

Prototyping Social Interaction

Esko Kurvinen, Ilpo Koskinen, and
Katja Battarbee

Acknowledgement

We would like to thank the Ministry of Trade and Industry for funding *Mobile Image*, Radiolinja for continuous cooperation and support, and Nokia Mobile Phones for funding *Mobile Album*.

Introduction

Recent changes in information technology have made social interaction an increasingly important topic for interaction design and technology development. Mobile phones, PDAs, games, and laptops have eased interpersonal communication and brought it into new contexts such as bus stops, trains, cars, and city streets—in fact everywhere people find themselves and move about. In these situations, the old paradigms of one person interacting with technology, or a group at work in an office or collaborating over a shared system, are inadequate for guiding the design of such systems.

For interaction design, these technologies represent new kinds of challenges. Interaction design has inherited its methodic baggage mainly from three sources, none of which specifically focuses on how ordinary people use social technologies. Usability research and human-computer interaction (HCI) seldom quote sociological theory in their premises.¹ While research in computer-supported collaborative work (CSCW) increasingly has focused on questions outside of the workplace, the basis of this field of study still stems from studies of the workplace, in which social organization is devised to support work rather than ordinary activities.² New articulations of methods and frameworks are required for designing interactive technologies for social interaction in ordinary activities.

This paper describes a series of studies conducted in Helsinki that focused on prototyping how people interact with each other using mobile multimedia. The central claim is that a prototype is not only a representation of a product or technology—such as a paper prototype, a software prototype, or a physical mock-up—but that it consists of both the representation and the social interaction the participants create together. For convenience, we talk about “prototyping social interaction.” The argument of this paper applies in particular to small communication devices meant for everyday life, but it also can be used with other products and services. Social processes inevitably affect the way in which technology is perceived, accepted, and used. If these processes are neglected, designs face risks. In our opinion, there ought to be ways to anticipate at least some of them.

1 Jenny Preece, *Human-Computer Interaction* (Harlow, England: Addison-Wesley, 1994).

2 See Andy Crabtree, *Designing Collaborative Systems: A Practical Guide to Ethnography* (London: Springer, 2003).

Approaches to User Involvement in Prototyping

Buchenau and Fulton Suri³ define prototypes as “representations of a design made before final artifacts exist.” As they note, prototypes range from sketches to different kinds of mock-ups and models.⁴ The main aim of prototyping is to produce information for design processes and design decisions, as well as to explore and communicate propositions about the design and its context. From this viewpoint, prototypes serve many purposes. They enable *direct access to challenges and potential solutions*. For example, if the problem is ergonomic, it makes little sense to abstract or theorize about it. In usability testing, prototypes are used mainly to *locate problems in the design and to correct these problems* to make use of the product or service more efficient and enjoyable. Prototypes also are “communicative tools,” and sometimes are built explicitly for this purpose. For example, in the car industry it is common to build scale or 1:1 models that preview the proposed vehicle. The aim is to communicate the concept and look of the future product, to obtain feedback, and to prepare the ground for the new product. Finally, prototypes need not address a predefined problem or product. They serve as “aids for imagination.” For example, “quick and dirty” experience prototypes can be used when the researchers or developers do not know where to start.⁵

While there is no one way to do prototyping, the role ascribed to the user best distinguishes between possible orientations. In practice, there are several partially incompatible approaches to user involvement. In the “human factors approach,” prevalent in usability engineering and cognitive science, the focus is on the individual’s behavior and the cognitive and emotional processes as he or she runs through a series of preset tasks in front of a prototype. In contrast, the “participatory design” movement, originating in the Scandinavian tradition of workplace design, involves users intensely throughout the design process.⁶ The manipulation of prototype-like representations provides a natural and influential slot for user participation in the process, not simply to generate useful material for design.⁷

One key differentiator is whether the focus is on the behavior of the users and what sorts of claims are made for it. For example, there are purely “artistic” or “inspirational” approaches to user involvement, such as the cultural probes approach,⁸ that use imaginative techniques like postcards to collect material from people. The material is used as a backdrop in design sessions, but user studies are not used to test designs or to gain in-depth understanding of people. More typically, *understanding the users’ thoughts, dreams, and aspirations* are preferred over mere inspiration. The ultimate interest is not in the observable doings of people, but in their *inner states*, which are regarded as the most important aspect of user-centered design.⁹

