifact functions may change in ways that were not anticipated by the original designers. If the artifact cannot be adapted or evolved by *design-in-use* to its changing environment, it will cease to be useful [Henderson & Kyng, 1991].

Alexander [Alexander, 1964] introduced the distinction between an unselfconscious culture of design and a self-conscious culture of design. In an *unselfconscious* culture of design, the failure or inadequacy of the form leads directly to an action to change or improve it. This closeness of contact between designer and product allows constant rearrangement of unsatisfactory details. In unselfconscious design, breakdown and correction occur side by side; the knowledge to repair breakdowns comes from the knowledge of the user, who is best able to recognize a lack of fit, and how the artifact should be changed to improve its fit to the environment. Table 1 summarizes some of the major distinction between self-conscious and unself-conscious cultures of design.

**Putting Owners of Problems in Charge.** Ill-defined problems cannot be delegated; therefore the owner(s) of a problem need to be present in incrementally frame the problems, because they have the “*authority*” to change the problem. If owners of problems are in charge, then *background assumptions do not need to be fully articulated* to avoid to achieve an impossible task [Suchman, 1987]. It is a strength of human experts that they know the larger problem context, which enables them to solve ill-defined design problems, to learn while solving problems, to notice similarities between design problems, and to know when design rules can and should be broken.

**Table 1: Comparing Self-conscious and Unself-conscious Cultures of Design**

	self-conscious	unself-conscious
definition	an explicit, externalized description of a design exists (theoretical knowledge)	process of slow adaptation and error reduction (situated knowledge)
original association	professionally dominated design, design for others	primitive societies, handmade things, design for self
primary goal	solve problems of others	solve own problems
examples	designed cities: Brasilia, Canberra Microsoft Windows	naturally grown cities: London, Paris Linux
strengths	activities can be delegated; division of labor becomes possible	many small improvements; artifacts well suited to their function; copes with ill-defined problems
weaknesses	many artifacts are ill-suited to the job expected of them	no general theories exist or can be studied (because the activity is not externalized)
requirements	externalized descriptions must exist	owners of problems must be involved because they have relevant, unarticulated knowledge
evaluation criteria	high production value; efficient process; robust; reliable	personally meaningful; pleasant and engaging experience; self-expression
relation with context	context required for the framing of the problem	both problem framing and solving take place within the bigger context

**Supporting Unselfconscious Cultures of Design with Domain-Oriented Design Environments.** *Domain-oriented design environments (DODEs)* [Fischer, 1994] put owners of problems in charge by supporting human problem-domain interaction rather than just human-computer interaction. The breakdowns users of DODEs will experience include gaps in design knowledge, lack of support for new domain elements, and new rules and guidelines that were not part of the original DODE. These breakdowns cannot be avoided; they are a consequence of the fact that design domains change with time. DODEs support unselfconscious cultures of design with the following tools and mechanisms:

- they support the *co-evolution* of problem framing and problem solving [Nakakoji, 1993];
- they increase the *back-talk* of design situations with critics [Fischer et al., 1998];
- they support *reflection-in-action* by making argumentation serve design [Fischer et al., 1996]; and
- the support the *seeding, evolutionary growth, reseeding process model* to incrementally refine and evolve systems as living entities [Fischer et al., 2001].

**Increasing the Back-Talk of Design Artifacts.** The core of Schön's framework for reflective practitioner can be summarized as follows: *the designer acts to shape the design situation by creating or modifying design representations, and the situation "talks back" to the designer, revealing unanticipated consequences of the actions. The designer reflects on the actions and consequences by listening to the situation's back-talk, and then plans the next course of action.*

Therefore: design materials and the externalized representations are essential to design as a reflective conversation. Externalized representations uncover *implicit, tacit, and emergent* dimensions of design tasks that

designers may not have considered. Externalizing ideas is not a matter of emptying out the mind but of actively reconstructing it, forming new associations, and expressing concepts while lessening the cognitive load required for remembering them [Bruner, 1996].

**Critics.** While representations can make our thoughts more accessible, it is important to recognize the relationship between the skill and experience of designers and the "back-talk" they receive from the situation. The fact that "*buildings do not speak for themselves*" [Rittel, 1984] reminds us that the meanings and intentions that are "designed into" an artifact are not always self-evident, either to the designer or other observers. *Critiquing systems* [Fischer et al., 1998] monitor the design process and attempt to detect problematic situations. When such a situation is detected, critics notify users and make further information available to help users understand the situation. Critiquing systems allow users to work in a self-directed manner and interrupt only when the users' plans, actions, or products are considered potentially problematic. The role of critics is to inform reflective practitioners, to make them aware of potential problems and help make trade-offs, rather than to design for them.

