

Chapter 7

Computer Support for Cooperative Work (CSCW)

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Summary

CSCW is a interdisciplinary area of research that examines technology support for social practices such as working together or multiplayer gaming. The acronym refers to Computer Supported Cooperative Work, but this is a legacy term that does not truly reflect the broad interests of the area. The key innovation of CSCW is that it takes primary interest not in technology, but in the kinds of human and social practices that are to be supported by technologies.

Background

The term Computer Supported Cooperative Work (CSCW) was coined in the mid 1980s. At the time, computing equipment was becoming more and more commonplace in workplaces, and the problem of software support for workgroups had emerged as a new research issue. There was much interest in groupware, for example Lotus Notes. However, as time went on, computers kept on becoming more and more affordable, not just to organisations but to general consumers. At the same time, networked computing was becoming the norm, first with local networks, then the Internet, and then wireless and mobile networks. Whereas CSCW started out with a somewhat short-term vision of developing software solutions for workgroups, the terrain in which it was interested opened up mas-

sively. The discipline remains very much alive today, often seen as a more socially oriented sibling of the field of Human Computer Interaction.

The Acronym

CSCW stands for Computer Supported Cooperative Work. Understanding what these terms mean are helpful for understanding the field, although many feel the acronym is now out of date:

- **Computer Support:** The original focus on groupware for desktop computers has given way to a broader focus. This includes software support for groups or ensembles of people (for example messaging systems, social network sites, wikis, versioning systems, and so on). It also includes the use of mobile devices, appliances, interactive displays and so on. The concern is still how these fit with and enable human practice, but "support" is not always the right term. For example, video games constitute the practices of games playing rather than support it. Even though "support" may be dated, the orientation of CSCW studies still remains very much to systems in practice.
- **Cooperative:** The second C in CSCW stands for cooperation, not coordination and not collaboration. These terms are often mixed up, and while some do not believe this is important, others argue it is a mistake. The argument is that cooperation can be used to mean collaboration or coordination, but can also mean work that has some impact between parties who are not collaborating, and perhaps not purposefully coordinating their work. This may, for example, be working with shared resources (such as scientists sharing a high-end computer), or it may be shared interests or focuses (for example hospital staff do not necessarily collaborate but must remain coordinated across a hospital and between shifts). It may also refer to interaction between adversaries or rivals (say in a sports game or an auction). Whether or not you think terminology is important, the essential thing is not to assume that CSCW implies a concern solely with groups and collocated action.
- **Work:** The initial focus in CSCW was on office work, but over the years this shifted. The CSCW papers in this handbook focus not only on office work, but on work in hospitals, banks, factories, and so on. They also look beyond work, for example, at technology use in the home. Pointing out that CSCW now looks widely beyond workplaces, Mike Twidale has suggested the discipline become known as CSC*, where the star is a wildcard

that could mean any cooperative endeavour (Leisure, Gaming, Education, Tourism, Commuting, etc). Others however contend that the word 'work' is flexible enough to cover any kind of human labour, whether this be working in an office, working on playing a computer game, or working through messages on a social network site. Again, the terminology is not the key issue, the point is that CSCW is concerned generally with human, cooperative practices, and not simply with office work. The term CSCW is, for many, out of date. Indeed the book series published by Springer has chosen to call itself CSCW: Collaboration, Sociality, Computation, and the Web. This is not to say the area is dying, far from it, it has simply outgrown its original concerns.

Interdisciplinary Research

What sets CSCW apart in computing related disciplines is its focus on "work" (or more general human and social practices) rather than technology. That is, research questions and results in CSCW generally discuss the requirements for or effects of technology regarding human practice. Because of this focus, CSCW has become highly interdisciplinary. CSCW draws from technology disciplines as much as those that have historically studied work-practices (for example Psychology, Sociology, Organisational Studies, and so on). How CSCW differs from these other disciplines are its concerns with the details of practice, how things are actually and specifically done, and how technologies, specifically, feature in this. The orientation is to how to design or deploy technology in ways that are supportive of cooperative practices. Therefore it is often essential to look at the details of use rather than broader trends. It is incorrect therefore to assume that any sociology, or any psychology is interesting to CSCW, and incorrect to assume that methods from these disciplines can simply be imported. CSCW is not the sociology or psychology of technology but a melting pot in which technologists, sociologists, psychologists and others have come together to innovate ways of understanding and designing systems. Ethnography is one example, it has taken on a very different form and set of concerns to what many sociologists think of as ethnography.

Common Interests

Most work is cooperative in some way, and the task in CSCW is not so much to separate out cooperative work as one kind among others, but to investigate the cooperative aspects that feature within people's broader efforts and concerns.

