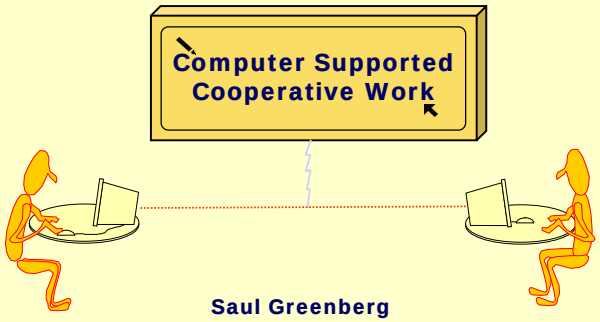

Saul Greenberg
Department of Computer Science

Primary Sources

- Dix, A., Finlay, J., Abowd, G., and Beale, R. **Chapter 13: Groupware** 463-508. in Human Computer Interaction, 2nd Edition. Prentice Hall. 1998
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Motivation

Motivation

The Computer Revolution

Computers became ubiquitous
Computers became inter-connected

The Computer Revolution

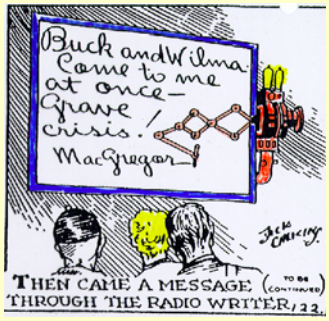
Computers became ubiquitous
Computers became inter-connected

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

Histories of Polybius in the year 2000 B.C.

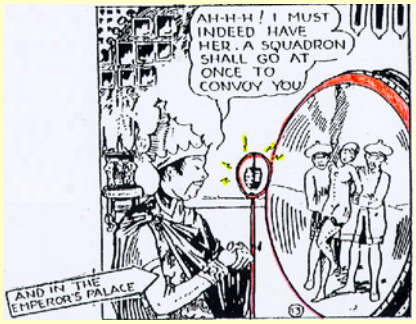
Let those who wish to communicate any matter of pressing importance to each other by fire-signals prepare two earthenware pots of exactly equal size both as to diameter and depth. Let the depth be 3 cubits, the diameter one…

Buck Rogers in the year 2429 A.D.



By Artist Philip Nowlan, circa 1930

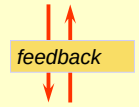
Buck Rogers in the year 2429 A.D.



By Artist Philip Nowlan, circa 1930

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

Definitions / Research Goals

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 & Rein
Groupware: some issues and experiences, Comm ACM 34(1) 1991

The Time/Space Groupware Matrix

	same time (synchronous)	different times (asynchronous)
same place (colocated)	face to face interactions	continuous task
different places (remote)	remote interactions	communication+coordination

The Time / Space Groupware Matrix

	same time (synchronous)	different times (asynchronous)
same place (colocated)	**face to face interactions** decision rooms single display groupware shared table / wall displays roomware…	continuous task
different places (remote)	remote interactions	communication+coordination

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…

The COLAB meeting room, Xerox PARC
http://www2.parc.com/istl/members/stefik/colab.htm

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…

Edward Tse
http://grouplab.cpsc.ucalgary.ca/papers/2004/04-SDGToolkit-MScThesis/SDGToolkit-MSc.pdf

Shared Table / Wall Displays

- device characteristics
- social affordances of tables/wall

InteracTable and Dynawall,
From the GMD Darmstadt web site on I-Land

Roomware

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

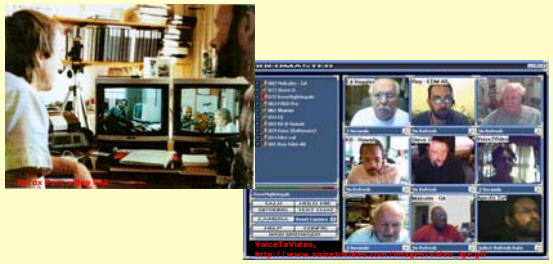
From the GMD Darmstadt web site on I-Land

The Time / Space Groupware Matrix

	same time (synchronous)	different times (asynchronous)
same place (colocated)	face to face interactions	continuous task
different places (remote)	**remote interactions** video conferencing instant messaging chats/muds/virtual worlds shared screens multi-user editors	communication+coordination

Video / Audio conferencing

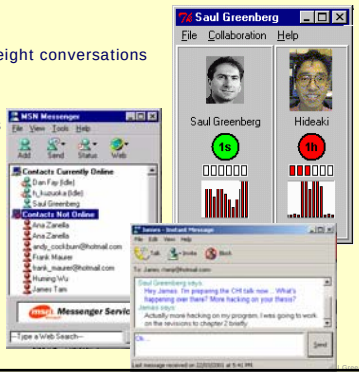
Desktop conferencing
- bandwidth/latency issues
- what is the value of talking heads?



