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# **Collaboration Technology in Teams, Organizations, and Communities**

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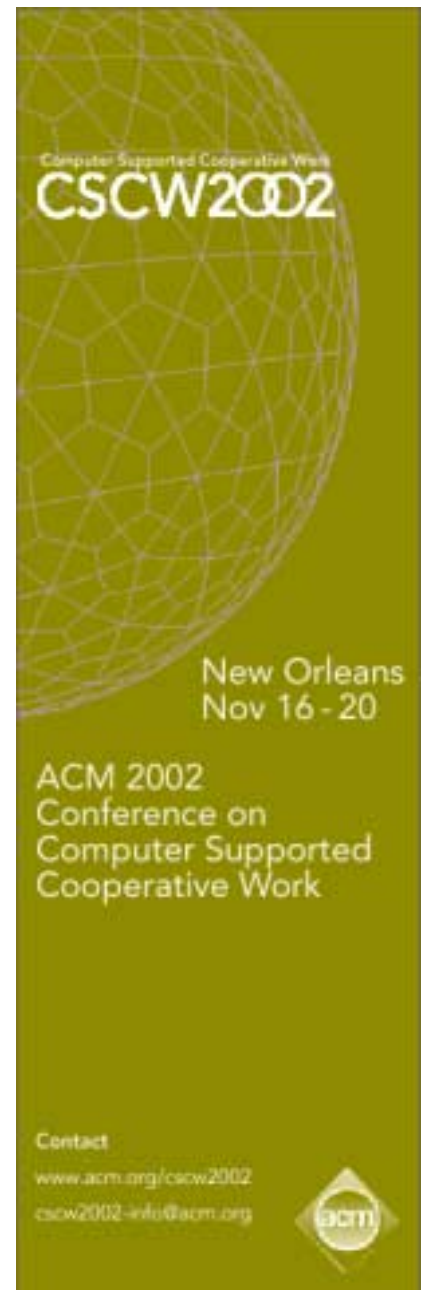
**CHI 2003 Tutorial**

# Computer Supported Cooperative Work (CSCW)

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CSCW conferences have been held since 1986, bringing together researchers and practitioners from diverse fields interested in how technology can support group work. In even years the conference is ACM-sponsored and in North America, in odd years it is in Europe.

- ◆ CSCW combines computer behavioral, and social sciences to support collaboration in the workplace
- ◆ Field studies illustrate complexity and richness of work
- ◆ Computer science demonstrates and validates new collaboration capabilities
- ◆ Further reading:
  - CSCW: History and focus.  
Grudin (1994a)
  - Computer-supported cooperative work and groupware.  
Grudin and Poltrock (1997)



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# Objectives of the Course

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- ◆ Compare your CSCW experiences with those of other course participants
- ◆ Understand how different disciplines contribute to the design and use of group support technologies
- ◆ Learn what technologies are being used to support small groups and teams, organizations, and broader activities
- ◆ Receive an update on research and technology
- ◆ Learn what problems have been encountered developing and deploying these technologies and how these problems can be addressed
- ◆ Acquire new perspectives on the future directions of technologies, organizations, society

# Abstract

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We usually work in a social context: We rely on prior contributions of other people, consult or collaborate actively with colleagues, engage in joint decision-making, forward our completed work to others, and so forth. Such activity sometimes take place in a formal group setting and sometimes it is wholly or partially informal.

This is the context in which computer software is used, yet until recently most off-the-shelf software applications were designed to support only individual work in isolation. Highly successful applications such as word processing and spreadsheets provide little or no support for the coordination and communication that their users engage in. Mainframe applications typically support departmental functions, but not workgroup activities. The underlying rationale for groupware and computer-supported cooperative work — and the reason it is succeeding — is that software designs that respect and support such coordination and communication will be more useful. The expanding use of the Internet and intranets create platforms for communication and coordination support. The information-sharing wonder named the World Wide Web provides opportunities for interaction that are only starting to be exploited.

Although we are starting to see significant progress in some application areas, many of them showed little progress over 20 or more years. Technical successes often fail to become market successes. What are the problems? What is the state of the art? What approaches show promise for the future? These are the topics of this tutorial.

