Interaction Styles: An Aesthetic
Sense of Direction in Interface Design

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In architecture and industrial design, the concept of style plays a major role in education as a way of establishing an understanding of visual design expression. In this article we claim that interaction design can benefit greatly from a similar application of style. It can provide designers with strong visions and a sense of direction in designing new interfaces. In particular, the focus is on solid user interface design (i.e., products with small displays and a limited number of keys) because of the tight coupling of interaction and industrial design.

Style theory is explored and an experiment is reported that introduces interaction-style thinking in a user-centered design process in industry. Further, a discussion about parallels between our approach to interaction design and the dominant styles of the twentieth-century, Scandinavian design in particular, is provided.

1. INTRODUCTION

In architecture and industrial design, the concept of style in new designs is used to achieve an aesthetic coherence with the predominant atmosphere in society. Style plays a major role in education as a way of explaining the historical inheritance and debating the relation between alternative design solutions.

Because user interaction design shares characteristics with industrial design, we claim that interaction design can benefit greatly from a more nuanced understanding of the concept of style. It could provide designers with strong visions and a sense of direction in designing new interfaces.

In particular, the focus is on solid user interface (SUI) design (i.e., products with small displays and a limited number of keys) because of the tight coupling of inter-

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action and industrial design (Black & Buur, 1996). As it is today, SUI design seems largely governed by technological progress and to a large extent SUIs seem to inherit user interface principles from the computer world, just one generation delayed. Human–computer interaction (HCI) interfaces were designed for full keyboard and mouse operation, therefore they become much more cumbersome with a tiny display and a limited number of keys. For instance, the benefits of a pull-down menu system are difficult to achieve on a mobile phone. Interaction designers in enthusiasm with new technologies may fail to preserve or transfer the qualities of use, which were achieved with outdated technologies. For instance, the digital adjustment of settings using plus/minus buttons, though more precise, loses the feeling of being in control and the sense of range and proportion offered by analog potentiometer knobs.

In industrial design, values and needs are often categorized and discussed using the concept of style. In the quality-in-use project, Ehn, Meggerle, Steen, and Svedemar (1997) proposed applying style thinking to the design of computer applications because they saw styles as a way of developing a repertoire of interaction design exemplars. They launched a Web site with a quality-in-use award as a motivation for designers to share their examples and contribute to developing some general interaction styles. These efforts inspired us to attempt an initiative in the context of a corporate design team working in the historical continuum of a company.

Danfoss is a manufacturer of mechatronic products like flow meters, temperature sensors, and controllers. It has a turnover of about 2 billion USD and 20,000 employees. Products are used in a diversity of settings ranging from private homes, supermarkets, and district heating stations to wastewater treatment plants. The products are often only a small part of some complex technological system.

The user-centered design group at Danfoss has been heavily influenced by Scandinavian participatory design practices. Historically, usability lab tests have been replaced with ethnographic field studies and with co-design workshops, bringing together daily users, service technicians, sales staff, product developers, and designers (Buur & Bagger, 1999). The starting point for the experiment described in this article was a concern in the group about design identity. In particular, the industrial designers felt that massive user involvement might restrict the development of a clear design expression and design identity in the group.

2. THE CONCEPT OF INTERACTION STYLES

In the field of HCI, interaction style is understood as something different from visual style. Interaction style is usually seen as a mode of interaction between human and machine based on a particular technology. An interaction style is explained through prototypical interface elements of the software platform and how they behave, for instance, command line, pull down menu, form fill in, or direct manipulation (e.g., Schneiderman, 1992).

"Older" interaction styles may be reused on newer technological platforms because they have better performance for specific tasks. For instance, today graphical user interfaces are combined with direct manipulation on the screen with a drawing tablet. Designers also have pull down menus and dialog boxes with buttons op-
erated by mouse, and form fill-in, question/answer, and command language styles, operated from the keyboard.

Categorizing interaction style according to interface elements and their behavior has severe limitations. It does not capture the underlying structure of data objects and their relations. These objects and relations are shaped by the designer’s values and paradigmatic understanding of their work. Kammersgaard (1990), and Maaß and Oberquelle (1992) have studied the way humans think about computers. They propose four perspectives of the computer:

1. The system perspective assumes that the user may be treated like a machine, with characteristics that must be allowed for in the design of the technical system to provide reliable and effective operation.

