

Communication Processes and Patterns in High-Performing Networked Teams – A Qualitative Analysis

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Motivation and Rationale

Complex endeavors build increasingly on network-enabled collaboration. Quality of information infrastructures and effective communication between human actors are essential effectiveness determinants.

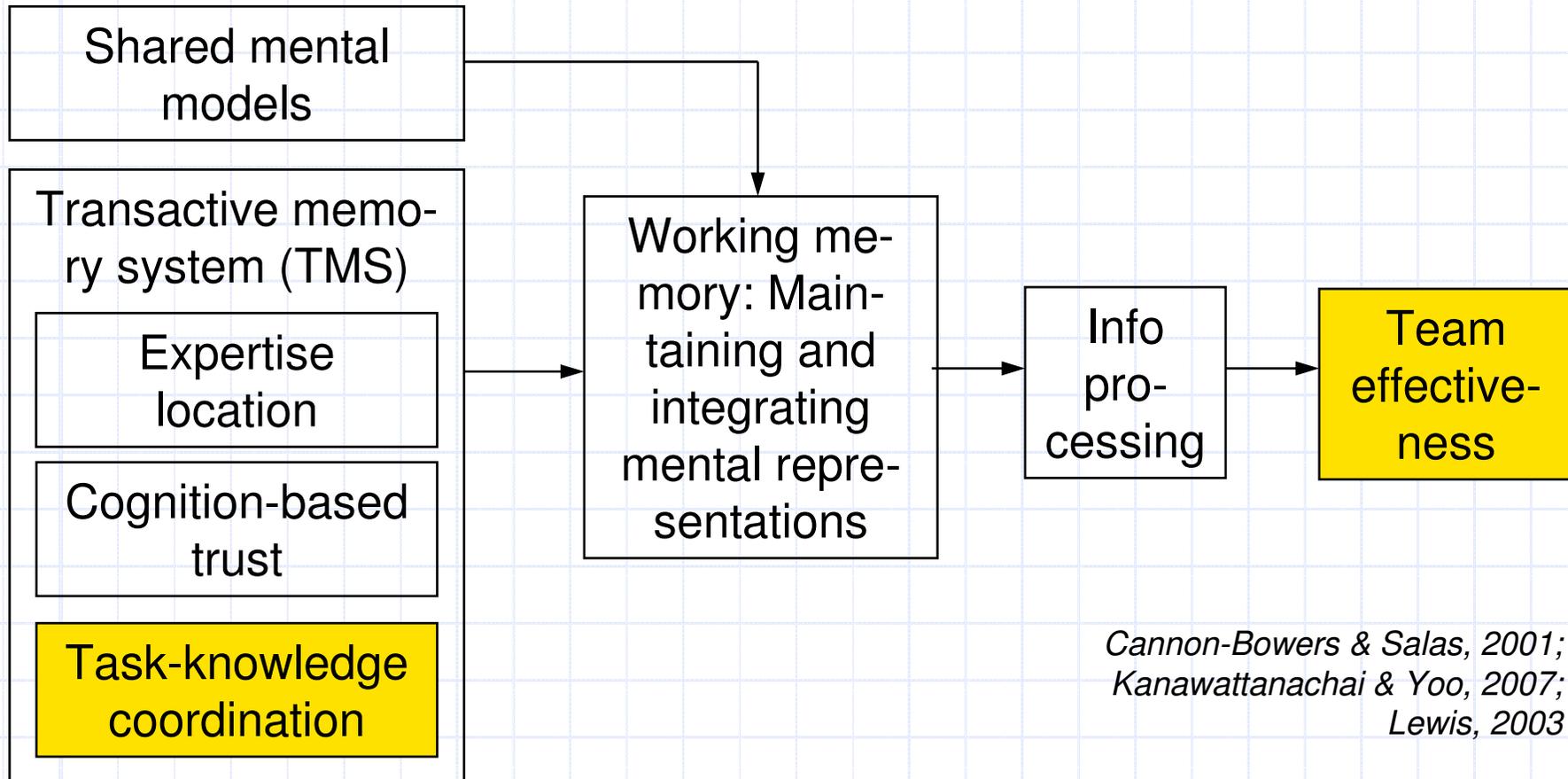
What factors of emergent human (communication) behavior contribute to a networked team's effectiveness?

