Prototyping Social Interaction

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Abstract. This paper describes three studies that have focused on prototyping the use of mobile multimedia communication technologies. These studies have placed technology prototypes into a social setting and followed their use over a period of time. Here, we present the methodology from these studies: the technology and the interpretive methods used to follow uses that evolve over time. We argue that the prototype consists of human action, not so much of the technology that supports it. We also take a more abstract viewpoint, pointing towards an emerging paradigm of designing for social interaction. We discuss what is needed to enable empirical approach on how people interact with each other using emerging , new or not yet available technologies.

Key words: design, prototyping, social interaction, mobile multimedia, experience

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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 like bus stops, trains, cars, and city streets — in fact all the places where people are 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 in guiding the design of such systems.

This paper describes a series of studies conducted in Helsinki that have focused on prototyping how people interact with each other with 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" in this paper. The argument of this paper applies in particular to small communication devices, meant for everyday life, but it can also be used with other types of products and services. Social processes inevitably affect the way in which technology is perceived, accepted and used. If these social processes are neglected, designs face risks. In our opinion, there ought to be ways to anticipate at least some of them.

Approaches to User Involvement in Prototyping

Buchenau and Fulton Suri[1] 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.[2] The main aim of prototyping is to produce information for design processes and design decisions, and also to explore and communicate propositions about the design and its context. From this angle, 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 correct these problems* to make use of the product or service more efficient and enjoyable. Prototypes are also *communicative tools* and sometimes they are built explicitly for this purpose. For example, in the car industry it is common to build scale or 1:1 models that give an idea on the future vehicle. The aim is to communicate the concept and looks of the future product, to collect feedback and to prepare 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.[3]

While there is no single way to do prototyping, the role given 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 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.[4] Prototype-like representations not only generate useful material for design, but their manipulation provides a natural and influential enough slot for user participation in the process.[5]

One key differentiator is whether the focus is on the behavior of the users and what sort of claims are made about it. For example, there are purely *artistic* or *inspirational approaches* to user involvement, such as the cultural probes approach[6] 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 observable doings of people, but in their inner states that are rendered as the most important focus of user-centered design.[7]

The main problem with these approaches is that today many products are designed for interaction, or are almost out of necessity used in social interaction. This is true not just for communications technology, but also for interiors, many types of games and cars. However, with the exception of teams in information systems design (ISD) at the workplace,[8] 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.[9] The problem begins in that people are constantly reflecting their action to how others relate to it. Even if it would possible to anticipate how all individuals will behave in the future, we cannot know up front when the paths of two or more people meet and what sort of interaction is set going. Therefore, although individual actors have their say in action, the process or its outcome is not in the control of any single individual.

This paper primarily aims at showing how one can study processes of social interaction around 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 study how people interact with others while using a prototype, and how these interactions affect the way in which people use the prototype. Throughout, our focus is on practices, what people do, rather than on meanings, what they say.[10] In Bannon's early terms, we study humans as "actors" rather than as "factors."[11] 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 methodic work outside a small circle of CSCW research.[12]

Prototyping Social Interaction

This paper describes how our work has in its own way tried to respond 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 first-hand 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.[13]

In our opinion, the key point in prototyping social interaction is that "a prototype" is not a piece of technology built 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 mean not a general sort of label one could cast upon events, but that people are engaged in interaction with other human participants either when mediated by the technology or when 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 behaviors and opinions on it when dealing with other people. These observations from social interaction, enabled by the representation, are turned into design drivers. They should not be treated as another set of variables, but given specific and sustained attention.

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 required conditions for prototyping social interaction.[14] With this setup, the intention is to create conditions in which there emerges a social organization around the representation so that this organization can be observed and described in detail. This understanding can be used as a driver in design, and it may perhaps even be modeled.

1. *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.

2. *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 their interests, their social interaction and experiences that they find meaningful. Data from people must be gathered and treated using empiric and up-to-date research methods.
3. *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 enforce them to use it in predefined ways.
4. *Sufficient time span*. The prototype ought to be followed for a few weeks at least. If the study period is shorter, it is impossible to get an idea of how people explore and redefine it in their actions.

In addition, there has to be a conceptual framework for studying social interaction: social interaction 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,[15] while Koskinen and Kurvinen build on conversation analysis, an offshoot of classic ethnomethodology.[16] In other studies on our topic, mobile multimedia, researchers have utilized activity theory and sociology of science and technology.[17] The framework ought to be detailed, well tried in previous research, and open enough to sensitize designers for 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.[18]

Three Studies

From 1999 to 2002, we conducted a series of studies on mobile multimedia. This paper is based on three of these studies. The first example is from the *Mobile Image* study, which took place in 1999-2001.[19] We gave a Nokia 9110 and a Casio digital camera, connected with an infrared link, to four groups of five people for approximately 2–3 months each. The University offered access to a computer system for all participants. Actual messages were collected as e-mail attachments. During the experiment the male and the female groups sent a total of 371 e-mail messages, which became our primary data. The service was free of charge.