The main problem with these approaches is that many products today are designed for interaction, or are used in social interaction, almost out of necessity. This is true not just for communications

- 3 Marion Buchenau and Jane Fulton Suri, “Experience Prototyping” in *Proceedings of Designing Information Systems DIS’00* (New York: The ACM Press, 2000): 424–433.
- 4 Simo Säde, *Cardboard Mock-ups and Conversations: Studies in User-Centered Design* (Helsinki: UIAH, 2001); and Carl Adams and David Avison, “Dangers Inherent in the Use of Techniques: Identifying Framing Influences,” *Information Technology & People* 16:2 (2003): 203–234.
- 5 Simo Säde, *Cardboard Mock-ups and Conversations. Studies in User-Centered Design*; Pelle Ehn and Morten Kyng, “Cardboard Computers: Mocking It Up or Hands-On the Future” in *Design at Work: Cooperative Design of Computer Systems* Joan Greenbaum and Morten Kyng, eds. (Hillsdale, NJ: Lawrence Erlbaum, 1991), 169–195; T. Erickson, “Notes on Design Practice: Stories and Prototypes as Catalysts for Communication” in *Scenario-Based Design: Envisioning Work and Technology in System Development*, John Carroll, ed. (New York: John Wiley & Sons, 1995); and Anthony Dunne et al., *The Presence Project* (London: Royal College of Art, 2000).
- 6 *Design at Work: Cooperative Design of Computer Systems*, Joan Greenbaum and Morten Kyng, eds., 169–195.
- 7 Konrad R. Budde, Karlheinz Kautz, Karin Kuhlenkamp, and Heinz Züllighoven, *Prototyping: An Approach to Evolutionary System Development* (Berlin: Springer-Verlag, 1992), 24–30; and Kaj Grønbaek, *Prototyping and Active User Involvement in System Development: Towards a Cooperative Prototyping Approach* (Unpublished Ph.D. thesis, Computer Science Department, Aarhus University, 1991). Access at: www.daimi.au.dk/~kgronbak/Thesis/ThesisOverview_ToC.html.
- 8 Bill Gaver, Tony Dunne, and Elena Pacenti, “Design: Cultural Probes,” *Interactions* 6:1 (1999): 21–29.

- 9 Jane Fulton Suri, "Empathic Design: Informed and Inspired by Other People's Experience" in *Empathic Design*, Ilpo Koskinen, Katja Battarbee, and Tuuli Mattelmäki, eds. (Helsinki: IT Press, 2003), 53. Interestingly, in this context, it has not been asked whether we need to address meanings at all. This discussion has been going on for quite a while within social sciences. For example, David Silverman proposes an alternative for qualitative research approach (i.e., the study of *practices* instead of *meanings*). See David Silverman, "Qualitative Research: Meanings of Practices?" *Information Systems Journal* 8 (1998): 3–20.
- 10 Konrad R. Budde, Karlheinz Kautz, Karin Kuhlenkamp, and Heinz Züllighoven, *Prototyping: An Approach to Evolutionary System Development* (Berlin: Springer-Verlag, 1992), 24–30; and Kaj Grønbaek, *Prototyping and Active User Involvement in System Development: Towards a Cooperative Prototyping Approach*.
- 11 Howard S. Becker, "Interaction: Some Ideas" (presented at the Université Pierre Mendes-France, Grenoble). (Accessed June 15, 2005 at: <http://home.earthlink.net/~hsbecker/>).
- 12 David Silverman, "Qualitative Research: Meanings of Practices?" *Information Systems Journal* 8 (1998): 3–20.
- 13 Liam Bannon, "From Human Factors to Human Actors: The Role of Psychology and Human-Computer Interaction Studies in System Design" in *Design at Work: Cooperative Design of Computer Systems*, Joan Greenbaum and Morten Kyng, eds., 169–195.
- 14 *Technology in Action* Christian Heath and Paul Luff, eds. (Cambridge: Cambridge University Press, 2000); Bonnie A. Nardi, "Studying Context: A Comparison of Activity Theory, Situated Action Models, and Distributed Cognition" in *Context and Consciousness: Activity Theory and Human-Computer Interaction*, Bonnie A. Nardi, ed. (Cambridge, MA: The MIT Press, 1996); and Graham Button and Paul Dourish, "On 'Technomethodology': Foundational Relationships between Ethnomethodology and System Design," *Human Computer Interaction* 13 (1996): 395–432.

technology, but also for interiors, and many types of games and cars. However, with the exception of teams in information systems design (ISD) at the workplace,¹⁰ prototyping literature typically uses an individual as the main unit of analysis. As many sociologists have noted, there are inbuilt methodological challenges in understanding social activity by looking at individuals only.¹¹ The problem is that people are constantly reflecting their action onto how others relate to it. Even if it were possible to anticipate how all individuals would behave in the future, we cannot know up front when the paths of two or more people will meet, and what sort of interaction will occur. Although individual actors have their say in social action, the process or its outcome is not under the control of any one individual.

