

Presenting Evocative Design as a Method for Divergent Thought for Interaction Design

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Abstract: This paper describes *evocative design* as a design method for engaging in problem setting in interaction design. Evocative design ideas play on designers' attempts to uncover assumptions in a problem space by creating uncommon design ideas and encourage new ways of thinking about design problems. We feel this is a beneficial practice since such designs expose innovations that typical user-centered approaches may not. We also provide a set of commitments for identifying potentially valuable designs as a design community based on designers' intentions. Commitments keep design ideas generated through the evocative design method grounded and connected with the client, design community, and society underlying a given problem space. The paper will *not* describe a systematic procedure for engaging in evocative design, but rather will make the argument for its efficacy as design method for interaction design.

Key words: *problem setting, design methods, subversion, critical technical practice, design community.*

1. Introduction

In traditional interaction design research, user-centered design places a significant emphasis on methods that begin with a well-defined problem based on an existing human need, which eventually leads to a proposed solution, implementation, and evaluation of that solution. A typical user-centered design process involves identifying a specific set of actual needs that are directly hindering a specific population in some way through careful observation. Once a particular need is defined, a problem statement is constructed and a broad series of interventions are suggested and analyzed. From this series, an optimal solution is selected which elegantly addresses the problems uncovered during observation. Finally, the effectiveness of this solution is evaluated with an appropriately designed user study. Processes like these provide interaction designers with more objective means of creating knowledge by solving specific problems (e.g., a solution that clearly derives from an actual human need). We recognize the usefulness of such approaches as they fulfill a specific role in design, but these are not the only possible approaches for solving problems or designing interactive artifacts. In some cases, such approaches may inhibit the overall evolution of interactive artifacts by focusing too specifically on existing problems, and not accounting for the constantly evolving bi-directional relationship between people and artifacts.

Focusing only within well-known problem spaces is limiting because in some cases a particular technology can generate its own needs. For instance, the concept for Apple's iPod did not evolve out of a preexisting well-known human need. This is to say, an interaction designer did not observe that people were unable to listen to the music as they were ambulatory. Furthermore, the iPod's conceptual predecessor—Sony's Walkman—did not receive an overwhelmingly positive response after it was developed because people at that time did not see any value in such a technology [1]. However, despite developing from a concept that did not solve an identified problem and despite being rejected by those who would be its initial audience, the need for portable music is now commonly accepted. Hence, it would seem that the iPod owes at least some of its success to Sony's decision to work outside the well-established norm and challenge commonly held assumptions of the way music listening takes place.

Innovative concepts like "portable music" are difficult to generate within a strict problem solving methodology because such concepts address problems that do not yet exist. We argue that interaction designers must consider the role of *problem setting strategies* within their overall design process. This problem setting leads designers to explore an entire problem space, and ideally generate new concepts that may not be initially accepted, but can either change the existing culture, or lead to other new concepts for a growing design community. In this paper, we explore such design thinking in interaction design research. We propose a new design method that explores a problem space as a problem setting activity through the creation of *evocative design ideas*, which challenge people's assumptions about a given problem by exploring uncommon or even impractical solutions. This method can be added to a designer's repertoire for breaking out of convergent thinking towards divergent modes of thought that help designers generate innovative and original ideas for design. This paper will *not* address exactly how to do evocative design, which will be saved for future work, but rather will make the argument for evocative design as a legitimate method for interaction design.

First, we will review the work on problem setting, its relation to interaction design, and how it is a crucial part of the design process. Next, we are going to introduce the design method of evocative design. We will introduce the method initially through a hypothetical design problem and then will describe theoretical research supporting such a method. Finally, we will describe a set of four commitments by which practitioners of this method must abide to make contributions of evocative design meaningful for designers, the design community, and society.

2. Problem setting: A designerly approach to interaction design

Interaction design research has been founded on the procedural constraints of the user-centered process. This process should not be followed *dogmatically*, but must be critically analyzed periodically to understand why user-centeredness is a core value to the interaction design community. The user-centered approach can be broken down in two ways: (1) the values for which it stands and (2) the user-centered *process* as described traditionally by studying the user group to identify a problem, design a solution to the problem, build a prototype, and evaluate that prototype based on some set of principles [2]. At the core of the user-centered process, we observe a problem solving paradigm. Even while iterating on potential solutions, designers who would dogmatically follow this process rarely reevaluate the problems themselves, and consequently, would always be stuck with the same designs and viewpoints. As a result, such designers ignore potential ideas due to this prevailing paradigm.