Instant messengers

Casual interaction
- awareness to light-weight conversations

Killer app
- evolving social norms
- defining communities



Rich Instant Messaging

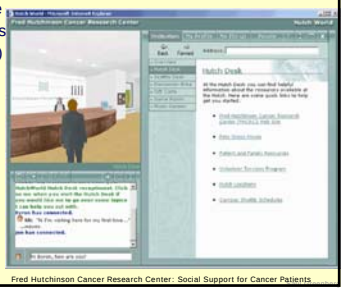
Can do much more than text
- How does one handle complexity?
- How does one handle interruption?

Community Bar, by Gregor Mcewan, U Calgary

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)

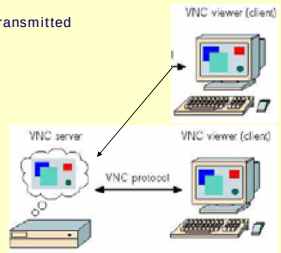
- community of strangers
- shared purpose...



Fred Hutchinson Cancer Research Center: Social Support for Cancer Patients

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

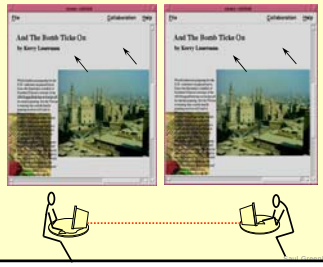


Richardson, T., Stafford-Fraser, Q., Wood, K. and Hopper, A.
Virtual Network Computing. IEEE Internet Computing. Vol. 2, No. 1. p33-39. January/February, 1998.

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 wysiwis



The Time/Space Groupware Matrix

	same time (synchronous)	different times (asynchronous)
same place (colocated)	face to face interactions	continuous task
different places (remote)	remote interactions	**communication+coordination** email bulletin boards, blogs asynchronous conferencing group calendars workflow version control wikis

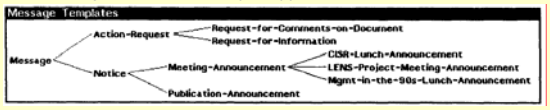
Email

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

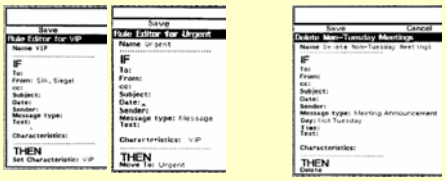
Social
- managing complexity and overloads
- spam
- archiving

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?

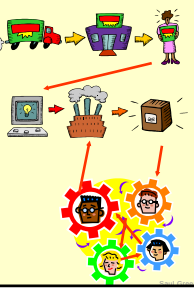
http://www.americusglobal.com/images/groupcalender.gif

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

The Time/Space Groupware Matrix

	same time (synchronous)	different times (asynchronous)
same place (colocated)	face to face interactions	continuous task team rooms large public displays shift work groupware project management
different places (remote)	remote interactions	communication+coordination

Community Bulletin Boards

Post information from various sources to public place

- who posts?
- how to personalize?
- relevance?

from Multimedia Fliers, Churchill, Nelson, Denoue, Communites and Technolgies 2003

Control Rooms

Information that goes across shifts

Reuters, http://www.electrosonic.com/command_and_control.shtm

NASA Mission Control Center http://spaceflight.nasa.gov/shuttle/reference/mcc/

The Time/Space Groupware Matrix

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Connected meeting rooms

Meeting / classroom
Video / audio links

Veterinary Report Vol 26, 1 Winter 2002 http://www.cvm.uiuc.edu/vetreport/winter2002/technology.html

Video Walls for Casual Interaction

Room to room IM?
- reciprocity
- engagement
- privacy

Figure 2. The VideoWindow teleconferencing system.