2. In the information processor perspective, the human is a cognitive information processor in a communication system. This may take the form of a dialog partner perspective, where the computer and the human are equal partners searching for a common understanding, or a formal communication perspective. The human has to accept formalism and procedure to communicate with the machine.

3. The workshop perspective sees the computer as a collection of tools, locations, and activities that are available to empower the user in his or her work.

4. The media perspective favors the computer as a medium for storing information for others to pick up. The media perspective assumes that the designer of the information freezes his or her influence on the message once it is placed in the medium, and leaves it to the reader to decipher, interpret, and act upon.

These four perspectives indicate that there are very different expectations coupled to ways of seeing the computer. One must expect these views to result in different design solutions and different interaction styles.

Svanes (1997) has shown how different understandings manifest themselves in a tacit dimension of interaction design. The kinesthetic experiences of the user find verbal or visual expression in the form of analogy and metaphor. The users construct naïve theories for themselves to understand how the product reacts. For instance, different users may say, “The computer moved it,” “I moved it,” or “It moved” when describing the same interaction. Svanes suggested that every usability test that incorporates qualitative questions is a search for such theories on parts of the designer.

Schneiderman (1992), Kammersgaard (1990), and Svanes (1997) all attempt to capture qualitative aspects of the computer in use, focusing on the opportunities of technology, on the meaning of the product, and on the experience of using it. In this article, we claim that the style concept known from architecture and design is suitable for bringing together and exploring these kinds of understanding. To interaction designers, this could mean clearer visions and a sense of direction in their work.

2.1. The Style Concept in Architecture and Industrial Design

The concept of style has been discussed for more than 2000 years. Style in the original Latin meaning denoted a writing implement, the stîlus, whereas stîle was a
hand imprint characteristic of the artist or writer. *Stimuli* meant to produce vital energy or strength. They are all derived from a root denoting an upright expressive object (Ylimaula, 1992). Today style theory has numerous applications, including the fields of literature, art, theatre, dance, archaeology, architecture, and design. As a result, one is overwhelmed by popular applications of the term. Academia, however, is converging on a semiotic understanding of style (Øritsland, 1999).

Style in architecture and industrial design has evolved from the simple categorization of properties into more or less specific types (e.g., Gothic or Renaissance) to an analysis of artifacts in the culture and value systems that gave rise to them. Similarly, interaction style needs to be approached at different levels. In this article, three levels of style understanding are used as the basis for developing activities in an interaction design process.

**Style as a reflection of values.** Ylimaula (1992) defined a phenomenological understanding of style in architecture:

... architecture exists to satisfy concrete needs. ... If style or form are manifestations of concrete values, then this brings us to architectural history’s essence. The buildings and the milieu reflect the needs of the people involved, and these needs emerge from people’s values. (p. 29)

Continuing this line of reasoning, she defined style as

...the underlying philosophy, the carrying idea which goes through the whole work of art. If philosophy is too demanding a word, maybe sound thinking and common sense could be used. But if the project lacks this thinking, if architecture lacks philosophy, no style can emerge. (p. 29)

**Style as a way of acting.** Enkvist (1974) proposed an understanding of style of action as a person’s predisposition to act in a certain way:

Styles may be sought within all systems, which allow different behavior within limits demarcated by a certain set of rules. Such a style definition may be applied to all art, to clothing, games, athletics, sports, and other types of action. A business man or a surgeon or a car driver would then have style: the car driver for example, might, within the framework of the traffic laws, choose whether he would drive softly or unevenly, closer to the middle or to the side of the road etc. The context stands forth as a style defining factor and any violations of the rule become style markers. ...

**Style as a network of norms.** Enkvist (1983) observed that the basic thesis of linguistic style is that all style experiences arise from comparison. When one observes an artifact, one compares it consciously or unconsciously with one’s prior experiences of comparable artifacts. Artifacts are chosen for comparison because one’s knowledge of the relevant cultural background indicates that they are related to the
artifact being observed. This kinship can depend on content and theme, on function and the technology by which the artifact was made, and on connections in time, space, and social situations. The person experiencing the style has systematized the artifacts for comparison into a network of norms. The comparison results in an identification of style markers: Elements in the artifact that show significant correlation with, or deviation from, the relevant norms. It follows that every new style experience can influence the relevant norms, so that they change with accumulated experience. Also, different individuals will have different experiences and therefore different norms, which can lead to different conceptions of style in the same artifact. Only a common network of norms can lead to a common style experience.

