Gust of Me: Reconnecting Mother and Son

The Gust of Presence conceptual design lets parents and children who live apart reconnect in a more friendship-based relationship. With two Gustbowls, parents and children can communicate in a simple way that requires little effort and could subtly become a part of their daily routines.

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Digital communication technology is increasingly affecting the way people organize their social contacts. Product designers therefore must understand users' needs, not only on a functional level (what information they share) but also on an affective, experiential level (what emotions are involved). Technological communications solutions can easily fail because they reduce affective interactions to functional ones. Our team from Delft University of Technology's ID-Studiolab (http://studiolab.io.tudelft.nl) designed the Gustbowl to promote and support informal, unobtrusive interactions in families whose members live apart. The Gustbowl helps families keep in touch, rather than just exchange information, by letting members be a part of each other's daily routines. This lets them have the little encounters that are ordinary to members who live together yet are greatly missed by members who live apart. We'll describe how the Delft design team created the Gustbowl from user studies by developing the concept for and field-testing an experiential prototype. This project was Delft's entry for the Microsoft Research Design Expo 2003 (see the accompanying sidebar).

Design process

The MSR Design Expo and Delft's Industrial Design Engineering faculty both place importance on user involvement and user testing.

At the ID-Studiolab, we take these aspects further by looking at product use over an extended time period. This extended period lets us investigate how users physically and emotionally interact with a product, as well as settings in which they don't use the product. So, we ask users to test not whether they understand the designers' intentions for the product but what they can creatively get out of the product. We design our products by "living with our prototypes." Letting users expressively participate in the entire design process from analysis to testing encourages them to show initiative, further ensuring that our approach is user-centered.

Selecting the target group

The Delft design team originally set out to create a product that explores communication on a high emotional level between people in a long-lasting relationship. A real-life situation every team member could tap into was their relationships with their parents. The team members' mothers were a particularly suitable target group because of the members' strong connections with them. So the team named itself the

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The Microsoft Research Design Expo

Microsoft Research's Social Computing Group, led by Lili Cheng, hosted the Microsoft Research Design Expo 2003. The group invited Carnegie Mellon University, New York University, Indian Institute of Technology, and Delft University of Technology to show their work on the topic of sharing personal rich media. Each university held a course in spring 2003 and selected one student team to present visionary product designs that emphasize user-centered research at the Expo.

The ID-Studiolab of Delft University of Technology organized a short, intensive design precompetition. Four small, multidisciplinary teams of master's design students created design concepts over a two-month period. The ID-Studiolab research community and Microsoft liaison Tjeerd Hoek selected one team to present its work at the Microsoft Research headquarters in Redmond, Washington. This team, the Mamasboys (www.mamasboys.tk), consisted of four industrial design engineering master's students: Dennis Luijer, Maarten Bekx, Pieter Diepenmaat, and Wouter van der Hoog.

Mamasboys, an ironic reference to their explicit dependence on their mothers. Furthermore, middle-aged parents are a commercially viable target group, growing in numbers and consumer power.

The design problem concerned the relationship change when sons leave their parents' home, as most do when they go to a university. Moving out of the house greatly affects the relationship. In the Mamasboys' cases, these relationships kept changing, resulting in a longing to reconnect on a different level. Both parents and sons experienced that current technology didn't address this need.

During the project, the team was continuously aware of the danger of designing for themselves. Too many people have unconsciously made products this way, so they continuously checked their research assumptions against other people's experiences. The team was aware of its bias, but the best way to test real emotional connections and communication is to be the guinea pig and test them yourself in real situations.

Understanding the users

The team initially found that current communication solutions failed because the parents were *digital illiterates*—they needed help in grasping technology. The team used ethnographic and participative design methods, such as cultural probes, interviews, and group sessions (see Figure 1), to gain better insight into the parents' needs in the context of home and emotional communication. The cultural probes were packages containing small diaries, postcards with assignments, markers, pens, and a photo camera.[1] The parents could use these packages to expressively communicate how they experience daily life and how they feel about communicating with their sons.

