Collaboration

CS 347
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Announcements

Next target: Project Fair 2 is Friday of dead week

Final presentation here during our finals slot, March 18 @ 3:30pm

Final project paper due at the end of finals, March 20th @ 5pm
The genesis of social computing

CSCW originated in the late 1980s, and was the field that evolved into modern HCI research in social computing.

CSCW evolved from a focus on work into a focus on online social systems at about the same time as online social systems such as Wikipedia, Facebook, and Twitter were gaining prominence.

Many of the core theories and orientations of modern social computing in HCI derive from CSCW research.
CSCW: Computer-supported cooperative work

The traditional definition...

Computer-supported: technology is mediating the conversation

Cooperative: typically teams or groups of coordinating people

Work: tasks, as opposed to play or socializing
Johansen matrix

[Johansen 1998]
Distance matters

[Olson and Olson, HCI Journal ’00]

“If, as it is said to be not unlikely in the near future, the principle of sight is applied to the telephone as well as that of sound, earth will be in truth a paradise, and distance will lose its enchantment by being abolished altogether.”
– Arthur Mee, 1898

But...colocated software engineering teams outperform the company average by 2:1.
The big idea behind this paper: why is distance collaboration so much worse?

This paper is the face that launched a thousand ships in CSCW—analogous to *The Computer for the 21st Century* in interaction—cited as motivation for nearly every study of remote collaboration.

The Olsons’s identified failures:

**Common ground:** knowledge that people have in common and know they have in common

**Coupling:** how complex the work interdependencies are
Why does distance matter?
Media richness theory

[Daft and Lengel 1986]

Collaboration media offer reduced cues relative to in-person interaction

- Videochat: can’t see the environment or whole body language
- Text chat: can’t see facial expressions or gesture, and can’t hear intonation

**Richness** is ability of the channel to transfer and recreate the signals that the person is sending: e.g., cues, feedback

Claim of MRT: richer media are more effective for collaboration and working through challenging issues
Out of sight, out of sync

[Hinds and Bailey 2003]

Evidence suggests that remote teams experience more conflict. Why?

Remote teams are generally less homogeneous than in-person teams, and lack shared context (e.g., norms)

Distance reduces familiarity and friendship and offsets temporal rhythms, leading to both affective conflict and process conflict

Technology leads to uneven information, negative relational effects, and coordination difficulties, all of which lead to affective conflict
Why do CSCW applications fail? [Grudin, CSCW ’94]

Many costly collaboration systems at work—project wikis, calendars not reflective of actual availability, uneven usage of messaging software—never quite get adopted. Why? [1 min]

Disparity between who does the work and who gets the benefit

Project wikis — manager benefits, employees contribute

Failure to reach critical mass

Tragedy of the commons: it's rarely in a single user's best interest to use a new CSCW system
Recall: the intellectual challenge of social computing CSCW

[Ackerman, HCI Journal 2000]

CSCW has made clear what the social requirements should be; why aren’t we done?

“The social-technical gap is the divide between what we know we must support socially and what we can support technically.”

The social sciences teach us mechanisms that are important for effective social interaction. But we lack designs that facilitate those mechanisms.

Intuitively: we know how to throw parties IRL, but generally not how to engage those same mechanisms online.
Then, what can we do about it?
Social translucence

[Erickson and Kellogg TOCHI ’00]

Give people enough information to let natural social cues take over
Socially translucent systems embody this approach

**Awareness:** others’ activity can be seen

**Accountability:** others know that their activity can be seen

Example: stairwell door with a small window in it

Why not **socially transparent** systems?

“Michael Bernstein looked at your Facebook profile for four hours yesterday!”
Beyond being there

[Hollan and Stornetta, CHI ’92]

Computer-mediated communication aims to be indistinguishable from being there

e.g., “Could Skype be like sitting in your room?”

Argument: being there is impossible (or at least unlikely). Instead, we should design for going beyond being there

e.g., “How could Skype bring you closer to someone in ways that an in-person conversation never could?”
Awareness in shared workspaces  

Awareness is understanding the activities of others

- Explicit awareness: code checkins, email broadcasts
- Permissions awareness: roles

This paper introduced shared feedback: automatically collect and broadcast implicit events to all participants (e.g., IM status, GDocs)
Portholes
[Dourish and Bly, CHI '92]

...yes, group video chat was invented in 1992.