**Three operational perspectives on style.** Therefore, in pragmatic terms, if a design team wants to benefit from interaction style thinking, it needs to create collective systems of norms concerning interaction. The design team needs three different approaches to style:

- The norm systems need to be based in history. It is necessary to understand the philosophies, needs, and values of the social systems in which products are made and in which interaction with them takes place.
- Interaction takes place within a system of activity where certain behavior is expected. Style is identified by how interaction relates to the norms for that activity.
- At a detailed level, in agreement with Enkvist, the system of norms must be defined by compiling and comparing individual experiences with artifacts.

To try out these perspectives on style in practice, we devised a workshop on “interaction styles through the company history” at the Danfoss Museum. The museum workshop was the start of an interaction style design experiment in the Smart Window project.

### 3. THE SMART WINDOW PROJECT

The Smart Window project was a 6-month effort to explore the use of personal digital assistant-type (PDA) equipment for operators of large plants like district heating and power plants. The interaction style experiment was an action research effort within the design project. The goal was to investigate if interaction style thinking would help the design team in developing a clear interaction expression. The conclusions in this article are based on observations and reflections of the professional designers on how this project compares to previous experiences.

Danfoss manufactures controllers and components (e.g., sensors, valves, motors) for the process industry. The trends are toward increasing computer power in every component, and components being connected in networks with a central control room for monitoring and control. However, from previous studies of user work practices we knew that it is pertinent for the operators that they “walk the plant” and get a
FIGURE 1  A use situation at a district heating plant—work is a complex interaction between watching and operating equipment in the plant and monitoring and controlling in the control room. A handheld PDA Smart Window for looking into the electronics of components out in the plant would help.

hands-on feeling of the plant operation—something they cannot get in front of computer screens in the control room. So the basic idea was to provide the operator on the move with a portable “window”—an industrial PDA (see Figure 1)—which would enable him or her to look into and interact with the electronics of the components on the spot. The goal of the project was to create a vision for the company to work toward in this area. The corporate user-centered design group (Buur & Bagger, 1999) ran the project in collaboration with invited experts and researchers from universities. The team was eight in total, with additional members moving in and out of the project when required. Based on extensive field studies in district heating and power plants, a set of use situations was distilled to provide a basis for creating use scenarios for the Smart Window. An example of such a use situation was an incident (see Figure 2) where the operator on a daily round of the plant decides to start a cleaning process of a condensing filter. This requires shifting the flow over to a parallel duct and administering a high-pressure airflow through the filter. This is not a simple change of a valve. In the plant, the operator is facing a complex of several manually operated valves with heavy hand wheels and electrically operated valves and pumps, which are remote controlled by the central computer system. To complete the operation, the

FIGURE 2  The tool-style Smart Window form prototype (left) and interaction prototype (right).
operator has to call a colleague in the control room on the intercom and negotiate the exact sequence of operations.

In the corresponding future scenario, the operator in the plant would be able to control the electrical valve and pump on location using his Smart Window, but he might still need to warn the control room of what he is doing, not to trigger a false alarm. Operating the manual valves requires two hands, so he will need to place the Smart Window somewhere while working the hand wheels.

A particular reason for introducing interaction style thinking in this project was that the user studies showed extreme—and often justified—skepticism toward the reliability and usability of new computer technology. We felt that it was necessary not only to go for high usability but also to aim for an interaction style that would appeal to the user population.

4. INTERACTION STYLES IN THE COMPANY HISTORY

The Danfoss Museum contains a complete chronological display of products from 1933 until today. It also houses a library with comprehensive archives of sales material, manuals, and news clippings.

For this study, we were kindly granted the use of the entire museum for two days. Nine people, three industrial designers, a computer science researcher, a multimedia designer, and four usability engineers, worked in three teams to study user interaction designs. Every team was asked to look for significant changes in interaction principles related to one of the following three perspectives on style:

Technology. As technology evolves, product properties such as activation force, user feedback, construction, and visual form change. This opens up new possibilities for designing interaction style and influences existing interaction styles. How do changing technologies influence interaction styles?