The assumptions about digital illiteracy proved wrong. Although a large percentage of the target group wasn't enthusiastic about using new technologies, some of the parents were quite capable with them. The team divided parents into two subgroups: "The Last of the Analogs," people unfamiliar with the latest technology, and "The First of the Digitals," people on the verge of understanding modern digital technology. But both groups had a different approach to

Figure 1. (a) A cultural probe's contents and (b) a group design session with the parents. The parents completed the assignments in the probes, which initiated and structured the group discussions.

new technology than the design team. The parents regarded their new devices as black boxes in which their actions were magically translated into input and output. Instead of trial and error, both subgroups had an "error and stop" approach to new technology—they wouldn't continue after encountering a problem. For example, one son had installed an email solution on his parents' PC only to find that his parents had stopped using it because of seemingly simple glitches in their Internet connection.

In the group sessions, team members and parents discussed and investigated the need to reconnect. Everyone agreed that the sons' first years away from home were marked by a quest for independence but now the parent-son relationship should evolve into friendship. A friendship meant that sons could communicate with parents as equals, without giving control of their lives back to their parents. Equipping parents with existing and new communication devices would make it easier for sons to convey emotional feelings.

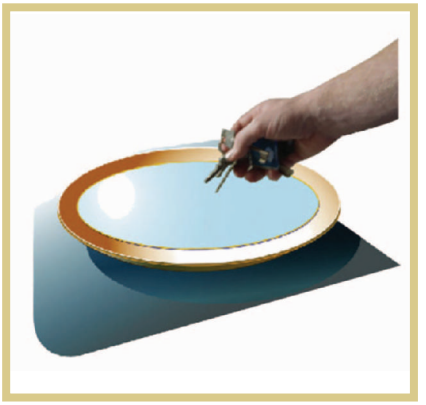

Figure 2. Putting keys into the aesthetically pleasing but nonintrusive Gustbowl.

One anecdote led the team to a very specific design challenge. What the mothers missed most was the everyday moment when their sons would come home saying, "Mom, I'm home!" This was a simple but meaningful interaction between a mother and son. The mothers agreed that the house felt emptier without this emotionally rich, reassuring moment. They didn't know how valuable it was until it was gone. This was clearly a fluent, emotionally rich interaction the parents needed.

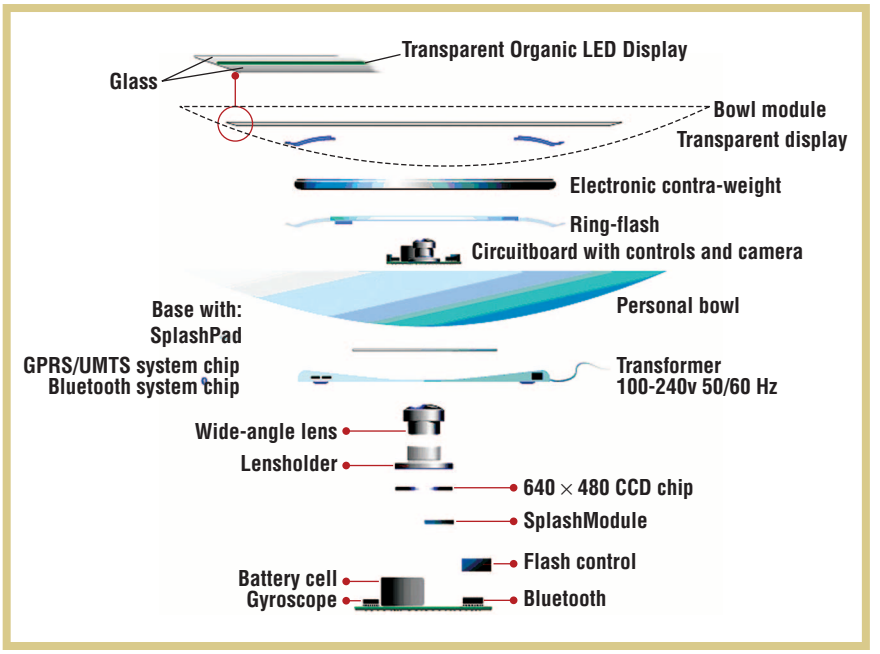

Figure 3. An exploded view of the Gustbowl.

