

Evolution in the Adoption and Use of Collaborative Technologies

Paul Dourish

Xerox Palo Alto Research Center
3333 Coyote Hill Road
Palo Alto
CA 94304
USA

dourish@parc.xerox.com

*Position paper for the ECSCW'99 Workshop on Evolving Use of Groupware
Copenhagen, September 1999*

Introduction

My goal in this position paper is to take a number of technologies I have been involved with as a starting point for some reflections on evolutionary patterns in the adoption and use of collaborative technologies. I put these two together because I believe that adoption and use must be seen as parts of the same process, and in fact that use can be seen as the continual re-adoption of technology and adaptation of technical systems to working practice. In a previous paper, Steve Harrison and I (1996) used the term “appropriation” to describe the co-adaptation of technologies and practices that characterises successful adoption experiences with collaborative technologies. Appropriation is what happens when a group “makes a technology its own”. This often takes the form of unexpected or unanticipated uses of technology, although it can also mean the development of novel practices organised around the specific opportunities offered by a technology. My goal here is to set out some common features of appropriation as a basis for design.

Appropriation in Action

In this paper, I want to sketch some aspects of appropriation, drawing on a couple of examples. The examples I draw upon here are ones that I've been involved in myself in one way or another. They are cases where appropriation has turned out to be a critical perspective on the development, deployment and uptake of a technology.

Buttons and the Tailoring Culture

Buttons was an early project at EuroPARC exploring collaborative customisation (MacLean et al., 1990). Buttons were on-screen objects that encapsulated code. Pressing the button caused the code to be activated. Buttons could live on the desktop, or be encapsulated into documents, which also allowed them to be collected together (lots of buttons on a single document), incorporated into software documentation, and included in email.

Early versions of buttons included simply the Lisp code to be executed to perform their actions. Later versions introduced customisable appearances, so that buttons could be distinguished from each other and given a personal flavour; and separable “parameters” so that the buttons could be tailored more easily by non-programmers. Along with the ability to pass buttons around through electronic mail, these features made it easier for people to share their buttons and adapt those of others to new or specialised purposes. Heavy users of buttons might end up with as many as fifty buttons on their screen, specialised to all sorts of different personal needs.

One thing that turned out to be crucial in the Buttons project was the fostering of what MacLean et al. describe as “a tailoring culture”. Not only was it critically important that the technology of Buttons was easily shareable and malleable, but it was also necessary to develop a workgroup ethos that encouraged tailoring. This included, for example, establishing that a button you received through email or copied from

a colleague was “your button”, and hence, available for you to modify (and not still “their property” and inviolate).

Communication through Portholes

Portholes (Dourish and Bly, 1992) is a media-space-based awareness system developed jointly at EuroPARC and PARC in 1990, and which was subsequently the basis for related designs at U. Toronto, NYNEX and other sites. In Portholes, period “snapshots” of offices and public spaces are distributed across a computer network and made available through “viewers”, which present a simple at-a-glance view of activity within a distributed work group. The original Portholes system was originally introduced within a small group in late 1990, expanded through 1991-2, and was in continual use until the technology on which it was based became unavailable around 1994, although related systems continued to be used within the same group. The adoption process was, then, relatively successful.

A number of specific examples of the use of the Portholes system within the PARC/EuroPARC media space groups illustrate the “appropriation” process at work. One of the most striking was the use of Portholes to send messages. On one occasion in late December, the EuroPARC users arrived in the office one morning to find that our colleagues in Palo Alto had left us “Christmas cards” in the form of visual displays arranged in front of their video cameras, appearing in Portholes. Most of these involved cut-out images of themselves with festive greetings and other traditional items. Portholes created a “space” that could be used for indirect communication. On another occasion, the communication was more directed. Those of us in Cambridge, including a visitor from PARC, noticed that S, one of our PARC colleagues, was working at his desk at noon Cambridge time, which was 4am in Palo Alto. The reason for this late night work was that he was completing his PhD dissertation. Noting that he seemed both stressed and lonely, we conspired to cause all the EuroPARC Portholes users to wave at him at once, at which point I also took down the server so that the images would “stick” and S’s Portholes window would be filled with Cambridge users waving at him.

Creating Digital Genres

In an exploration of the emergence of new digital media genres, Erickson (1999) discusses a particular pattern of communication in an on-line discussion environment. In the example, a group of people using the system engage in a “limerick game,” in which they construct a limerick collectively and asynchronously, individuals contributing lines one at a time until the whole has been assembled (until, in the particular incident Erickson discusses, one person makes a joke by contributing an unrhymable line.)

Although one can imagine textual games of this sort arising in a variety of online chat systems, Erickson’s analysis shows how the details of this game are, in fact, organised around very specific details of this particular system. For instance, he shows how the presentation of the message transcript as a single, largely seamless body of text (rather than as separate messages with extensive headers) contributes to the development of the “contributory narrative” genre, and in particular encourages users to play off each others remarks and collaboratively construct the text. In other words, this appropriated use of the discussion system is based in a number of particular interface details. Similarly, Cherny (1999) discusses a variety of textual practices that emerge around the specific features offered by the virtual environment she studied.