Company spirit. The way people work and view themselves is an integral part of the designs they produce. When choosing functions and interface components, when writing documentation and sales material, people in the organization have to make judgments of their customers and users. How is the Danfoss spirit reflected in the design of user interfaces? Is an evolution of the Danfoss spirit apparent?

Society trends. In industrial design, architecture, and the arts, styles are often created on a macro level by referring to the "spirit of the times." Later, in books of style history, causality is established between social, political, economic, and technological factors and the emergence of new styles. From a micro-perspective, style is exemplified by pointing out characteristic details and their role in the totality of the object. How do the social situation, political climate, and technological paradigms influence the view of human and machine? How is this reflected in the interaction styles of the products at the museum?

The groups found that the museum focused on presenting the technological development of the company in relation to its physical growth, market growth, and
production technology. It was possible to feel the action of knobs and switches but there was little information about users and use contexts. The museum offered no explicit understanding of the company spirit (beyond the pioneering days), what users thought of the products, what using the products was like in context—this had to be inferred indirectly from sales material and news clippings.

Changes in interaction style were most obvious when following the development of one product or a particular function over time. When looking at the full range of products or functions over time, the picture was much more complex. Each product line seemed to follow its individual path—answering to different impulses within the general styles of the era. The research teams observed that it was important to track where inspiration for a particular solution came from to be able to judge the product before them: “We need to know about the products that created the archetype or paradigm for the style.”

Toward the end of the workshop, the teams presented and compared their observations. There was reasonable overlap of style periods identified from the three perspectives. Developments in technology, company spirit, and society seemed to fit easily together, supporting the claim for a causal relation between influencing factors and the resulting styles. Finding names for the style periods generated discussions among the teams. Finally, the teams agreed on labels referring to technological paradigms in society. The groups produced posters describing four interaction style periods in the history of Danfoss products. The following text and figures (3, 4, 5, and 6) are excerpts from the posters:

**FIGURE 3** In the Machine Cowboy Epoch, interaction required heavy activation force and provided direct tactile feedback.

**FIGURE 4** In the Analog Professional Epoch, activation force is reduced, the trend toward miniaturization starts, and direct feedback disappears.

Interaction requires heavy activation forces and provides direct tactile feedback; there are few buttons and few operations. The company spirit is that of the pioneer, Mads Clausen, who is a problem solver of few words; solutions are simple, quick and self-made. The company's relation to users is personal and based on shared technical knowledge.

Interface design and aesthetics is only icing on the cake. In this period, a positivist view of technology dominates society. Flash Gordon wins the fight between good and evil with blasters and rockets. Interaction is working with tools or machine-like controls. Controls are often hidden inside the product or are a part of the structure.


Analog electronics takes over control of the mechanism. Activation forces are reduced and direct feedback disappears. The LED is introduced into the interfaces. The trend toward miniaturization of product and interface starts. In the company the willingness to find and implement quick solutions is replaced by thoroughness and professionalism. User interfaces have a clean functionalistic style. Instructions and product graphics are given higher priority. As computing and automation be-

**FIGURE 5** In the Digital Hacker Epoch, interfaces stabilize at a practical size, whereas the number of parameters to control grows rapidly.

**FIGURE 6** In the Molly Epoch, remote controls and communication busses are the new interfaces. A trend toward direct control and manipulation starts.
come reality, fear of being replaced by the machine grows in society. Central data processing is a reality.

The hippie movement counterpoises the view of the scientist as an objective genius without social abilities. In the Tintin comics, Professor Turnesol can build a moon rocket but is unable to get dressed properly! Interaction goes off-line. Parameters are manipulated before hand to set up the system.

