

ALTERNATIVES

Exploring Information Appliances through Conceptual Design Proposals

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ABSTRACT

As a way of mapping a design space for a project on information appliances, we produced a workbook describing about twenty conceptual design proposals. Here we describe them both in terms of content and process. On the one hand, they serve as suggestions that digital devices might embody values apart from those traditionally associated with functionality and usefulness. On the other, they are examples of research through design, balancing concreteness with openness to spur the imagination, and using multiplicity to allow the emergence of a new design space.

Keywords: design research, information appliances, home, conceptual design

INTRODUCTION

As digital technologies migrate into our everyday lives, we expect their forms, functions, and values to expand beyond those embodied by the desktop PC. Recently we have joined in the formation of the Information Appliance Studio, a virtual organisation headed by the newly created Appliance Design Inc. which spans Hewlett-Packard, IDEO Product Development, and the Computer Related Design department at the Royal College of Art, to explore and shape new possibilities for everyday technologies.

Information appliances, as described for instance by Norman (ok), are devices that perform a single function (or closely related cluster of functions) with simplicity and elegance. Networking, often assumed to be wireless, allows new synergies to form among them, recreating the complex possibilities of traditional computing while offering new affordances for interaction. Because specialised appliances can take a wide variety of forms, their benefits can be fluidly integrated in peoples' everyday lives, without requiring that they withdraw to a desktop computer.

The notion of information appliances is inspiring but fuzzy, defined by a combination of abstract vision, technological infrastructure, and only occasional exemplars. For instance, the Hewlett Packard CapShare, a handheld scanner that allows images to be captured by passing the device over a page and wirelessly transmitted to a PC or printer, is a good example of an information appliance. The Palm Pilot, on the other hand, is usually held to perform too many functions to qualify. Other possibilities that have been suggested as "good" information appliances include digital cameras, cookbooks, or gardening appliances. So far, how-

ever, the field has been defined largely at a conceptual level, with the space of devices that might populate it little defined either analytically or by example.

In order to better understand the range of information appliances that might evolve, we developed a large number of conceptual design proposals which we presented in a workbook produced for our partners. These speculations were intended to open a conversation with the group about the values that might characterise everyday technologies—values seldom reflected in existing products.

The goal of this paper is to describe the Alternatives workbook both in terms of the proposals it made for future information appliances and as a method for pursuing design. First, almost half the paper is devoted to the presentation of reduced versions of the workbook pages, slightly modified to retain legibility, as a way of simulating their impact directly. Second, we discuss the ideas in terms of the cultural values they suggest for technologies meant to be integrated in everyday life. Finally, we describe the proposals as an example of research through design, describing how they were designed to balance concreteness, openness and multiplicity to allow the emergence of a design space that could be developed with our partners.

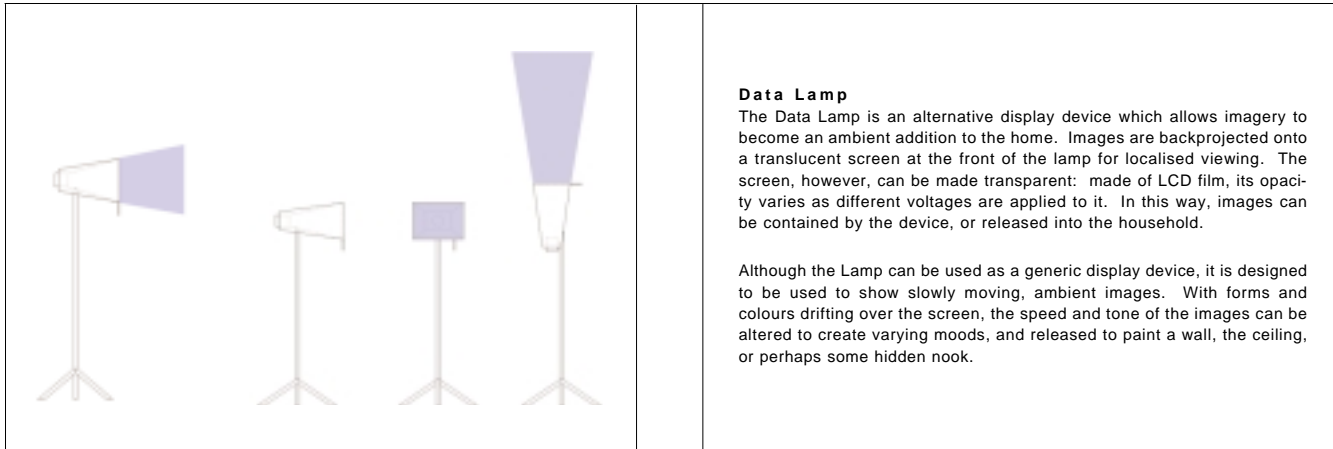
ALTERNATIVE VALUES

Suggestions for how digital technologies might be employed in everyday settings tend to represent a narrow

