

The Intellectual Challenge of CSCW - A Summary

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Human activity is highly flexible and contextual and likewise , the computational entities supporting these human activities should be equally flexible and contextualised. However , there exists a fundamental gap between what we know we must support socially and what we can support technically. Understanding and bridging this gap is one of the central challenges of CSCW and HCI.

The author also talks about refocusing CSCW as a Simonian science (strictly based on empiricist grounds). I have not read Simon yet and do not have any comment on the same.

Summary of CSCW Findings :

This section summarises important CSCW findings/observations until early 2000s.

- **Limited Rational Actor Model / Bounded Rationality** : When individuals make decisions, they are bounded by the tractability of the problem , their cognitive capabilities and time constraints. In such situations, they act as satisficers seeking a satisfactory solution rather than the most optimal solution. For more detail - https://en.wikipedia.org/wiki/Bounded_rationality
- **Fluidity of Social Activity** : Social activity is fluid and nuanced. The emphasis on which details to consider/ignore/act on differs according to the context. Technical systems should be equipped to handle this flexibility.
- **Groups may not have shared goals, knowledge and histories** : Sometimes , conflict could be as beneficial as cooperation in settling issues. Meanings will have to be negotiated between different subgroups if there is no shared meaning. Boundary objects are shared artifacts across two or many subgroups and each group attaches its own meaning to this artifact. Boundary objects lets groups coordinate while at the same time obfuscating the internal workings. Resolving conflicts among groups is an active research area in CSCW.

- **Normality of Exceptions** : Exceptions are very normal and dealing with exceptions is the core part of most jobs. Roles are very loosely defined across contexts and situations and these give rise to exceptions.
- **Awareness in Shared Spaces** : The knowledge of who else is present in a shared space guides people to do their work effectively. Shared spaces should provide awareness of who else is present and a peripheral awareness/monitoring of everyone else's activities.
- **Transparency in Exchanges** : Transparency in communication and information exchanges increases efficiency and promotes learning. However, the notion of being monitored can make people alter their behaviour. Managing this tradeoff is an active area of research.
- **Dynamic Nature of Usage** : The norms of use are actively negotiated among users all the time. A backchannel should allow people to actively negotiate the terms and norms of usage.
- **Critical Mass and Meltdown Problems** : CSCW applications require a 'critical mass' of users to take off and add value. A 'meltdown' in quality is encountered when the number of users fall below a certain threshold. Effective usage of a CSCW application requires a continued buy in from a group of users.
- **Co Evolution** : People adapt the systems to their needs as much as they adapt to the system's needs. Sometimes , a system will be put to use in ways not envisioned by the creator of the system.
- **Criticality of Incentives** : A lack of shared rewards for different sets of users leads to a less than desirable usage of the system. The incremental cost of collaboration must be supplemented by an organisational reward structure.

All CSCW applications do not satisfy all of the above requirements. A tradeoff is made between technically workable and socially/organisationally workable.

Socio Technical gap in action :

Privacy Preferences Project (P3P) of the WWW is used as a case study. P3P is an attempt to create a privacy standard for the web.

The goal of P3P was to enable users to exercise their privacy preferences in sites they visit. P3P enabled site sends a machine readable proposal to the user. The user's browser parses the proposal and compares it with the preferences set by the users and automatically sends the data if an agreement is reached / warns the user about objectionable practices. This prevents the reader from having to read the terms and conditions of every site they visit. This automatic transfer of data wasn't initially implemented and the initial implementations carried out a different approach - the browser maintains a repository of data the user has agreed to share and the list of services they have agreed to share certain data with.

This presents a significant usability challenge. The user has to deal with a two dimensional information space - recipients (potential recipients + possibility of interaction among them) and data (defined by the user). This is a very laborious process and presents the user with potentially unlimited combinations to choose from. However , users deal with the same issue seamlessly in an offline social setting.

One approach would be to let users create categories of people who have similar data collection needs. In the offline world , we do this often and we also move users from one category to another seamlessly. However, that will be a limitation in this case. This level of explicit categorisation required from users is undesirable.

To summarise ,

- Systems do not allow the nuance people expect and they almost always provide them with limited options.
- Systems are not very flexible when it comes to switching states. This, in contrast, is done seamlessly in the offline world.
- Systems do not allow for ambiguity. In the real world , most of the time , the roles are not explicitly defined and there is bound to be some overlap. However , systems limit us by requiring explicit definitions of roles and states.

This paper was written in 2000 and the author states that with the progression of time , the undesirability of requiring explicitness was understood and taken care of in the new CSCW applications.

Questions regarding the significance of the gap :

- There is the ill-founded argument that this gap results from the ignorance of software designers and engineers. This is certainly not true. This gap is very well recognised and every major tech company invests heavily on UX designers to build products that mimic our social protocols.
- The second argument is that we will eventually build new technology to solve this gap. Proponents of this view argue that with better user modelling and AI , we will eventually bridge this argument. We cannot dismiss this argument as we've seen in the 20 years since this paper was written that AI systems have developed and understand our preferences in a much better way. It is entirely possible that we will reach a level of sophistication to completely eliminate this gap.
- The third argument is that if this gap is indeed insurmountable , we will learn to live with it and evolve our social practices to adapt. This is a very pessimistic view though.

WHAT TO DO

Reframing CSCW as a Science of the Artificial :

The basic premise of Simon's Sciences of the Artificial is that engineering and design are fundamentally different from sciences. Science is about the analysis of the natural and engineering is about the synthesis of the artificial. He argues that new sciences are possible for understanding the nature of this synthesis. The author of this paper argues that CSCW is inherently a science of the artificial. CSCW is an engineering discipline attempting to construct systems for groups while also being the social science attempting to understand the basis for that construction.

Palliatives :

Palliative - a medical drug that reduces pain without treating the cause of the pain.

The author argues for centralising this gap in the discipline to create a sense of coherence.

Ideological Initiatives : prioritise the needs of the people using the system. stakeholder analysis , participatory design.

Educational Initiatives : argues for educating programmers to understand the basic requirements of a social system.

First Order Approximations :

First Order Approximation - a tractable solution to a problem with known tradeoffs.

1. Partially satisfy social requirements extremely well. E.g. Email does not satisfy all social requirements discussed. The task is to identify which requirements to satisfy.
2. Provide communication channels to let people make effective social adjustments.
3. Create technical architectures that do not invoke the socio technical gap in the first place. They should not require or delegate action.

Final Steps :

To determine guiding research principles for the field. This requires a lot of trial and error , studies and answering questions like the ones below -

- When can a computational system successfully ignore the need for nuance and context?
- When can a computational system augment human activity with computer technologies suitably to make up for the loss in nuance and context, as argued in the approximation section earlier?
- Can these benefits be systematized so that we know when we are adding benefit rather than creating loss?
- What types of future research will solve some of the gaps between technical capabilities and what people expect in their full range of social and collaborative activities?

Conclusion / Reader's Thoughts :

This paper identifies that there is a fundamental socio technical gap between what CSCW applications can support technically and what they need to support socially. The author goes on to argue that this gap is not present merely due to the ignorance of designers and developers. The author then goes on to list some of the social findings the field has uncovered and explains why satisfying some of the social requirements extremely well is a good solution. There has been a significant development in the field since this paper was written.

The author then talks about how this gap can be used to make CSCW a science of the artificial. He ends the paper by stating that CSCW will be a science if we can find

fundamental guiding principles for the field itself. I believe scientific papers come in two flavours - papers that ask questions central to the field and papers that explore a fringe very deeply. This falls in the first category and does a brilliant job.