4.3. The Digital Hacker Epoch, 1980–1994

Miniaturization reaches the limit; interfaces stabilize on a practical size. LCD screens and plastic foil buttons with weak feedback dominate. Electronics goes from analog to digital and the number of parameters to control grows rapidly. In-frequency transformers go from 3 initially to approximately 270 two decades later. Interaction is built around a menu–tree structure, instead of the one-control, one-function design. In the company, bureaucracy increases, a growing self-consciousness adds to the pride in products. Users have become anonymous to the developers: Sales people act as go-betweens. Personal computers are introduced to everyday lives. In science fiction movies such as Star Trek, problems are solved by pressing the right buttons. Blade Runner introduces a new view of technology as something that can be perverted, ethically complex and dirty. Technology is no longer the domain of scientists. Everybody uses hi-tech.

4.4. The Molly Epoch, 1995–?

Remote controls and communication busses are the new interface components. User interaction moves away from menu juggling toward seamless control and manipulation. In the company, there is a reaction against the arrogance of previous times. Developers become aware that they know too little about users and customers. There is an increasing attention to the professionalism of design processes and user/customer involvement. In society, the first generation born with computers is growing up. William Gibson’s novel Neuromancer coins the terms cyberspace and cyberpunk. Humans are disillusioned with science and technology but accept it as a part of life and a major means of expression. Gibson’s character, Molly, lent her name to this style.

This analysis helped understand the roots and possible motivations of the interaction styles. The research teams found qualities of use, which might still have a bearing on interface design even though the embodiments are outdated. They also became aware of the underlying philosophies governing the choice of functions and their realizations. This provided insights into alternative value systems.

Could the knowledge we gained in the company museum be applied to the design of a new product? Would it be possible consciously to choose an “old” interaction style for a product based on new technology? Or would it just appear old and outdated?
It seemed that we needed to rework the historical interaction styles and look for expressions of our time in them, rather than style periods belonging to the past.

5. DEVELOPING CONTEMPORARY INTERACTION STYLES

A few weeks after the museum workshop, the user-centered design group arranged a new activity with the goal of establishing a set of contemporary interaction styles in some operational form and then plunge into designing products with identical functionality but different interaction styles. To bring the historical interaction styles up to date, the information we had collected was abstracted, and then new, up-to-date representations of the same experiences, actions, values, and philosophies were established. The period resulted in a set of three styles presented on mood boards after three days of group work and discussions.

Roughly the same group of people as in the museum workshop participated, nine in all. The group made a series of semantic transfer exercises in which we negotiated agreement on the meaning of the historic material we had found, what values and philosophies the material represented. First, inspired by Kammersgaard (1990), the historical information was generalized by describing four user perspectives and four technical perspectives that contained representations of the values we had identified. Then, to bring these general descriptions of values and philosophies back into reality, current trend analysis journals in the fashion and interior industry were searched to find materials, graphics, activities, types

![Image of mood board with words: energy, light, competition, tough, confident, polished, pleasure, perform, practical, rugged, lustre, control.]

**FIGURE 7** The Tool style mood board: Actions are smooth, positive and goal oriented. The world is mediated through things that are portable, dynamic and protective.
FIGURE 8 The System Style mood board: Precise action to build strength as an armor of formality. The world is unsafe—don’t get hurt—have goals, be efficient, reliable, and in control.

FIGURE 9 The Dialog Partner Style mood board: Activity is seamlessly integrated with technology. The artificial world is safe because it is adaptive. The user evolves with it, through technology.
of people, and expressive words that conveyed the values and philosophies we were interested in.

The results were synthesized into three mood boards containing collages of the visual material we found, with a list of expressive words beside them (see Figures 7, 8, and 9). The style on each mood board was given a name. Later, when referring to the style or presenting the mood boards to people outside the design team, it became apparent that a strong mutual understanding of the styles had been developed. It was difficult, however, to convey the nuances of the style through the mood boards and names alone. The designers observed that “the styles need names that denote action, the ones we used were too ‘internal’ to the design team.”

6. WORKING WITH STYLE USING MOOD BOARDS

The mood boards were developed midway through the project, at a point when the team had completed ethnographic field studies, created a set of use scenarios in collaboration with users, and experimented with preliminary ideas of wearable types of equipment. For the remaining 3 months of the project, the team worked through three design iterations. Each cycle included a user workshop to explore the concepts-in-use scenarios. In the first cycle, the workshop developed form and interaction concepts based on each of the three styles. These were created in parallel by three subteams through an intensive 2-week period. The designs were presented using foam mock-ups and paper prototypes for interaction (see Figure 10). Then, over the next month, the field was narrowed down to two concepts (Tool and System styles) in the second cycle. Interaction concepts were prototyped on computers (see Figure 11).