The team set out to recreate this moment—this *gust of presence*—in a product design. The design challenge was to leverage that moment to grow a friendship without obliging mother or son to radically change their daily intentions or behavior.

Intended use and interaction

The team members built the final concept design around this moment when the son comes home. Instead of using written text or speech, they looked for another way to communicate presence and state of mind. To recreate the effect of a son coming home, they developed a nonintrusive product that causes a gust of wind—a welcome disturbance in a quiet room—like a child running in and out of the house. In an aesthetically pleasing form, this product provides a way for parents and children who live apart to let each other know when they come home.

People usually empty their pockets of things like money, keys, and mobile phones when they come home. The Gustbowl serves as a central place to put these personal items (see Figure 2), inviting the user to touch, move, or throw belongings into the bowl.

Throwing items into the Gustbowl makes it wobble because of its unstable, curved form. A pressure sensor and gyroscope sense the throw and the movement (see Figure 3). When the motion stops, the bowl takes a picture from the inside using a fisheye lens and CCD chip. Using the Internet, the bowl sends this information (movement and picture) over to another identical Gustbowl situated in the parents' home. This bowl will start to wobble as recorded at the son's home and, using a Transparent Organic LED Display, the picture of

Figure 4. Use scenario: son throws keys into the Gustbowl; mother notices the wobble and sees the picture appear in her Gustbowl.

the son's personal items will appear in the mother's Gustbowl. The picture is visible to the mother for two to three hours. Both Gustbowls are technically identical, enabling two-way awareness and communication.

The gust of presence—the wobble and the picture—is similar to saying, "Mom, I'm home!" The Gustbowl's wobble tells the mother her son came home, and the picture gives her an idea of what's going on with her son (see Figure 4). The mother doesn't have to get up and see the picture to know that her son came home. Also, she doesn't have to be there at the moment her son comes home to see what he's up to.

For the son, throwing his belongings into a bowl is a regular act that doesn't invade his daily routine. But if the son wants to communicate with or give more attention to his mother, he can spend time at the Gustbowl to make a more telling picture or wobble. The mother can also send back messages through the Gustbowl, telling her son she's come home or updating him about family affairs.

Actual use

To explore the variety of messages that people could send through the Gustbowl, the design team constructed a simple prototype. This working mock-up took pictures from inside the bowl using a simple webcam with a fisheye lens. The team placed this prototype in offices, students' homes, and parents' homes, inviting everyone passing by to try it out. From this prototype, the team learned about the wide range and emotional value of real messages. At first, people criticized the camera's positioning—below and aimed upwards—during the design critiques. But the ability to capture faces, personal artifacts, and even the ceiling in one picture proved powerful, providing rich emotional material (see Figure 5).

The next step was to explore interactions in real-life environments. The team used a low-tech prototype to test how the actual moment of coming home was conveyed. They wanted to know if the mothers would actually be at their homes and appreciate knowing when their sons came home. They used a mobile phone hidden in the mother's bowl and some preprinted gusts in an envelope to test the moment in a real mother-son relationship. Every time the son came home, he'd call the mobile phone hidden in his mother's bowl, which would vibrate and simulate the wobble. If the mother noticed this wobble, she would take a preprinted gust from the envelope and put it on the bowl as if she'd received a picture.

In the results, the mother responded to only four out of 14 wobbles. However, all four moments prompted the mother to call her son and express her joy in receiving a gust. Even the brother who still lived with his parents felt the joy of receiving gusts, as he picked up the phone to tell his brother that he received a message.

After this low-tech prototype test, the team made two high-tech prototypes to simulate interaction over a longer time period. In each table-sized prototype,

Figure 5. Real gusts of presence that the Gustbowl prototype captured over time.

Figure 6. Low-tech prototype testing: son calls mobile phone hidden in mother's bowl when he comes home.