Nonetheless, designers can still follow the values of user-centeredness, but do so from a problem setting perspective.

Within the broader scope of design research, problem solving is not the only accepted approach to design problems and often is not even the most desirable. Researchers have argued that in practice, problem and solution must co-evolve together [3, 4]. Many designs do not start with structuring a problem, but rather begin by first leveraging "what designers already know about a general problem." Design practitioners often rely on precedent and gambits, which are design moves that open up new favorable possibilities, for working through design problems [5] before actually studying the user group. We can consider this approach to utilize problem setting or framing rather than problem solving [6]. So, although many practitioners' best ideas may require them to rely on designerly thinking that operates differently from the user-centered *process* as defined above, contributions along these lines to the interaction design research community have been met with controversy [7] even if these designers are still committed to the values of user-centeredness. Along similar lines, Greenberg and Buxton [8] argue that researchers are overcommitted as a field to the scientific ideas underlying usability evaluation. The tension over science and design has always existed within interaction design and has existed in the field of design since the turn of the twentieth century [9]. The interaction design research community though is starting to listen to the arguments against strictly following the user-centered process. Consequently, issues such as problem setting are becoming important topics of discussion for the community.

2.1. Tame vs. wicked problems

In design, there has always been a tension between the scientific methods through which our design should proceed and creative design work [6, 9, 10, 11]. Simon [12] presents the scientific account as a design science whose goal is to manipulate unfavorable situations into favorable ones through a specific design method analogous to the scientific method. Another, more pragmatic account, argued for by Schön [6], states that designers rely on a repertoire of experience and reflection-in-action. Bartneck [13] notes a difference in the quality criteria in these perspectives, but feels that we must decide on shared criteria or the interaction design research community will exist as a divided, transdisciplinary community rather than an integrated, multidisciplinary community. Wolf et al. [7], on the other hand, argue that the interaction design community can only operate as a transdisciplinary community because of a division between tame and wicked problems. When critically reflecting on the distinction between these two different types of problems, we see that there is a need for different approaches, communities and cultures, and design philosophies.

Tame problems require three aspects to qualify as tame. They have an identifiable initial state, a well-understood goal state, and an algorithm for translating one state to the other [14]. Addressing well-defined problems relies on the effectiveness of the method used and deemphasizes the role of the individual designer in the process. However, wicked problems are the opposite of well-defined problems. Rittel and Webber [15] describe the aspects of wicked problems as having no formal problem definition; as having no rules for stopping (goal state); as having solutions that are not right or wrong, but better or worse; as having no ultimate solution; having no single method (such as a design method); as having an indefinite number of solutions; as unique and individual; as symptoms of other problems; as describable according to a variety of different reasons based on how we

frame the problem; and as requiring designers to be responsible for the outcome of their designs [16]. Therefore, wicked problems require an exploratory approach to design due to their intractability.

2.2. Problem setting vs. problem solving

For both tame and wicked problems, the design process can be decomposed into problem setting and problem solving activities. According to Schön [6], problem solving is the process whereby we apply the most appropriate method for solving an identified problem. However, problem setting, which is an activity that takes place prior to the process of problem solving, involves exploring the problem space to frame the problem in a new way. For tame problems, the emphasis is on problem solving, while problem setting is less important because the designer has already defined the requirements for solving the problem. For wicked problems, the emphasis is on problem setting because part of the design process is defining a direction to our design activities, while problem solving is reserved to those moments of *parti* where our design explorations have finally crystallized into an actionable direction in our design [16]. We have summarized our understanding of problem solving and problems setting activities in Table 1 with related descriptions from previous research for each category.

Table 1. Distinctions of problem solving and setting activities.

Problem solving	Problem setting
Strength of design found in method described in [7, 10, 12]	Strength of design in design expertise [3, 17, 18, 19] schemata [5], repertoire of experience[6]
Design process proceeds from problem to goal described in [12, 14]	design process proceeds through exploration [4, 14, 20, 21]
Problem and solution are separate [6, 7, 10]	Problem and solution co-evolve [3, 4, 11]
Results in generalizability and reliability described by [10, 11 13]	Results in ultimate particular [11, 16, 4, 22]