This paper primarily is intended to show how one can investigate processes of social interaction involving prototypes. Through a detailed case study, we argue that social interaction is worth taking seriously; and we need to study the ways in which it evolves and affects the ways in which people use prototypes. We show that it is important to understand how people interact with others while using a prototype, and how these interactions affect the way in which individuals use the prototype. Our focus throughout is on practices, and what people do, rather than on meanings, and what they say.¹² In Bannon's early terms, we study humans as "actors" rather than as "factors."¹³ However, we would like to add that Bannon's call requires attention not just to what individuals do, but also to social interaction, which has received little methodological work outside a small circle of CSCW research.¹⁴

Prototyping Social Interaction

This paper describes how our work has tried to respond in its own way to Bannon's programmatic call, with lessons learned from CSCW. Our response builds on Buchenau and Fulton Suri's notion of "experience prototyping." Experience prototypes enable design team members, users, and clients to gain firsthand appreciation of existing or future conditions through active engagement with prototypes:

By the term "Experience Prototype" we mean to emphasize the experiential aspect of whatever representations are needed to successfully [re]live or convey an experience with a product, space or system.... Experience Prototype is any kind of representation, in any medium, that is designed to understand, explore or communicate what it might be like to engage with the product, space or system we are designing.... When we use the term "Experience Prototyping" we are talking about methods that allow designers, clients, or users to "experience it themselves" rather than witnessing a demonstration or someone else's experience.... Experience Prototyping is less a set of techniques than it is an attitude,

allowing the designer to think of the design problem in terms of designing an integrated experience, rather than one or more specific artifacts.¹⁵

In our opinion, the key point in prototyping social interaction is that “a prototype” is not a piece of technology, constructed to see whether technology works, nor is it something that is “tested” on humans. Instead, the prototype—or a series of prototypes—is a “pair”: there is a representation, typically a new piece of interactive technology, *and* several people using it in ordinary social situations. By “social,” we do not mean a general sort of label that one could apply to events, but people engaging in interaction with other human participants, either when mediated by the technology or affected by its presence. The representation creates conditions under which people try to understand this technology, redefine it, develop a stance towards it, and change their behavior and opinions of it in dealing with other people. These observations from social interaction, enabled by the representation, are turned into design drivers. They should be given specific and sustained attention, not treated as another set of variables.

In prototyping social interaction, following a few principles in the design process is more important than the qualities of the actual representation used. The following paradigm describes the conditions required for prototyping social interaction.¹⁶ The intention of this setup is to create conditions in which a social organization involving the representation emerges so that this organization can be observed and described in detail. This understanding can be used as a driver in design, and perhaps may even be modeled.

Ordinary social setting. More than one person has to be involved in a unit of study to create the conditions for social interaction in a manner that is appropriate for the design context. Social interaction has to take place in a real context to overcome studio-based contemplation.

Naturalistic research design and methods. People are the authors of their own experiences. They are involved as creative actors, who can and will engage with available products that support them in interests, social interaction, and experiences that they find meaningful. Data from people must be gathered and treated using empirical and up-to-date research methods.

Openness. The prototype should not be thought of as a laboratory experiment. The designer’s task is to observe and interpret how people use and explore the technology, not to force them to use it in predefined ways.

15 Buchenau and Fulton Suri, “Experience Prototyping”: 424–425.

16 Katja Battarbee, *Co-Experience: Understanding User Experiences in Social Interaction* (Helsinki: University of Art and Design, 2004), 92.

