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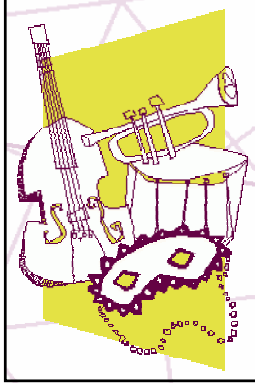
A Whirlwind Tour of CSCW Research



Joseph F. McCarthy
Intel Research, Seattle

(Elizabeth F. Churchill
FX Palo Alto Laboratory)

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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 Work*outs*
    - Proactive Displays
    - Others…

Computer Supported Cooperative Work
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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, …

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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

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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, …

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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

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CSCW has many influences

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

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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

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Dimensions of Cooperation:

Time and Space

Place/Space

Time

	Same	Different
Same	Synchronous (immediate) technologies Local	Synchronous (immediate) technologies Remote
Different	Asynchronous (delayed) technologies Local	Asynchronous (delayed) technologies Remote

- F2F interactions
- Post-its
- Telephony
- Email
- Newsgroups
- Text chat (IM, SMS)
- Calendar / scheduling
- Electronic whiteboards
- Audio / video conferencing
- App. / data sharing
- Group editing / annotation
- GDSS
- Dataflow, workflow
- Expertise location
- Recommendation Systems
- Awareness (media spaces)

See Bannon and Schmidt, 1991: CSCW: Four Characters in Search of a Context. In Bowers, J. and Benford, S. (Eds) Studies in Computer Supported Cooperative Work – Theory, Practice and Design. North Holland.

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Thinking of activities from focused to peripheral

Awareness

Shared experience

Social activities

Informal interactions

Locating colleagues

Office sharing

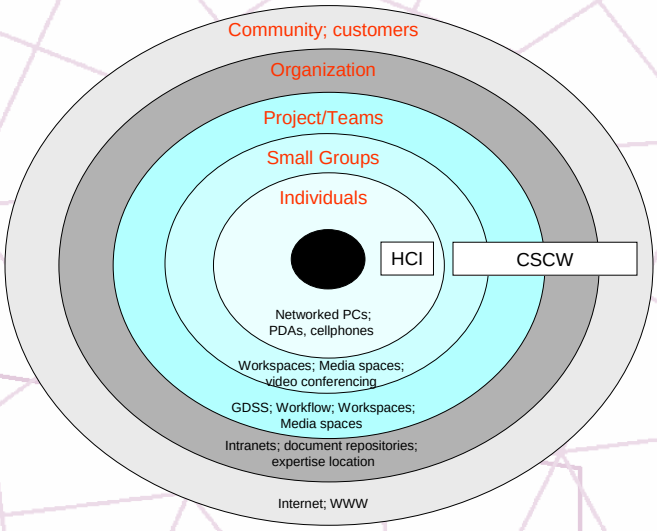
Meetings

Focused work tasks

Reciprocity and symmetry are important for collaborative tasks

See Harrison and Bly

CSCW focuses on people working (interacting) with others



From Grudin, 1994

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

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

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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

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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"

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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

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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

Discretionary Adoption of Group Support Software: Lessons from Calendar Applications.
L. Palen and J. Grudin, 2002. In B.E. Munkvold (Ed.),
Implementing collaboration technologies in organizations, 159-180.

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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

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Similarities

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

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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

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Factors affecting adoption

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

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Case Study: Intel

- intel.com vs. intel-research.net

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Case Study: Shared Environment

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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

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"Ambient" Displays

Dangling String (PARC)

Bus Mobile (UC Berkeley)

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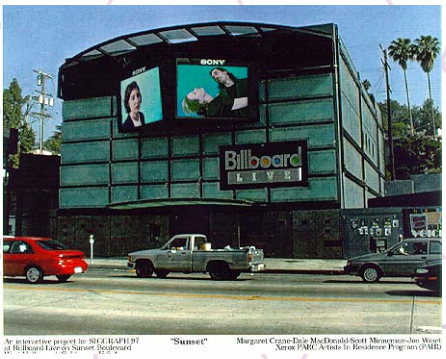
Proactive Displays in the Large



Sunset @ 200MHz (PARC)

Love Board (Hachiko Crossing)

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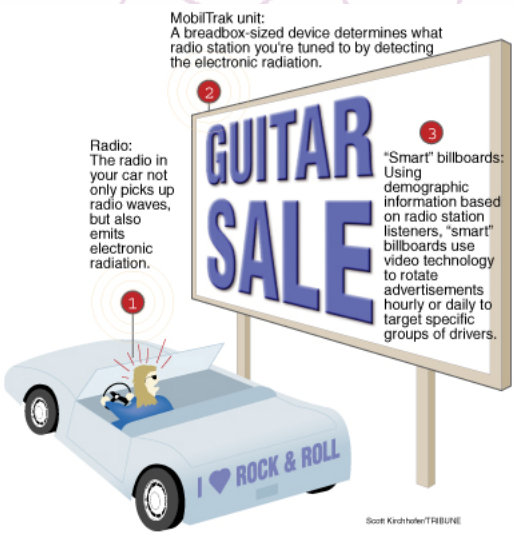
Proactive Displays in the Large

Alaris E-boards
(www.alaris.net)



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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

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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

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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

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Registration

E-mail Address: ssoroczak@intel-research.net
(e.g., jane.doe@intel.com)

Full Name: Suzanne Soroczak
(e.g., Jane Doe)

Affiliation: Intel Research, Seattle
(e.g., University of Washington)

Photo: Browse...
Share a GIF/JPG photo of yourself.