Many, if not all, of the design problems faced in interaction design are of the wicked type. Consequently, practitioners must rely on problem setting activities to give direction to their work in this field. Figures 1 and 2 contrast the way practitioners approach problems through problem setting and problem solving. In problem solving, practitioners start from their initial state and proceed to their goal state choosing the best method to get them there. In problem setting, practitioners often have to experiment with different ideas until they progress to a stable design idea that can be used for addressing the design problem and creating the ultimate particular design [11, 22]. Greenberg and Buxton [8] refer to this sense of problem setting as ‘getting the right design’ as opposed to problem solving, which would be ‘getting the design right.’ As many researchers have argued a need for creating a venue for sharing work done in such areas [7, 10, 11, 17, 23], we feel that the interaction design research community needs to include a venue specifically for sharing problem setting activities. This venue could include a *repository of evocative design ideas to help innovate and inspire the interaction design community towards new ways of seeing common design challenges and of problem setting*. These evocative design ideas constitute the base for a design method for helping to engage in problem setting by uncovering and subverting problem spaces to uncover new ways to look at a problem. Evocative design ideas will be described in the next section.

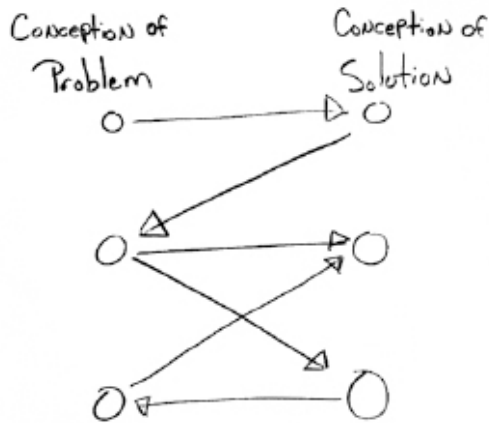


Figure 1. In problem setting, the designer is involved in an exploration of many different related problems and solutions.

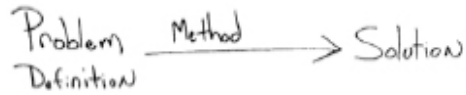


Figure 2: In problem solving, your method should guide you from problem to solution.

3. Evocative design ideas

In this section, we propose a hypothetical example to demonstrate our point. We will show how *evocative design ideas* can alter the design process because of the innovative thinking that this method enables.

Consider the problem of designing a new system to help people who are in wheelchairs ascend stairs. Several designers have proposed ideas such as replacing the stairs with an escalator that has a wide platform for a wheelchair, a pulley system that lifts the user to the second floor, or a wheelchair that climbs the stairs.

The ideas above show a problem solving mentality where underlying assumptions of the problem space such as why does the wheelchair need to ascend the stairs and why are we concerned with moving both the wheelchair and the passenger go unquestioned. This is not to say that any of these ideas are invalid, but these ideas could also be challenged by other, less typical ways of viewing the problem space. Through problem setting and using evocative design ideas, we can see this problem from a different perspective. An individual taking such a perspective could challenge the assumption that the floors must remain stationary. This designer could design a system that brings the second floor down to the individual. The designer would have inverted the point of reference from the stairs as obstacle to the floors of the house as agent. Even though this strategy would not be cost effective, practical, or necessarily useful to an individual in itself, it may help the designer generate new ideas that focus on different aspects of the problem space. Not only does this way of thinking help generate new design ideas, but can also open up new questions to ask about the problem space and new assumptions to challenge. From this evocative design idea, a designer could realize that perhaps the most effective system permits a user to easily access areas of the house on both floors such that only those portions of the house need to move, or that the design could accomplish what it needs to using a "virtual" connection between the two floors using cameras to connect them. These questions require more design work and research to flower into actionable design ideas.

Alternatively, suppose the designer instead chooses to challenge the assumption that a person always needs to remain in the wheelchair, and argues that a suction system could levitate this person up to the second floor, or

gently float them back down to the first floor. Of course, this idea might be impractical due to issues of cost, space, safety, and lack of existing technology, but now the design focus is on the individual and their intentions rather than the wheelchair. Supposing the designer throws out the original idea, the designer then creates an idea for a separate chair just that lifts the individual up stairs, otherwise known as stair lifts, which already exist. Finally, the designer realizing that these lifts are often very mechanical and rough when lifting a person up the stairs could try an idea for something that utilizes the idea of a stair lift, but brings in characteristics from the original design idea—the aspect of lightness and levitation. The designer works on a design that emphasizes a sense of ease of use by providing a system that locks person's existing chair in place and by paying strict attention to the hydraulics of the lift gently brings them between the two floors. Hence, the designer has progressed from an implausible idea that challenges the assumptions of the problem space, to a practical idea that has already been implemented, and finally to a new idea that would be practical to design and also differentiated from the rest of the potential designs.