- 17 John Dewey, *Art as Experience* (New York: Perigee Books, 1980, originally published in 1934). The notion of experience in Battarbee's analysis depends on Jodi Forlizzi and Shannon Ford, "The Building Blocks of Experience: An Early Framework for Interaction Designers" in *Proceedings of Designing Information Systems DIS 2000* (New York: The ACM Press, 2000), 419–423. For the notion of "co-experience," see Katja Battarbee, *Co-Experience: Understanding User Experiences in Social Interaction*; and Katja Battarbee and Ilpo Koskinen, "Co-Experience: User Experience as Interaction," *CoDesign Journal* 1 (2004): 5–18. For symbolic interactionism and its relationship to pragmatism, see Herbert Blumer, *Symbolic Interactionism: Perspective and Method* (Berkeley: University of California Press, 1986, originally published in 1969); and Hans Joas, *G. H. Mead: A Contemporary Re-Examination of His Thought* (Cambridge, MA: MIT Press, 1997).
- 18 Harold Garfinkel, *Studies in Ethnomethodology* (Englewood Cliffs, NJ: Prentice-Hall, 1967); Harvey Sacks, *Lectures on Conversations* (Cambridge: Blackwell, 1995); Ilpo Koskinen and Esko Kurvinen, "Messages visuels mobiles: Nouvelle technologie et interaction," *Réseaux: communication, technologie, société* 112–113 (2002): 107–138; Esko Kurvinen, "Emotions in Action: A Case in Mobile Visual Communication" in *Proceedings of the 3rd International Design and Emotion Conference D+E'02*; and Esko Kurvinen, "Only When Miss Universe Snatches Me: Teasing in MMS Messaging" in *Proceeding of Designing Pleasurable Products and Interfaces DPP'03* (Pittsburgh, PA, 2003).
- 19 Nancy van House, et al., "The Uses of Personal Networked Digital Imaging: An Empirical Study of Cameraphone Photos and Sharing" in *Proceedings of Computer-Human Interaction CHI 2005*, Portland, OR (New York: The ACM Press, 2005).

A sufficient time span. The prototype usage ought to be observed for a long enough time, typically for a few weeks at least since it is difficult to get an idea of how people explore and redefine the technology in their actions if the study period is shorter. However, as our third example below shows, one can create prototypes to see how people use the prototype using considerably shorter study periods, provided that the setting is open enough for the participants to freely organize their activities around the prototype.

Special attention to the sequential unfolding of events.

One needs to study the stepwise development of the social process, not simply list its outcomes. Interaction unfolds in time, and has to be considered in temporal terms.

In addition, there has to be a conceptual framework for studying social interaction, which is difficult to understand without a proper framework to guide observations and conceptual work. This requirement does not imply that any particular theory is needed. For example, Battarbee's notion of "co-experience" builds on Dewey's pragmatist philosophy and Blumer's version of symbolic interactionism, a sociological tradition consistent with pragmatism,¹⁷ while Koskinen and Kurvinen build on conversation analysis, an offshoot of classic ethnomethodology.¹⁸ In other studies of our topic, mobile multimedia, researchers have utilized activity theory and the sociology of science and technology.¹⁹ The framework ought to be detailed, validated by previous research, and open enough to sensitize designers to social interaction. However, since the aim is to identify and describe how orientations and behaviors towards the prototype are created in social interaction, the framework must be inductive in nature. For these reasons, our work has been based on symbolic interactionism and ethnomethodology rather than more formal theories of interaction—such as the notion of gift-exchange.²⁰

Three Studies

From 1999 to 2002, we conducted a series of studies on mobile multimedia. This paper is based on three of these. The first example is from the "Mobile Image" study, which took place in 1999–2001.²¹ We gave a Nokia 9110 and a Casio digital camera connected by an infrared link to four groups of five people for approximately two to three months each. The University offered access to a computer system to all participants. Actual messages were collected as e-mail attachments. During the experiment, the male and the female groups sent a total of three hundred and seventy-one e-mail messages, which became our primary data. The service was free of charge.

The second example is from the “Mobile Multimedia” study,²² in which we selected three user groups from the Helsinki-based teleoperator Radiolinja’s technology and service pilot of their new multimedia messaging service (MMS). The pilot study, which took place during the summer of 2002, lasted about five weeks. Each user was given an MMS cellular phone. Three mixed-gender groups with seven, eleven, and seven members were studied. In all, users sent more than four-thousand messages during the study, with about half of them unique and the rest duplicates in group messages. As in Mobile Image, the service was free of charge.

