Computer-Supported Cooperative Work (CSCW)

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Agenda

- Issues & Concepts
- Groupware
- Social issues
- Evaluation

CSCW

- Computer Supported Cooperative Work
  - Study of how people work together as a group and how technology affects this
  - Support the social processes of work, often among geographically separated people

*Mark Guzdial provided input on this presentation

Paradigm Shift

- Before: System was a tool that was applied to work
- After: Multitasking paradigm shift
  - The "system" became the medium, the moderator, rather than "just" a tool

Examples

- Scientists collaborating on a technical issue
- Authors editing a document together
- Programmers debugging a system concurrently
- Workers collaborating over a shared video conferencing application
- Buyers and sellers meeting on eBay

Research Focus

- Often divided into two main areas
  - Systems - Groupware
    - Designing software to facilitate collaboration
  - Social component
    - Study of human and group dynamics in such situations

Groupware

- Software *specifically* designed
  - To support group working
  - With cooperative requirements in mind
- NOT just tools for communication
- Groupware can be classified by
  - *Then* and *where* the participants are working
  - The *function* it performs for cooperative work
- Specific and difficult problems with groupware implementation

Classifying Groupware

- Time/Space matrix
  - When and where the participants are working
- People-Artifact Framework
  - The function it performs for cooperative work

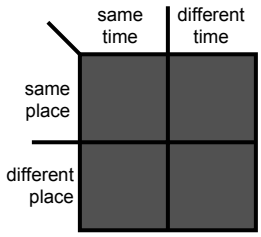
The Time/Space Matrix

Classify groupware by:

when the participants are working, at the same *time* or not

where the participants are working, at the same *place* or not

Common names for axes:
time:
synchronous/asynchronous
place:
co-located/remote



Applied to "Traditional" Technology

	same time	different time
same place	face-to-face conversation	post-it note
different place	phone call	letter

Applied to Computer Technology

Place \ Time	Synchronous	Asynchronous
Co-located	Face-to-face E-meeting room	Post-it note Argument. tool
Remote	Phone call Video window,wall	Letter Email

A More-fleshed Out Taxonomy

	Same Time	Different Time
Same Place	*Face to face interactions* • conference tables with embedded computers • public displays • dedicated tools for e.g., voting and brainstorming	*Ongoing tasks* • team rooms • group displays • shift work groupware • project management
Different Places	*Distributed real time interactions* • chat systems • transparent sharing of single user applications • collaboration-aware groupware • video conferencing • media spaces	*Communication and coordination* • unstructured or semi-structured electronic mail • electronic bulletin boards • asynchronous conferencing • list servers • workflow systems • schedulers • collaborative hypertext

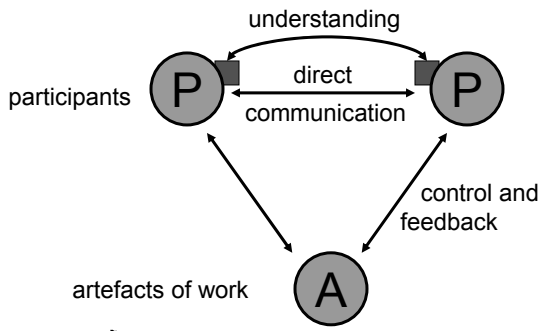
Table 1. A typical space/time matrix (after Baecker, Grudin Buxton and Greenberg 1995 p.742)

Styles of Systems

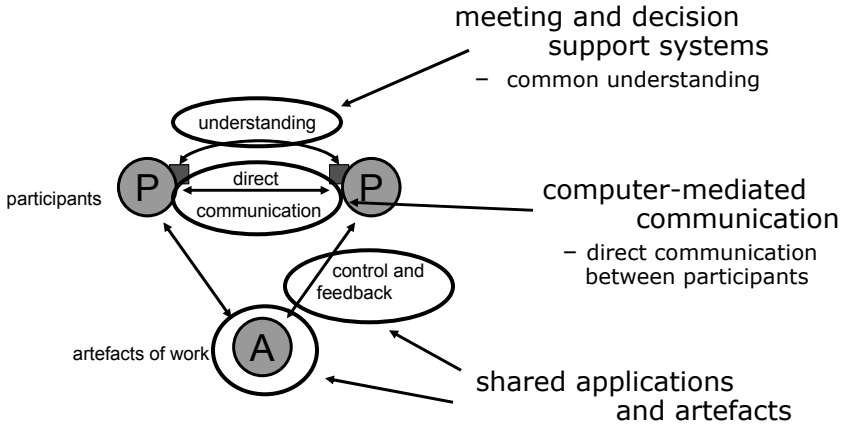
- 1. Computer-mediated communication aids
- 2. Meeting and decision support systems
- 3. Shared applications and tools

Classification by Function

- Cooperative work involves:
  - **Participants** who are working
  - **Artefacts** upon which they work



What interactions does a tool support?