This evocative design method rejuvenates the concepts these practitioners have been exploring by providing a new perspective through which to think about the problem. We end this section with a tentative definition of the notion of evocative design ideas:

Evocative design ideas act as inspiration for new potential design solutions. They help designers to engage in problem setting by challenging and subverting unchallenged assumptions within a problem space and to open peripheral ways of seeing problems.

4. Breaking the mold of design thinking: Evocative design as design method

Evocative design is about critically evaluating a given problem. Evocative design allows designers to break the mold that may cripple design thinking. Agre [24] describes how dominant or central metaphors often go unchallenged in a research community because these central metaphors are rarely the focus of analysis. He argues that researchers need to consider what lies on the periphery of those metaphors so that many of the unchallenged assumptions of dominant metaphors may be explored and potentially subverted. In this sense of subverting central metaphors, he introduces the idea of *critical technical practice*. Coyne [25] elaborates on the idea of central metaphors in design practice showing that there is a certain set of enabling metaphors for different design communities. These different metaphors transform the way that we look at technology. Using evocative design ideas, researchers and designers can engage with these metaphors and contribute to the community to help progress towards new designs not currently possible or even foreseeable for current users of future use situations. Within interaction design, Harrison et al. [26] have already raised this same argument to promote communication among the myriad different research traditions that constitute the field of interaction design and to acknowledge the different perspectives these researchers all bring from these traditions.

Reed et al. [27] demonstrate evocative design in that they examine what factors make people reluctant to use mass transportation. They constructed a large set of evocative designs to help reconsider mass transportation at a level beyond strict utility. Some examples include "Spa-a-go-go," "Subway train as park," and the "subway as art

museum," (see figure 3). Of course, these designs should not be necessarily considered practical transportation solutions, but should be considered as a way to challenge the existing predispositions, metaphors, and values regarding public transportation, and act as discussion point to foster future design ideas. These examples consider situations where commuting is so enjoyable and engaging that people may consider it as a privilege rather than as a consequence of not owning a car.

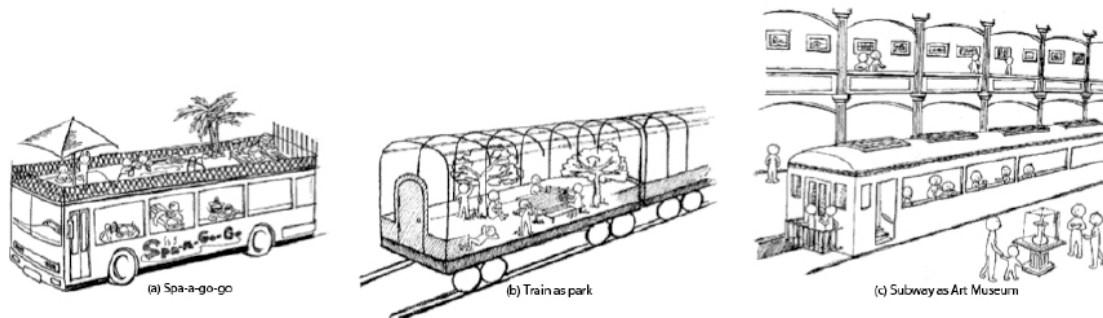


Figure 3. Selection of ideas to promote sustainable transit from Reed et al [23].

Within interaction design, evocative designs are one method among a growing set of other methods to aid the problem setting. For example, cultural probes [28] help identify several aspects of users' lived experience by providing packets of maps, postcards, diaries and cameras for users to record their experience. Researchers can compare this recording to the assumptions that the design group may have about the users and the problem space. Also, Holmquist [29] presents a brainstorming technique that juxtaposes users and usage situations with different technologies or domains in new, unthought-of ways. Another example is the future workshop described in Preece et al. and Löwgren and Stolterman [2, 17] where users meet to discuss current problems, imagine future use situations, and discuss how those situations could be achieved. These are just a sample of the techniques that are in use in interaction design that help promote problem setting activities and help generate evocative design ideas.

The subversive aspect of design as described in this method does have precedent in the general field of design. Anti-design was a design movement in the 1960s and 1970s¹ that aimed to challenge the modernist assumptions of the strict attention of designers to the functionality of design. It used humor, irony, and distortion to challenge these assumptions and instead emphasized the role of form in design—occasionally to the detriment of the design's functionality. Anti-design was always meant as conceptual design and not intended for use among mainstream society, which is where anti-design and evocative design differ. Evocative design is part of the design process for the expressed purpose of arriving at some actionable design idea that can be implemented to address a real design problem at some point.