Our third example, “Mobile Album,” is from a concept study done for Nokia Mobile Phones in 2002. In contrast to our interest in mobile multimedia, recent empirical studies of mobile multimedia have repeatedly argued that people show their pictures to other people without ever sending them: cellular phones are largely capture-and-see-devices rather than capture-and-send devices.²³ Mobile Album was specifically constructed to study how people would share experiences with multimedia phones in the presence of others, and how social context shapes the capturing, sharing, and viewing of images. The study also shows how we turned ideas from Mobile Image into a more traditional, low-fidelity prototyping approach. We gave people ten i-Zone Polaroid cameras and a PVC-covered album template. People could cut, paste, and glue their Polaroid stickers on it, and simultaneously see what others did with it. The session took place during a one-day picnic party at *Suomenlinna*, an old fortress island and a popular recreation spot located fifteen minutes from Helsinki. Participants were thirteen students of Finnish language at the University of Helsinki. The second part of this study, called “Indoors,” was an indoor party for twenty to thirty guests. Photographing and completing the template took place during a single evening.

Framing Experiences

The first example shows how people may use mobile multimedia for social purposes. In this example, a small and insignificant experience is transformed into something larger than life under suitable conditions by situating it in a story that reframes it. Here, six people first spot a wound, create a murder mystery from it, and organize a simple play, which is recorded with the camera. Eija’s wound is “co-experienced” and communicated as a story, not merely an experience.

The title, “Murder at Lammassaari,” makes the reader expect a murder mystery. The prologue tells the reader that a scratch on Eija’s hand initiated the story. She also explains her blunder: she accidentally deleted the first shot. In the first three images, we see a group of horrified people who witness bloodshed and find a body in

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- 20 Christian Licoppe and Jean-Philippe Heurtin, “Managing One’s Availability to Telephone Communication through Mobile Phones: A French Case Study of the Development Dynamics of Mobile Phone Use,” *Personal and Ubiquitous Computing* 5 (2001): 99–108; and Sara Berg, et al., “Mobile Phones for the Next Generation: Device Designs for Teenagers” in *Proceedings of CHI 2003*, Ft. Lauderdale, FL (New York: The ACM Press, 2003).
- 21 Ilpo Koskinen, Esko Kurvinen, and Turo-Kimmo Lehtonen, *Mobile Image* (Helsinki: IT Press, 2002).
- 22 See Ilpo Koskinen and Esko Kurvinen, “Mobile Multimedia and Users: The Domestication of Mobile Multimedia,” *Teletronikk* 101: 3–4 (2005): 60–68; and Katja Battarbee, *Co-Experience: Understanding User Experiences in Social Interaction* (Helsinki: University of Art and Design, 2004), 92.
- 23 Tim Kindberg, et al., “How and Why People Use Camera Phones” (Consumer Applications and Systems Laboratory, H&P Laboratories, Bristol, England, HPL-2004-216, November 26, 2004). Available at: www.hpl.hp.com/techreports/2004/HPL-2004-216.html (Accessed August 15, 2004); and *Empathic Design*, Ilpo Koskinen, et al., eds., Chapter 7; Marc Davis, et al., “MMM2: Mobile Media Metadata for Media Sharing” in *Proceedings of Computer-Human Interaction CHI 2005*, Portland, OR (New York: The ACM Press, 2005); and Nancy van House, et al., “The Uses of Personal Networked Digital Imaging: An Empirical Study of Cameraphone Photos and Sharing.”

the grass. The next three pictures show a runaway murderer, who is caught and punished. The movie-like atmosphere is emphasized in the final image, which underlines the fictional, movie-like character of the episode by referring to the Oscar gala, which situates the story in the safe world of mainstream movies.



Example 1. Murder at Lammassaari

The long awaited horror movie shots!

Unfortunately, I messed up and deleted the first image by accident (but I've heard I'm not the only klutz among us...). The first image was a picture of the murderer's hand (the story started with a small scratch on Eija's hand some-time in the darkest hours of the night at the Lammassaari summer party.

Liisa

- A Horror at Lammassaari: A murder has been committed!
- B A body in the grass (note the smile).
- C The body is found.
- D The murderer runs for it.

This example shows how new technology may enable social interaction in many ways simultaneously. An actual experience in Lammassaari becomes reportable, tellable, and shareable because of technology at both the sending and receiving ends. Activities at parties may of course evolve into plays, but a camera and a phone makes this process different. When there is a camera, the play is specifically staged for it. These people are not experiencing just a play, but a play played for the camera with an eye to sharing it later. Finally, there was an advertisement at the beginning of the message. That it exists at all shows that this story had been discussed for quite some time earlier: the information exchange had begun prior to the actual story being shared.