Ticket2Talk Image: Browse...
Share a GIF/JPG image of something you'd be happy to talk about with other UbiComp 2003 conference attendees.
Click here for more information on "tickets to talk").

Ticket2Talk Caption:

Homepage URL:

A few words about your interests:
Use a comma to delimit the concepts. [e.g. RFID, personal servers, kite boarding]

Submit Reset

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Activation

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Evaluation

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

	Positive	*Negative*	*No Impact*	*No Response*
AutoSpeakerID	52	5	11	2
Ticket2Talk	30	3	26	11
Neighborhood Window	17	2	28	23

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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

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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

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GroupWear Nametags

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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

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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

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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)

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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

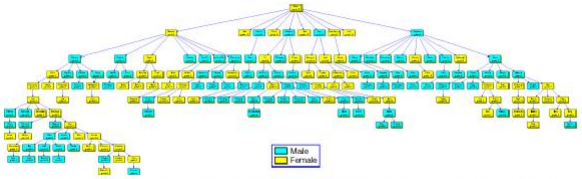

Figure 7: Visualization of How the "Romance" I-Ball Traveled, Colored by Gender (See color plate on page 000)

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Familiar Stranger

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

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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
    - In Michel Beaudouin-Lafon, editor, Computer-Supported Cooperative Work, Trends in Software Series. John Wiley & Sons Ltd, 1999
    - http://www-ihm.lri.fr/~mackay/pdffiles/TRENDS99.Mediaspaces.pdf

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RAVE

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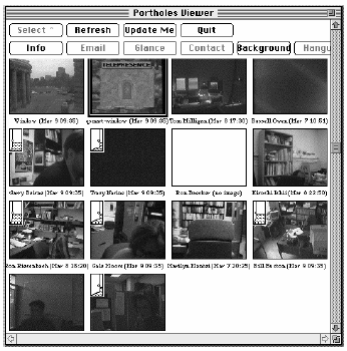
Portholes

- Passive awareness
- Distributed workgroups
- No explicit video connections



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Hole-In-Space

http://www.ecafe.com/getty/HIS/

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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 succcessfully 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 DeKerkhove), University of Toronto. Materials: Steel, Plexiglas, motors, custom electronics, see http://www.normill.com/artpage.html

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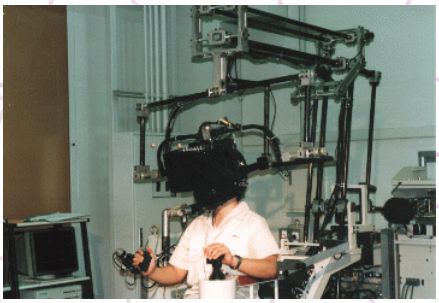
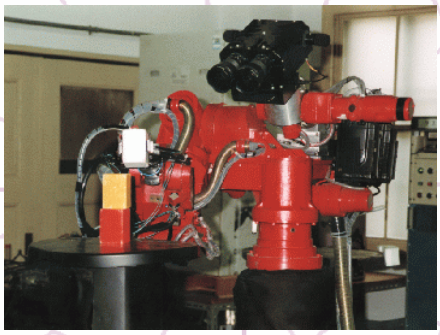
RobotPHONE

(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





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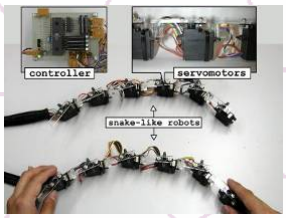
RobotPHONE

- Shape-sharing
  - Snakes



  - Teddy Bears

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PRoPs

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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"

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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

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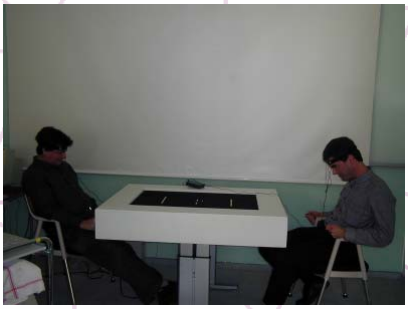
Interactive Institute - Stockholm

Brainball



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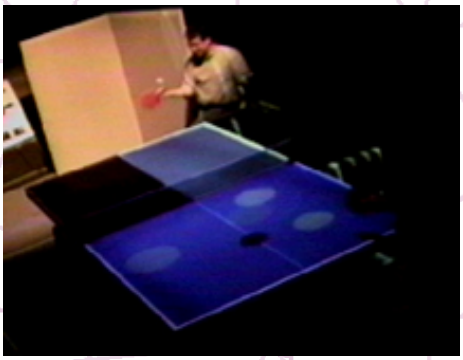
PingPongPlus



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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
- 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

Computer Supported Cooperative Work
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The BabySense Environment




CSCW2002

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

CSCW2002

For more information

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

Thanks! … Questions?