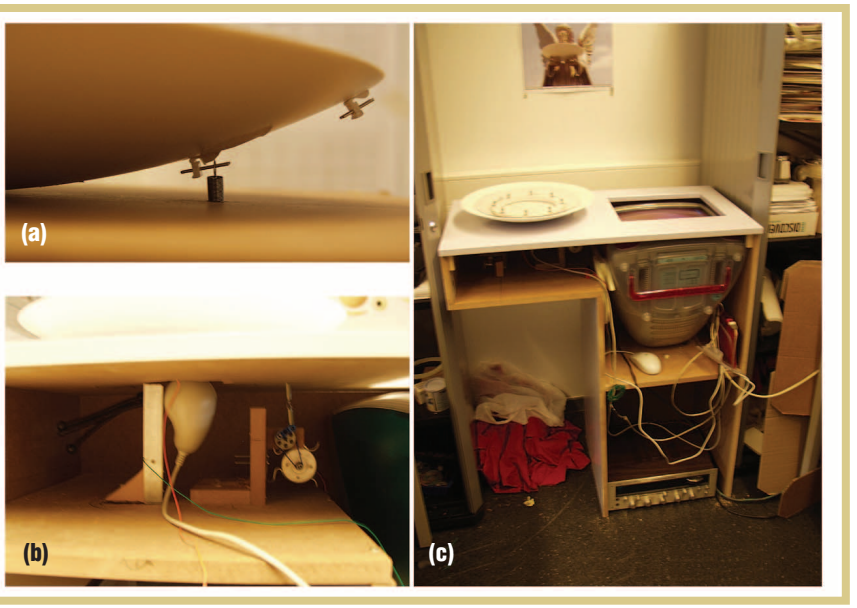

Figure 7. A high-tech prototype's technical construction. (a) The bowl is connected with a spring to an electromotor, (b) a camera with fisheye lens is positioned pointing upwards below the bowl, and (c) a PC connects all elements.

Figure 8. The high-tech setup at (a) the son's place and (b) the mother's place.

they connected the bowl to a motor, a camera, and a simple sensor (mouse-click), all controlled by a computer connected to the Internet (see Figure 7). The computer display would show the pictures taken from the other prototype. They amplified the computer's sound output to create a signal that would make the electromotor spin and the bowl wobble. The images weren't projected in the bowl, and the sensor and motor couldn't transfer the intensity of the motion. Still, the prototype could create a gust of presence with motion and pictures, and two people could use it over a distance.

The team had a mother and son test these prototypes for one week. During this time, mother and son sent over 80 messages back and forth but noticed only two wobbles as they happened; they discovered six wobbles as they appeared on the monitor. From this testing, the team got a clearer idea of actual use patterns, and the kinds of messages people would send and times they would send them.

The mother in particular displayed some unique, unforeseen behavior: she used the bowl to send pictures of her son's old belongings and memorabilia. The mother even took the opportunity to find a box with the son's primary school work, and used the Gustbowl to remind her son to pick these up as he had promised he would some years ago.

The son reported that, while on the road, he collected material to put in the Gustbowl to show his mother what he'd done. One day, he took his kids to the zoo, and he deliberately looked out for souvenirs like tickets, receipts, and brochures to give his parents an impression of their day.

Using Tangible Interfaces for Affective Communication

The tangible interfaces and calm computing[1] fields aim to make technology-enabled products that evoke interactions without relying on strict computer interfaces that suggest or communicate a single right answer. These approaches offer great opportunities for creating products that bring more emotion into the subtle communication between close but separated family members.

Some of these design concepts and products were intended to create emotional connections over a distance. Perhaps their designers are looking for an alternative to the traditional telephone. Emotional notifications have received much attention, but we still lack a suitable carrier for rich, affective communication. The following examples of calm ubiquitous computing show how you can communicate presence using only notification.

The Feather and Scent[2] are small devices that you can use when you're away to notify a person at home that you're thinking of him or her. When you squeeze the device, it will activate a signal in the other person's home that triggers either feathers in a tube that elegantly fall or the spreading of a scent. The 6th Sense[3] consists of two connected lamps located in separate homes. When one person holds still in front of his lamp for a few seconds, the other person's lamp slowly changes the illuminating color.

