

# The Social Life of Cameraphone Images

Nancy A. Van House  
School of Information Management and Systems  
University of California, Berkeley  
Berkeley, CA 94720-4600  
1.510.642.0855  
vanhouse@sims.berkeley.edu

Marc Davis<sup>1</sup>  
School of Information Management and Systems  
University of California, Berkeley  
Berkeley, CA 94720-4600  
1.510.643.2253  
marc@sims.berkeley.edu

## Abstract

In this paper we describe our empirical study of how users appropriate a new cameraphone-based system for both pre-existing and emerging uses. Ours is a larger and longer study than most, with up to 60 participants using the system for up to 10 months (and continuing). As of this writing, they have captured and uploaded more than 24,000 images. We seek to understand both how cameraphone imaging fits into existing photographic practices, and how new technology facilitates new practices. We have identified four higher-order “social uses” of personal photography, which we see in a somewhat altered form in cameraphone use: creating and maintaining social relationships; constructing personal and group memory; self-presentation; and self-expression. We find three interpretations of cameraphones: as *memory-capture devices*, *communicative devices*, and *expressive devices*.

## INTRODUCTION

As networked, context-aware cameraphones become more common, we argue that they may well become the dominant platform for digital imaging. These devices provide important opportunities (and, of course, problems). For users, they offer the possibility of new uses for digital images as well as improved support for pre-existing uses. For both users and multimedia researchers, they offer the possibility of new approaches to media analysis and management: combining automatically-gathered contextual metadata and user-created metadata with media content analysis, and with data on the user’s prior patterns of behavior, including image sharing.

While the use of personal images has always had a large social component, film and digital photography have nevertheless been primarily individual. But now networked imaging devices, contextual metadata, online image sharing, and re-use of digital content are making image creation and use an increasingly collaborative activity.

In this paper we describe our empirical study of how users appropriate a new cameraphone-based system for both pre-existing and emerging uses. Ours is a larger and longer study than most, with up to 60 participants using the system for up to 10 months (and continuing). As of this writing, they have captured and uploaded more than 24,000 images.

We seek to understand both how cameraphone imaging fits into existing photographic practices, and how new technology facilitates new practices. In addition, we can learn more about the role of photography and of visual communication in people’s lives as they adapt the new technology to pre-existing, higher-order activities.

We find that cameraphones are highly interpretively-flexible. We identified three interpretations of cameraphones: as *memory-capture devices*, *communicative devices*, and *expressive devices*.

## THE MMM SYSTEM

Two major barriers to cameraphone use are difficulties in “getting pictures off the cameraphone” and cost. We gave 60 users cameraphones with virtually unlimited voice and GPRS service connected to our MMM2 system. Some have been using the system for as long as 10 months. Users are largely SIMS master’s students, plus some faculty and PhD students.

Participants received Nokia 7610 cameraphones, with 1-megapixel resolution and four levels of zoom. These generally produced what users considered “good enough” images, especially in daylight.

The cameraphones were pre-loaded with the Mobile Media Metadata 2 (MMM2) photo-sharing system [4].<sup>2</sup> At time of capture, the MMM2 system allows users to add captions to pictures and videos, and to send them from the phone to other MMM2 phones or via email.

MMM2 also automatically uploads all pictures and videos to the MMM2 database, where each user has her or his own private MMM space which collects the images captured by or shared with the individual. The photos can be viewed at varying resolutions, annotated, organized into albums, and shared with others. Other MMM2 users can choose whether to receive images via email or via the phone. All shared images also show up in their MMM2 space. Non-MMM2 users receive images via email. In addition, the images (as JPEG files, or as URLs) can be used in any way that the one uses other such media, such as copying the images into other applications, sharing them via email, or even (as some users do) pasting a URL into an Instant Message (IM).

Some 24,000 images have been captured and uploaded to MMM2. Images may be labeled as restricted or unrestricted (for use by researchers), or as public (viewable by any MMM user).

## THE SOCIAL USES OF CAMERAPHONE IMAGES

Previous research in a number of different fields has investigated film-based personal photography [2] digital photographic practices [6, 13], and, most recently, cameraphone use [9, 10, 11].

In trying to understand what cameraphone research reveals, several cautions are in order. First, the international nature of such studies raises questions about cross-cultural differences in communication and photographic practices, as well as cameraphone use. For example, Ito [8] describes how Japanese mobile email practices echo the specifics of Japanese culture and living conditions.

Second, many of these studies are, of necessity, small: small numbers of participants and images, studied over a short period of

time. Small numbers raise questions of external validity. Short-term studies of technology use always run the risk of reflecting users' behavior early in the adoption process, before the novelty of the technology gives way to sustainable practices. Our study, larger and longer than most, reveals a much greater variety of uses than a small study would be likely to find.