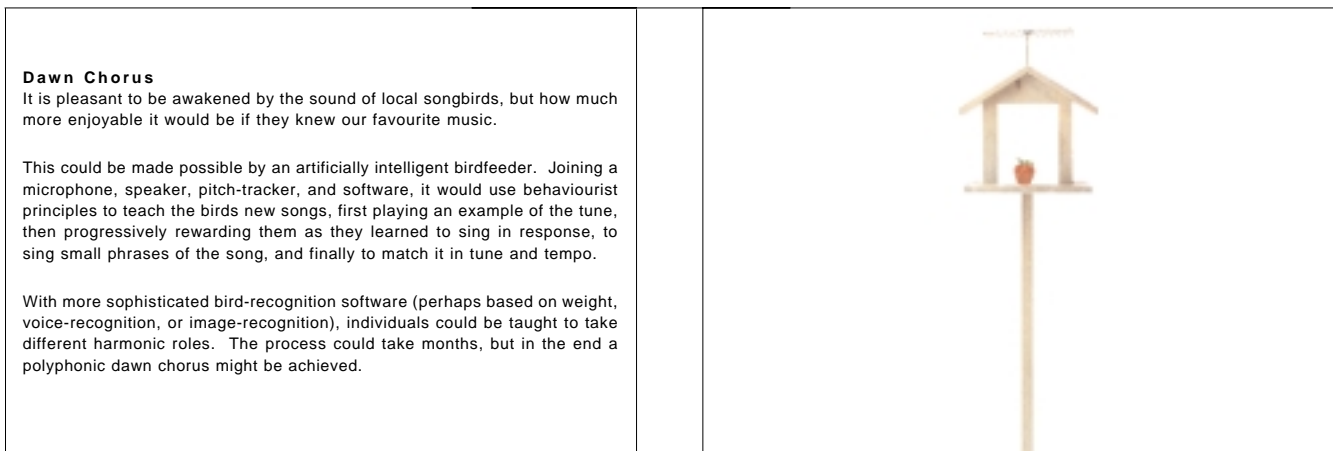


Multiple proposals allow a design space to be explored.

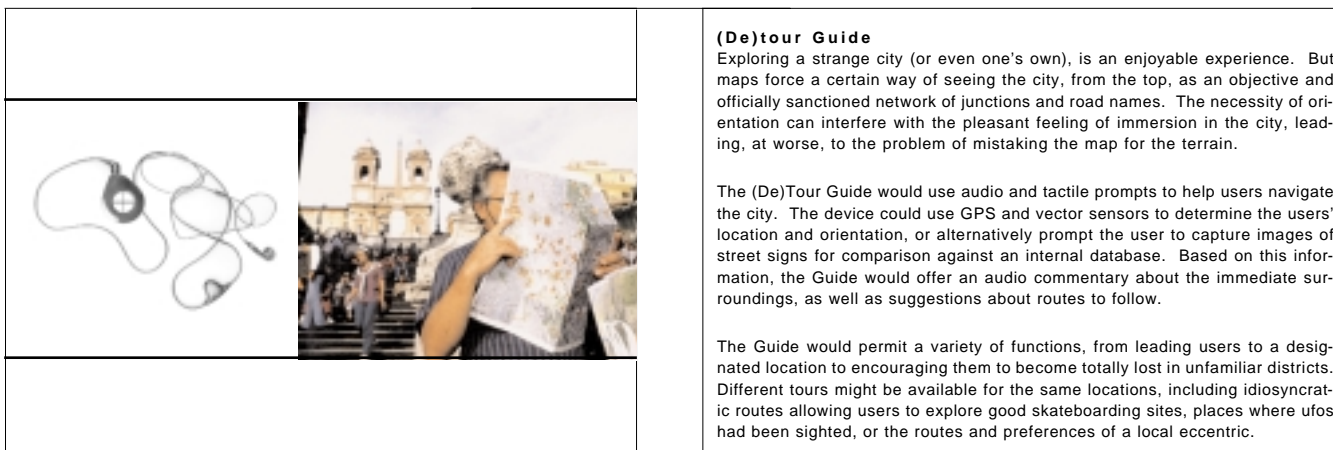
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1. Data Lamp: The front LCD screen can be made opaque or transparent, allowing images to be contained or escape.