Fish, R., Kraut, R. and Chalfonte, B.
The VideoWindow System in Informal Communications. Proc. ACM CSCW'90. 1-11. 1990

The Time/Space Groupware Matrix

	same time (synchronous)	different times (asynchronous)
same place (colocated)	face to face interactions	continuous task
different places (remote)	remote interactions	communication+coordination

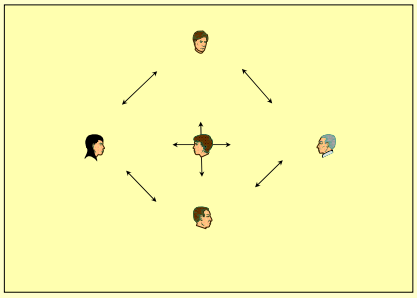
Notification Collage

Connects
- distributed groups
- public display

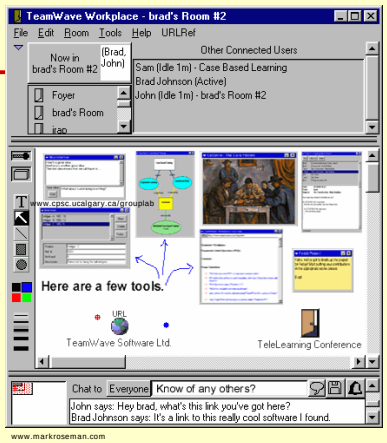
www.cpsc.ucalgary.ca/grouplab

Anytime, any place groupware

	same time	different times
same place		
different places		



Teamwave Workplace



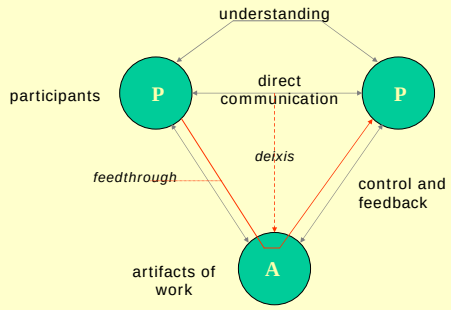
www.markroseman.com

Perspective : Synchronicity

	co-located	remote
concurrent synchronized *people intentionally active at the same time*	meeting rooms	video conferences, video wall, etc.
	shared work surfaces and editors, shared PCs and windows	
semi-synchronized *people active in near real time*	rapid email exchanges, delayed IM exchanges	
Mixed *may include active and serial activity*	co-authoring systems, shared calendars	
Serial *forces turntaking*	argumentation tools	
Unsynchronized people use tools at different times	email and structured messages, electronic conferences	

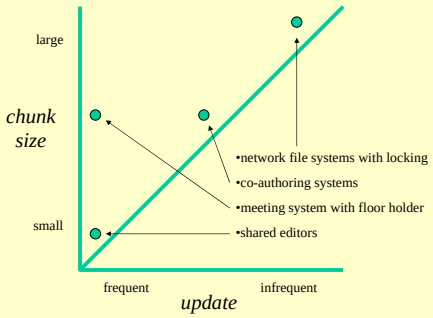
Modified from Figure 13.9 in Dix, Finlay, Abowd & Beale, Human Computer Interaction, 2nd Ed. Prentice Hall, 1998

Perspective : As Cooperative Work



recreated from Figure 13.12 in Dix, Finlay, Abowd & Beale, Human Computer Interaction, 2nd Ed. Prentice Hall. 1998

Perspective : Information / time granularity



Modified from Figure 13.8 in Dix, Finlay, Abowd & Beale, Human Computer Interaction, 2nd Ed. Prentice Hall. 1998

Perspective: As Social Science

How people socialize
- in the everyday world
- as they adapt computer technologies
- as they normalize their behaviours over time

Different criteria for
- single person working with future self (reflexive 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…

Parts of this slide influenced by Ron Baecker's 2005 CSCW Course Introduction

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, …

Modified from Figure 13.8 in Dix, Finlay, Abowd & Beale, Human Computer Interaction, 2nd Ed. Prentice Hall. 1998

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

Grudin: Why CSCW Applications Fail

Breakdown of intuitive decision making
- Organizational decision makers see benefit for
  - people like themselves
  - The organization as a whoe
- 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
- Worker
  - now 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'

Grudin: Why CSCW Applications Fail

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?

Perspective: This course

Small groups / communities
- intimate collaborators

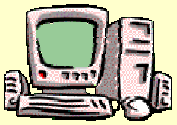
Behavioural foundations
- what do people do now?

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

Perspective: Society

Why pursue collaboration through computers?

- consider massive change to society of:
  - printing press
  - telephone
  - facsimiles
  - electronic mail
  - world wide web



16th C printing press from JR Greene: A short History of the English People. Univ Victoria Library.