**Fame or Shame?**

**Fame**
- Interface maps to physical world
- Allows for a high degree of flexibility, but hides this complexity
- Provide good user feedback with "Identify Monitors" function

**Outline**
- Review of Mobile UI Design
- Definitions of CSCW & group work
- Implementation issues
- Success/Failures
- Media

**Mobile UI Design Review**
- Many Design Choices
  - Think different from GUI/Web
  - Swiss army vs. dedicated
  - Pen/speech modalities
  - Integrate with other tasks
  - Social apps
- Always in your pocket & networked
- Context is very different from desktop
Collaboration

• Current work environments
  – several people working on personal computers
• Frequently people need to cooperate
  – create/modify documents, drawings, designs
• Two key ways
  – at different times (asynchronously)
    • see changes previous workers have made
  – simultaneously (synchronously)
    • actions taken by user must be seen immediately

Computer-Supported Cooperative Work (CSCW)

• Def.: “the study of how people work together using computer technology”
• Examples of systems
  – email
  – shared databases
  – web sites (social, shared)
  – video conferencing
  – chat systems
  – real-time shared applications
    • collaborative writing, drawing, games

Groupware

• Groupware denotes the technology that people use to work together
  – “systems that support groups of people engaged in a common task (or goal) and that provide an interface to a shared environment.”
• CSCW studies the use groupware
  – “CSCW is the study of the tools and techniques of groupware as well as their psychological, social, and organizational effects.”

Background

• CSCW grew from discontent with single user HCI methods applied to multi-user technologies and settings
• Focus on
  – Workplace activity
  – Understanding nature of collaborative tasks
  – Co-evolution of technologies and communities
• Early apps
  – CAD, computer integrated manufacturing, computer aided software engineering, office automation
CSCW focuses on people working with others.

What is CSCW?
- Work is a social activity
  - People and their activities are integral to design of technology
- Workers may have social proximity despite physical/temporal distance
  - The water cooler effect

Types of Cooperation
- Focused partnerships
  - Users who need each other to complete a task
  - Often a document or image to work on
  - E.g., joint authors of a paper
- Lecture or demo
  - Person shares info. with users at remote sites
  - Questions may be asked
  - May wish to keep history and be able to replay

Types of Cooperation (cont.)
- Conference
  - Group participation distributed in space
  - At the same time or spread out over time
- Structured work process
  - A set of people with distinct roles solve task
  - E.g., hiring committee accepts applications, reviews, invites top for interviews, chooses, informs
  - Aka "work flow" or "task flow"

Types of Cooperation (cont.)
- Meeting and decision support
  - Meeting with each user working at a computer
  - E.g., PDA Brainstorming tool
- Tele-democracy
  - Online town hall meetings

Dimensions of Cooperation

What are examples of applications in these areas?
Dimensions of Cooperation

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same Time</td>
<td>Face to Face conversation, Telephone</td>
</tr>
<tr>
<td>Different Time</td>
<td>Post-it note, Letter</td>
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</tbody>
</table>

Location

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<th>Different</th>
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<tr>
<td>Same</td>
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</tr>
<tr>
<td>Face to Face conversation</td>
<td>IM, Games</td>
</tr>
<tr>
<td>Face to Face, Telephone</td>
<td>ATC</td>
</tr>
<tr>
<td>Different</td>
<td>Augmentation tools</td>
</tr>
<tr>
<td>“Where were you?”</td>
<td>Email, Electronic conferences</td>
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<tr>
<td>Project Scheduling</td>
<td>Blogs/Netnews</td>
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<tr>
<td>In/Out Board</td>
<td>Co-authoring systems</td>
</tr>
<tr>
<td>Email</td>
<td>Shared calendars</td>
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</tbody>
</table>

Where would google docs fit?

Related Fields to CSCW

• Behavioral Science
  – Social psychology
  – Organizational science
  – Anthropology
  – Sociology
• Computer Science
  – Distributed computing
  – Networking
  – User interface/visualization
  – Mobile & wireless
• Telecommunications
  – Telephony
  – Video

Face to Face Communication

• Personal Space
• Eye contact and gaze
  – Can convey interest, confusion, boredom
• Gestures and body language
• Back channels, confirmation, interruption
  – Back channels = nods, shrugs, small noises
• Turn Taking
  – Ums, ahs, pauses
• What happens when these channels are unavailable?

Face to Face vs CMI

Face to Face

Communication
Coordination

Information

Computer mediated interaction

Communication
Coordination

Information

Beyond Being There

• What are some advantages of computer mediated collaboration over face to face?
Questions

- When is a text better than a phone call?
- What is the difference between IM and Email?