2. Dawn Chorus: An intelligent birdfeeder uses behaviourist training to teach local songbirds the owner's favorite songs.



3. The (De)Tour Guide uses a global positioning device to give audio and tactile directions—or misdirections—in the city.

range of cultural possibilities, reinforcing a simple dichotomy between work and play. Many devices import values from the workplace into the home, emphasising the requirements of “domestic work” by allowing chores to be done more efficiently or productively. Others emphasise the desirability of taking “time off,” allowing people to play unproductive games or access new forms of mass media. Other values seem rarely to be addressed at all.

One exception to this generalisation is in telecommunications, which has long been appropriated for domestic use. More recently, products have explored the potential for supporting emotional communication, often without explicit messages. For instance, the Lovegety (4) signals romantic availability to nearby users via lights and sounds when their simple profiles match. While this may seem a crude reflection of the subtleties of everyday courting behaviour, more sophisticated forms of emotional communication are starting to be explored by research groups (e.g., 1, 8, 11). Still in early forms of development, their explorations of sensual aesthetics and implicit expression, coupled with the value they place on emotional connections, suggest new roles for technologies in our personal lives.

While emotional interfaces have been increasingly recognised as a meaningful alternative to more traditional perspectives on functionality, there are many other examples of noninstrumental values that technologies might support. The speculative design examples presented in the Alternatives workbook are intended to greatly expand the kinds of meaning recognised by technology.

In presenting these proposals we are deliberately noncommittal about the exact technologies that might be used in their implementation. As Raby has noted (ok), in the technology industry a prototype “works” when the technology has been implemented, even if aesthetic and cultural issues are neglected. In design the opposite is true: A prototype “works” when it successfully captures the experience of using a given device. At the same time, we see little value in “science fiction” concepts which rely on technological effects that can or do not exist. Instead, the proposals are intended to be *technologically plausible*, in the sense that it seems likely that they can be realised even if the exact means are unknown or unspecified. In practice, achieving plausibility depends on designers’ knowledge and judgement, while an evaluation of the results may depend on discussions with technical experts.

While maintaining technical plausibility, however, we do propose several systems that seem socially implausible. Proposals such as Democratic Advertising (Figure 4) and the Dawn Chorus (figure 2) may be seen as examples of what Tony Dunne calls *value fictions* (Dunne, ok). Unlike science fiction, in which implausible technologies are invented to support recognisable cultural activities, value fictions propose practical technologies for implausible social goals. They can be valuable as criticisms of culture and technology—in the case of Democratic Advertising, pointing out the overwhelming degree to which public spaces are controlled by commercial and governmental interests; while the Dawn Chorus might be seen as a comment on our desire to tame nature.

In the following, we discuss some of the values our designs are meant to encourage. Analysed post hoc, this may be a somewhat incomplete list: As we discuss later, the best

embodiment of the values we have been exploring are the proposals themselves.

Impressionistic Displays

Computer displays tend to present information precisely, whether this is appropriate aesthetically or functionally. Many of the proposed designs seek to move away from the precise symbolic displays often associated with computers and provide impressionistic, ambient information more normally provided by analogue devices. For instance, the Datalamp (Figure 1) allows images to spill out of the device into its surrounds—perhaps onto a screen, but equally possibly onto a corner of the room, the ceiling, or a piece of furniture. The Weather Flower (not shown here) uses memory metal which unfurls and extends depending on some aspect of local or remote weather, such as temperature or luminance. Other proposals, too, employ these sorts of imprecise, suggestive displays in making their effects.

The soft aesthetics of these sorts of displays seem well-suited for domestic environments. Perhaps less demanding than more precise information, they also permit a degree of ambiguity that might encourage imagination and speculation. In encouraging the use of these sorts of aesthetics, we join researchers such as Weiser (12), Ishii (see 1), and McWilliams (personal communication) in embracing a softer approach to technologies designed for home environments.