The second example is from the study *Mobile Multimedia*,[20] where 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 took place in summer 2002, and lasted about 5 weeks. Each user was given a MMS phone. Three mixed-gender groups with 7, 11, and 7 members were studied. In all, users sent over 4000 messages during the pilot. Over 2000 were unique (the rest being 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 has repeatedly argued that people show their pictures to other people without ever

sending them: phones are largely capture and see devices rather than capture and send devices.[21] 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 in *Suomenlinna*, an old fortress island and a popular recreation spot located 15 minutes outside of Helsinki. Participants were 11–13 students of Finnish language at the University of Helsinki. The second part of this study, called *Indoors*, was an indoor party with 20–30 guests. Photographing and filling the template took place during one 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 under suitable conditions translated into something larger than life by situating it into 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 shot with the camera. Here not just an experience, Eija’s wound, is “co-experienced” and communicated as a story. The heading, "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. A blunder is also explained: the initial first shot was accidentally deleted. In the first three images, we see a group of horrified people who witness bloodshed and find a body in 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. ***The Lammassaari Murder Story***

Murder at Lammassaari

The long awaited horror movie shots!

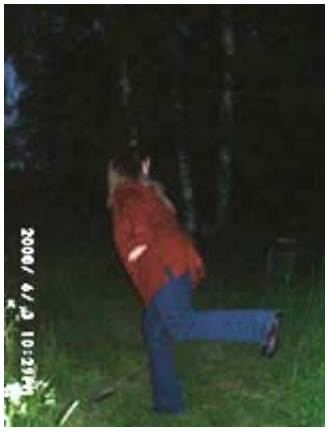
Unfortunately, I messed up and deleted the first image by accident (but I've heard I'm not the only clutz among us...). The first image was a picture of the murderer's hand — the story got its start in a small scratch on Eija's hand sometime in the darkest hours of the night at the Lammassaari summer party.

Liisa

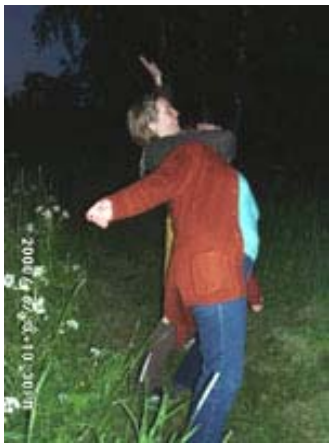
Horror at Lammassaari: A murder has been committed!

A body in the grass (note the smile)

The body is found

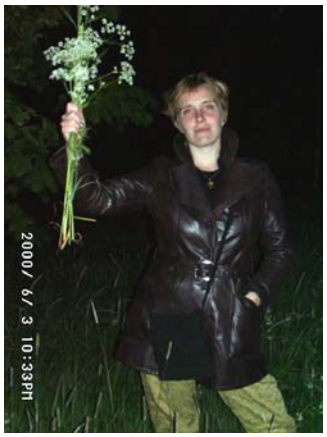


The murderer runs for it



Plot climax: The murderer is caught...

The murderer gets what he deserves — The Happy Ending



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

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. Of course, in parties, activities may evolve into plays, but a camera and a phone makes this process it 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 of 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 before it was actually shared; the information exchange had begun even before the actual story was 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 these methods, we have explored have been postcards, riddles, teases, questions and answers, as well as stories.[22] In this context, Ling and Julsrud talk about "genres," which we, however, see as a special case of social interaction. Genres — like Hollywood-type murder mysteries — provide conventional means for giving shape for constructing messages.[23] As *Murder in Lammassaari* shows, genres provide important resources for observing, imagining and reporting social activities.

Routines and Creativity

While in Mobile Image, sending a multimedia message to another phone easily took several minutes, in Mobile Multimedia, the process was considerably quicker. As expected, this was reflected in how people used their devices to capture and share experiences with their peers, and forms of social interaction became more elaborate. People were able to not just capture and send experiences but they could also 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.[24] Sometimes a missing reply is noticeable and may prompt sanctions. If one asks a question, he can expect a quick answer. In Mobile Multimedia, these "sequences" include question-answer pairs, greetings, teases and riddles, among others.[25] These are orderly acts that people in ordinary life use to make sense and to reinterpret their experiences using a piece of communication technology. They also explain a good deal of variations in use over time.[26]

Example 2. ***Good morning greeting***

From Hanna to Tuomas.

morning!

In Example 2, Hanna sent early morning greetings to her spouse. It is was one of many greetings send 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.[27] Greeting such as the one above were typically counter greeted only in a routine manner, if replied to at all. They are examples of routinized communication patterns and ways of telling about things and as such, fit to the notion of genres. However, a closer look reveals that people do not merely take their content and shove it in a ready-made set of response types, series or sequences. For example, greetings enable creative spin-offs. Later in that afternoon, Tuomas recycles Hanna’s tired looking photo, sending a mockery personals ad to everyone in the group.