5. Evaluating evocative design ideas

For an interaction design research community to provide a venue for accepting evocative design ideas, there must first be some way of evaluating these ideas. In some cases, peculiar and unusual ideas are the most thought provoking. However, peculiarity does not necessarily imply goodness. It is hard to predict in advance which

¹ In addition to this timeframe, anti-design has also been connected with later postmodern movements in design that emphasize some of the same qualities.

ideas are going to influence interaction design researchers and practitioners most profoundly. Nonetheless, if we are going to encourage this kind of designerly thinking, we must separate those ideas that will be helpful to the interaction design community in laying down a path from those that will be a hindrance—leading us down a wrong path—by making reference to designers’ intentions for generating their *evocative design ideas*. This section lists several *normative commitments* that we argue identify evocative design ideas worth supporting as a community. These commitments ensure that designers will be serving users rather than their own whims.

5.1. Commitment #1: Commitment to a theoretical grounding

To avoid “anything goes” subjectivity when problem setting, Croon Fors [30] points out that it is imperative to design from the grounds of a theoretical background. This theoretical background should open certain approaches to the way designers see their designs and should shed light as to why certain designers make certain design movements. Theoretical groundings provide a lens, which helps designers to critically reflect upon the design situation, reframe and reinterpret the problem space, and evaluate their design from the standpoint of what has come before. Theoretical groundings also help solidify the arguments that designers make and color the assumptions that they make in the process of designing.

Sengers [31] describes several project examples where her theoretical grounding allowed her to engage critically with design problems in her research. One example describing her work with Penny et al. [32] was called Traces. Traces is a virtual environment where the world would trace the movement of the body in 3-dimensional space so the user could see it. This design idea allowed Penny et al. [32] to challenge common assumptions about the design of virtual environments. Where virtual worlds are typically thought of as a window into a new virtual space, Traces forced users to be aware of and confront their own embodiment. Another group of researchers working under this commitment is Redström et al. [33]. They describe their commitment of bringing aesthetics to information visualization to promote moments of concentration and reflection. Such evocative design ideas as these relate to how we allow theory to ground our explorations.

5.2. Commitment #2: Commitment to a specific user group

Although user-centered design is upheld as the primary mode of design for interaction design [2], there are many other approaches that focus on the user including activity centered design [34], artifact-centered design², and ecology-centered design [35]. Nelson and Stolterman [16] describe design as service to a particular group. Designers are always committed to serving their employers to enact changes in the world. Their design decisions, ideas, and thought experiments should always be directed at helping users in the context in which they live and work. Even design ideas that are impractical, expensive, or unusable can be acceptable if the designers are committed to the user group and finding the best design for their problems. Designers stay committed to users by being subversive to the dominant ways of viewing the problem. Designers reframe the problem to shift their ways of looking at the problem space.

² Artifact-centered design differs from technology-centered design in that artifact-centered design is focused on an artifact *and* its relation to its use context whereas a technology-centered approach is concerned only with pushing technology forward.

Reed et al. [27] provides a good example of this commitment. Despite exploring a wide array of ideas— some practical and able to be implemented and others fanciful and mere thought experiments—they show a commitment to the users and not the underlying technology. In this exploration, the focus is not necessarily on the advanced technology nor on marketing strategies, but rather on providing new experiences for users and new incentives to use public transportation. Rather than being constrained by the physical practicality of the problem space, the authors free themselves from those constraints to see the problem differently. To do this, they reframed the problem by refocusing on the possibilities of public transportation.

5.3. Commitment #3: Commitment to a design community

As mentioned above, evocative design ideas cannot be self-serving. In addition to being committed to the user, designers must be committed to the design community in this field. They must use original design ideas to advance not just their own notions of design, but also provide new opportunities for the designers in the field to see the problem differently. Willis [36] touches on this through her description of the hermeneutic circle within the context of the design activities in which we engage. In this process, design ideas are enacted, and, once enacted, provide enhanced functionality to users, but also provide new ways of seeing design to those who generate such designs. Through this new way of seeing, different and hopefully better ways to address the problems of the world emerge. Finally, McCarthy and Wright [37] introduce the notion of unfinalizability, which means that we can never create a “final” design because new technologies, new designs, and new contexts are constantly emerging that change how designs can affect the kinds of problems users face. Unfinalizability ensures that potential interpretations of designs will always reemerge through use. A designer committed to this ideal will be willing to revisit the problems they have addressed to ensure that what has been created serves the needs of users and the community. Both of these theorists describe how the designs we create now ultimately shape the design community in which we reside in the future. This commitment ensures that such a connection is at the forefront of our evocative design ideas.