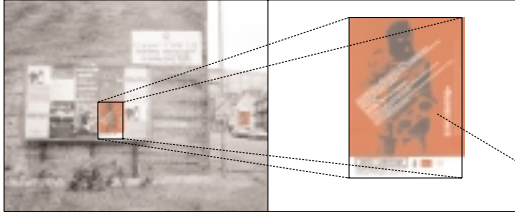
Aesthetic control may be an easily recognisable feature of design approaches to technology, but even more important is the conceptual design of devices meant to fit everyday life. Changing the appearance of devices is not enough; they must also be designed to provide functions meaningful in those parts of life that are not dominated by productive work or unproductive entertainment. This was the primary focus of the work reported here.

Diversions

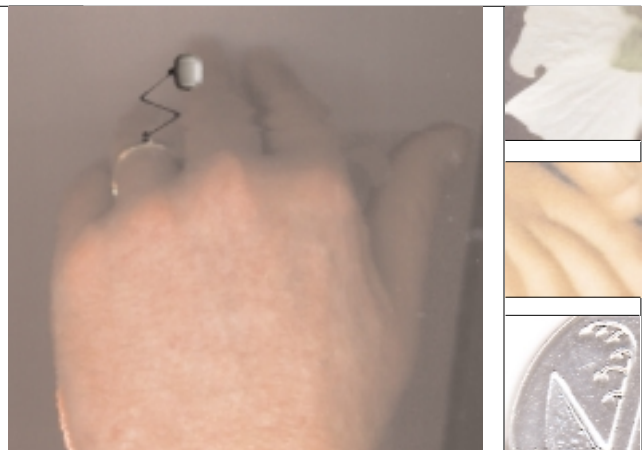
A conceptual analog to the value of impressionistic displays is the value people find in being diverted from their normal patterns of perceiving and behaving in the world. Rather than pursuing clear and precise goals, we often find enjoyment and meaning in experiencing the world in novel or surprising ways.

The (De)Tour Guide proposal (figure 3) expresses this value clearly. The device would use location and direction information to play audio and tactile cues to travellers in the city. In moving away from the kind of omniscient overview provided by maps, the (De)Tour Guide would allow districts and landmarks to be discovered only upon approach, as if by chance. Beyond this, however, people might sometimes use the device to get lost on purpose, or to follow the idiosyncratic paths of unusual strangers. In providing for these sorts of possibilities, the device gives technological support for Situationist detournés (7), wanders through the city’s emotional and cultural topology.


Other concepts, too, explore the notion of diversions in everyday life. For example, several of our proposals concerned psychological exploration, using alterations of normal perception as a way of evoking insight. The Gestalt Camera (figure 10), for instance, would manipulate images of the users’ surroundings to produce ambiguous stimuli upon which viewers might project meaning. In producing new, accidental patterns, it is hoped, the device would stimulate novel interpretations of the viewer’s relationship with

	<p>Democratic Advertising</p> <p>If people can capture posters, flyers, and images to take home using the Ad Collector, they might also want to leave them at various spots in the city to share with others. Democratic Advertising would allow this by offering a system of electronic posters distributed through the city.</p> <p>People might download posters to the various DemAd displays for a variety of reasons. They might simply like the image, or the event it announces. They might wish to communicate to people living nearby—perhaps friends, but also strangers. This public intervention could begin to infiltrate the city as the public begins to control what is deemed important/inspiring or concerning.</p> <p>Allowing public control over advertising imagery would appear extremely risky to advertisers. But Democratic Advertising might offer unique advantages to those prepared to take the chance.</p>
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4. Democratic Advertising allows people to propagate advertising imagery to new sites in the city.

<p>Intimate View</p> <p>The objective nature of text, words, even video images is not only unsatisfactory for supporting distant love relationships, but even seems to interfere with the deeper, more subtle forms of interaction that create intimacy</p> <p>The Intimate View seeks to build a visual connection between lovers, but constrained so that shared perceptions, rather than visual facts, become the object. This is achieved by transmitting images from a tiny macro camera, or personal scanner, worn on the body.</p> <p>By sharing only tightly focused portion of the local environment--the veins of a leaf, a drop of water, the corner of one's smile--the system would encourage partners to join together in a moment of highly focused mutual perception. Used playfully, aesthetically, or erotically, the device would permit rich new forms of loving communication to exist even over great distances.</p>	
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5. The Intimate View allows lovers to send each other extremely magnified images, sharing moments of mutual focus.

