Constructing activity awareness in CSCW

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Constructing activity awareness in CSCW

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Collaboration is an intricate dance

- Establish & maintain common understandings
- Negotiate & modify goals and plans
- Assign roles, decompose/divide/coordinate work activity
- Manage artifacts & other external resources
- Integrate perspectives, suggestions, & partial work products
- Improvise & coordinate as necessary
- Interpret & evaluate outcomes
Awareness in Collaboration

• What is the other person doing and thinking?
• What is he/she paying attention to now?
• What does he/she expect me to do?
• What will he/she do next?
• Can I trust this person?
Awareness in Computer-Supported collaboration

- Is anyone there? Who?
- Am I interrupting?
- What is his/her situation (materials, tools, knowledge)?
- When will he/she finish/reply/confirm?
- Is he/she monitoring me?
Chat Circles: Who is here? Who is working with whom?
GroupLab: What can he see & do wrt to me, & conversely?
Clearboard: Where is he looking now?
In this talk …

• **Beyond** awareness of presence, current action status, locus of visual attention
  – Presence awareness, social awareness, action awareness, workspace awareness, situation awareness

• The high, ragged regions of awareness
  – Longer term interactions in more complex and significant task contexts
  – Shared *activity* vs. shared *information*

• Implications for groupware design & evaluation
Shared Activity (Vygotsky)

• Dynamically co-constructed
  – Shared goals & plans continually revised in action

• Articulated at multiple levels
  – Collective/individual, roles, POVs, divisions of labor
  – Continually renegotiated & evolving

• Includes tools, practices, norms & other resources

• Always involves learning and innovation
Activity Awareness

• We stay on the same page
  – Testing, updating, resynchronizing
• We do this work together
  – Collective self-regulation, sharing praxis
• We are competent, trustworthy, adaptive
  – Taking initiative, relying on one another
• We take the risk to do better
  – Social modeling, emergent roles, informal learning, creativity, development
| Common ground | Protocol for continual testing and signaling of shared knowledge and beliefs |
• We test shared understandings to recognize and synchronize with potential collaborators
• Through testing and exploiting common ground, common ground is enhanced
• E.g., “Could we reach them via the Scotia Barrens?”
<table>
<thead>
<tr>
<th><strong>Community of practice</strong></th>
<th>(Tacitly) leverage and regulate shared praxis through enactment and improvisation</th>
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Communities of Practice

- E.g., “We need that road” ⇒ “Where are the power lines, gas lines, …” (to the public works specialist)
### Social Capital

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<th>Nurture &amp; exploit mutual interdependencies; access broader resource networks</th>
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E.g., “It might be more efficient to just bring those people out on your bulldozer.”
## Human Development

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<th>Human development</th>
<th>Reconcile different levels of performance and approaches to problems by synthesizing zones of proximal development</th>
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Building shared activity

Community of practice

Social capital

Human development

Community of practice

Social capital

Common ground
Implications for groupware

• Technology design ideas
  – “activity” as a primitive system concept (e.g., versus “thread”)
  – Visualizations of activities, workspaces for activities

• Empirical concepts and studies
  – Experimental models, tasks, measures
  – Field studies, data coding, representations
## Implications for technology

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<th>Human development</th>
<th>Contrast individual capabilities, roles &amp; achievements through time</th>
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<td>Social capital</td>
<td>Aggregate and individuate contributions toward collective achievement</td>
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<td>Communities of practice</td>
<td>Synthesize team members’ behavior or decisions into best practices or patterns</td>
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<td>Common ground</td>
<td>Public availability of shared information</td>
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• Public views of data
• Aggregate contributions
- Awareness of presence, roles, actions, results

Project activity timeline (Document versions, communications, events)

Concept map (project roles, decomposition)

Chat tool (to-dos, planning, coordination)

Collabs & status
• Summarize current project activity
  – Facilitate change inspection/verification
• Spatially integrate work and awareness support
Empirical studies

- Articulate testable hypotheses
  - Multiple levels of theory and method
- Experimental models
  - Synthesized breakdowns with confederates
  - Performance measures, protocol analysis, self-assessment scales, anaphoric/deictic reference
- Field studies
  - Critical incidents (collaborative breakdowns), discourse analysis, open coding of episodes
E.g., Common Ground

• A state
  – Maximize explicitly shared information

• A social protocol
  – Jointly construct sufficient shared understanding
  – Filter non-essential information, provide details on demand (i.e., what should not be shared?)
  – Identify and exchange information held by only some team members
  – Annotate information sources (i.e., negotiate meanings)
Emergency management scenario

Rescue families stranded by flood
Role-specific map-views
Complementary knowledge
Team view is constructed jointly
- Shelters, hospitals, schools, critical supplies, emergency vehicles
• Utilities and roadway infrastructure
• Waterways, flood plains, weather
• E.g., Old Spring School floods
Task design

- **Task for the team**: build the best plan
  - Plan components (and major source of info)
    1. Identify Shelter (Mass Care expert)
    2. Route and Transport (Public Works expert)
    3. Timing/schedule (Environmental expert)

- **Hidden profile**
  - Information allocation among the 3 “experts” is biased both toward their unique expertise area and toward a particular non-optimal solution
## Hidden Profile

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<th>Environment</th>
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<tr>
<td></td>
<td>Route</td>
<td>Time</td>
<td>Shelter</td>
<td></td>
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<tr>
<td>A – unsh</td>
<td>$a_1^s$</td>
<td>$a_2^t a_3^r$</td>
<td>$a_4^s a_5^s a_6^r a_7^t$</td>
<td>7</td>
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* Optimal Plan: plan with the least number of Cons
**Assumption: all Cons have equal strength & do not interact
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Examples of Cons

1. Public Works expert
e.g., This route is an older street and has an obsolete drainage system

2. Environmental expert
e.g., This route goes through a floodplain

3. Mass Care expert
e.g., There are no appropriate vehicles for this route
E.g., Environmental Expert
E.g., Environmental Expert
E.g., Environmental Expert

Risk of landslide

Floodplain
E.g., Public Works Expert
E.g., Public Works Expert

Power outage
Team View

Best route
Measuring common ground

• Psychometric scales
  – Communication, awareness, efficacies

• Linguistic-content analysis (Clark et al)
  – Deictic references, reference breakdowns

• Recall/cued recall for who did what, and why (Monk et al)
  – Convergence

• Performance
  – Time, output quality, satisfaction
Goals

- Validate lab model wrt hidden profile results for this more complex task
  - Expert role manipulation - belief that self and others have valuable information and equi-status favor sharing
  - Critical perspective (ranking alternatives, differences of opinion, discussion at all) favors sharing
- Explore more complex/interesting tasks and instructional manipulations
- Explore alternative user interface designs
The intricate dance

• Awareness in collaboration beyond radar views
  – Presence, current action, locus of attention

• Real shared activity seems more complex
  – longer term, ill-defined, social, developmental
  – Common ground, community of practice, social capitalization, human development

• This complexity also provides *resources*
  – Complementary knowledge, community formation, trust, human development
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Comments, Questions, Suggestions?  Thanks!

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