A Whirlwind Tour of CSCW Research

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Overview

- Traditional CSCW
  - Background, Influences, Technologies
  - Case study (Palen & Grudin)
    - Calendar use in the workplace
- Non-traditional CSCW
  - Beyond the workplace
  - Case Studies
    - MusicFX: A system for Computer Supported Collaborative Workouts
    - Proactive Displays
    - Others...
What is CSCW?

- *Computer Supported Cooperative Work*
- The field of CSCW focuses on the **use of technology** to mediate **interactions** among **people**
  - Use: Ethnography, design, ...
  - Technology: Devices, infrastructures, ...
  - Interactions: Text, audio, video, ...
  - People:
    - Teams, organizations, communities, ...
    - Psychology, organizational behavior, sociology, ...

HCI vs. CSCW

- **HCI**: human-computer interaction
  - Individuals’ interactions and relationships **with** information technology
    - May involve > 1 person, but not necessarily

- **CSCW**: human-computer-human interaction
  - Individuals’ interactions and relationships **through** information technology
    - Always > 1 person
Evolution of CSCW

- Computer Supported Cooperative Work
  - Work is [typically] a social activity involving > 1 person
  - Technology can aid and abet:
    - Foreground: Communication, coordination, collaboration
    - Background: Awareness
  - Bridging time, space, organizational boundaries, ...
- Computer Supported Cooperative Whatever
  - Beyond the workplace: increasingly available in other contexts ...
    - Home, car, coffee shops, public places, private places, ...
  - ... and applied to non-work activities
    - Socializing, recreation, staying in touch, ...

Trends

- Convergence
  - Computing, telephony, broadcast media
- Mobility (→ Ubiquity)
  - Devices: Laptops, PDAs, mobile phones
  - Infrastructure: WiFi, {2,2.5,3}G, EDGE
- Communities
  - Professional (communities of practice)
  - Others (Ebay.com, match.com, meetup.com)
- Goals
  - Efficiency vs. fun
CSCW has many influences

- Computer Science
- Engineering
- Sociology: macro and micro
- Psychology
- Organisational Studies
- Management Studies
- Anthropology
- Communication
- Ethnography

CSCW research has many perspectives

**Hard Determinism**
- Behaviour is inevitably shaped by technology

**Soft Determinism**
- Behaviour tends to be shaped by technology

**Co-Determinism**
- Technology and our intentions control in concert

**Non-Determinism**
- We control the uses of technology
Dimensions of Cooperation:
Time and Space

**Place/Space**

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<tr>
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Thinking of activities from focused to peripheral

- Awareness
- Shared experience
- Social activities
- Informal interactions
- Locating colleagues
- Office sharing
- Meetings
- Focused work tasks

Reciprocity and symmetry are important for collaborative tasks

See Harrison and Bly
CSCW focuses on people working (interacting) with others

Team and Small Group Characteristics

- **Characteristics**
  - Members know each other
  - Collaborate to achieve a common goal
  - Highly focused, interactive
  - Strong need for communication

- **Examples**
  - Software development team, proposal writing, conference program committees, small operational groups such as customer support, research project teams

- **Support technologies include:**
  - Buddy lists, instant messaging, chat, Groove, Quickplace, BSCW, video conferencing, data conferencing

From Grudin, 1994

See Grudin and Poltrock, Tutorial Collaboration Technology in Teams, Organizations, and Communities
Organization Characteristics

- Characteristics
  - Geographically distributed
  - Hierarchical management structure
  - Strong need for coordination
- Examples
  - Companies, governments or government agencies, non-profit organizations
- Support technologies include:
  - Email, calendars, workflow, Lotus Notes, intranet applications and webs, document management systems, broadcast video

Community Characteristics

- Characteristics
  - Members do not [all] know each other
  - Common interests or preferences
  - Loose structure & interactions
- Examples
  - Citizens of a city or neighborhood
  - Newsgroups
  - Virtual world citizens
  - Auction participants
- Support technologies include:
  - web sites, chat rooms, virtual worlds
- Issues: reputation, accountability, anonymity
  - Civic support often suffers from uneven participation
    - Lurkers
    - “Tragedy of the Commons”
**Groupware vs. Communityware**

- **Groupware**
  - Medium for contacting and interacting with known collaborators in order to achieve a shared goal
  - Email, Calendars, Chat, Whiteboards, Conferencing
- **Communityware**
  - Medium for initiating contact / transactions with unknown collaborators who have similar interests and preferences
  - Newsgroups, Ebay, Amazon, Epinions, Meetup.com, Match.com

**Case Study: Shared Calendars**

- **Adoption of Groupware**
  - Managerial Mandate (decide to use)
  - Discretionary Choice (begin to use)
- **Effort / benefit tradeoff**
  - Benefit to managers, admins
  - Effort required by “contributors”
- **Critical mass required**
  - [nearly] all or nothing