	<p>Dream Communicator</p> <p>Years of our lives are spent in dreaming. Dreams have long been considered important sources of emotional and spiritual information, but currently clinical psychoanalysis is the primary inheritor of their insights. There are very few products that allow a wider audience to tap the possibilities of our dreams.</p> <p>The Dream Communicator would build on our tendency to incorporate external stimuli into our dreams, to allow lovers to contact each other's dream-selves. Distant lovers might be alerted when their partners enters REM sleep, for instance, and be allowed to stimulate their dreams with sounds or speech. The intimacy and trust implied by such a device would only be found in the closest of relationships.</p>
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6. The Dream Communicator allows lovers to influence one another's dreams.

the surrounding social and physical environment.

Using technology to surprise or distract runs contrary to the usual efforts to increase efficiency and productivity through predictability and control. Yet there are values to be gained from diversion such as the chance to discover new places, people, or ways of looking at the world. Such benefits are recognised implicitly within the CSCW field, where support for “peripheral awareness” of colleagues, without explicit purpose or function, is advocated as leading to opportunities for serendipitous communication and a general increase in the coherence of work groups (e.g., Kraut, 6). Supporting such accidental encounters—with other places or perceptions, as well as people—can thus be seen as a sort of “serious play” fitting between the usual categories of work and time off.

Influence

People seek influence over their environments, and digital technology have traditionally extended possibilities to extend knowledge and control. Two of our proposals emphasise this value as well, but in new domains and surprising and poetic ways.

First, the Dawn Chorus (figure 2) offers the possibility that people might control the songs sung by local birds. Although this may seem far-fetched, with the use of a pitch detector and simple machine intelligence it seems plausible that an automatic behavioural paradigm could be arranged to shape birds’ behaviour as their songs increasingly approximate a target tune. With the addition of individual bird recognition, a polyphonic choir might even be achieved.

The Dawn Chorus speaks to the value people find in appreciating—and domesticating—nature. Just as the burgeoning garden industry has allowed people to extend control from their living rooms to their gardens (Rogers, 10), so the Dawn Chorus would extend this control to the very wildlife that shares domestic neighbourhoods.

Of course, the control offered by the Dawn Chorus is not unproblematic. Apart from the problem of neighbours having incompatible musical tastes, interfering with bird’s natural songs might adversely affect their mating behaviour. Perhaps it is fortunate that not all songbirds are susceptible to training. Nonetheless, the proposal often seems to delight people, at least conceptually, because of the surprising influence it offers.

In another sphere, Democratic Advertising (figure 6) would allow people to copy advertisements between various sites using portable capture devices. By spreading advertisements that they found beautiful, useful, or socially important, people could influence elements of the public sphere which are normally beyond their reach. Advertisers, in turn, would find advantages if their advertisements spread for no extra cost, and direct feedback if they failed.

Intimacy

People also find meaning in nonverbal, inexplicit forms of communication that few technologies support well. Whereas emotional communication systems described earlier in this paper have often sought to make the qualities of

the medium itself mimic or reflect those of intimacy—using softness, tactility, and so on—the proposals here use constraints on the media to suggest or encourage intimate forms of communication.

The Intimate View, for instance, suggests that sharing extremely constrained images of magnified details might allow lovers to create moments of mutual focus. Intimate View is deliberately open about the kinds of images that might be shared, so that partners might share erotic explorations as easily as mundane details of their surroundings.

The Dream Communicator encourages an even more intimate form of communication. Building on the idea that people incorporate external stimuli into their dreams, and the situation in which people in different time zones are awake when their partners are asleep, the device monitors the sleeper and signals the user when their partner enters REM sleep. At this point, the traveller may seek to influence his or her partner’s dreams, transmitting sounds, or perhaps tactile stimuli, lights, or scents.


Proposals like the Dream Communicator may raise questions about the degree to which people will accept technological mediation or support of their intimacy. However, it may not be the technology per se that is at issue, but the degree of intimacy it implies: allowing one’s dreams to be influenced by somebody else would seem to require an extraordinary amount of trust, and desire for togetherness.

Insight



Many people desire to understand and change their experience of their selves and the world around them. When reflected by phenomena such as the sales of self-help books or new age materials, such values are clearly widespread, yet can be easy to dismiss. Nonetheless, designs might reflect them in ways that can be meaningful without being solemn, externalising psychological mechanisms into digital technologies either to escape or encourage them.