Their vision: always-on video for **awareness**
A fun mix of topics in this course

- Design and creation: programming toolkits
- Social computing: CSCW

Groupware programming abstractions: how should we be enabling more interfaces to support Google Docs-style interaction?

- RPC broadcast between application instances and data sharing

Groupware UI widgets: logged-in participants, remote mouse pointers
Clearboard
[Ishii and Kobayashi, CHI ’92]
Collocated eye gaze and canvas
Pick-and-drop
[Rekimoto, UIST '97]
The original AirDrop idea
Share files between...
  My phone and yours
  My phone and the projector
Modern CSCW research
1. Groups interacting with technologies

1990

- Harris et al. 2019

- Foundation of CSCW, 1984
- McCarthy, 1992
- Ellis & Weinert's 1994
- McDonald & Akerkam, 2000
- Badley et al., 2004
- Naithi & Harris, 2006
- Cumming & Kiesler, 2008
- Ketterer et al., 2013

2. Enabling online groups and communities

1995

- Badrulhanum et al., 2011
- Baudisch et al., 2008
- Randell et al., 2008
- Montani, 2013
- Yatsuguchi et al., 2012
- Fakhuli et al., 2012
- Teeter, 2013
- Larson et al., 2014
- Miller et al., 2014

2000

- Plötscher & Thum, 2008
- Plötscher & Thum, 2008
- Recruitment and group formation
- rockabuy, 2008
- rockabuy, 2008
- rockabuy, 2008
- rockabuy, 2008
- rockabuy, 2008
- rockabuy, 2008
- rockabuy, 2008
- rockabuy, 2008
- rockabuy, 2008
- rockabuy, 2008

3. Enabling crowds

2005

- Kaduk et al., 2012
- Diversity and team composition
- Ting, 2011
- Diversity and team composition
- Hames et al., 2016
- Diversity and team composition

2010

- Bazzan et al., 2016
- Hames et al., 2016

2015

- Bazzan et al., 2016
- Group formation and collaboration
- Bazzan et al., 2016
- Group formation and collaboration

2018

- Bazzan et al., 2016
- Group formation and collaboration
- Bazzan et al., 2016
- Group formation and collaboration

4. The renaissance of small groups

- Harris et al. 2019

- Foundation of CSCW, 1984
- McCarthy, 1992
- Ellis & Weinert's 1994
- McDonald & Akerkam, 2000
- Badley et al., 2004
- Naithi & Harris, 2006
- Cumming & Kiesler, 2008
- Ketterer et al., 2013

[Harris et al. 2019]
What is the best way for teams to organize themselves?

[Zhou, Valentine and Bernstein 2018]

Should teams be flat or hierarchical? Encouraging or critical? Enforcing equal turn-taking?

Unfortunately, organizational behavior research has demonstrated that there exist no universal answers to these questions. They are contingent on the people and the task.
Hi everyone!

Hi!

INSTRUCTIONS

SUBMISSION
goal-robot

END OF ROUND

<feedback to DreamTeam system>

dreamteam-robot

This round change the following...

Be super cheery! Make sure to write encouraging comments to all your teammates, despite any losses!
Hierarchy
None, Centralized, Decentralized

Interaction Patterns
Emergent, Round-robin, Equally distributed

Norms of Engagement
None, Professional, Informal

Decision-Making Norms
None, Divergent, Convergent, Informed, Rapid

Feedback Norms
None, Encouraging, Critical

<feedback>
In Search of the Dream Team

[Zhou, Valentine and Bernstein 2018]

**Human decision making**: risk-averse under-exploration

**Algorithmic decision making**: an algorithm called a multi-armed bandit explores alternatives to find the best strategy. However, teams are overwhelmed by the velocity of change.

**Temporally-constrained bandit**: redistributing the posterior probabilities of arm selection via Thompson sampling, encouraging exploration without overwhelming.

The resulting teams outperform managers, collective decision making, and traditional multi-armed bandits by 40%.
Network rotation

[Salehi and Bernstein 2018]

Groups frequently fail to envision shared outcomes to act on together. Unfortunately, simply sharing ideas with each other will exert limited influence.

Could we intermix people instead of ideas?
Network rotation

[Salehi and Bernstein 2018]

Stochastic search algorithm to identify rotations that balance tie strength (stable teams) against network efficiency (bridging structural holes)
Discussion

Find today’s discussion room at http://hci.st/room