Studies of Calendar Use

- Initial interviews (Microsoft)
  - 5 subjects; different positions, departments
- More interviews (Sun)
  - 40 questions
  - 12 subjects (users, non-users)
- Survey (both)
  - 20 questions
  - 3000 people (each site)
    - Microsoft: 30% response rate
    - Sun: 50% response rate

Similarities

- Widespread adoption (75% of appts)
  - Sun: 81%
  - Microsoft: 75%
- “Mundane” technology
  - Part of everyday work
  - “Hard to imagine life without it”
Differences

- **Sun**
  - CalendarManager
  - Default (82%): open calendars
    - User name + host computer name
    - Company rolodex
  - Scheduling, coordinating (inferences)
- **Microsoft**
  - Schedule+
  - Default (81%): free/busy (only)
  - Scheduling only

Factors affecting adoption

- Peer pressure
  - “widespread expectation”
  - “plus me”, “browse me”
- Exclusive benefits (conf. rooms)
- Integration (email “invitations”)
- Interface transparency & efficiency
- Technical support
Case Study: Intel

- intel.com vs. intel-research.net

Case Study: Shared Environment

MusicFX
Proactive Displays

- Displays that can sense and respond appropriately to the people and activities taking place in their vicinity
  - Displays
  - Sensors
  - Contexts
  - Content
  - Interaction Models

“Ambient” Displays

Dangling String (PARC)

Bus Mobile (UC Berkeley)
Proactive Displays in the Large

Sunset @ 200MHz (PARC)

Love Board (Hachiko Crossing)

Proactive Displays in the Large

Alaris E-boards
(www.alaris.net)

Multifruit unit: A breast-sized device determines what radio station you're tuned to by detecting the electronic radiation.

Radio: The bed in your car not only picks up radio waves, but also emits electronic radiation.

“Smart” billboards: Using demographic information based on radio station listeners, “smart” billboards use video technology to rotate advertisements hourly or daily to target specific groups of drivers.

GUITAR SALE

I ❤ ROCK & ROLL
Proactive Displays at a Conference

AutoSpeakerID
- Q/A session
- Photo, name, affiliation

Ticket2Talk
- Coffee break
- Explicit content
- One person (at a time)

Neighborhood Window
- Lounge area
- Implicit content
- Multiple people

Experience UbiComp Project

- Desire for *mutual revelation*
  - show & tell about you & your work;
  - learn about others & their work
- Restricted *contexts*
  - Paper / panel sessions
  - Demo / poster sessions
  - Reception / breaks
- Available *content*
  - Explicit: registration info
  - Implicit: homepage data mining
- *Stakeholders*
  - people who influence, and are influenced by, displayed content
UbiComp 2003 Deployment

- Register (create profile)
  - www.proactivedisplays.org
  - WiFi available throughout conference
- Activate
  - Associate profile with RFID tag (kiosk)
- Participate
  - Insert RFID tag into badge sleeve
  - Approach a Proactive Display
- Opt out at any time
  - Delete information / profile
  - Remove RFID tag

Registration

E-mail Address: stonzczak@research.eal.com  
Full Name: Szymon Stonczak  
Affiliation: Intel Research, Seattle  
Photo:  
Ticket2Talk Image:  
Ticket2Talk Caption:  
Homepage URL:  
A few words about your interests: RFID, personal servers, life logging

Submit  Reset
Activation

Evaluation

- Survey (as of Nov. 6, 2003)
  - 500 attendees
  - 250 participants
  - 70 respondents (48 were participants)

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<tr>
<td>Neighborhood Window</td>
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<td>28</td>
<td>23</td>
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Experiences

• AutoSpeakerID
  – 50% of questioners’ tags detected
  – Oral only, visual only, visual + oral
  – Fun with picture, name and/or affiliation
    • “I’m the real <X>”

• Ticket2Talk
  – Conversations, awareness about new & old
    • “Who’s <X>?! ”

• Neighborhood Window
  – Similar to T2T, though more of a novelty factor (and more noise)
    • “red bishops”
    • Death Valley

PlasmaPoster

• Churchill, et al., FXPAL
• An interactive display
  – poster board / bulletin board / billboard
  – content as “conversational props”
  – complement/spur to online interaction
  – social networks and social capital
GroupWear Nametags

• Richard Borovoy, Fred Martin, Mitch Resnick, Brian Silverman (MIT Media Lab)
  - CHI ’98
• Interpersonal augmentation
  - facilitating interaction between people, not people & machines
  - interpersonal displays: display for other people
  - Q&A: programmed by “dunking” in “bucket kiosks”
  - issue: how to augment but not distract
    • lights indicate percentage of similar views, not identifying individual questions
nTAGs

- Networking Applications
  - Common Ground
  - Idea Sharing
  - Card Exchange
  - Network Tracking and Visualizations
  - Networking Games
- Event Management Applications
  - Lead Capture
  - Polls and Surveys
  - Attendance Tracking and Security
  - Digital Tickets
  - Event Information
  - Message Delivery

www.ntag.com

i-balls

- Folk Computing: Revisiting Oral Histories as a Scaffold for Co-Present Communities
  - Rick Borovoy, et al., MIT Media Lab
  - CHI 2001
- i-balls: key-chain computer programs
  - Key-chain-sized video game devices (SEGA / DreamCast)
  - Animations, games, etc.
  - “Hot potatoes”, “Quests”, “Randomizers”, “Hitchers”, “Secret i-balls”, “Multi-author i-balls”
  - Create, trade, track, teach (everyone, everywhere)
i-balls