Main areas addressed:

- Task-knowledge coordination
- Decision-making processes
- Communication patterns
- Emergent team roles



Task-Knowledge Coordination

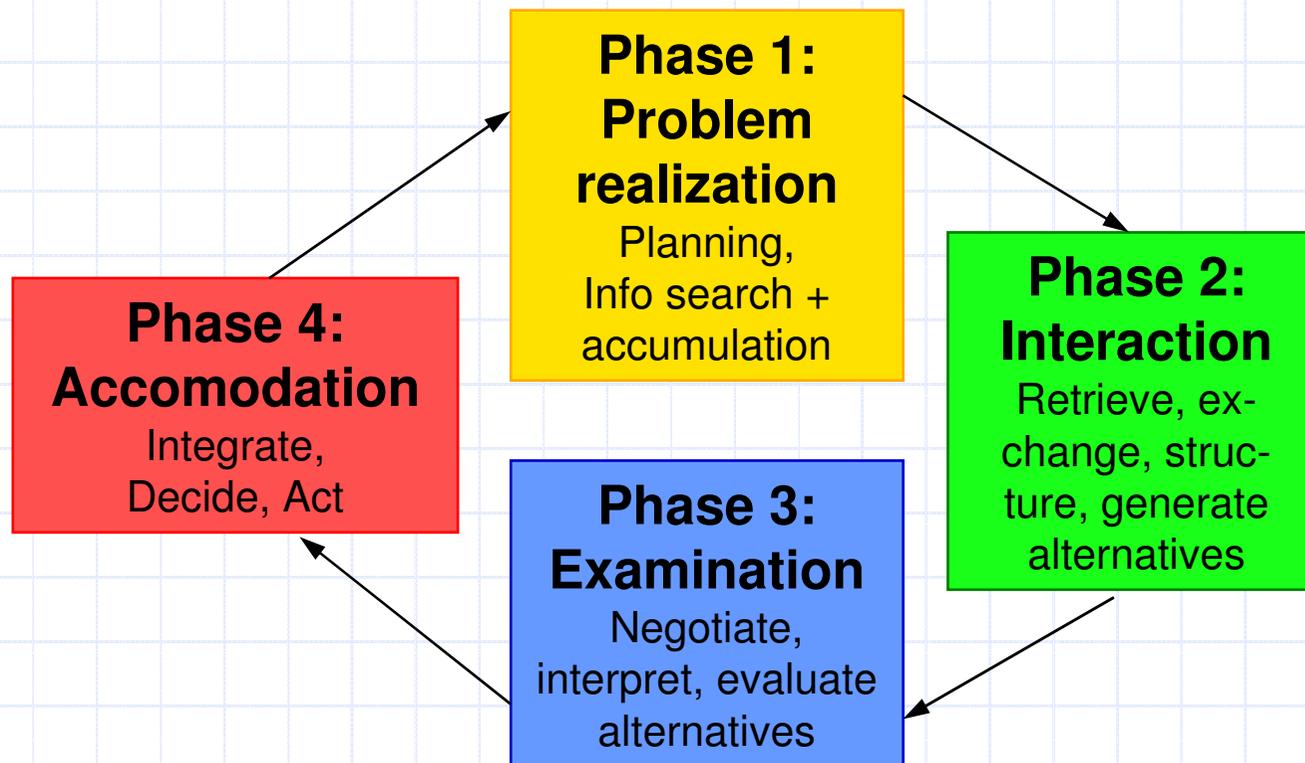


*Cannon-Bowers & Salas, 2001;
Kanawattanachai & Yoo, 2007;
Lewis, 2003*

Research Question 1: What are the key factors in terms of task-knowledge coordination that distinguish effective from ineffective networked teams?

Team Decision-Making Processes

Process models of team decision-making include several phases.
Team effectiveness depends on the quality of these phases.



*adapted from
Finnegan &
O'Mahony 1996;
Gibson 2001;
Letsky et al. 2007*

Research Question 2: In what terms do phases and processes within the phases differ between effective and ineffective networked teams?

Communication Patterns

Face-to-face group studies: Group decision-making effectiveness depends on

- accurate problem analysis,
- establishment of reasonable evaluation criteria,
- generation of realistic alternatives,
- appropriate assessment of positive and negative consequences

Mixed results for other communicative functions (e.g., establishment of task procedures, socio-emotional talk).