Mobile Image made it possible for us to study ways in which people use a camera and a mobile phone to capture and reconstruct experiences, and share them with other people. Among the methods we have explored have been postcards, riddles, teases, questions and answers, as well as stories.²⁴ In this context, Ling and Julsrud talk about "genres," which we see as a special case of social interaction. Genres—like Hollywood-style murder mysteries—provide conventional means for giving shape to constructing messages.²⁵ As *Murder in Lammassaari* shows, genres provide important resources for observing, imagining, and reporting social activities.

24 Ilpo Koskinen, Esko Kurvinen, and Turo-Kimmo Lehtonen, *Mobile Image* (Helsinki: IT Press, 2002).

25 See Rich Ling and Tom Julsrud, "The Development of Grounded Genres in Multimedia Messaging Systems (MMS) among Mobile Professionals" in *A Sense of Place*, Kristóf Nyíri, ed. (Vienna: Passagen-Verlag, 2005).

E



F



G



Routines and Creativity

While in Mobile Image sending a multimedia message to another phone could take several minutes, in Mobile Multimedia, the process was considerably faster. As expected, this was reflected in how people used their devices to capture and share experiences with their peers, and the forms of social interaction became more elaborate. People were able to not just capture and send experiences, but also could respond to messages almost in real time.

Examples of messages that make a response possible, but do not require one, are reports of good news, insults, “good night” messages, “wish you were here” messages, and many others.²⁶ Sometimes a missing reply is noticeable and may prompt sanctions. If one asks a question, one can expect a quick answer. In Mobile Multimedia, these “sequences” include question-answer pairs, greetings, teases, and riddles.²⁷ These are orderly acts that people use in ordinary life to make sense, and to reinterpret their experiences using a piece of communication technology. They also explain a good deal of variation in use over time.²⁸

E Plot climax: The murderer is caught.

F The murderer gets what he deserves
—The Happy Ending.

G The photographer wins an Oscar, responding to acclaim like a champion.

26 Battarbee, *Co-Experience: Understanding User Experiences in Social Interaction*.

27 See Koskinen, et al., *Mobile Image*; Kurvinen, “Only When Miss Universe Snatches Me: Teasing in MMS Messaging”; and Koskinen and Kurvinen, “Mobile Multimedia and Users: The Domestication of Mobile Multimedia.”

28 Ilpo Koskinen, “User-Generated Content in Mobile Multimedia: Empirical Evidence from User Studies” in *Proceedings of International Conference of Multimedia and Expo ICME’03*, Baltimore, MD, (IEEE Publication, 2003).

29 Alex S. Taylor and Richard Harper, “Age-Old Practices in the ‘New World’: A Study of Gift-Giving between Teenage Mobile Phone Users” in *Proceedings of Computer-Human Interaction CHI’02*, Minneapolis, MN (New York: The ACM Press, 2002), 439–446.

Example 2. Good morning greeting

In Example 2, Hanna sent early morning greetings to her spouse. It was one of many greetings sent during the study. As such, it is a good example of an age-old practice familiar to anyone from numerous ordinary situations in everyday life.²⁹ Greeting such as this typically were routinely acknowledged, if replied to at all. These are examples of “routinized” communication patterns and ways of communicating things and, as such, fit the notion of genres. However, a closer look reveals that people do not merely take this material and shove it in a ready-made set of response types, series, or sequences. For example, greetings enable creative spin-offs. Later that afternoon, Tuomas recycles Hanna’s tired-looking photo, sending a mock personals ad to everyone in the group.

Example 2 (continued)

From Hanna to Tuomas:

“Morning!”

A



From Tuomas to all:

- A “I am 20, a hot sassy panther lady from the city! You hunk of male, catch me if you dare!—Always on the prow!”

Tuomas used this reply to step outside routine communication patterns, and thus opened himself to an affectionate and quick counter attack. Hanna replied with two messages. The first, jocular message consists of a similar ad on behalf of Tuomas, with a primitive wooden sculpture representing him. The second message offers the contents of a diaper to Tuomas, thus displaying her disapproval of the earlier message in a strikingly literal way. She did not have to use a bad word with this picture. After the first message, there was a natural slot for Tuomas to take his turn, but the second reply cuts in and efficiently kills the line of conversation.

