CSCW: Computer-Supported Cooperative Work

- It's about tools that allow people to work together.

- Most of the tools support remote work
  * video, email, IM, Workflow

- Some tools, e.g. Livenotes, augment local communication.
Asynchronous Groupware

- Email: still a killer app
- Newsgroups: topical messaging
- Structured messaging: e.g. Workflow - messages carry data, route automatically.
- Cooperative hypertext/hypermedia authoring: e.g. swiki
- Knowledge repositories: Answergarden, MadSciNet, Autonomy
Workflow

Documents carry meta-data that describes their flow through the organization:

- Document X should be completed by Jill by 4/15
- Doc X should then be reviewed by Amit by 4/22
- Doc X should then be approved by Ziwei by 4/29
- Doc X should finally be received by Don by 5/4

The document “knows” its route. With the aid of the system, it will send reminders to its users, and then forward automatically at the time limit.
Knowledge repositories

1. AnswerGarden (Ackerman): database of commonly-asked questions that grows automatically.

2. User poses question as a text query:
   * System responds with matches from the database.
   * If user isn’t satisfied, system attempts to route query to an expert on the topic.
   * Expert receives query, answers it, adds answer to the database.
Wither Email?

There is a lot of research on “Email++”
- Automatic organization
- Task management
- Other functions: contacts, reminders

Multimedia email: Can include sound, video, images.
- But who really does this?
- May be important for developing economies.
Extensible Groupware: Lotus Notes

- Notes is a product that combines standard office software (email, calendar, contacts etc.) with a scriptable database backend.

- Easy to create new apps: PERT charts, novel workflow, custom shared authoring...

- “most successful groupware system to date”
Synchronous Groupware

- Desktop Conferencing (MS Netmeeting)
- Electronic Meeting Rooms (Access Grid)
- Media Spaces (Xerox PARC)
- Instant Messaging
Video

- Eye contact problems:
  * Offset from camera to screen
  * “Mona Lisa” effect

- Gesture has similar problems: trying pointing at something across a video link.
Sound

- Good for one-on-one communication
- Bad for meetings. Spatial localization is normally lost. Add to network delays and meeting regulation is very hard.
Turn-taking, back-channeling

1 In a face-to-face meeting, people do a lot of self-management.

1 Preparing to speak: lean forward, clear throat, shuffle paper.

1 Unfortunately, these are subtle gestures which don’t pass well through today’s technology.

1 Network delays make things much worse.
Breakdowns

- Misunderstandings, talking over each other, losing the thread of the meeting.
- People are good at recognizing these and recovering from them “repair”.
- Mediated communication often makes it harder.
- E.g. email often escalates simple misunderstandings into flaming sessions.
Usage issues

Our model of tele-communication is episodic, and derives from the economics of the telephone.

Communication in the real world has both structured and unplanned episodes. Meeting by the Xerox machine.

Also, much face-to-face communication is really side-by-side, with some artifact as the focus.
Solutions

• Sharing experiences is very important for mutual understanding in team work (attribution theory).

• So context-based displays (portholes) work well.

• Video shows rooms and hallways, not just people or seats.
Solutions

Props (mobile presences) address many of these issues. They even support exploration.
Solutions

Ishii’s Clearboard: sketching + presence
Solutions – Outpost (Berkeley)

- Post-it capture system for web site design.
- For collaboration, add pen traces and user shadows (to add awareness).
Outpost Implementation
Break
Face-to-Face: the ultimate?

- It depends.

- **Conveys the maximum amount of information, mere presence effects are strong. But...**

- People spend a lot of cognitive effort managing perceptions of each other.

- In a simple comparison of F2F, phone and email, most subjects felt *most* comfortable with the *phone* for routine communication.
Face-to-Face: the ultimate?

- Kiesler and Sproull findings:
  * Participants talk more freely in email (than F2F).
  * Participation is more equal in email.
  * More proposals for action via email.
  * Reduced effects of status/physical appearance.

- But
  * Longer decision times in email.
  * More extreme remarks and flaming in email.
Face-to-Face: the ultimate?

Kiesler and Sproull found that email-only programming teams were more productive than email+F2F teams in a CS course.

There you want coordination, commitment, recording.

Conclusion: Match the medium to the mission.
1. Disparity between those who benefit from the App, and those who have to work on it.  
   e.g. secretary uses calendars to schedule meeting, but others must maintain calendars.

2. Critical mass, Prisoner’s Dilemma
   Need full buy-in to automate scheduling, similarly with Lotus Notes.
3. Disruption of social processes:
   * people are flexible, adaptive, opportunistic, *improvisors*, sometimes imprecise.

4. Exception Handling:
   * People react to interruptions or exceptions and dynamically re-plan what to do. Most software doesn’t plan, so exception-handling must be anticipated and pre-programmed.
Grudin: Eight challenges

5. Unobtrusive accessibility:
   * Group features should complement individual work functions, and be easily accessible

6. Difficulty of evaluation:
   * Collaborators add uncertainty! Hard to isolate the parameters you want to study. WOZ can help.
7. Failure of intuition:
   * Group processes (and social psychology) are often counter-intuitive. This leads to mistakes both by adopters and designers.

8. The adoption process:
   * Very hard to get people to voluntarily change their habits. Incentives are often needed. Otherwise follows a (slow) adoption curve.
Beyond communication

- How can computers assist cooperative work beyond communication?

- Can they “understand” conversation?

- Speech-act based systems like the Coordinator attempted to do so.

- General understanding is too hard. But business communication is mostly about propose-accept-acknowledge sequences.
The Coordinator was a system that tried to track these speech acts. Users had to specify the type of each utterance (email message).

The experiment failed, it was too constraining.

But it was reborn as Workflow.
CSCL: Computer-Supported Collaborative Learning

- Sub-area of CSCW concerned with learning and collaboration.

- Peer interaction is a powerful source of learning, especially in universities.

- Three powerful models:
  * TVI, DTVI: recorded instructor, team review
  * Peer instruction: pauses for group discussion
  * PBL: Problem-based learning, team problem-solving
Summary

- Asynchronous groupware: email, newsgroups, workflow, swiki, knowledge repositories.
- Synchronous groupware: desktop, conference room, media spaces.
- Issues with videoconferencing.
- Alternative systems for remote presence.
- Face-to-face vs. email
- Grudin’s 8 challenges for CSCW
- Beyond communication: smart groupware
- CSCL