The tutorial does not address the software implementation challenges that accompany groupware development, although these are important topics. We focus on understanding the workplace and the technology appearing there. Our view is that today's greatest challenges arise from our inadequate appreciation of the subtle dynamics that affect a group's activity and determine its response to technology. Social, political and motivational factors that are not very important in computer support of the "solo" aspects of an individual's work are major factors governing the success of groupware. Getting a better understanding of the workplace and the organizational change resulting from the systems being introduced today is the surest avenue to success.

## Human Nature and Social Organization



Human nature does not change

- ◆ Groups and teams: Have existed for millions of years
- ◆ Large organizations: Have existed for several thousand years
- ◆ Extensive communities: Have existed for a few hundred years

## Behavioral Challenges To Successful Design & Use

- ◆ Effort/benefit disparities
- ◆ Poor intuition
- ◆ Critical Mass & The Tragedy of the Commons
- ◆ Social and motivational factors
- ◆ The Prisoner's Dilemma
- ◆ Low-frequency events
- ◆ Exception handling

Groupware and social dynamics: Eight Challenges for developers.  
Grudin, 1994b.

## Effort/Benefit Disparities

Assuming an overall benefit to the group...

- ◆ Which group members get the most benefit?
- ◆ Which group members have to do more work?

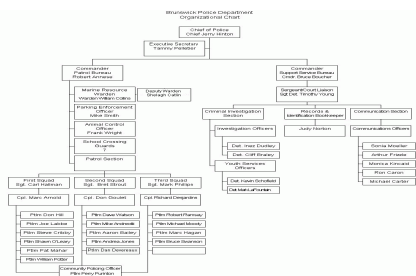
Distributed project management application

**Which users and human-computer interface get most attention?**

## Human Organizational Structures

### Team:

A group organized to work together



### Organization:

A number of persons or groups having specific responsibilities and united for a specific purpose

### Community:

A group or class having common interests



## Team and Small Group Characteristics

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- ◆ Characteristics
  - Face-to-face, distributed, or mixed
  - Typically one leader coordinates the work
  - Typically people fulfill different roles
  - Strong need for communication
- ◆ Examples
  - Software development team, proposal writing, conference program committees, small operational groups such as customer support, research project teams
- ◆ Technologies support both distributed and face-to-face teamwork:
  - Buddy lists, instant messaging, chat, Groove, Quickplace, BSCW, video conferencing, data conferencing, SharePoint
  - Meeting facilitation, digital whiteboards



## Teams & Small Groups: Behavioral Considerations

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- ◆ Communication: why groups are usually collocated
- ◆ Size
  - Under ~7, interaction and control tend to be informal
  - Technologies often have trouble supporting small teams and large teams
- ◆ Participation
  - Primary or secondary task for key participants?
- ◆ Functions (including point in lifecycle) and tasks vary
- ◆ Physical and organizational context
  - Collocated or distributed?
  - Behavioral and technological infrastructures
- ◆ Often unstable
  - Influenced by members; one change can create a different team

Researcher and group typologist: Joseph McGrath (e.g., see Baecker book contents)

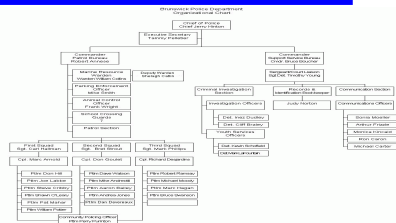


## Technologies for Teams: An Overview

- ◆ Facilitating face-to-face meetings
  - Physical work environment design
  - Extensions to geographically distributed teamwork
- ◆ Online meetings via data conferencing
  - Whiteboard, application sharing, chat, file sharing
  - Web-based meeting environments
- ◆ Instant Messaging (IM) and Chat
  - Evolving communication behavior
- ◆ Videoconferencing for group communication
  - An immature, emerging technology
  - H.323 terminals and multipoint control units (MCUs)
  - New desktop technology (Polycom ViaVideo, VCON ViGo, Sorenson EnVision)
  - Multicast where networks support it
  - Session Initiation Protocol (SIP) promises to simplify the technology
- ◆ Collaborative virtual workspaces
  - Team awareness and communication