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Therefore a CSCW researcher may approach one of many settings and seek to uncover how cooperation is or could be done with technology. They may seek to address one of a number of themes, including:

1. **Awareness:** In what ways can one person be aware of the actions of others? This is particularly important when actions can have an effect on other people and may not necessarily be visible. The problem is not just how to increase awareness, but how to do this appropriately (for example without compromising privacy).
2. **Articulation:** In what ways can people's efforts be divided up and kept separate? This is important where there could be clashes or wastage if practices begin to consume the same resources or are unnecessarily repetitive.
3. **Plans and Action:** How are plans achieved in actual, situated practice? Plans, including project plans, workflows, protocols and so on do not determine how work is done, but rather it is an achievement of that work to have gone to plan.
4. **Timing:** There are a variety of issues associated with the temporal features of work. How can cooperative work be effectively scheduled? How can information be delivered in timely ways? What are the patterns and routines that people engage in? Ultimately, how can technologies support timely work and do things in a timely way?
5. **Ordering:** How can cooperative activities be done in order? What role can technology play in ensuring that one thing is done after another, rather than simultaneously, or not at all? Conversely in what ways does technology impose order inappropriately?
6. **Interaction:** What role does technology play in the ways people interact, and how does human interaction take place through and around technology? How do people talk as they work, and what do they talk about? How does communication technology play a role in wider forms of communication (for example how and when do people talk about emails they have sent, or chose to use IRC rather than email?)
7. **Leadership and management:** How can technologies be used to appropriately monitor and manage cooperative work? How can leaders (as opposed to managers) make better use of technology?

8. **Power and Politics:** How do technologies affect the distribution of power within workplaces? How can technologies be used to empower people, improve social settings, and so on?

The above is not an exhaustive list, but sketches out some frequent interests.

Technology 'in the wild'

CSCW researchers often find a great deal of interest in the settings in which technologies are used. CSCW research is often done in 'the wild' because the complexities of the settings in which work is done and the agendas and concerns they need to satisfy can be difficult to predict and simulate in controlled settings. Key points for doing this include:

- **Descriptions of work often differ to actual work:** People often describe their work in normative and rational ways, whereas the realities can be somewhat different. In particular many of the details of exactly how a technology is used may not be seen as interesting or remarkable by the user but can be of profound interest to the researcher.
- **Multiple technologies are often in use:** Most cooperative practices take place across a variety of technologies (e.g. programmers cooperate across code, versioning systems, plans, email, talk, IRC and so on). Often, any new technology has to be seen in the context of others.
- **Extra artefacts or technologies are often in place:** The users of technology often configure other technologies around them. So all-in-one software solutions may in reality be supported by the use of spreadsheets or other software. Complex technologies may be supported by the use of cheat-sheets, and so on.
- **Technologies are used in unintended ways:** Technologies may not always be used in the ways they were designed. A classic example is that people may write in the margins of paper forms. If these uses are not understood when developing new technology (and either supported, or the underlying causes eliminated) then problems will arise.
- **The layout of a setting can have effects on interaction:** The context in which a technology is used will affect its use. In co-present settings people may do things like ask for help rather than read documentation. If a computer is situated too far from where an action takes place (e.g. away

from a bed in a hospital) then this can affect the ways record keeping is done. And so on.

Again, the above is a flavour rather than an exhaustive list. Because CSCW is focused upon practice, because people routinely make use of multiple technologies as a part of their practices, and because other aspects of the setting in which that practice takes place, CSCW researchers are often interested in what can be described as 'systems ecologies'. Ecology is a useful metaphor because it refers to the interdependencies of elements of an environment without necessarily implying stability or harmony. In particular it implies that introducing something new will potentially have wide-ranging effects that are difficult (or perhaps impossible) to predict, and so important to monitor.

Retrospective

CSCW provides a melting pot for ideas from several disciplines interested in technology and human practices. This has provided a context in which methods and perspectives relevant to engineering socio-technical systems have thrived. However the corollary of this has been something of a lack of a clear focus and an importing of longstanding disputes from other disciplines.

Moreover, it can often seem that little progress is made in CSCW. The problems that CSCW grapple with are tameable but not resolvable; there will be no once-and-for-all solution to the problems of cooperative work. As technologies move on, many of the issues prove to be the same, with the same insights confirmed for new settings. The focus in CSCW on the human practices, rather than on producing novel technology, often also means that it provides a commentary on new technology rather than provides an arena for its invention. This is not necessarily a bad thing, as the management and deployment of technology is often more of a challenge than its production. Many organisations understand that the real costs of software are not in its shelf price but in its long-term use.