For instance, the Worry Stone (figure 7) is basically an electronic to-do list that uses its processing power to endlessly and visibly rehearse entries. By taking on the fretting of the user, the intention is that it should free time for less neurotic activities. This proposal may be seen as a comment on peoples’ behaviour, but also as an appropriate use of digital technologies to perform tasks that are onerous or difficult for humans.

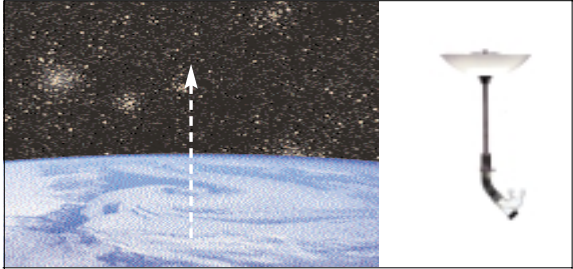
The Gestalt Camera would allow people to capture and manipulate images of the environment around them. This might be done merely for entertainment. But the forms of manipulations possible would be guided by the projective tests of psychoanalysis such as Rorschach inkblots. The interpretations people make of these ambiguous stimuli can give insights into their preoccupations or desires; using the Gestalt Camera, then, might similarly provide a pleasurable foundation for people to reflect on their attitudes towards their current situation. Related to this, the Daydreamer would present pictures to users and prompt them to write short interpretive phrases. Using both the image and the phrase, the system would search for a new picture in an internal database or over the internet. A chain of images and words would emerge, providing support for and a

<p>Worry Stone</p> <p>In stressful times, many people maintain internal lists of the tasks they face. As the list grows, they spend more time fretting about the things they have to do than they spend on getting them done. The problem is compounded by the tendency of worries to surface into consciousness without reason, at inconvenient times. The distraction this causes is often counterproductive and even neurotic.</p> <p>The worry stone would be a device that allows people to externalise their cares so that they need not dwell on them. Speaking into the device would offload a task to a small database via a speech convertor. The user could scroll through the list, delete obsolete entries, or print out a 'to do' list.</p> <p>But the primary function of the Worry Stone would be to take over the user's anxious fretting. To show that the device had truly internalised the use's concerns, its processing power would be dedicated to displaying the list of worries in random order, as quickly as possible. The user could let go of the problem for the moment, knowing that it was safely held in the Worry Stone's memory.</p>	
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7. The Worry Stone internalises the user's concerns and frets over them without pause.

 <p>gestalt</p>  <p>daydream</p>	<p>Gestalt Camera / Daydreamer</p> <p>Imagination could be more rewarding than TV. Rather than providing us with scripted narratives crafted for the widest possible audiences, devices might support us in interactively developing our own particular stories.</p> <p>The Gestalt Camera, for example, would manipulate captured images to produce abstract, suggestive results. Like the projective tests used by psychologists, these could spur interpretations and ideas beyond the original scene.</p> <p>The Daydreamer would allow people to create a narrative series of images. As new images appeared, users could enter their associations or reactions. Their words, as well as the original image itself, would form the basis for a new image search. The result would be a semi-structured, impressionistic daydream.</p> <p>These devices could provide enough support to allow entertaining imaginative fantasies. Beyond a pastime, however, they also set the stage for reflection upon ones preoccupations, concerns, hopes and desires. Over time, they might lead to a useful self-awareness, not using the methods of psychotherapy, but those of engagement and delight.</p>
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8. The Gestalt Camera manipulates images forming projective tests to help people understand their attitudes.

<p>Prayer Device</p> <p>Spirituality, the need to connect to forces beyond the familiar and mundane, should not be discounted in modern times. Despite the apparent rationality and even cynicism of our age, large numbers of people persist in a search for transcendental meaning through psychics, exorcists, and a belief in extraterrestrial lifeforms.</p> <p>It is surprising, from this perspective, that technology has not been employed to support spiritual quests. The Prayer Device would be a first attempt to rectify this omission. Most likely deployed in public spaces, it would serve as a kind of telephone booth to heaven. People could speak privately into the mouthpiece, and their prayers, wishes, or confessions would be transmitted via a highly focused transmission to the skies.</p> <p>The recipient of these words might never be known. Individual users might hope, however, that they would be picked up by God, or by benevolent aliens. The use of a potent technology to reinforce their thoughts might strengthen their faith that somebody, somewhere, might hear them.</p>	
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9. The Prayer Device allows people to transmit their voices to the skies.

record of an extended reverie.

