Info 203 - Shaohan Chen, Sandra Helsley, Lisa Jervis, Colin MacArthur, A.J. Renold.

Ackerman, M.S.: The Intellectual Challenge of CSCW: The Gap Between Social Requirements and Technical Feasibility

Type: Summative evaluation combined with argumentative essay
Topic: The field of CSCW and its ~~discontents~~ most important work to do
Problem Space: Defining a problem space that is addressed by CSCW and computer science as the *social-technical gap* - "the great divide between what we know we must support socially and what we can support technically."

1. INTRODUCTION - Lisa

1. The base findings in the field of CSCW are that human activity is flexible, nuanced, and contextual, and that computational entities to support human activity should be so as well.
2. However, we do not know how to build systems like that.
    a. Systems by nature are rigid and brittle.
    b. This brittleness and rigidity, when combined with human activities, produces the social-technical gap, which is "the great divide between what we know we must support socially and what we can support technically."
3. HCI/CSCW researchers have made great progress in exploring this gap in the last decade.
    a. CMC elements have been built into systems to attempt to bridge the gap, but by the nature of the gap they have only been partially successful.
    b. This article argues that continuing the study of the socio-technical gap, with the purpose of bridging it more successfully, "is the central challenge of CSCW as a field."
4. Here is an outline of the rest of the article.
    a. It will provide an overview of existing CSCW research.
    b. It will then argue for the existence and importance of the socio-technical gap.
    c. It will then discuss potential resolutions and research directions for same.

2. A BIASED SUMMARY OF CSCW FINDINGS - A.J.

"An overview of CSCW, briefly reviewing the major social and technical findings of the field, while not complete, summarizing what researchers tend to assume.

1. Social activity is fluid and nuanced, people's emphases on which details to consider or to act on differ according to the situation, systems often have considerable difficulty handling this detail and flexibility.
    a. One finding of CSCW is that it is sometimes easier and better to augment technical mechanisms with social mechanisms to control, regulate, or encourage behavior
2. An active area of CSCW research is in finding ways to manage the problems and

trade-offs resulting from conflict and coordination

      a. Boundary objects (Star, 1989) are information artifacts that span two or more groups; each group will attach different understandings and meanings to the information.

3. Exceptions are normal in work processes, CSCW tried to deal with exceptions and fluidity in approaching workflow and process engineering
4. People prefer to know who else is present in a shared space , and they use this awareness to guide their work (Erickson et al., 1999).
5. Visibility of communication exchanges and of information enables learning and greater efficiencies (Hutchins, 1995b).

      a. A very active area of CSCW is trying to determine ways to manage the trade-offs in sharing.

6. The norms for using a CSCW system are often actively negotiated among users supported by a back channel communication tool.
7. Adoption of CSCW systems is often more difficult than for single-user systems because CSCW systems often require initial buy-in from groups of people, rather than individuals, as well as continued buy-in. (critical mass problem)
8. People not only adapt to their systems, they adapt their systems to their needs (coevolution; Orlikowski, 1992a; O'Day, 1996), often in ways unanticipated by the designer.
9. Incentives are critical. A classic finding in CSCW, for example, is that managers and workers may not share incentive or reward structures; systems will be less used than desired if this is true (Grudin, 1989).

      a. Many CSCW researchers try to use available data to reduce the cost of sharing and collaborative work.

10. "technically working" and "organizationally workable" systems is a trade-off made in any given implementation, CSCW as a field is notable for its attention and concern to managing this tension.

3. THE SOCIAL–TECHNICAL GAP IN ACTION - Shaohan

    3.1. Technical Research in CSCW

- ○ Early collaborative systems were awkward
- ○ Social nuance and flexibility were slowly added to all CSCW systems
- ○ Through the decade, all CSCW systems became more sophisticated, as technical researchers better understood the social requirements.

- ○ Suggested one argument against the significance of the social-technical gap that the gap resulted merely from ignorance of habit by software designers and researchers
- ○ CSCW software researchers and designers are indeed aware of the need for nuance, flexibility, and contextualization.