## TRANSCENDING SCHÖN

Schön [Schön, 1992] ends one of his papers with the following challenge: "*The design of design assistants is an approach that has not in the past attracted the best minds in AI. Perhaps the time has come when it can and should do so*". Schön was interested in developing a *descriptive* account of design activities, illustrating and explaining what designers do, identifying the importance of human collaborations in this process, and arguing for educational changes. He did *not* design and/or build more powerful socio-technical environments that would empower

reflective practitioners beyond the possibilities provided by pencil and paper technologies..

But design never *was and never will be independent of the media* used to support the creation of artifacts. What has been true on a very global scale that “*the story of the human race is one of increasing intellectual capability; our brain have gotten no bigger, our bodies no stronger, but there has been incremental creation and evolution of new tools for physical and intellectual work to support more effective ways of distributed work and cognition*”, is true for design. Socio-technical environments will empower reflective practitioners to be more effective, to avoid and overcome problems, and learn new things as they go along. Our research has been grounded in Schön’s theory in the following way:

- we have *build objects-to-think-with* in the form of demonstration prototypes (e.g. DODEs, critiquing systems);
- we have developed *process innovations* (e.g., meta-design, seeding, evolutionary growth, reseeded process model);
- we have *deployed, used, and evaluated* these prototypes [Bonnardel & Sumner, 1994; Sumner et al., 1997].

With DODEs, we have investigated the following questions:

- How can computational media change the nature of the *reflective conversation* between designer and the materials of the situation [Redmiles, 2002]? Unlike paper, computational media can provide active design materials that allow the situation to talk back to the designer in an explicit manner.
- How can computational media support the *integration of problem framing and problem solving*? By partially externalizing the framing in explicit computational representations such as specification components [Nakakoji, 1993], new ways of supporting design are possible. If the designer’s framing of a problem is interpretable by the computer, it allows the computer to detect conflicts between the current design and the framing [Shipman, 1993].
- How can computational media support designers in dealing with *breakdowns*? First, they can help designers to identify breakdowns that they may not be aware of. Second, the occurrence of breakdowns provides an opportunity for learning on demand and reflection-in-action, facilitated by making argumentation serve design [Fischer et al., 1996].

**From Reflective Practitioners to Reflective Design Communities.** Complex design problems require more knowledge than any single person possesses because the knowledge relevant to a problem is usually distributed among stakeholders. Bringing different and often controversial points of view together to create a shared understanding among these stakeholders can lead to new insights, new ideas, and new artifacts. The challenge for the

future will be not only to develop new frameworks, new media, and new social environments to support reflective practitioners but to support *reflective design communities* thereby extending the limitations of the individual human mind. Simon [Simon, 1996] argued that when a domain reaches a point at which the knowledge for skillful professional practice cannot be acquired in a decade, specialization increases, collaboration becomes a necessity, and practitioners make increasing use of media supporting distributed cognition. Design is a prime example of such a domain [Arias et al., 2000].

**Issues for further Investigation.** More than ten years ago, we articulated the following issues for further investigation [Fischer & Nakakoji, 1992]:

- Are there differences in the performance and quality of the product if the system is used with and without critics?
- What are the tradeoffs between running the system in a critiquing mode or a constraint mode, where the latter prevents certain problems from arising, whereas the former provides designers with opportunities of dealing with breakdowns?
- What are the tradeoffs between different intervention strategies, e.g. the balance between displaying enough information versus the disruption of the work process? When are designers willing to suspend the construction process to access relevant information? Does making information relevant to the task at hand prevent serendipity?
- If an environment can always supply the information that the situation demands, why will users bother to learn the information?
- Under which conditions will designers challenge or extend the knowledge represented in the system? How can they be motivated to do so?
- Should the 'back talk' be embedded directly into the artifact, or handled by a separate discourse? It is conceivable that diving into hypermedia focuses users on other tasks, and takes them out of the situation?
- If information is plentiful, what is scarce? How can information delivery systems be created that make information more relevant to the task at hand?
- To what extent are situations and reflective conversations controlled by media properties?
- How can a balance be achieved between technical rationality (e.g. the use of plans and rules) and reflective action?

It is the author’s hope that the CHI workshop will provide *many new answers from all the participants to the issues.*

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