Making Customisation Intelligible

Appropriation often involves adaptation and customisation. The problem with standard approaches to customisation is that, by specialising the behaviour of a system to one individual or group, they simultaneously make the system less useful or intelligible to others. So, while customisation can support appropriation through the adaptation of technologies to immediate local needs, it also interferes with the ability to share information with others. (This is a familiar problem to programmers, who must balance the issues of change and reuse; we need solutions that tackle these problems in other domains without introducing the rigid structures of software.)

One setting in which we have recently encountered this is the management of a large collection of workgroup documents in a local government organisation (Trigg et al., 1999). We have been developing a prototype system called Macadam (Dourish et al., 1999) which attempts to address these issues. Macadam

is a system for managing documents according to customisable category structures. However, when a user or a group customise the category structure, Macadam retains the relationship between the original and new structures. In this way, when document collections are presented to a different user who does not share the same set of categorisations, the customisations can be “unrolled” and so the documents can be presented in a way that makes sense to whoever is looking at them.

Aspects of Appropriation

This position paper takes “appropriation” as its basic stance towards the issues of evolution of groupware. What are some of the elements of which appropriation consists?

- *Flexibility.* Appropriation arises from the ways in which a technology is flexible. Flexible has at least two possible meanings here. Flexibility can arise through *control* or through *openness*. Flexibility through control means offering ways for people to adjust settings, reprogram the system or otherwise technically adjust it to their own needs. Flexibility through openness means that a system is simply uncommitted to particular forms of use or content (e.g. in the way that email is not committed to particular styles of conversation or content).
- *Community.* Appropriation is a communal activity. It takes place within a community; in fact, specific uses only become appropriated practices when they are taken up and shared.
- *Visibility.* Appropriation is a collective phenomenon. In order to share patterns of use and customisation within a community, their effects have to be visible to others.
- *Incrementality.* Appropriation is a gradual process; a gradual accumulation of variations in practice and technology that build on each other over time. As a result, then, technologies that provide for incremental development lend themselves more easily to this sort of use.
- *Persistence.* Similarly, since appropriation happens over time, it can happen more easily in systems which hold their state stably from moment to moment. Persistence allows changes and adaptations to survive, and in turn (along with visibility and incrementality) to provide the basis for further appropriation.

Of course, appropriation is not simply a technical phenomenon. The same general process can be seen at work in the development of working styles and practices, for instance, as new organisational processes are adapted and arranged to fit local needs. However, in the technical domain, we can begin to see how specific features of computer systems can either enhance or interfere with the gradual intertwining of technology and practice that constitutes appropriation and evolutionary use. Any understanding of how evolutionary use emerges needs, then, to be grounded in understandings of the relationship between design and practice that these examples begin to uncover.

Biography

Paul Dourish is a Member of Research Staff in the Computer Science Laboratory at Xerox’s Palo Alto Research Center (PARC). His primary research interests lie in the relationship between computer systems design and ethnomethodological studies of practice. Currently, he is exploring these issues as part of the Placeless Documents project, a prototype document management system for personal, workgroup and organisational document collections. Before coming to PARC, he worked at Apple Research Laboratories and at Rank Xerox EuroPARC, where he was the primary developer of the RAVE media space, including the Portholes awareness system. He holds a B.Sc. in Artificial Intelligence and Computer Science from the University of Edinburgh, and a Ph.D. in Computer Science from University College, London.

References

- Cherny, L. (1999). *Conversation and Community: Chat in a Virtual World*. Stanford: CSLI Press.
- Dourish, P. and Bly, S. (1992). Portholes: Supporting Awareness in a Distributed Work Group. Proc. ACM Conf. Human Factors in Computing Systems CHI’92 (Monterey, CA). New York: ACM.

Dourish, P., Lamping, J. and Rodden, T. (1999). Building Bridges: Customisation and Mutual Intelligibility in Shared Category Management. Submitted to GROUP'99.

Erickson, T. (1999). Rhyme and Punishment: The Creation and Enforcement of Conventions in an On-Line Participatory Limerick Genre. Proc. Hawaii Intl. Conf. Systems Science HICSS'99.

Harrison, S. and Dourish, P. (1996). Re-Place-ing Space: The Roles of Space and Place in Collaborative Systems. Proc. ACM Conf. Computer-Supported Cooperative Work CSCW'96 (Boston, MA). ACM: New York.

MacLean, A., Carter, K, Lovstrand, L. and Moran, T. (1990). User-Tailorable Systems: Pressing the Issues with Buttons. Proc. ACM Conf. Human Factors in Computing Systems CHI'90 (Seattle, WA). New York: ACM.

Trigg, R., Blomberg, J. and Suchman, L. (1999). Moving document collections online: The evolution of a shared repository. Proc. European Conf. Computer-Supported Cooperative Work ECSCW'99 (Copenhagen, Denmark). Dordrecht: Kluwer.