## 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



## **Organizations: Behavioral Considerations**

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- ◆ Fundamentally artificial
  - Groups have existed for millions of years, organizations for a few thousand
  - Incentive and control structures are efforts to channel natural ‘urges’
- ◆ Lifespan longer, behavior more stable than groups
- ◆ Division of labor leads to focus on coordination, healthy competition
- ◆ Size and geographic distribution are significant factors
  - Organizations under 200-250 often differ in processes, motivation
- ◆ Lifecycle & maturity, institutional, environmental factors
- ◆ Goal is production; individual efforts measured various ways
  - Standardization of: output, process, skill...
- ◆ Vastly more literature than on groups or communities

Researcher and organizational typologist: Henry Mintzberg

## **Technologies for Organizations: An Overview**

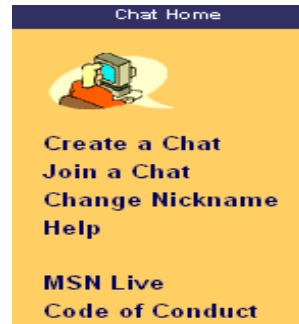
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- ◆ Asynchronous communication
  - Email, voice mail, FAX
  - Audio & video streaming
- ◆ Asynchronous information sharing
  - Document management
  - Threaded discussions
  - Hypertext including web technology
  - Collaborative repositories
- ◆ Asynchronous coordination
  - Workflow management
  - Case tools
  - Project management
  - Calendar & scheduling

## Community Characteristics

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- ◆ Characteristics
  - Geographically distributed
  - Share a common interest but no structure
  - Organizations provide services to communities (e.g., ARPA, NRA, Amazon.com)
- ◆ Examples
  - Citizens of a city or neighborhood
  - AOL chat groups
  - Virtual world citizens
  - Auction participants
  - Stamp collectors
  - Retired people
- ◆ Support technologies include:
  - web sites, chat rooms, virtual worlds



## Communities: Behavioral Considerations

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- ◆ Unlike teams and organizations, virtuality is usually assumed
- ◆ Digital support for physical communities
  - Civic support often suffers from uneven participation
  - 'Netville' experiment proves success is possible (Hampton, 2001)
- ◆ Strictly online communities
  - "Community" is controversial term
  - Difficulties in establishing trust, shared assumptions and conventions
    - » Internet games (Everquest, Asheron's Call) prove it can be done
  - Issues: reputation, accountability, anonymity

Communities, trust, and economics ("social capital")  
Robert Putnam, 2000

## Technology for Communities: What Do They Need?

- ◆ Information of interest to the community
  - Websites developed and maintained by organizations serving the community (e.g., Amazon.com, American Association of Retired Persons, About.com, Intentional Communities)
- ◆ Contribute to the community knowledge
  - Bulletin boards, weblogs, wikis
- ◆ Get advice, directly or indirectly, from community experts
  - Expertise location (e.g., AskMe, Organik)
  - Recommender systems
- ◆ Communicate and build relationships with other community members
  - Reputation systems, identity management
    - » E.g., auction bids correlate with seller's online reputation
    - » Community support and identity management.  
Koch & Wörndl in ECSCW 2001
  - Bulletin boards
  - Collaborative virtual environments
    - » MUDs and MOOs
    - » 3D virtual worlds and online games



## Considerations for Design & Adoption

- ◆ Be wary of intuition and scenarios: try to directly contact users
- ◆ Consider processes and impacts of use: where is flexibility needed?
- ◆ Focus on people inconvenienced by the system
  - Usually the *beneficiaries* get the attention instead
- ◆ Adoption is likely to be organization-wide or web-accessible
- ◆ Organizational change or formation is an opportunity for innovation
  - People have not defined social conventions and processes
- ◆ Different roles or work patterns can determine what features are useful
- ◆ Consult the research literature on group activity

## Conclusion

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This tutorial has surveyed:

- ◆ Historical roots of CSCW and studies of collaboration technology
- ◆ Examples of today's products and prototypes, and current research into design and use
- ◆ Future trends and issues in digitally-mediated interaction

This field is fast-moving and not well-documented.  
To help engage with it, we've focused on

- ◆ Lessons learned from experience and from research findings
- ◆ Design guidelines, focusing on behavioral challenges & opportunities
- ◆ The need to focus on people and the complexities surrounding how they work together

The following pages provide references to guide further exploration.