Example 2. ***(continued)***

From Tuomas to all

I am 20, a hot sassy panther lady from the city!

You hunk of male, catch me if you dare! —

Always on the prowl

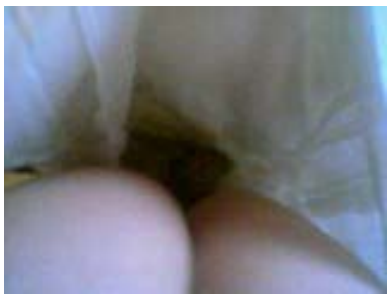
With this reply, Tuomas stepped outside routine communication patterns, and thus opened himself to an affectionate and quick counter attack. Hanna replied with two messages. The first, jocular message consists of a similar ad on behalf of Tuomas, with a primitive wooden sculpture acting as him. The second message offers the contents of a baby diaper to Tuomas, thus displaying, most concretely, her disapproval of the earlier message. With this picture, she did not have to use a bad word. 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.

Example 2. ***(continued)***

From Hanna to Tuomas

I am Tuomas of the Jungle, 37, humbly known as the king of the forests. Seeking a wild 60 yrs jungle woman to come and grab me off the vines. —

Dangling yo-yo



From Hanna to Tuomas

And just for daddy…

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 is often creative, which makes it difficult, if not impossible, to model; any system built 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 in explicit negotiations. Mobile Image already taught us that the notion of “category” does

not properly support action through mobile multimedia. However, as Mobile Image was based on collecting actual messages, it did not provide us an access to what people actually do when they get multimedia messages and decide to respond to them. It was this actual 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 where one participant was eating and her mouth was wide open. Soon after, others 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 as "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 metaphor of mouth became increasingly more complicated. The example also shows that the abstraction process was social: several people participated in creating the category, which became a source of fun as the "round shapes" category became increasingly richer in content.

Indoors, the second study of Mobile Album, was from a cocktail party like situation. Through this study, we wanted to study how people create meaning to the situation using our experience prototype in the absence of the clear-cut visual structure of Suomenlinna. In Suomenlinna, the fortress island and the easily identifiable physical activities during the picnic provided a natural conceptual structure to the event. In contrast, in Indoors, the main

activities were socializing, eating, and drinking. What happened was that people started to crop images, create collages, create panoramas, and cut images into all kinds of shapes rather than create collections of similar objects as in Suomenlinna. 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, and the idea of cropping and cutting images with scissors was similarly picked up from early inventions by others.[28]

In Mobile Album, our design conclusion was to suggest that any system for storing albums would have to offer a possibility to keep categories plastic, renameable and open so that people can create and edit categories as they will. In contrast, systems relying e.g. on ready-made categorization schemes or automated classification systems do not support discovery and fun inherent in collaborative album building. 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

Above we have demonstrated that it is possible to study how prototypes function in social interaction. In the three reported studies, we have followed how groups of friends and acquaintances have 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 on a variety of technology levels from paper-and-scissors to pre-launch products and services. We have not just gained insight and inspiration, nor 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. This work has partly been based on ethnomethodology, but insights from these studies have also led to a new understanding of user experience as co-experience, as something people create together.[29]

Our approach to prototyping social interaction was inspired by Buchenau and Fulton Suri's notion of experience prototyping[30], but our focus is on the unfolding of social activities rather than on how experiences take shape in these activities. Our primary aim 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, for example, people construct messages, how messages form sequences and how category systems evolve. Another difference is that in our opinion, prototyping social interaction requires an even more open approach to prototyping than experience prototyping. People have to have time and opportunities to explore technology and develop uses for it with others. The main similarity is that the prototype does not have to be technologically advanced, detailed in terms of its design, nor 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 potentials of technology, we need to understand what interpersonal activities it might support. Still, current representational practices support social action only partially — and use social activities as resources rather than study them in detail. In contrast, our prototypes provided only starting points for social interaction, which became the main topic of analysis. These studies were not aimed at producing product ideas, but to make it sure that such ideas are based on a solid understanding of the intricacies of social interaction and what happens to the prototype as it is

embedded in social action. It is up to the design team to decide how to take the step towards specific product ideas.

Our study has dealt with mobile communications technology. For us, mobile multimedia has provided 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 like in studying how audio files can augment photography.[31] This raises the question about whether the prototyping social approach can be applied to "slow technologies" such as intelligent furniture or textiles.[32] Another open question is the place of prototyping social in the design process. The answer to both questions is based on 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 propagated in this paper can easily be adopted for studying, 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 a design process when design drivers are still open. However, as our examples have shown, research can be conducted at considerably later stages of the design process just as well. In final analysis, the purpose of prototyping social interaction is not so much about telling what the future product or system should be like. Rather, it is about understanding the social phenomena related to the product or service idea.

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