Motivation

I work by myself

The Computer Revolution

Computers became ubiquitous
Computers became inter-connected

Primary Sources


Result

- through their computers, people will be able to
  - communicate
  - work together

CSCW – An Introduction

Saul Greenberg - 1
Let those who wish to communicate any matter of pressing importance to each other by fire-signals prepare two earthenware pots of exactly equal size both as to diameter and depth. Let the depth be 3 cubits, the diameter one...

**Definitions / Research Goals**

**Groupware**
- software that supports group work
- investigate algorithms & architectures fundamental to multi-user systems

**Computer Supported Cooperative Work (CSCW)**
- knowledge about the context of groupware design
- investigate individual/group/organizational requirements for multi-user systems

**CSCW**
- is about groups of users – how to design systems to support their work as a group and how to understand the effect of technology on their work patterns.

Dix, Finlay, Abowd & Beale
Human-Computer Interaction, 2nd Ed. Prentice Hall. 1998

- is the study of the electronic workplace – an organization-wide system that integrates information processing and communication activities.

Ellis, Gibbs & Rain

**The Time/Space Groupware Matrix**

<table>
<thead>
<tr>
<th>Same Time</th>
<th>Different Times</th>
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<tbody>
<tr>
<td>Synchronous</td>
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**Group Decision Rooms**

Embeds decision making process
- dedicated computer-based conference facility
- real-time large group support (5-50)
- typically facilitated
- embeds a structured meeting process
- domain of MIS

**Typical Function**
- explore unstructured problems
- brainstorm ideas
- organize/prioritize results
- voting...
- good for brainstorming, but...

**Single Display Groupware**

Multiple people using a single display
- multiple input devices
- simultaneous input
- new interaction widgets
- technical issues (O/S)
- conflict with conventional applications
- supporting social conventions of simultaneous work
- mice vs. direct touch...

**Shared Table / Wall Displays**

- device characteristics
- social affordances of tables/wall

**Roomware**

Computer-augmented room elements
- integrated desk/wall displays for collaboration
- Inter-operation between devices

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Saul Greenberg

The Time/Space Groupware Matrix

Group Decision Rooms

Single Display Groupware

Shared Table / Wall Displays

Roomware
**Video / Audio conferencing**

Desktop conferencing
- bandwidth/latency issues
- what is the value of talking heads?

**Instant messengers**

Casual interaction
- awareness to light-weight conversations

Killer app
- evolving social norms
- defining communities

**Rich Instant Messaging**

Can do much more than text
- How does one handle complexity?
- How does one handle interruption?

**Chat rooms/MUDS/Virtual worlds**

Space for meeting and interacting with people
- from text to 3d spaces
- can move between 'rooms' and/or around space
- seeing/manipulating artifacts
- self-representation (avatars)
- community of strangers
- shared purpose...

**Shared Screens/Windows**

Share unaltered single user applications
- technical concerns
  - how regions are captured/transmitted
  - architectural limitations
  - controlling input
  - access control...
- social limitations
  - turntaking
  - control
  - privacy

**Multi-user editors**

True groupware for visual artifacts
- structured documents (e.g., text paper)
- visual workspace (2d graphics)
- awareness
- conflicting actions
- tight vs loose coupling
- relaxed w/siws
### The Time/Space Groupware Matrix

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<td>Bulletin boards, blogs, asynchronous conferencing, group calendars, workflow, version control, wiki</td>
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### Email

**Many styles**
- vanilla email
- threaded mail
- intelligent mail (routing / sorting)
- structured mail (by speech acts)
- multimedia mail
- object-oriented mail
- distribution lists / elist servers

**Social**
- managing complexity and overloads
- spam
- archiving

### Email – Information Lens

**Structured email**
- messages as inherited object types

**Rules**

### Communal Messaging

**Many types**
- bulletin boards
- computer conferencing
- discussion groups
- blogs
- e.g., Usenet

### Group Calendars

**common calendar**
- meeting scheduling
- resource use
- privacy
- who keeps things up to date?
- how do you stop people scheduling your meetings?