These examples show the possibility of a rich, emotional notification where the tangible interface lets the user have a more affective experience. However, a notification communicates nothing more than "I'm thinking of you." Some might argue that notification alone doesn't suffice to make an emotional connection over a distance. Also, when the communication is asymmetrical—one side is notified but unable to return the communication—users can have an unsatisfying experience and get frustrated. The next examples show what happens when, in subtle ways, devices can convey a bit more personal information.

The Shaker[2] is a small handheld device that, when shaken, sends a signal to another Shaker to start vibrating. The White Stone[4] is another handheld device that you carry in your pocket. Initiated by pressure and heat sensors, it conveys signals to other stones to play a sound. The Hug[5] concept includes two small, pillow-like, soft objects connected through a wireless network. Each object is suited with a pressure sensor, light indicators, and a microphone with speaker. The Hug can be used to communicate a hug in a social, intimate way.

These subtle means are adequate for nonchalant communication, but a means of more active, explicit, conscious communication might be necessary. The Digital Family Picture Portrait[6] is a picture frame that displays general information from your life on four different scales in the form of icons in the frame. With two Portraits connected to each other, a grandmother and granddaughter can show each other information.

In some of these calm computing products, users must change their behavior if they want to fully use these devices and their capabilities. But tangible interfaces seem flexible enough to adapt to users' own criteria for interaction. By looking at the user's sequence of action, the designer can adapt the interface to both nonchalant and focused types of use.

Along these lines, the Peek-A-Drawer[7] is worth special mention. The Peek-a-Drawer takes a picture of a cupboard drawer's contents when you close the drawer, and it sends the image information to another cupboard that shows the picture on a display in the top drawer. The user can compose or view the message deliberately or unintentionally. The Peek-A-Drawer concept is based on the unequal relationship between grandparents and grandchildren. Its creators built it around a combination of children's unconscious use and grandparents' conscious use. The Peek-A-Drawer was a great inspiration to the Gustbowl's designers, showing them the importance of naturally adapting the interface to help different users fulfill their needs.

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These real-life usability tests reassured the Mamasboys of the Gustbowl's added value and possibilities. Even after one week, it was hard to get the mothers and sons to give up their prototypes (high-tech and low-tech). They had bonded with the prototypes and saw them as a tool to stay in touch.

As we discuss in the "Using Tangible Interfaces for Affective Communication" sidebar, the design team thought that notification—particularly of incoming gusts—would be very important. However, testing showed that the content is actually more important because of the small chance of being notified by the wobbles.

The field test users' behavior was far beyond the team's expectations. Although they set up the field tests partly to discover new use patterns, mothers and sons demonstrated border-crossing use. For example, they didn't foresee that the Gustbowl could be used for communication between parents, children, and grandchildren.

An important premise for the design team was that people should be able to use the Gustbowl casually and not have to change their daily routines. Even though they achieved this in the design concept, the tests continuously showed a high degree of intentionality and care in people's interactions with the Gustbowl. The team saw an extreme example of behavior change when the son started collecting items throughout the day to place in the Gustbowl when returning home. However, the effects of changed behavior can only be measured over a significantly longer time period.

By allowing expressive use patterns during these tests, the Mamasboys found more than just validation of their concepts. Opportunities and use patterns they hadn't even imagined arose during these longer testing periods. We are investigating new areas of application, possibly in slightly adapted form, for the Gustbowl.

Furthermore, the positive reactions at the MSR Design Expo suggest that the Gustbowl might be useful in situations other than the mother-son relationship. Currently, we're running two tests in which both a mother and son and a mother and daughter test the Gustbowl over a two-week period. In the future, we intend to use the Gustbowls in an office environment by letting two floors communicate with each other using printouts.

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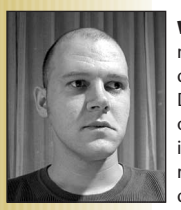

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