B



From Hanna to Tuomas:

- B “I am Tuomas of the Jungle, 37, humbly known as the king of the forest. Seeking a wild 60 yr-old jungle woman to come and grab me off the vines.—Dangling yo-yo.”

- From Hanna to Tuomas
- C And just for daddy.

C



The morning greeting above could have initiated a routine exchange of greetings. However, people do not always behave as expected. People may be humorous, witty and, at times, even nasty to each other. Even routine interactions can, and are, exploited in innumerable ways—not in line with the pattern, but to make a point here-and-now. Human activity often is creative, which makes it difficult, if not impossible, to model. Any system designed to support communication has to provide room for these outbursts of creativity.

Sharing Photographic Experiences as They Happen

Our third example, from Mobile Album, shows how categories emerged in action rather than explicit negotiations. Mobile Image already taught us that the notion of “category” does not properly support action through mobile multimedia. However, since Mobile Image was based on collecting actual messages, it did not provide us with access to what people actually do when they get multimedia messages and decide to respond to them. It was this work that we probed in Mobile Album.

To take an example, one group of images that emerged in Suomenlinna consisted of round shapes. The first images in the series were inspired by one accidental shot in which one participant was eating and her mouth was wide open. Others soon picked up the cue. A few minutes later, there were many similar pictures as some participants started to take pictures of each other's mouths. At this stage, the newly created collection of round shapes was labeled "mouths," after which more pictures of similar or closely related shapes were added, including openings of tunnels and beer cans shot from above.

This example shows that the process of creating the metaphor of "mouths" from the originally descriptive term was stepwise and collaborative. Several people participated in creating the category, which became a source of fun as the mouth metaphor became increasingly more complicated. This example also shows that the abstraction process was social, since several people participated in creating the category, which became a source of fun as the "round shapes" category became increasingly rich in content.

Indoors, the second study of Mobile Album was from a cocktail party situation. We wanted to study how people create meaning in the situation using our experience prototype in the absence of the clear-cut visual structure of Suomenlinna, where the scenic fortress island itself and the easily identifiable physical activities within provided a natural conceptual structure for the event. In contrast, as the main activities in Indoors were socializing, eating, and drinking, there were fewer visual elements and less action to capture on film. Consequently, people started to crop and cut shapes out of photos, and create panoramas and collages not only out of photos, but also using physical objects such as candies that were glued on the paper prototype. Instead of creating collections of similar objects—as at Suomenlinna—the activity was geared towards editing and manipulating the otherwise monotonous visual scenery. However, although the methods of creating meaning were different, the process was just as social. For example, when we traced the process later from the videotapes, all collages in the template were created collaboratively, the idea of cropping and cutting images with scissors having been similarly picked up from earlier creations by others.³⁰

In Mobile Album, our design conclusion was to suggest that any system for storing albums would have to offer the opportunity to keep categories plastic, renameable, and open so that people could create and edit categories at will. In contrast, systems relying on ready-made categorization schemes or automated classification systems do not support the discovery and fun inherent in collaborative album-building. Furthermore, we argued that the need for image editing or assisted storytelling abilities do not exist in the abstract, but are tied to the nature of the activity; some events are reportable

30 Esko Kurvinen and Ilpo Koskinen, "Mobile Photo Album: An Experience Prototype" in *Empathic Design*, Ilpo Koskinen, Katja Battarbee, and Tuuli Mattelmäki, eds. (Helsinki: IT Press, 2003): 96–100.

as is, while others cry for assistance of some kind. Our analyses were translated into scenarios of how people classify images into groups; how they turn these classifications into fun, and how classifications, once created, direct social interaction in the future.

Discussion

Interaction design has created a knowledge base from a variety of disciplines. Primarily, the field has turned to usability research, cognitive psychology and, to some extent, CSCW in the search for concepts and theories. Through these choices, the field tends to have an individualistic tendency. With few exceptions, social action is studied at the workplace rather than in mundane contexts. However, when interaction design has matured, it increasingly has had to address technologies that people use to do things with other people in settings not constrained by the tasks and rules of the workplace.