FIGURE 10 Three mock-ups from the first design iteration. From left, System, Dialog, and Tool styles.
Finally, based on user preferences, the team decided to engineer a Tool style concept in the last design cycle (see Figure 2). The concept was presented both in an industrial design mock-up and in a working prototype on a commercial PDA platform.

Some design decisions of the product cannot be attributed to functionality and users' work practices entirely. In the second iteration loop for instance, three of the key discussions were

- if the PDA should be designed to fit into the operator's pocket or into his toolbox;
- if the PDA should be operated with buttons (Tool) or with a pen (System); and
- if navigation between components of the plant should work through plant overviews and zoom (System) or by touching the component physically on location (Tool).

None of these questions could be solved through knowledge of user work practices alone; they were as much based on personal preferences of the individual operators.

7. LESSONS LEARNED

Frequent discussion sessions throughout this interaction design process disclosed three aspects relating to the interaction style work.

FIGURE 11 In the second iteration, design is narrowed down to two concepts. System style fits in toolbox; Tool style fits in a pocket.
7.1. **Interaction Style Versus User Descriptions and Use Scenarios**

When introduced to interaction style thinking and the mood boards, the team had difficulties coming to grips with the aesthetics in relation to the user-centered design practice of describing users (real or generalized) and future scenarios of use (Verplank, Fulton, Black, & Mugridge, 1993). Are interaction styles synonymous with the preferences of particular users? Are some use scenarios related to a particular interaction style?

After some days of struggling, the breakthrough came when one designer reflected on this relationship: "User characters work well to build empathy with all types of users. But it is difficult to immerse yourself in a style when you don’t like it!"

User characters let the designer keep a distance and assume that interaction design may be derived causally from user understanding. The mood boards force a personal affective judgment. "In the mood boards there is more kind of dream-stuff while the user characters tend to contain some of the prejudices we have against each other." "Style thinking seems to give us an empathic understanding without stigmatizing users or contexts."

When working with different style expressions for products in the same use scenario, the team learned that some scenarios seemed to fit better in one style than others. It seemed that users with different style preferences might act differently in the same work situation—which is not much of a surprise.

In other words, interaction styles may modify the behavior one anticipates of users in scenarios. So the interaction style thinking provokes an important discourse between empathy with users and personal artistic expression of the designer, and it enhances the designer’s ability to create potential use scenarios.

7.2. **Interaction Design Style Versus Product Design Style**

The team found it extremely difficult to distinguish between interaction design style and product (industrial) design style. It was much more difficult to discuss variations in interaction expression than in visual expression, which is part of the industrial designer’s competencies. It can be seen from the prototypes of the first design iteration (see Figure 10) that the visual expression is shaky. Later on, the team acquired more confidence in finding visual expressions that supported each interaction style. Designers needed to maintain a clear understanding that “interaction style is about the quality of action, not visual expression.” Naturally, the two are closely intertwined because the product semantics, as well as its visual expression raises expectations with the users as to the feeling when interacting with it.

For instance, the two bulges on the final prototype (see Figure 2) afford holding. This property is enhanced by the product semantics (Vihma, 1995)—large, black, rubberized, rounded forms in contrast to the angular, smooth yellow of the body being signs on handgrips on a heavy-duty tool.
7.3. The Art of Interaction Design Versus User Involvement in Design

Another initial concern of the team was how thinking in terms of style should relate to the practice of involving users in design in the Scandinavian tradition (Binder, Brandt, Horgen, & Zach, 1998). Could users be involved in the questions of interaction aesthetics? How should the team model and present interaction design alternatives?

And how would it be possible for users to evaluate concepts with identical functionality but different interaction styles?

In both the first and second iterations, the team chose to present the design alternatives in catwalk fashion (see Figure 12): At the user workshops a designer dressed in stereotype cloths (expressing the style) would present each design concept in front of a projection screen with plant pictures and screen prototypes.