These proposals, and others like them, suggest that technology might work with the tendency for people to structure their worlds meaningfully. On the one hand, they might lead users to reflect on the ways they interpret the world. But even used unreflectively, such devices might help relieve stress (e.g., the Worry Stone) or provide new forms of meaningful play (e.g., the Gestalt Camera).

Mystery

People can find value and solace in contemplating the unknown. Just as technologies tend to overlook peoples' interest in the psyche, so do they neglect their enthusiasm for speculations about spirituality, extraterrestrial life, and parapsychology. Without committing ourselves to belief or disbelief, we developed several proposals to explore these issues.

For instance, the Prayer Device would simply transmit a speaker's voice to a tightly focused beam of energy—perhaps radio waves—to be transmitted into the heavens. Perhaps installed in public spaces like a new kind of telephone booth, the device would allow people to send their thoughts or supplications to whomever or whatever they thought might listen. No provision is made for any kind of feedback, or for devices allowing others to listen in. However, it might be imagined that some proportion of transmissions would be heard accidentally via radios, TV's, or even telephones. This would allow people to overhear and perhaps gain appreciation for their fellow humans' deepest concerns.

Other proposals explored paranormal phenomena, suggesting, for instance, the creation of a Psy Exerciser that would allow people to work through game-like exercises to increase their paranormal powers. A culmination of this line of thought is the Telegotchi, which is similar to the popular children's toy but without any controls.

These proposals do not depend on a belief in numinous phenomena to be meaningful. Instead, like many of the proposals aimed at exploring psychological phenomena, they depend on peoples' tendency to project meaning onto ambiguous stimuli such as chance events. Although the devices may suggest spiritual or paranormal interpretations, they require merely an open mind and a willingness to experiment.

A BOOK OF SHORT STORIES

The proposals presented in the Alternatives workbook were an effective way to elicit a conversation among our partners about directions we might take in pursuing information appliances. Presented as fictional products, they encourage people to imagine living with them, raising many of the sorts of reactions that might be encountered if they actually existed. This encourages both a more integrative and a more emotional approach than might be encouraged by formal analyses, and one marked by imaginative engagement, so that the proposals act as tools for brainstorming new ideas. In this way, the proposals act as probes into the values and beliefs of design partners.

In order to spark conversations without overly constraining them, the proposals were presented with attention to several factors. Individually, the proposals required a balance between *concreteness* and *openness*: they needed to be specific enough to evoke intuitive reactions, yet indefinite

enough to encourage imaginative extensions. In addition, the group of proposals was *numerous* enough to avoid undue focus on any single one of them, allowing a design space to be an *emergent* outcome of the process. In the following sections, we discuss these issues in more detail.

Concreteness: (Fictional) Artifact as Theory Nexus

Synthesising ideas in the form of design proposals is an efficient and effective way to promote discussion of a wide range of design issues. As Carroll and Kellogg (2) have pointed out, the design of an artifact involves commitment to stances on many potentially articulable theoretical issues, and these commitments may be—often are—implicit. This is no less true for imaginary artifacts than for realised ones. Beyond serving as suggestions for development, then, design proposals can also be seen as complex hypothetical statements for debate.

While Carroll and Kellogg's analysis focused on cognitive aspects of artifacts' usability, their insight is more generally applicable to questions of technology, aesthetics, and (most importantly here) the psychological, social, and cultural effects that systems might make. Some of these issues are difficult to articulate and seldom discussed in the HCI community. This makes design proposals particularly valuable: insofar as they address such issues at all, even if implicitly, they provide a ground for discussing them, whether explicitly or through intuitive reactions ("that looks too nostalgic").

In addition, artifacts—imaginary or real—take on a reality apart from their creators. On the one hand, they can serve as a representative of a theoretical stance without implying the commitment of the designer. On the other hand, they do not enforce a single theoretical framework, but allow multiple perspectives. This again makes proposals a valuable basis for communication among disparate partners.

The intuitive approach we took to developing and presenting our ideas does not preclude a more analytic perspective. The dimensions and decisions implicit in the proposals can be identified via a post-hoc analysis, as we have done to some degree in the first part of this paper. As a tool for promoting discussion, however, it seems more useful to leave such aspects unarticulated. This may help avoid premature and distracting discussions of abstractions, and allow different participants to develop their own views about the issues involved. In addition, it may be more efficient to work directly on the synthesis of issues in artifacts rather than via a mediating layer of abstraction and articulation.