Böhlen and Matteas [38] describe an ambient technology created to give members of an office a sense of the kinds of network traffic in the office. The metaphor used for this work is the notion of an office plant. The different kinds of physical movements that one can expect to see with a plant (e.g., growing stems and opening buds) was mapped to metrics identified in the network traffic. This work shows a commitment not just to the users by providing a utility for monitoring the shared network traffic and bandwidth in a certain aesthetic, physical form, but also to the community of researchers in interaction design. Not only does this encourage researchers to think divergently when creating information visualization (e.g., considering aesthetic and community dimensions), but also opens up whole new lines of research such as physical visualizations, plant-human interaction, and the potential of shared communal visualizations. These kinds of designs shift the community’s collective ways of viewing the problems of its field away from central metaphors that dominate a problem space [24].

5.4. Commitment #4: Commitment to realization

Finally, when problem setting using evocative design ideas, we often generate thoughtful ideas that are highly impractical. Nonetheless, we must remain committed to ultimately finding a way to address the problem. Generating design ideas are ultimately not useful unless they are part of a broader process that realizes final designs for the concerned user groups. Rogers and Belotti [39] show a concern for bringing blue-sky research, which runs parallel with evocative design ideas, down to earth. Often testing such research is expensive or impractical, as users cannot imagine hypothetical use situations. They argue that designers must be able to envision future situations with the new technologies, but also be supported by ethnographic research. Hence, a designer must always be oriented towards an improved future. Finally, the designer must show evidence of trying to prototype or implement the idea and share what can be learned from such an exercise.

Of course, if we examine the hypothetical wheelchair design problem above, we can see a potential problem with this commitment. While this idea is creative and repurposes the problem statement for its own interpretation, if the designer is not committed to actually solving this problem and instead is trying to find a niche for his or her own house designs, then the proposed design is inadequate. Instead the design community needs designers who intend on enter into a dialog with their designs. Designers need to seek a solution and not a problem that fits their solution in problem setting, which is at the core of the values of user-centered design³.

It is in this commitment also that we see the largest gap with anti-design. While anti-design was engaged in a discourse among a community of designers and researchers, it ultimately had no real interest in addressing a real problem space. This commitment to realization forms a strong core to evocative design ideas, however. Such anti-design shows less of a connection with problem setting and more of a connection with a process of artistic expression.

We feel that the four commitments described above encapsulate a *heuristic for evaluating evocative design ideas* from inadequate design ideas. It is hard to validate the design ideas in themselves because these ideas are largely self-fulfilling: those that are useful will be used. We must therefore rely on the intentions of the designer themselves. The focus here is on the individual designers and their intent, how they work with the problem space, and where they want this design idea to take the design community.

6. Conclusion

This paper has presented a design method of problem setting using evocative design ideas. We have argued that the user-centered approach emphasizes problem solving in its methodology. However, the problems that

³ This means that perhaps what the interaction design research community needs to do is not scrap the user-centered process, but rather repurpose it as a means to ensure a connection with users rather than using it as an end in itself. We feel that even though traditional research on the user-centered design may have a procedural inclination on this process, the majority of designers and researchers have focused more on the core values of the process rather than the systematic procedures of it.

interaction design practitioners address are quite frequently wicked, which require at least some problem setting to address such problems. Evocative design is a method for generating ideas that test and subvert assumptions about a problem space by exploring uncommon or even impractical ideas. These design ideas allow designers to frame problems in new ways to focus on new and potentially unforeseen aspects of the problem space. Such ideas push innovation in a design community forward by allowing designers to see a problem differently. We have provided a hypothetical design example where evocative design ideas prove to be very useful. We have also provided a set of commitments that can help researchers evaluate heuristically the adequacy of evocative design ideas presented to the interaction design community.

While there will always be a role for proper user-centered problem solving of human-computer interaction, we feel that the realm of design exploration through problem setting needs to be expanded in the interaction design research community. Being a source of inspiration and innovation is one way that we as researchers can serve the community of interaction design practitioners. Evocative design ideas are one way to provide this inspiration to them. Again, while there will always be a role for designers of the next stereo system in interaction design, there will certainly be great opportunities available for those designers who are willing to take a risk and look into new unexplored avenues of design such as the designers of the Sony Walkman did.

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