Emerging Paradigm: Computer-Supported Cooperative Work

Wendy Schafer

November 3 & 4, 2003

Collaborative Systems

• Computer-Supported Cooperative Work (CSCW)
• Includes multiple areas:
  – Groupware
  – Computer-mediated communication (CMC)
  – Workflow management systems
  – Knowledge management
  – Videoconferencing and virtual meetings
  – Meeting support
  – Online communities
  – Community networks
What is CSCW?

- Computer
  - Technology aspects: hardware and software
- Supported
  - How technology supports collaboration
- Cooperative
  - Collaboration work flow
- Work
  - What people are trying to do

Brainstorm: Project Groups

- Computer
  - Technology aspects: hardware and software
  - Examples: PCs, cell phones, Palm pilots, email, web pages, instant messaging, shared workspace?
- Supported
  - How technology supports collaboration
  - Examples: synchronous voice and text, messages, file transfers, restricted memory?, shared calendar?
- Cooperative
  - Collaboration work flow
  - Examples: sequential dependency, parallel activity, independent and merging stage
- Work
  - What people are trying to do
  - Examples: divide up project, review others ideas, bring everything together, check grade sheet
### Time-Space Matrix

<table>
<thead>
<tr>
<th></th>
<th>Same Place</th>
<th>Different Place</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Same Time</strong></td>
<td>Face-to-face interaction</td>
<td>Synchronous, distributed interaction</td>
</tr>
<tr>
<td><strong>Different Times</strong></td>
<td>Asynchronous interaction</td>
<td>Asynchronous, distributed interaction</td>
</tr>
</tbody>
</table>

### Time-Space Matrix

<table>
<thead>
<tr>
<th></th>
<th>Same Place</th>
<th>Different Place</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Same Time</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Different Times</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CSCW Social Challenges

“Groupware and Social Dynamics Eight Challenges for Developers”
by Jonathan Grudin

• Work vs. benefit
  – People who use a system are not necessarily the
    people who benefit from it
  – Ex: Auditory comments on a document
    • Person leaving comments has an easy job
    • Listening to a recording is time-consuming, more
difficult navigate, hard to know precise edits

• Critical mass
  – Need high usage to make a system useful
  – Ex: Contributing to a discussion forum

CSCW Social Challenges (2)

• Disruption of social processes
  – Systems can violate social and political norms
  – Ex: Automatic supervisor notification,
    Requiring a formal indication of priority

• Exception handling
  – Many work processes do not work the way
    their supposed to
  – Ex: People take shortcuts, different groups take
different approaches
CSCW Social Challenges (3)

- Unobtrusive accessibility
  - Need to support individual and group work
  - Can we add collaboration features to existing systems rather than create another system?
  - Ex: Track changes feature in Word
- Difficult to evaluate
  - Drastically different than observing one person working alone in one location
  - Multiple people involved over time at different sites and a variety of group personalities
  - Want the collaboration process and the product to be successful as well as satisfy the people involved

CSCW Social Challenges (4)

- Poorly-formed intuitions
  - Our intuitions often do not lead to good design decisions, unlike single-user apps
  - Need to balance issues with many stakeholders, group dynamics, work over time, etc.
- Technology adoption
  - System needs to be adopted by everyone involved, not just a single user
  - Group needs must be align with system
Awareness

• In collaboration, people need to know:
  – What each person is working on
  – What has been completed by who
  – Future plans of each person

• Coordination activities or articulation work involve:
  – Dividing work and sharing plans
  – Scheduling meetings
  – Following up on missed information
  – Anything not directly related to the goal

Face-to-Face Awareness Information

• Nonverbal communication
  – Body posture
  – Hand or arm gestures
  – Head and shoulder movements (e.g. nodding, shrugging shoulders, …)
  – Facial expressions
  – Eye gaze
Spatial Collaboration Example

- Spatial collaboration - activity with focus on a large, physical spatial entity
- Example:
  - Multiple people in different locations
  - Each navigates the same map interface
  - Collaboratively marking locations on the map

Workspace Awareness

“A Descriptive Framework of Workspace Awareness for Real-Time Groupware”
by Carl Gutwin and Saul Greenberg

- Who
  - Is anyone in the workspace?
  - Who is participating?
  - Who is doing that?
- What
  - What are they doing?
  - What goal is that action part of?
  - What object are they working on?
- Where
  - Where is each person working?
  - Where are they looking at?
  - Where can they see?
  - Where can they reach?
Radar Views for Awareness

- Displays miniature of entire space
- Indicates each user’s window
- Reveals differences in windows
- Answers many awareness questions
- Useful and usable

Activity Awareness Research

- Activity Awareness: focuses on the higher-level meaning behind group tasks
  - roles and expectations of the team members
  - planning and goals along with their dependencies
  - overall project status
- Small group collaboration between classrooms on long term projects
- 6th and 8th grade science classes at Auburn Middle School in Riner, VA
- People:
  - Dr. D. Scott McCrickard
  - Dennis Neale
  - Craig Ganoe
  - Jacob Somervell
Brainstorming

- Stakeholders?
- Setting?
- Activities?

Desktop Interface

- User list
- Persistent chat
- Workspace
  - Where documents open
- Timeline
  - Navigation for documents
  - Windows document history overlaid with calendar
Large Screen Interface

- Shows overall work for all groups
- Announcement's area at top
- Mostly hands-off use

Multiple Devices in Meetings Research

- Craig Ganoe’s PhD research
- Environment
  - Face-to-face collaboration, small group, meeting room
  - Large screen display and multiple wireless PDAs
- Task
  - Organization of a large number of facts, ideas, etc.
  - Each idea fits on a Post-It note
  - Ideas need to be arranged in a hierarchy diagram
Multiple Device Issues

- How do we distribute control functions and display output between the devices?
- How do we design a multiple-device application that works both individually and collectively?
- How can these technologies be coordinated to avoid confusing users?
- How do we avoid the problem of users just looking at their own screen and not collaborating?

Two Approaches Under Investigation

- Mixed Condition
  - use interactions that require both the PDA and the large display
  - diagram only on large screen
  - selected notes on the diagram will have controls on the PDA
    - edit text on PDA
- Redundant Condition
  - equivalent synchronous applications on both the PDA and the large screen
  - diagram on both
  - all interactions can be performed entirely on either device
  - additional zooming and navigation on PDA
Take a way message …

• Collaboration software is not easy to design
  – Multiple people working together
  – Possibly different locations
  – Work occurs over time
  – Awareness issues
  – Social issues
  – Multiple device issues