This paper has described how one can use prototypes in studying social interaction with and through technology. One example has come from a study of one particular technology: mobile multimedia. We have demonstrated that it is possible to study how prototypes function in social interaction. In the three studies reported, we observed how groups of friends and acquaintances invented ways of using mobile multimedia technologies. We have gathered log data, actual messages, interviews, and videotapes to make sense of how people invent uses for these representations while interacting with other people. The representations have been at a variety of technology levels, from paper-and-scissors to prelaunch products and services.

Our approach to prototyping social interaction was inspired by Buchenau and Fulton Suri's notion of experience prototyping,³¹ but our interest is the emergence of social activities rather than how experiences take shape in these activities. Our primary goal was not to create a shared experience that could later be used as a reference point in design work, but to create a setup in which we could analyze in detail how people construct messages; for example, how messages form sequences and how category systems evolve. We have not simply gained insight and inspiration or tested our ideas based on what we have witnessed in our studies, but also described and modeled several social practices for the purposes of product development. Thus, our contribution relates not so much to prototypes *per se*, or their role in providing for user-designer interaction, but to the ways of looking at the data prototypes generate when exposed to social action. Although this work was partly based on ethnomethodology and conversation analysis, insights from these studies also have led to a new understanding of user experience as co-experience—as something people create together.³² Another difference is that, in our opinion, prototyping social interaction requires an even

31 Buchenau and Fulton Suri, "Experience Prototyping."

32 Katja Battarbee, *Co-Experience: Understanding User Experiences in Social Interaction*.

more open approach to prototyping than experience prototyping. If people are given the time and opportunity to explore technology, they will develop uses for it with others.³³ The main similarity is that the prototype does not have to be technologically advanced, detailed in design terms, or expensive.

There are several reasons for prototyping social interaction. Many technologies—for example, mobile multimedia—are inherently social. There is a place for ergonomic and usability studies, but to fully understand the design potential of technology we need to understand what interpersonal activities it might support. Still, many if not most ways of describing social action use social activities as resources rather than study them in detail.³⁴ In contrast, we treated our prototypes only as bases for social interaction, which became the *topic of analysis*. These studies were not aimed at producing product ideas, but to make sure that such ideas are based on a solid understanding of the intricacies of social interaction and what happens when the prototype is embedded in social action. It is then up to project constraints, design teams, and the maturity of organizations to turn this understanding into product ideas. Our approach is more in the tradition of ethnographic research, primarily aiming at better understanding of human behavior in this technological context. It should be judged in terms of its ability to generate theory that helps the design field more generally—not simply in terms of its ability to serve the contemporary needs of developers.³⁵

Our study has dealt with mobile communications technology. Mobile multimedia have provided us with a perspicuous setting that makes social phenomena observable and reportable in sufficient detail. A similar approach has been used in a variety of other settings such as exploring how audio files can augment photography.³⁶ This raises the question about whether the prototyping social approach can be applied to “slow technologies” such as intelligent furniture or textiles.³⁷ Another open question is the place of prototyping social interaction in the design process. The answer to both questions depends on the presumption that our point is conceptual—aimed at advancing a shift in thinking rather than suggesting something totally new for the most advanced design practice. The approach advocated in this paper can easily be adapted to researching, say, interaction with robots or intelligent textiles. If for practical reasons one can do only one prototype, then it is wise to conduct research early on in the design process, when design drivers still are open. However, as our examples have shown, research can be conducted at considerably later stages of the design process just as well. In the final analysis, the purpose of prototyping social interaction is not so much about saying what the future product or system should be like. Rather, it is about providing a more accurate description and understanding of the social phenomena related to the product or service idea.

33 As argued by, for example, Mika Pantzar, *Kuinka teknologia kesytetään?* (Helsinki: Tammi, 1996). [*How Is Technology Domesticated?* in Finnish]

34 Don H. Zimmerman and Melvin Pollner, “The Everyday World as a Phenomenon” in *Understanding Everyday Life: Towards the Reconstruction of Sociological Knowledge*, Jack D. Douglas, ed. (New York: Routledge & Kegan Paul, 1973), 80–104.

35 Paul Dourish, “Implications for Design” in *Proceedings of Computer-Human Interaction CHI 2006*, April 22–27, Montréal, Québec, Canada (The ACM Press, 2006), 541–550.

36 David Frohlich, *Audiophotography: Bringing Photos to Life with Sounds* (London: Kluwer, 2004).

37 Lars Hallnäs and Johan Redström, “Slow Technology: Designing for Reflection,” *Personal and Ubiquitous Computing 5* (2001): 201–212.