Third, many of these studies (including our own) begin by giving people cameraphones and following their use; a more naturalistic method would follow people who have voluntarily adopted cameraphones (e.g., [12]).

### **Our Approach**

To design technology that is useful for users, and not just attractive to technology designers, we need to understand users' interpretations of the technology and how they appropriate it for both pre-existing and emerging uses.

Our approach to understanding the uses and meanings of cameraphones and cameraphone images is rooted in Social Construction of Technology (SCOT) [1] and Activity Theory (AT) [5]. We borrow from AT its emphasis on the user's goals or motives; its assumption of a hierarchical relationships among activities, actions, and operations, such that a single higher-order activity may be supported by a changing array of actions or operations; the importance of community and the cultural setting; and the mediating role of artifacts. AT reminds us that people may choose among alternative actions for the same purposes—or have alternative purposes for the same actions. In trying to understand how people's actions may change with changes in technology, it is helpful to ask what more stable, enduring activities or motives are behind people's actions, and how people may adapt their actions to achieve those ends as conditions change.

The key concept that we borrow from SCOT is interpretive flexibility: a given artifact may have multiple meanings (or uses). These meanings are constrained but not determined by the design; they are created by users as they match the possibilities of the technology to their lived experience.

### **Our Empirical Work**

In an earlier phase of this study, we interviewed individuals about their general personal photographic practices. These interviews are continuing. We have also interviewed cameraphone users who are not part of our system. These interviews, too, are ongoing. We have interviewed 15 users of the MMM2 system, asking them about their cameraphone practices. Using a visualization developed by the MMM2 development team, we could show participants their images arranged by time, and shared images by recipients, grounding their discussion of taking and sharing practices.

Our researchers are also participant-observers, using cameraphones and the MMM2 system. Grounded theory [3, 7, 15], the basis of our analytical approach, stresses that the researchers' own knowledge is always a part of their analysis anyway, since there is no "view from nowhere," and should be included explicitly. As users ourselves, we have an inside view that is as valid as that of our participants – but not more so.

We are also beginning to analyze the MMM corpus for content. Viewing images without the photographer allows us to code for public, not private, meanings.

Our MMM users are primarily master's students in the School of Information Management and Systems (SIMS). This group has several characteristics useful for this study. First, they are more

likely to be interested in new technology and tolerant of the glitches that sometimes occur with an experimental system. Second and most important, it has proved highly valuable that they are a tightly-connected group who work and socialize together. Unlike studies that gave a handful of cameraphones to people who then sent to non-cameraphone users, we have a set of users who can easily send and receive images, and have developed patterns and norms of image taking and exchange. This group may be indicative of what use will be like when cameraphones are ubiquitous and sharing is easy and low cost.

Of course, they are also limited in being a relatively homogeneous group. But small, qualitative studies can never argue that theirs are representative samples, and ours is a larger and therefore more heterogeneous group than in most studies.

## **FINDINGS**

### **Social Uses of Cameraphones**

From our interviews with non-cameraphone photographers, we identified four higher-order purposes of personal photography, which we are calling "social uses" [16]: creating and maintaining social relationships; constructing personal and group memory; self-presentation; and self-expression. We have found that these have proliferated to cameraphone use, as well, but with some differences, which we will discuss below. In addition, we have found other emerging uses for cameraphones.

### *Memory*

Images are used, to preserve memories, but also to construct individual and group narratives of oneself and one's life. Digital and film cameras are generally used to capture images in bursts. In contrast, cameraphones are always present, and our data generally showed steady, low-level picture taking – many days with one, two, or three pictures -- interspersed with bursts. The ubiquity of cameraphones facilitates the unplanned capture of opportunistic images.

Many participants reported using cameraphones to capture frequent, mundane images of their daily lives. Some intended these as a record of their daily life; others began this as experimentation or playfulness but then, in retrospect, realized that they had a record of the pattern and texture of their lives. This is quite different from most personal photographic practice which tends to focus on the exceptional, not the mundane.

### *Relationship Creation and Maintenance*

Personal photography both reflects and sustains relationships by who is in the picture and how images are used, especially sharing. The ubiquity of cameraphones and good-but-not-great quality of images combine to result in pictures of people and shared events much like film and digital cameras, but also many casual pictures of people engaged in daily activities and groups socializing.

Within this group, there also emerged a practice of labeling social events as important, funny, or otherwise noteworthy by the act of taking pictures. This use communicated to others present that an event or action was noteworthy.

Image sharing – face-to-face, and across time and space -- is important in all kinds of personal photography. Cameraphone images were often captured specifically for sharing. These included capturing sights that the photographer thought someone else might find interesting and pictures taken for their communicative value, often highly transitory, indexical images used as messages.