Openness: Proposals as Prototypes

Presenting ideas as narrative proposals allows their concreteness to be balanced with openness, because many details of their implementation, aesthetics, or functionality do not need to be resolved. This allows them to remain open to imaginary extensions, developments, and modifications in a way that would be difficult to achieve with more finished examples.

Balancing concreteness with openness depended crucially on the presentation of our ideas in the Alternatives workbook. Each of the proposals relied on images and text to suggest how the idea might be developed. Both were meant to be suggestive but clearly uncommitted as to details of form, function, or technological implementation. We sought to develop a narrative feel to the proposals, similar to commercial advertisements or science fiction stories

which describe enough to imagine a device without necessarily specifying either its form or underlying mechanisms.

A variety of imagery was used to convey the basic concepts. Many used collages of disparate elements to suggest facets of the designs' forms, aesthetics, or potential technologies. Using juxtapositions of found elements allowed us to evoke new relationships of aesthetics and function. For instance, the collage for the Dawn Chorus (figure 2), an intelligent feeder that teaches local birds to sing favourite songs, combines images of a birdhouse to indicate the product genre, a strawberry suggesting the desirability of the birds' rewards, and an antennae pointing to the electronic nature of the product. None of these elements are to be taken literally, of course. Nonetheless, the combination of elements is effective in suggesting both the kind of artifact being proposed as well as its playful and somewhat surreal nature. We also used simple diagrams to illustrate some of our ideas, as well as found imagery conveying the context of the proposal. This range of collages, diagrams, and found imagery allowed us to suggest aspects of our design concepts without prematurely committing ourselves to details.

The writing was styled to support the impressionistic feel of the images. Most of the texts briefly set a context for the ideas and then described the concept with pointers towards possible technologies and forms. But the voice used in doing this is meant to seem slightly estranged. In this we were inspired, in part, by Kabakov's (5) "Palace of Projects," a book describing a series of installations in which many are purported to be written by fictional authors—teachers, chauffeurs, pensioners, and the like—to emphasise the ordinary if seldom articulated values they address. Without going so far as to attribute the concepts to fictional characters, we did try to write the descriptions as if borrowing the voices of people with value systems and technological knowledge slightly less cynical than our own.

The text and images were mutually dependant in communicating the proposals. The text set the scene and described the functions and roles of the proposed artifacts, while the images suggested their aesthetic and cultural feel in a more intuitive way, opening a space for imagination to fill in details or extend the concepts beyond what was written.

The surreality of collages, writing style, and value fictions all contributed to the openness of individual proposals. Moreover, the range of proposals, from practical to poetic, contributed to their openness as a group of ideas.

THE ROLE OF SPECULATIVE DESIGN: PLACEHOLDERS AS LANDMARKS

While we believe that even the most speculative of these proposals has merit, their overriding function was to serve as landmarks opening a space of design possibilities for future information appliances. As such, the concepts are *placeholders*, occupying points in the design space without necessarily being the best devices to populate it.

The sheer number of proposals encouraged them to be treated as a group defining a broad territory, rather than as a number of proposals to be evaluated separately. While individual ideas might be taken forward, the existence of many alternatives discouraged too much weight being placed on any single idea. Though some might stand out more than others, all contributed to a rough sense of a larger domain.

The design proposals are primarily intended to explore a number of positions on issues concerning future technologies. This might have been done by addressing the space more analytically, perhaps trying to identify its important dimensions before creating examples within the space. Instead, we followed our intuitions and interests in developing the proposals, and allowed the space to emerge from the territories they covered (as suggested by the map on the first page of this paper). While the space thus defined is necessarily biased by our desires and interests, this approach has strengths in allowing the discovery of new areas and dimensions as unarticulated interests guide the introduction of new ideas.

Proposals such as these might also form the basis for new kinds of user studies. Aimed at a middle ground between research into peoples' general lifestyles, and studies more focused on their reactions to product concepts, concept proposals could introduce speculative new ideas to potential users in such a way as to evoke specific reactions as well as more general insights into their attitudes. Perhaps most promising, by inherently acknowledging seemingly unusual values, the proposals might encourage people to admit to pleasures and desires that the high technology industry often seems to dismiss as unworthy or nonexistent.

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