Figures 1 & 2: i-Ball and PC-based i-Ball Editor

Figure 3: Two Children Exchange i-Balls

Figure 4: Kids Sharing Their New i-Balls After Class

Figure 5: Visualization of How the “I-Ball” i-Ball Travelled, Colored by Gender (See color plate on page 100)

Familiar Stranger

http://berkeley.intel-research.net/paulos/research/familiarstranger/
Media Spaces

- Media Spaces: Environments for Informal Multimedia Interaction
  - PARC, EuroPARC, 1980s-90s
  - Support for informal, unplanned and unstructured interactions
  - Summary paper by Wendy Mackay

RAVE
Portholes

- Passive awareness
- Distributed workgroups
- No explicit video connections

Hole-In-Space

http://www.ecafe.com/getty/HIS/
Norm While (Telephonic Arm Wrestling, 1986)

A collaborative telecommunications project to allow contestants in two different cities to arm-wrestle, using motorized force-transmitting systems interconnected by a telephone data link. First successfully exhibited during a 1986 link-up between the Canadian Cultural Centre, Paris, and the Artculture Resource Centre, Toronto. Sponsored by the McLuhan Programme (Director: Prof. Derrick De Kerckhove), University of Toronto. Materials: Steel, Plexiglas, motors, custom electronics, see http://www.normill.com/artpage.html

RobotPHONE
(RUI for Interpersonal Communication)

- Dairoku Sekiguchi, et al., Univ. of Tokyo
  - "RobotPHONE: RUI for Interpersonal Communication"
    - CHI 2001 Extended Abstracts
    - http://www.star.t.u-tokyo.ac.jp/
- Tele-existence
RobotPHONE

- Shape-sharing
  - Snakes
  - Teddy Bears

PRoPs
PRoP: Personal Roving Presence

- Eric Paulos & John Canny, UCB
  - http://www.prop.org

- Tele-embodiment in a remote real place
  - casual, unstructured, spontaneous interactions, away from PC
  - simple, inexpensive, internet-controlled, untethered tele-robots
  - mobile physical proxy (vs. image / voice on stationary screen)

- Two prototypes
  - Space Browser (blimp): 600 grams
    - color video camera, microphone, speaker, wireless radio, batteries
  - Surface Cruiser (cart)
    - remote-control vehicle (dampened), 1.5m vertical pole
    - same equipment as blimp + LCD screen & “pointer”

The Brain Ball

BrainBall is a game unlike others. The "winner" is the player who can relax under stress rather than the player who is the most aggressive. Brain waves recorded from the scalp of the players are processed to extract the alpha activity, which reflects a relaxed state of mind. The motion of a ball on the table is controlled by the difference in the alpha activity between the two players.

BrainBall™ By Moberg Research, Inc.

http://smart.interactiveinstitute.se/smart/projects/brainball/index_en.html
Interactive Institute - Stockholm

*Brainball*

PingPongPlus
PingPongPlus

- Craig Wisneski, Julian Orbanes, Hiroshi Ishii
  - Things That Think, Digital Life (MIT Media Lab)
  - CHI ’98
  - [http://tangible.media.mit.edu/projects/PingPongPlus/PingPongPlus.html](http://tangible.media.mit.edu/projects/PingPongPlus/PingPongPlus.html)

- Computer Supported Collaborative Play
  - augmented reality + tangible bits, in athletic scenario
    - a computer game in the physical world
  - transforms game: competition --> collaboration
  - ball tracking via microphone array + sound source localization (1”)
  - water ripple, blackout, thunderstorm, painting, comets
  - SIGGRAPH 98
  - another project: BilliardsPlus

The BabySense Environment
The BabySense Environment

- Gili Weinberg, Rich Fletcher, Seum-Lim Gan
  - Hyperinstruments Group, Physics & Media Group
    (MIT Media Lab)
  - CHI '98
  - http://web.media.mit.edu/~gili/research/projects.html#7
  - Toys to Grow With, Toys to Communicate With
  - self-enrichment, monitoring, interaction
- Enhance infant’s sensory-motor experience
  - Pressure sensor mattress (fabric electrodes)
  - Mobile sculpture (with lights & sound)
  - Foreground display: toy panda bear (lights & sound)
  - Background display: kinesthetic sculpture (lights)
- Infant interaction
  - Move one toy, other toy (in another crib) responds

For more information

- Joe McCarthy
  - seattleweb.intel-research.net/people/mccarthy
  - mccarthy@intel-research.net
- Proactive Displays
  - www.proactivedisplays.org
- UbiComp 2003
  - ubicomp.org/ubicomp2003

Thanks! … Questions?