This last was an important use of cameraphones and cameraphone images: the cameraphones were used as *communicative devices*, not (only) for voice calls but via image sharing. For example, a student who had talked about missing New York, including what he claimed to be its vastly superior pizza, sent to his friends in Berkeley a poor quality but sufficiently clear image of a slice of pizza from New York

Another participant used her cameraphone to describe her day to her partner, showing him images of people and events as she talked. She spoke of this use specifically as being important to their relationship.

### **Self-presentation**

Self-portraits are one means of self-presentation, of influencing how others see us. We found a surprisingly large incidence of such pictures: arms-length images in which the camera is turned back on the photographer, made possible by the one-handed operation of cameraphones, and made acceptable by the perceived lack of seriousness of cameraphones. Other forms of self-presentation were also common: pictures of one's pets, belongings, space, and so forth.

Another aspect of self-presentation is that of subjects who are not photographers: i.e., posing. The poses in cameraphone images are often humorous. Again, the lack of seriousness of cameraphones facilitated candid and humorous shots.

### **Self-expression**

By self-expression, we mean the creation of images that express one's own view of the world. – images that are “artistic,” funny, experimental, or otherwise expressive. They may or may not be shared with an audience. Our respondents took many photos of this sort. Again, the ubiquity and perceived lack of seriousness of cameraphones made this kind of picture-taking more likely. We often heard, “I’m not a photographer, but...”

One respondent took many such pictures but rarely viewed them, saying that the act of taking was what was important to him, not the image itself.

### **Functional**

Another use, much more prevalent with cameraphones than with other kinds of cameras, is functional, for oneself and for sharing with others. As image quality improves, it is increasingly possible to use cameraphones like scanners or copy machines. Participants recorded whiteboards at meetings or items in stores they were considering buying.

Functional use with others often had a light-hearted component. For example, one participant sent a picture of a clock to remind his co-workers of an impending deadline.

### **Social Documentary**

Sontag [14] identifies another use of images: social documentary. We did not see such uses among our participants, but we are beginning to see them publicly, such as cameraphone images from the recent London Underground terrorist attacks.

### **Patterns of Sharing**

A major use of photos of all kinds is for sharing. Cameraphone participants tended to have stable, often non-overlapping sets of people they shared with: a well-defined group of fellow students with whom they worked and socialized; outside friends or co-workers; or family. This validated our hypothesis that social and other kinds of metadata could be used to facilitate sharing. Im-

ages were often shared with people who were in the picture or present at an event or “should have been,” e.g., members of a social group who missed a social event. The stability of these sets of people with whom images were shared meant that the group of recipients could often be predicted once one was named.

The design of the MMM2 system was such that most users (erroneously) thought that images were removed from the cameraphone, and so we saw much less sharing on the phone than would have otherwise been the case. Sharing from the MMM web interface, however, had the advantage that the images were much clearer than on the phone. Participants often reviewed sets of related images to pick “the best” to share.

Image-sharing was reciprocal, not on a one-to-one basis, but as a helping to define a relationship. Participants said that they did not feel a need to respond to a picture with another picture, but that, once an image was sent, that opened the door to further sharing, often thematic: cat owners exchanged pictures of cats, or a running joke of images of socks being exchanged.

Most sharing was within 24 hours of image capture. The overall consensus was that, if sharing doesn't happen immediately, it is forgotten. Furthermore, many images had a short useful life. This highlights another important characteristic of cameraphone images: although many are of enduring value, *most are highly transitory*, with little expectation of future value. Some may prove to have an unexpectedly enduring value, such as a picture of an event or person that, in retrospect, takes on added importance.

## **CONCLUSION: THE SOCIAL LIFE OF CAMERAPHONES AND THEIR IMAGES**

In sum, the combination of ready availability of cameraphones, easy uploading and sharing via MMM, and good-enough picture quality resulted in cameraphone images being used in ways both similar to and different from other personal images.

The use of MMM within a closely-coupled network, where participants worked and socialized, spending a lot of their time in one another's company, proved to be of value in seeing the social nature of cameraphone use. The group norms that developed *not only allowed but valued cameraphone image-capture and sharing*. It was *acceptable, even expected, that participants would take pictures during group events*. *The “better” images were expected to be shared*. And the *use of images for short communication* was not only accepted but common.

We conclude that the cameraphone is seen as three different though related devices:

- *A memory-capture device*: Cameraphones are used to capture images of memory-worth events. However, unlike other kinds of cameras, they are also used to capture mundane images, the texture of everyday life.
- *A communicative device*: many images are captured specifically for communicative use, whether from the phone or from the MMM website. Many such images are highly transitory and indexical, as is much communication.
- *An expressive device*: the cameraphone is used to capture expressive images, including art and humor, that express the photographer's sensibility and view of the world. Another expressive use emphasizes, not the images, but the act of taking images, and the development of “photographic seeing.”