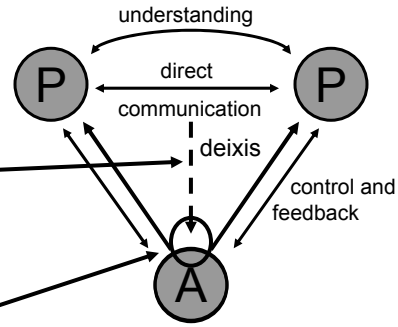
meeting and decision support systems
- common understanding

computer-mediated communication
- direct communication between participants

shared applications and artefacts
- control and feedback with shared work objects

Communication via an artifact

- Deixis
  - reference to work objects
- Feedthrough
  - communication through the artefact

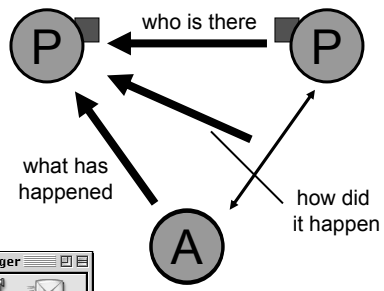


Many aspects of communication

- Good groupware – open to all aspects of cooperation
  - e.g., annotations in co-authoring systems
  - embedding direct communication
- Bar codes / RF ID
  - Form of deixis
  - Aids diffuse large scale cooperation

Awareness

- What is happening?
- Who is there
  e.g. IM buddy list
- What has happened
  … and why?

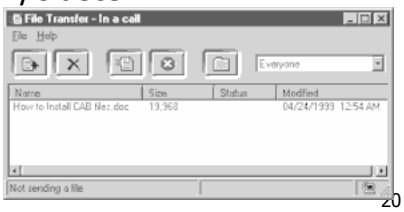


1. Computer-mediated Communication Aids

- Examples
  - Email, Chats, MUDs, virtual worlds, desktop videoconferencing
  - Example: CUSee-Me, iChat, Skype

2. Meeting and Decision Support Systems

- Examples
  - Corporate decision-support conference room
    - Provides ways of rationalizing decisions, voting, presenting cases, etc.
    - Concurrency control is important
  - Shared computer classroom/cluster
    - Group discussion/design aid tools



3. Shared Applications and Tools

- Examples
  - Shared editors, design tools, etc.
    - Want to avoid "locking" and allow multiple people to concurrently work on document
    - Requires some form of contention resolution
    - How do you show what others are doing?

Example

- Teamrooms - Univ. of Calgary, Saul Greenberg

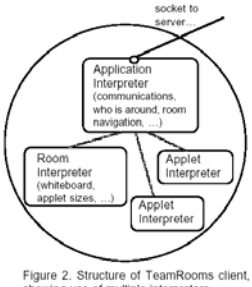
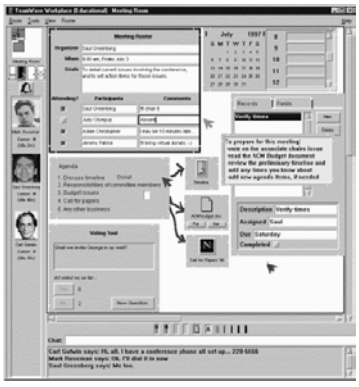


Figure 2. Structure of TeamRooms client, showing use of multiple interpreters.