    3.2. Arguments Against the Significance of the Gap

- It could be that CSCW researchers merely have mnot found the proper key to solve this social-technical gap, and that such solution, using existing technologies, will shortly exist.
    - Time to consider what to do about it
    - We should consider the gap as enduring until proven otherwise, since the solution may or may not arrive.
- The significance of the gap is historically-based
    - We should adapt ourselves to the technology or that we will coevolve with the technology
    - Software engineering processes are software and by extension, software engineers should function according to rule.
    - Technological trajectories are responsive to:
        1. social direction (Heilbroner)
        2. intellectual direction (Ackerman)

4. WHAT TO DO?
    4.1. A Return to Simon: The Science of CSCW - Sandra
- Simon's *The Sciences of the Artificial* (1969/1981) argues for a path between the idea for a new science
    - This science would distinguish between the synthesis of the artificial and the analysis of the natural
    - But his call to create a science of design has gone unheeded.
- Problems with Simon's ideas
    - Naivete about complexities of such a science arose from at least two sources
        - 1: Simon "confused the task of identifying fundamental intellectual issues in his sciences of the artificial with specific technical ideas ans implementations."
        - 2: Simon did not confront long-term, systemic incapability as an intellectual possibility.
    - His book does not address the inevitable gaps between the desired outcome and the means of producing that outcome for any large-scale design process.
- Simon ignores the social-technical gap, but CSCW is the closest we can get to his ideal new science
    - CSCW is an engineering discipline attempting to construct suitable systems for groups, organizations, and other collectivities
    - CSCW is a social science attempting to understand the basis for that construction in the social world (or everyday experience)
    - CSCW's science must centralize the necessary gap between what we prefer to construct and what we can construct

    4.2. Palliatives: Ideological, Political, and Educational - Sandra
- Centralizing the social-technical gap leads to the logical coherence of these ideological,

political, and educational initiatives.
- ○ Ideological initiatives include those that prioritize the needs of the people using the systems
  - ■ Two methods address the inability to solve the social-technical gap by bringing forth a solution that is open and known to all important parties
    - ● 1: Takeholder analysis brings in the voices of all stakeholder parties
    - ● 2: Participatory design is similar to stakeholder analysis, employing important stakeholder parties in the design
  - ■ Educational perspectives would argue that programmers and users should understand the fundamental nature of the social requirements.
    - ● Software engineers could be suitably trained to understand organizational/social impacts resulting from their designs.
    - ● Computer science education can teach students what can and cannot be done.
- ○ Palliatives by themselves do not create a science or lead to intellectual coherence in a research area.

4.3. Beginning Systematic Exploration: First-Order Approximations - Colin
- ● To begin our exploration of the social technical gap, we should investigate first-order approximations, or good ways to work around the socio-technical gap.
- ● There are already several first-order approximations for the socio-technical gap: systems that only partially address social requirements, CMC components, and systems that avoid the gap altogether.

4.4. Toward Making CSCW Into a Science of the Artificial - Colin
- ● We need to develop systematic methods for designing around the gap.
- ● To begin doing so, we should answer a key set of guiding questions:
  - ● What can computational system successfully ignore?
  - ● When can a computational system augment human activity with technologies that make up for the loss of context?
  - ● How can we systematically consider when a system is adding benefits instead of creating loss?
  - ● What types of future research will solve some gaps?

5. CONCLUSION - Lisa
1. [not a sentence!] A brief recap of the argument for the socio-technical gap as CSCW's primary intellectual problem.
2. CSCW as a sub-discipline of HCI is uniquely positioned to address the gap because it exists where technology and social settings meet and interact.
   a. This enables CSCW to update and encompass Simon's concept of a science of

the artificial
3. Understanding the socio-technical gap is the reason for CSCW's existence
    a. If CSCW doesn't motivate itself with a fundamental understanding of how humans live and work, the field of computer science will produce unusable systems that distort rather than support collaboration and other social activity