*Hirokawa & Salazar 1999;
Li 2007; Orlitzky & Hirokawa 2001*

Networked team studies: Significant effects of task-oriented communication and other interactive patterns (e.g., frequencies of elaborations, no-responses, positive emotional expression) on team performance.

*Fischer, McDonnel & Orasanu 2007;
Kanawattanachai & Yoo 2007*

Research Question 3: In what terms do observed communication patterns differ in effective and ineffective networked teams?

Emergent Team Roles

Classical team role models

- Task related roles (e.g., proceduralist, record-keeper, devil's advocate, opinion-seeker, opinion-giver, idea generator, co-ordinator, implementer)
- Socio-emotional roles: listener, motivator, gatekeeper, conflict handler, tension-releaser
- Boundary spanning roles

Belbin 1993; Mumford et al. 2006; Zigurs & Kozar 1994

Emergent leaders

- engage more strongly in sending messages to others
- send more task-/procedure-oriented messages
- act as initiators, schedulers, integrators

Hawkins 1995; Ketrow 1991, 1999; Mullen et al. 1989

Shared leadership and “dynamic delegation” as determinants of team effectiveness

Carson et al. 2007; Klein et al. 2006; Hoegl & Muethel 2007; Pearce & Manz 2005; Pearce & Sims 2002

Research Question 4: In what terms do emergent team roles and emergent (shared) leadership differ in effective and ineffective networked teams?

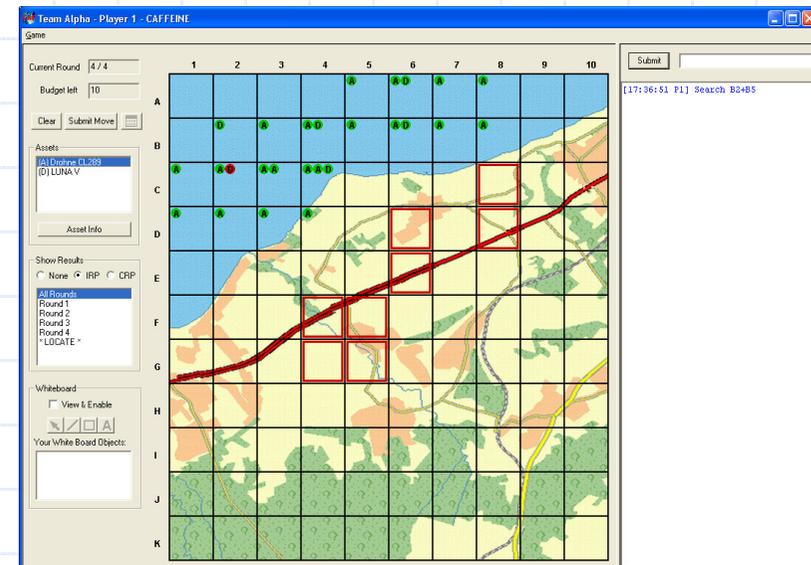
Method: Sample, Setting, Analysis Tools

Sample

- 12 most and 12 least effective teams out of 130 four-person teams
- Students of the German Air Force Officer School, 86.4% male, 20.8 years

Setting

- Multi-player computer game *CAFFEINE* (Schäfer, 2005)
- Networked teams locate randomly distributed “targets” by deploying sensors (different coverage, precision)
- Team members integrate their individual recce results, jointly identify target locations.



Measurement

- Team effectiveness: Number of hits and fails
- Qualitative analyses of communication using Interaction Process Analysis (IPA; Bales, 1950).

Results: Task-Knowledge Coordination

Criterion	Effective teams	Ineffective teams
Expertise location	Exchange information on who had what sensors available	No exchange of information on sensor allocation
Task division	„Filter strategy“	Spatial de-conflicting, e.g. „Quadrant strategy“
Integration of subtasks	Evaluation of recce results; development of a final target list	Report of individually pre-evaluated results; no shared target list
Coordination of option selection and action	Joint development of target list	No agreement on targets; autonomous (pre-mature) actions

