Computer-Supported Cooperative Work

Michel Beaudouin-Lafon
Université Paris-Sud

Thanks to Nicolas Roussel, INRIA

Humans are social beings ...

Groups structure human activity

Professional life: teams, management chain,

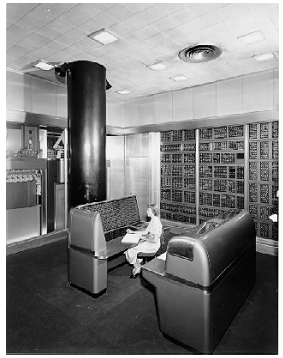
Private life: family, friends, sport teams, choir, etc.

Groups are more than the sum of their parts
- Division of labor
- Take advantage of different expertise
- Transfer of skills: learning

... but computers are (mostly) personal

Time-sharing systems create the illusion that each user has access to all the resources and do not support awareness of what other users are doing.

Example: file system



IBM SSEC, 1948

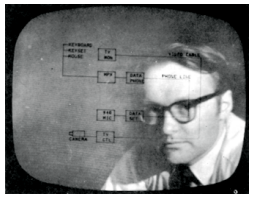
Don Norman

"Most work done on any complex entity is done by more than one person"

"Social impact of technology is hard to predict"

Augmenting the human intellect

1968 : Engelbart and his colleagues NLS/Augment, a system that supported file sharing, personal annotations, electronic messaging, videoconferencing, screen sharing, telepointers, etc.



Emergence of a field

Software that supports group work
- Groupware (Johnson-Lenz, 1982)
- Computer Supported Cooperative Work (Greif & Cashman, 1984)

In French:
- *Collecticiel*
- *Travail Coopératif Assisté par Ordinateur (TCAO)*

Conferences: CSCW (ACM) and ECSCW since 1986
Journal of CSCW

Social definition

CSCW should be conceived as an endeavor to understand the nature and characteristics of cooperative work with the objective of designing adequate computer-based technologies. [...]

The focus is to *understand,* so as to *better support,* cooperative work.

Bannon et Schmidt, 1989

Engineering definition

Computer-based systems
that support
groups of people
engaged in
a common task (or goal)
and that provide
an interface to a shared environment

Ellis, Gibbs & Rein, 1991

Software definition

Groupware is distinguished from normal software by the basic assumption it makes: groupware makes the user aware that he is part of a group, while most other software seeks to hide and protect users from each other.

Lynch, Snyder & Vogel, 1990

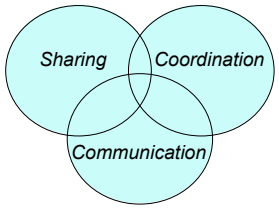
Challenges

What should groupware systems do?
How to design them?
How do they affect use?

A multidisciplinary endeavor: sociology, ethnography, anthropology, design, computer science, etc.

Problems are both technical and human
Solutions are both technical and human

Functional taxonomy



Communication
- exchanging information among participants

Sharing
- creating and computer artifacts and actions for editing them

Coordination
- organization of labor among participants

A sample of groupware systems

Some groupware systems

- e-mail, distribution lists
- discussion groups (EMISARI, 1976)
- chat, talk, IRC
- workflow systems
- group calendars
- shared editors
- audio-video communication systems
- argumentation tools
- roomware, collaborative buildings
- etc.

Information lens

Malone et al., 1987

To:
From: Thomas Malone
Cc: Anyone
Subject : LENS Meeting This Monday
Topic : Lens
Day: Monday
Meeting Date: Time: 3:00
Place: E53-301
Text:

Colab

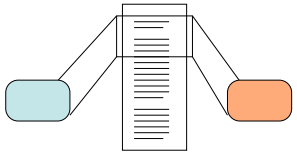
Stefik et al., 1987

Meetings of small group in a specially-equipped room

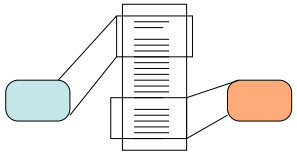
"Shared external memory"
- Boardnoter : hand drawing
- Cognoter : outlining ideas
- Argnoter : argumentation spreadsheet

View, space and time congruence
- What You See is What I See
- What You See Is Almost What I See

WYSIWIS / WYSIAWIS



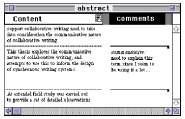
WYSIWIS
Strict view congruence



WYSIAWIS
Relaxed congruence

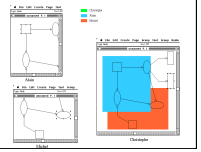
Shared editing

Text, asynchronous
- Quilt (Leland, Fish & Kraut, 1988)
- Prep (Neuwirth et al., 1989)



Text, synchronous
- Grove (Ellis, Gibbs & Rein, 1989)
- ShrEdit (McGuffin & Olson, 1992)
- SASSE (Baecker et al., 1993)

Graphics, synchronous
- GroupDesign (Karsenty & Beaudouin-Lafon, 1992)



GROVE

Ellis et al., 1989

Group Outline Viewing Editor
- concurrent editing at the character level
- private, shared and public views
- clouds to show activity to other users
- aging text: first blue, then progressively black

Workflow systems

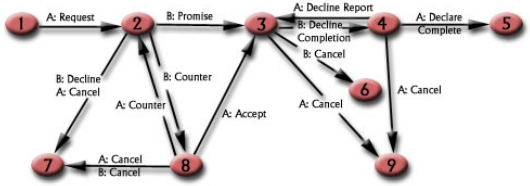
Managing a document across an organization
Example : a document includes metadata describing its path through an organization
- must be written by Anne by April 15
- must be proofread by Bob bt April 22
- must be approved by Charlie by April 29
- must be sent to Charlie by May 4

