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
- Cooperative hypertext/hypermedia authoring: e.g. Wikis, Blogs
- Structured messaging: e.g. Workflow - messages route automatically.
- Knowledge repositories: Answergarden, MadSciNet, Wiki-pedia

Blogs and Wikis
- Hybrids between mail/news and web sites.
- Posting capabilities make the site dynamic.
- Web presence makes it accessible+searchable
- Usually create a hierarchy among the user group (posting, commenting, reading).

Content-Management Systems
- CMSes (like Plone) go a step further.
- They include fancier publishing options (templates) and site navigation widgets.
- They also include more groupware features, scheduling, news, comments, etc.

Language/Action Analysis
- Early studies of CSCW noticed that human dialogue at work was “transactional”:
- It comprised a few categories of “speech acts”, like ask, propose, accept, acknowledge...
- i.e. user action and form of dialogue were closely coupled.
Language/Action Analysis

- Systems were built to support specific acts and to follow and help the work.
- BUT: they were too restrictive.
- E.g. the Coordinator forced users to identify the speech act they were using to the system.
- Finally a compromise was found: Workflow.

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.

Workflow

- There are many Workflow systems available. Lotus notes was one of the earliest.
- Workflow support now exists in most enterprise software systems, like Peoplesoft, Oracle, SAP etc.

Knowledge repositories

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

Social & Knowledge Networks

- Some systems explicitly model personal connections between individuals.
- Users can search for an employee with the right expertise, and a common contact who can mediate.
- E.g. Ryze

Trends

- There is a trend toward “do everything” systems like Autonomy:
  * Automatic expertise profiling
  * Social networks (communities of practice)
  * Document clustering and categorizing
  * Search and browse
  * Automatic cross-referencing & hyperlinking
  * i.e. no boundary between “content management” and “people management”
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?
  - Photos, style sheets, sound and image emoticons.

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

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

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

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

- 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 – Outpost (Berkeley)

- Post-it capture system for web site design.
- For collaboration, add pen traces and user shadows (to add awareness).
Solutions - Multiview (here)

- Uses directional screen technology + projectors to provide each viewer with a unique, and spatially-correct view.

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.

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.

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

Grudin: Eight challenges for CSCW

1. Disparity between those who benefit from the App, and those who have to work on it.
- e.g. secretary uses calendars to schedule meetings, but others must maintain calendars.

2. Critical mass, Prisoner's Dilemma
- Need full buy-in to automate scheduling, similarly with Lotus Notes.
Grudin: Eight challenges

3. Disruption of social processes:
   * People are flexible, adaptive, opportunistic, improvisors, sometimes imprecise. Many CSCW systems are not.

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.

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.

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