Video, CHI '97

http://www.cpsc.ucalgary.ca/grouplab/projects/index.html

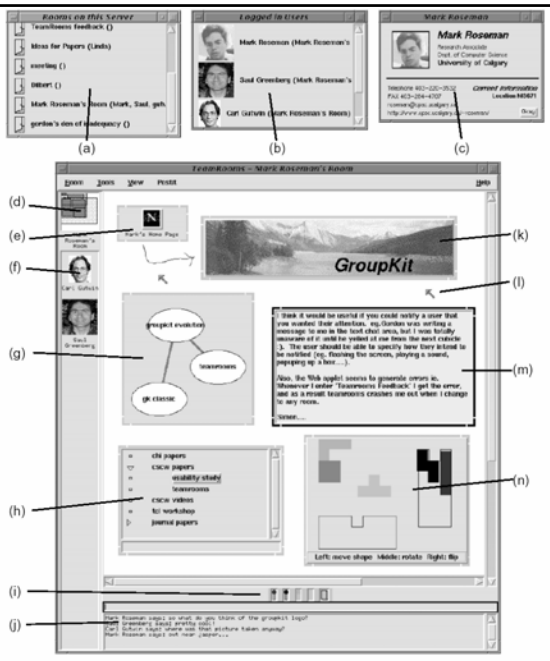
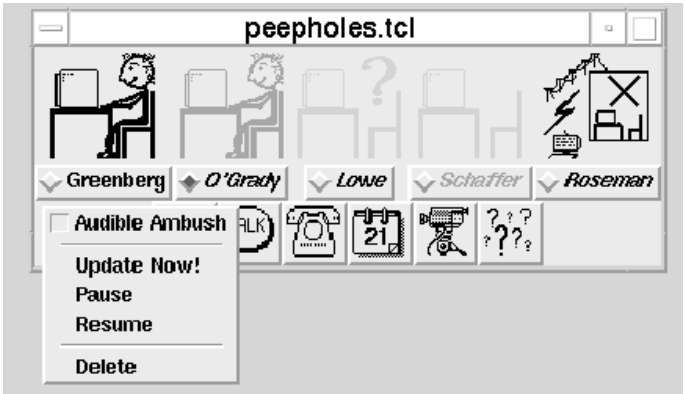


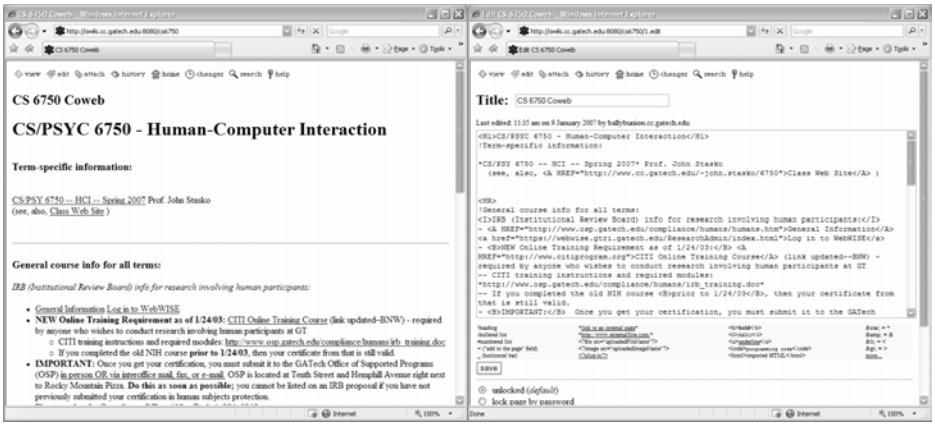
Figure 1. TeamRooms user interface, showing (a) available rooms; (b) connected users; (c) business card; (d) radar overview of room; (e) URL reference applet; (f) users in room; (g) concept map applet; (h) outliner applet; (i) whiteboard pens; (j) text chat area; (k) image applet; (l) telepointer; (m) postit applet; (n) tetrominoes applet.

Example

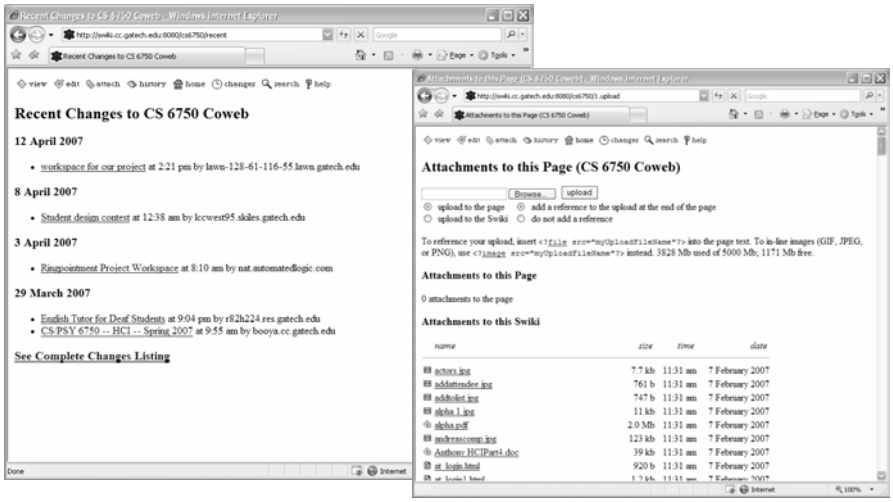
- Peepholes (same lab at Calgary)
  - Contact facilitation system that lets you know who is around on the Internet by illustrating their presence through iconic indicators