### Workflow

**“Integration and harmonious adjustment of individual work efforts toward the accomplishment of a larger goal”** – B. Singh

**Codified procedures and processes**
- PeopleSoft
- forms management and routing
- coordination theory (speech acts)
- Notifications triggering user actions
- triggering automated actions
- standard operations
- exceptions management
**Wikis**

- Group-viewable / editable web site
- Community of strangers to community of collaborators
- Culture of what is allowed vs. hard-coded access control

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**Community Bulletin Boards**

- Post information from various sources to public place
- Who posts?
- How to personalize?
- Relevance?

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**Control Rooms**

- Information that goes across shifts

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**The Time/Space Groupware Matrix**

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**Connected meeting rooms**

- Meeting / classroom
- Video / audio links
Video Walls for Casual Interaction

Room to room IM?
- reciprocity
- engagement
- privacy


Notification Collage

Connects
- distributed groups
- public display

Anytime, any place groupware

Teamwave Workplace

Perspective: Synchronicity

Mixed
- may include active and serial activity

Serial
- forces turntaking

Unsynchronized
- people use tools at different times
Perspective: As Cooperative Work

- Understanding
- Direct communication
- Control and feedback
- Artifacts of work

Perspective: Information/time granularity

- Chunk size
- Large
- Small
- Frequent update
- Infrequent

Perspective: As Social Science

- How people socialize
  - In the everyday world
  - As they adapt computer technologies
  - As they normalize their behaviors over time

Different criteria for
- Single person working with future self (refl exive CSCW)
- Dyads – two people
- Families
- Small groups (3-15) – usually tightly focused
- Large groups (16-50) – organizational unit / sub community...
- Organizations (hundreds, thousands) – purpose, responsibility, structure
- Communities, societies – loose aggregates of people
- Strangers
- Different kinds of relationships
- Task vs. game vs. social focus...

Perspective: As technical issues

- Architectures
  - Centralized, replicated, mixed, federations, redundancy...

- Distributed system
  - Network delays & bandwidth, concurrency control, data storage, locking, ...

- Toolkits
  - Building blocks for groupware
  - Testing as a distributed system

- Operating systems
  - Single vs. multi-user models
  - Efficiency, robustness, scaling, ...

Perspective: Success or Failure

Major widespread success stories
- Email
- Instant messaging
- Wikis
- Blogs

Other systems have organizational / task successes
- Lotus notes
- Peoplesoft
- Reviewing system
- Version control system

But far more failures that successes!

Grudin: Why CSCW Applications Fail

Disparity between who does the work and who gets the benefit
- What does each participant have to do
- What benefits does each get from it
- Tradeoffs between individuals and between groups?

Email: Cc'ing
- Sender
  - Trivial work to include multiple recipients
  - Benefits: more exposure, more responses
  - Extreme case: spam
- Recipient
  - Nuisance to screen email
  - Need to read to see if its relevant
  - Extra work setting up spam filters
  - Lose trust in system
Breakdown of intuitive decision making
- Organizational decision makers see benefit for
  - people like themselves
  - The organization as a whole
- don’t see implications of extra work for others

Example: Peoplesoft financial system (and others like it)
- Decision makers
  - easier change of command for auditing finances
  - workflow defined by subordinate groups vs financial staff
  - Easier tracking / accountability
- Workers
  - must do work normally done by others
  - must learn a complex system that they will use infrequently
  - errors have direct impact on monies returned to them
  - knowledgeable people ‘out of the loop’

The difficulty of evaluating CSCW applications
- standard usability studies do not work
- task analysis difficult
- normative adaption
  - 1st 15 minutes of use of little relevance...
  - complex group dynamics
  - individual variability
  - critical mass
  - politics
  - context
  - field studies hard
  - iterative design may not be possible due to wholesale rejection

Example
- Community Bar
- Nectar: use it for helping a community of researchers and students
- how can we judge whether it will work?

Small groups / communities
- intimate collaborators

Behavioural foundations
- what do people do now?

Systems for day to day interaction
- casual interaction
- real time interaction over visual work surfaces

Why pursue collaboration through computers?
- consider massive change to society of:
  - printing press
  - telephone
  - facsimiles
  - electronic mail
  - world wide web