The document "knows its way" and can send reminders to the various people involved

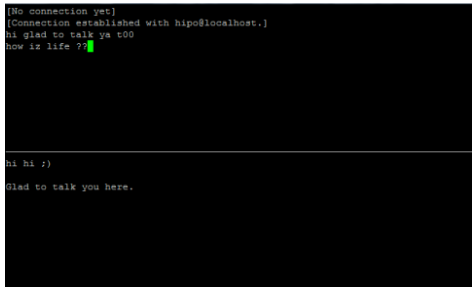
The Coordinator

Winograd & Flores, 1988

Based on the theory of speech acts

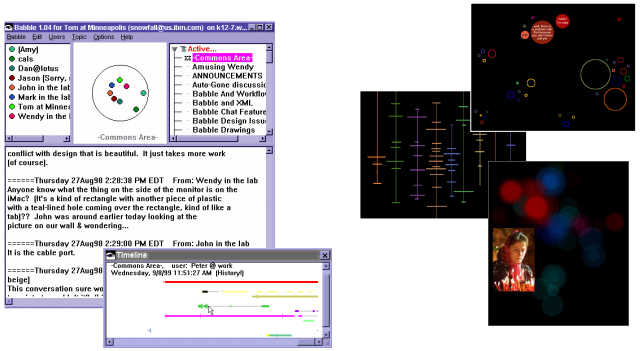


From communication to social networking



Unix talk

Chat rooms

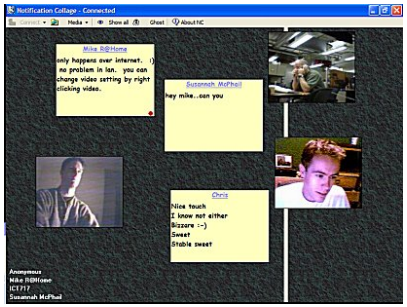


Babble (Bradner et al., 1988)
http://www.research.ibm.com/SocialComputing/babble.htm

Chat circles (Viégas et al., 1999)
http://web.media.mit.edu/~fviegas/circles/
http://web.media.mit.edu/~fviegas/CC2/

Notification Collage

Greenberg & Rounding, 2000

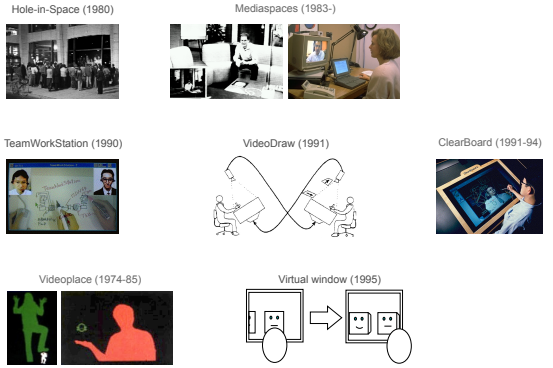


Social networks

Networked games

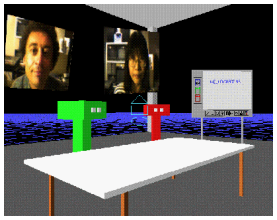
World of Wrarcraft

Video-mediated communication systems



Collaborative Virtual Environments

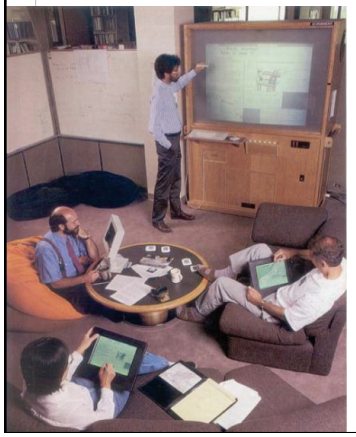
Represent participants by avatars in a virtual world



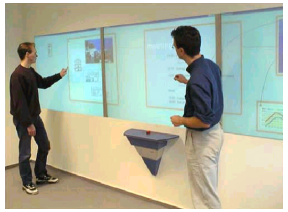
DIVE (1991)

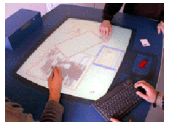
Second Life (2005)

CSCW infrastructure



Ubicomp (Weiser, 1991)



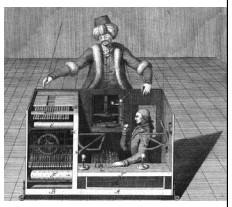


Cooperative buildings
(Streitz et al., 1998)

Crowdsourcing

Harness the power of the crowd

Combine human intelligence with machine computation



Taxonomies

Several ways to classify systems:

- Time, space and size of the group
- Sharing (e.g., editors) vs. exchanging (e.g., email)
- Structured (e.g., workflow systems), vs. open (e.g., whiteboards)
- Strong vs. weak computer support

Time-space matrix

Johansen, 1988

	Same place	Different place
Same time	face-to-face conversation	telephone call
Different time	Post-it note	letter

Challenges for groupware developers

Jonathan Grudin

- Who does the work vs. who gets the benefit
- Critical mass and Prisoner's dilemma problems
- Disruption of social processes
- Exception handling
- Unobtrusive accessibility
- Difficulty of evaluation
- Failure of intuition
- Careful adoption process

Privacy, and other social behaviors

"On the Internet, nobody knows you're a dog."

Plausible deniability

Some references

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http://www.lri.fr/~mbl/Trends-CSCW/