Using the CoWeb



Features to support collaboration:
Recent Changes and Attachments

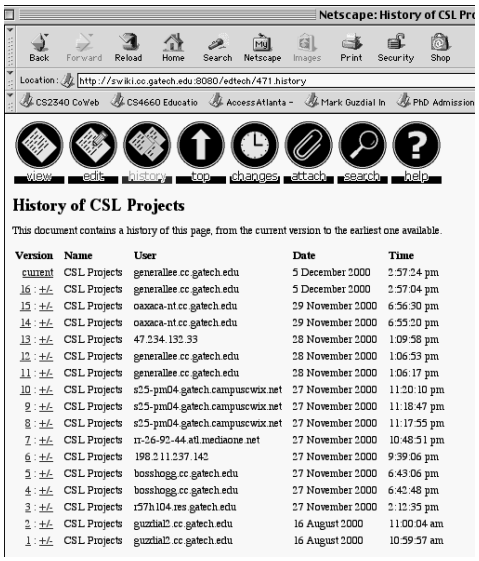


Handling contention in CoWeb

- No locking
  - On the Web, how do you know if someone walks away?
- But if person A edits, then person B starts and saves edit before A saves, how do you deal with it?
  - Old way: A "wins," but B's is available in history for retrieval
  - Current way:
    - Each edit time is recorded
    - If incoming edit time is earlier than last save, then note collision. Provide user with both versions for resolution.

Security

- Save everything,
- But it's mostly social pressure that keeps it working
- Problems (finally) reared ugly head after a while
  - Passwords



Social Issues

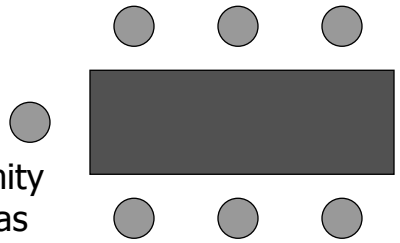
- People bring in different perspectives and views to a collaboration environment
- Goal of CSCW systems is often to establish some common ground and to facilitate understanding and interaction

Turn Taking

- There are many subtle social conventions about turn taking in an interaction
  - Personal space, closeness
  - Eye contact
  - Gestures
  - Body language
  - Conversation cues

Geography, Position

- In group dynamics, the physical layout of individuals matters a lot
  - "Power positions"



- "Proxemics" – Proximity and body alignment as social cues
  - Video: "Stitching" CSCW '04

What about in online collaborations?

Case Study: WikiPedia

Case Study: WikiPedia

- Consider the tools available
- Who are the users?
- "Community" ?
- How does all this affect the content?

- What to do about it?
- Broader issues of trust, anonymity, validity, responsibility, authority…

Evaluation

- Evaluating the usability and utility of CSCW tools is quite challenging
  - Need more participants
  - Logistically difficult
  - Apples - oranges

- Often use field studies and ethnographic evaluations to assist
  - Video: ESPACE (CSCW'04)
  - Video: Dynamo (CSCW'04)

Evaluation Efforts at Calgary

- Uses modified heuristic evaluation techniques
  - www.cpsc.ucalgary.ca/grouplab/papers/2001/01-HeurisiticsMechanics.EHCI/talk/EHCI_2.html
- Heuristics (reformulated):
  - Support intentional & appropriate communication
    - Verbal communication (content)
    - Gestural communication (deixis)
  - Support communication of individual's embodiment (attitude)
  - Support sharing of artifacts
  - Provide protection of shared resources
  - Switch between loosely and tightly coupled coordination
  - Support establishment of contact

Video: VideoArms (CSCW'04)

Video: Jazz (CSCW'04)

Video: LiveContacts (CSCW'04)

Interested in More…?

- CS 7460: CSCW
  - Readings, discussion, research-oriented
  - '08-'09
- CS 6470: Online Communities
  - Students study an existing community in depth, and then develop a new community design
  - '08-'09
- CS 7467: - Computer-Supported Collaborative Learning
  - CSCW-like concepts and ideas but in learning and education context
  - '07-'08

Upcoming

- Ubiquitous Computing
- Project presentations 1
- Project presentations 2 / Final exam