Results: Decision-Making Processes

Phase	Communication/Actions	Effective teams	Ineffective teams
<i>Forming</i>	<i>Small talk</i>		no differences identified
<i>Analysis</i>	<i>(performed in trial runs)</i>		-
<i>Resource orientation</i>	<i>Available sensors, sensor qualities</i>	Information on sensors exchanged	Phase missing in most cases
<i>Plan info collection</i>	<i>How to proceed, who goes where / first?</i>	Comprehensively and jointly done	Missing or only short notice given to others
<i>Info collection</i>	<i>Scan requests, request status / results, scan</i>	Follows joint info collection planning	Overlaps with communication on info collection
<i>Info integration</i>	<i>Evaluate recce results, list alternatives</i>	Diligent joint recce result integration	Results reported unsystematically, no feedback
<i>Assess options</i>	<i>Declare alternatives, refuse suggestions</i>	Careful evaluation of results and options	Individuals pre-evaluate results, little agreement
<i>Action</i>	<i>Strike (agreed) targets</i>	Following evaluation and joint option selection	Overlapping with info integration and assessment

Results: Communication Patterns

IPA Scale: Main Categories	Effective teams	Ineffective teams	T
Positive reactions	11.03	11.87	- .13
Attempted answers	69.76	52.34	3.72**
Questions	12.56	14.49	- .35
Negative reactions	6.65	21.30	- 2.24*

Numbers report percentages; T = T-Test statistic; * $p < .05$; ** $p < .01$

Content analysis: Evolved Categories	Effective teams	Ineffective teams	T
Strategy (suggest strategy)	4.14	1.50	-2.30*
Guidance (influence attempts)	11.71	9.00	-2.10*
Request guidance (ask for assignments)	1.00	2.83	1.62
Coordination (assess status, coordinate)	12.86	7.00	-2.44*
Quality assessment/ validation (evaluate potential target)	12.86	9.00	-1.53
Information (exchange task-related info)	18.00	21.50	.87

Numbers represent absolute numbers; T = T-Test statistic; * $p < .05$; ** $p < .01$

Results: Emergent Team Roles

Emergent team roles

- Emergent leader(s): Proceduralist, content integrator, socio-emot. integrator
- Proactive followers
- “Time-observer”

Criterion	Effective teams	Ineffective teams
Emergent leadership	<p>Leadership attempts accepted</p> <p>Leadership throughout the whole process</p> <p>Emergent leaders make large efforts to integrate individual results and promote joint evaluation process</p> <p>Emergent leaders make sure that all members sufficiently contribute their results and participate in the group process</p>	<p>Leadership attempts neglected</p> <p>Leadership only at the beginning or toward the end</p> <p>Emergent leaders make little efforts to integrate individual results and promote joint evaluation process</p> <p>Emergent leaders do not care about members' willingness to contribute their results and participate in the group process</p>
Proactive followership	Members engage in proactive followership	Members refuse to engage in proactive followership

Practical Implications

Task-knowledge coordination: Sufficiently exchange information on available resources (e.g., expertise location, available methods and tools, resourceful ties to others outside the team) at the very beginning

Collaborative capability/maturity: Use the potential inherent in the network configuration; improve “maturity” of a team’s collaborative capability (true resource sharing and sophisticated coordination)

Communication patterns: Focus on task-related communication, e.g., discussion of procedural and coordination matters; constructive conflict communication

Emergent team roles: Train and develop leadership behavior (proceduralist, content integration, maintenance of cohesion); enable development of cognition-based trust, proactive followership, shifting leadership

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Annex: Interaction Process Analysis

IPA Scale (Bales, 1950)

Area		Description of behaviors	Problem of ...
Socio-emo- tional area: Positive reactions	1	shows solidarity, raises other's status, gives help, reward	Reintegration
	2	shows tension release, jokes, laughs, shows satisfaction	Tension reduction
	3	agrees, shows passive acceptance, understands, concurs, complies	Decision
Task area: Problem- solving attempts	4	gives suggestion, direction, implying autonomy for other	Control
	5	gives opinion, evaluation, analysis, expresses feeling, wish	Evaluation
	6	gives orientation, information, repeats, clarifies, confirms	Communication
Task area: Questions	7	asks for orientation, information, repetition, confirmation	Communication
	8	asks for opinion, evaluation, analysis, expression of feeling	Evaluation
	9	asks for suggestion, direction, possible ways of action	Control
Socio-emo- tional area: Negative reactions	10	disagrees, shows passive rejection, formality, withholds help	Decision
	11	shows tension, asks for help, withdraws out of field	Tension reduction
	12	shows antagonism, deflates other's status, defends/asserts self	Reintegration