The first level had paper prototypes only of the interaction; at the second level, users could try out basic tasks on computer prototypes. An attempt to engage users in a semantic evaluation on the first level (attach “experience” key words to each of the style prototypes) did not succeed. It was probably too abstract, and confused users so that many of the keywords were connected to functionality issues rather than experiences. A usability designer reflected on this workshop: “Interaction style is not visible in a quick presentation. You have to experience it yourself or take time to think in terms of actions.” Based on the computer prototypes the users were much clearer on their evaluation of the style alternatives: They preferred the Tool style, whereas the participating research-and-development engineers liked the System style, which is much closer to the “windows, icon, menu, pointer” interface principles on their personal computers.
FIGURE 13 A user at a workshop is fitting the Smart Window concept into a use scenario.

When collaborating with users, the interaction style thinking may help clarify the distinction between user intentions (interface functionality) and user values (interaction experience)(see Figure 13).

8. TOWARD A SCANDINAVIAN INTERACTION DESIGN STYLE

By making a clear distinction between user experiences and user intentions, interaction style thinking brings up the major philosophical issue of twentieth-century design—the relation between form and function. The functionalistic position, “form follows function” was coined by the architect Louis Sullivan (1856–1924). It came to mean that by developing a clear understanding of the functional necessities of a product, it should be possible to develop a minimalistic form that purely and truthfully represents the nature of the product, its materials, and mechanisms. Such a form will then be the new style of the modern era. In opposition are the embellished styles of the eighteenth and nineteenth centuries that use form to decorate and refer to classical symbols, applying them over the functional structure of the product. In opposition, also, to functionalism, the postmodern position is that “form follows fancy.” As inspired by the writings of Roland Barthes, Umberto Eco, Jean Baudrillard and others, form is understood as a dimension of design that may be used independently as a communicative function, to add extra meaning to the product. Form may be used to raise issues of sarcasm, to analyze, to demarcate social groups, or to explore novel experiences with familiar object types. Postmodern style is semiotic, an exploration, and trade in meanings.
At its worst, functionalism developed disrespect for the user, treating formal, technological, and economic minimalism as the only benchmarks. "Scandinavian design," which originated in the 1950s, was a successful interpretation of functionalistic style. It acknowledged the human aspect of products. Softer forms were used with a focus on natural materials: textile, wood, stone, glass and steel. Letting the natural qualities of the materials dominate the product and following their inherent properties when making the product. Making socially responsible products and products that addressed the needs of ordinary people rather than intellectually and physically capable elite.

In the Smart Window project, we used a style characterization process to become conscious of our possibilities for expression. Therefore, we worked with multiple styles. We did not seek to define our relationship to, or follow any existent style of, industrial design. However, many of the qualities we discussed are also present in the Scandinavian participatory design approach to HCI and in mainstream user-centered design.

We have the feeling that usability engineering is presently suffering from misguided functionalism and that a heavy focus on the use of analogy and metaphor runs the risk of postmodernist pitfalls. We believe that the harmonious, direct interaction with the real world exerted through the Smart Window design points toward a Scandinavian interaction design style. There is still a lot of work left to understand the implications and potential, but the seed is there.

9. CONCLUSIONS

Designing with interaction styles is still a very immature field, but one that holds great promise for designers, once more is learned about what constitutes a style and how it is practical to work with interaction styles. This article shows that there is no simple relation between the interface technology and the interaction styles that designers may realize. Rather, styles relate broadly to the philosophies, needs, and values of the social system in which the products are made and that in which user interaction takes place.

To introduce interaction style thinking in a design team, it is necessary to sensitize the team to interaction style by discussing the designer's own experiences with people and artifacts in relation to use scenarios. The discussion creates a shared network of norms that may be applied in the design process. An initial investment of 2 to 3 days and a continued focus on interaction style as a design factor should achieve significant results.

The three mood boards illustrate that it is possible and rewarding to make the transition from periods of interaction style in history to contemporary style expressions, which co-exist in product designs today. The mood boards were developed for one type of product (industrial components with solid user interfaces) and for one particular company. It is too early yet to discuss how much of this can be reused and generalized to other types of products and other industries.

The introduction of the interaction style thinking into an industrial user-centered design practice—although it required a substantial effort—was a definite suc-
cess. It succeeded in providing clear visions and a sense of direction for the design
team, so it holds great promise for future experiments.

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