## ISSUES FOR THE WORKSHOP

A number of issues need to be addressed in considering camera-phone use and especially cameraphone research:

- Most cameraphone research, as with other qualitative research, consists of *small, short-term studies*. *How do we develop a more general understanding of cameraphone use from these?*
- Cameraphones are an international technology, but we can reasonably expect cross-cultural differences in photographic practices, communication, and other practices to be reflected in cameraphone use. *How do we account for such cross-cultural differences in understanding cameraphone research and use?*
- Cameraphone use is a moving target, both within our studies, as use changes with familiarity, and in the larger society, as cameraphones become more common. *How do we understand these trajectories of use?*
- *What are the emerging uses and interpretations of cameraphones, and how do we distinguish fads from enduring uses?*
- Finally, the networked nature of cameraphones is essential to understanding future use. Current users, for a variety of reasons that include charging and service policies and technical incompatibilities, are not fully exploiting this potential. *How will cameraphones as networked digital imaging devices change people's practices, social life, and societies?*

## ACKNOWLEDGMENTS

Our thanks to the MMM2 development team as well as the MMM users.

## ENDNOTES

1. Currently on leave at Yahoo! Research Labs – Berkeley; [marcedavis@yahoo.com](mailto:marcedavis@yahoo.com)
2. <http://mmm.sims.berkeley.edu>

## REFERENCES

1. Bijker, W. E., Hughes, T. P., Pinch, T. J. *The Social construction of technological systems: New directions in the sociology and history of technology*. MIT Press: Cambridge, 1987.
2. Chalfen, R. *Snapshot versions of life*. Bowling Green State University Popular Press: Bowling Green, Ohio, 1987.
3. Clarke, A. *Situational analysis: grounded theory after the postmodern turn*. Sage Publications: Thousand Oaks, Calif, 2005.
4. Davis, M., Van House, N. A., Burgener, C., Perkel, D., King, S., Towle, J., Ahern, S., Finn, M., Viswanathan, V., and Rothenberg, M. MMM2: Mobile Media Metadata for Media

Sharing, in *CHI '05 Extended Abstracts on Human Factors in Computing Systems, 2005*, ACM Press, 1335-1338.

5. Engeström, Y., Miettinen, R., Punamaki-Gitai, R. L. *Perspectives on activity theory*. Cambridge University Press, Cambridge ; New York, 1999.
6. Frohlich, D., Kuchinsky, A., Pering, C., Don, A., and Ariss, S. Requirements for Photoware, in *ACM Conference on Computer Supported Cooperative Work (Nov. 16-20, 2002)*, ACM Press, 166-175.
7. Glaser, B. G., Strauss, A. L. *The discovery of grounded theory: Strategies for qualitative research*. Aldine Publishing Company: Chicago, 1967.
8. Ito, M. Personal Portable Pedestrian: Lessons from Japanese Mobile Phone Use. <http://www.itofisher.com/mito/archives/ito.ppp.pdf>. 1-18-0005.
9. Kindberg, T., Spasojevic, M., Fleck, R., and Sellen, A. I saw this and thought of you: some social uses of camera phones, in *Extended Abstracts of the 2005 Conference on Human Factors and Computing Systems, 2005*, ACM.
10. Koskinen, I., Kurvinen, E., Lehtonen, T.-K. *Mobile Image*. IT Press: Helsinki, 2002.
11. Okabe, D. Emergent Social Practices, Situations and Relations through Everyday Camera Phone Use, in *Proceedings of Mobile Communication and Social Change, The 2004 International Conference on Mobile Communication, 2004*.
12. Palen, L., Salzman, M., and Youngs, E. Going wireless: behavior and practice of new mobile phone users, in *Proceedings of the 2002 (December 2-6, 2000, 2000, 201-210*.
13. Rodden, K. and Wood, K. R. How do people manage their digital photographs?, in *CHI 2003: Proceedings of the Conference on Human Factors in Computing Systems (April 5-10, 2003)*, ACM Press, 409-416.
14. Sontag, S. *On Photography*. Picador USA; Farrar, Straus and Giroux: New York, 2001.
15. Strauss, A. L., Corbin, J. M. *Grounded theory in practice*. Sage Publications: Thousand Oaks, 1997.
16. Van House, N. A., Davis, M., Ames, M., Finn, M., and Viswanathan, V. The Uses of Personal Networked Digital Imaging: An Empirical Study of Cameraphone Photos and Sharing, in *CHI '05 Extended Abstracts on Human Factors in Computing Systems, 2005*, ACM Press, 1853-1856.