Activity Spectrum

- Awareness
- Shared Experience
- Social Activities
- Informal Interactions
- Locating Colleagues
- Office Sharing
- Meetings
- Focused work tasks
- Highly interactive activity

The Awareness Orb

Organizational Issues

- Who benefits?
- Free rider problem
- Critical mass
- Changing power structures

Organizational Issues

- Reciprocity / Symmetry
  - If you do work for a system, you should get some benefit
- Fitting in with organizational structure and values
- Flexibility
- Cost
  - Setup
  - Maintenance

Granularity

- Large
- Chunk size
- Network system with locking
- Shared editor
- Small
- Frequent
- Update
- Infrequent
Email

- Where does it fit?
  
<table>
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- Why is it successful? Where has it failed?

Videoconferencing

- Where does it fit?
  
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- Why is it successful? Where has it failed?

Videoconferencing

- What are the difficulties?
- How has it failed?
- How has it succeeded?
- How could it be improved?
  - Clearboard/Teamworkstation (Ishii et al)
  - VideoWhiteboard (Tang et al)

ClearBoard

MultiView
CSE 441, Winter 2009
Advanced HCI
Professor Landay

Pebbles / Remote Commander

DiamondTouch

CSCW Topics

- Social Tagging
- Concurrent Editing
- Displays
- Social Networks
- Privacy
- Wikis

Key Issues

- Group awareness
- Multi-user interfaces
  - hard to design/conduct controlled experiments
- Concurrency control
  - consistency and reconciliation
- Communication & coordination
  - can’t see each other -> lose visual cues
  - floor control

Key Issues (cont.)

- Latency
  - e.g., user points at an object and talk
- Security and privacy
- more...
Asynchronous Implementation Issues

• Each user may have own copy of data
• Must integrate changes at some point
  – example: programmers working on source
• Problems when conflicts between changes
  – lock portions of work
  • keeps state well defined, although doesn’t stop semantically incompatible changes
  – resolve conflicts via integration mechanism

Synchronous Implementation Issues

• >= Two users working on same data, at the same time, in cooperation
• Extend Model View Controller (MVC)
  – views & copies of the model are distributed
• Propagate command history
  – must resolve conflicts among N histories
  – at what level are commands?
    • mouse position not good enough (e.g., different font sizes, etc.)

Social Issues

• Can these technologies replace human-human interaction?
  – can you send a “handshake” or a “hug”
  – how does intimacy survive?
• Are too many social cues lost?
  – facial expressions and body language for enthusiasm, disinterest, anger
  – will new cues develop? e.g., :)

Groupware Successes

• Email
  – ubiquitous (your grandparents have it?)
• Newsgroups and mailing lists
• Videoconferencing
  – growing slowly but steadily

Groupware Successes (cont.)

• Lotus Notes
  – integrates email, newsgroups, call tracking, status, DB searching, document sharing, & scheduling
  – very successful in corporations
  – will the Web erode? Notes is more structured

Groupware Failures

• Shared calendars
  – making a come back? web-based?
• Why does groupware fail? (Grudin)
  – disparity between workers & beneficiaries
  – threats to existing power structures
  – insufficient critical mass (Web reduces)
  – violation of social taboos
  – rigidity that counters common practice or exceptions
Success/Failure of Groupware

- Depends on competing alternatives
  - collaborators down the hall or across country?
- If users are committed to system, etiquette & conventions will evolve
  - tend to arise from cultural & task background
  - users from different orgs or cultural contexts may clash
- Synchronous systems that work well for 2 users may be less effective w/ more users

Media

- Video: Rich, but problems with gaze, gesture, non-verbal communication.
- Audio: Conveys meaning well but not necessarily location
- Text: Good for synchronous or asynchronous communication
- Ink: Good for expressing ideas and brainstorming

Video

- Eye contact problems:
  - Offset from camera to screen
  - “Mona Lisa” effect
- Gesture has similar problems: trying pointing at something

Audio

- Good for one-on-one communication
- Bad for meetings. Spatial localization is normally lost. Can be put back but tricky.

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

- Communication in the real world has both structured & unplanned episodes – meeting by the Xerox machine
- Much face-to-face communication is really side-by-side, w/ some artifact as focus

Solutions

- Sharing experiences is very important for mutual understanding in team work
- Context-based displays (porholes) work well
- Video shows rooms & hallways, not just people or seats

Solutions

- Props (mobile presences) address most of these issues. They even support exploration.

Solutions

- Ishii’s Clearboard: sketching + presence

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 business contact

Face-to-Face: the ultimate?

- Kiesler and Sproull found 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
CSCL: Computer-Supported Collaborative Learning

- Sub-area of CSCW concerned with learning & 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

Livenotes

- Designed to include other learners perspectives into note-taking

Review

- CSCW vs. groupware
- Taxonomy based on space and time
- Key issues
  - awareness, multi-user UIs, concurrency, communication & coordination, latency
- Implementation and social issues
  - extend MVC
  - are social cues lost?
- Successes (email) & failures (scheduling)

Next Time

- Presentations
- Midterm next Tuesday
  - covers assignments, lectures, & readings