




IAMOT 2007 


**DEALING WITH  
DISTRIBUTED  
PROJECTS: ISSUES AND  
SUCCESS FACTORS**

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In cooperation with:  
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**Contributors to the Workshop**


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## Workshop Program

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**9:00** Introduction; a short review of literature



**9:45** Empirical results from a survey on distributed teams and projects

**10:15** Break

**10:45** Organizational support and virtual project teams: a report from case studies

**11:15** Dealing with distributed partners in a complex project : a practitioner's view


**12:00** Concluding remarks



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## Distributed, collaborative projects: a short review of the literature


Mario Bourgault, Ph.D.  
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May 13, 2007

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Overview




## Overview

- Introduction to key concepts
- What does the literature say about distributed projects and virtual teams? (*empirical work*)
- Suggestions for future research

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Introduction to key concepts

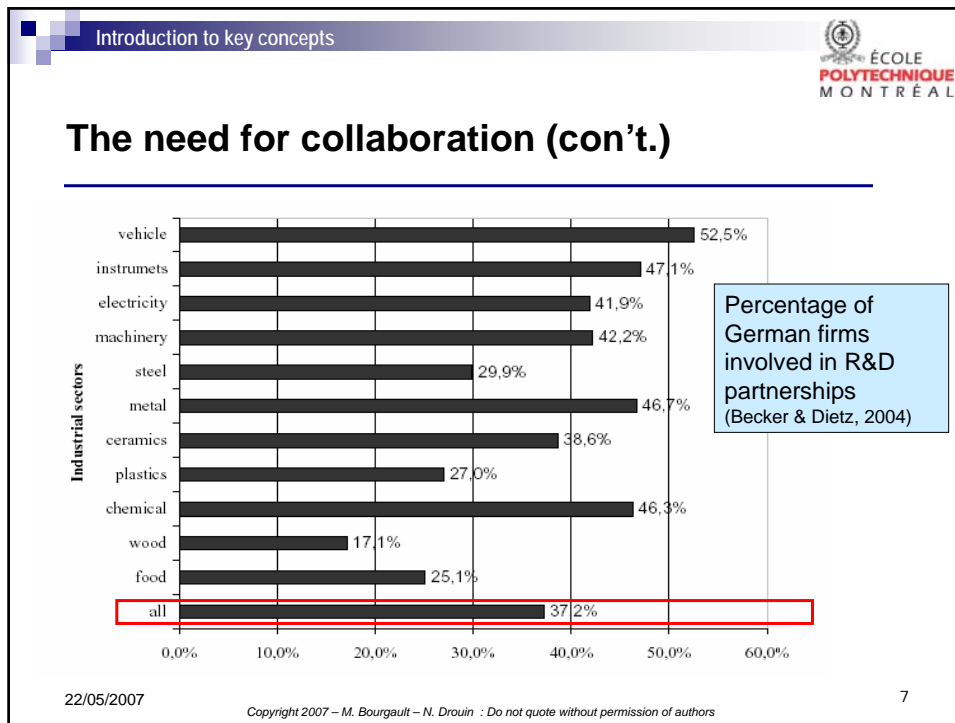


## The need for collaboration

- In the field of innovation, many studies have linked the networking behavior of firms with their innovative capacity (Pittaway et al., 2004; Faems et al., 2005)
- Several explanations as to why firms collaborate: demand for increasingly complex products, emerging cross-domain applications, new business models, high performance information & communication tools, elimination of trade barriers, cost of development, etc.
- Whether it is formal or informal, inter-organizational collaborative work is used to reduce risk, to get access to new knowledge and markets, to reduce the time-to-market cycle (Hagedoorn, 2006)

*“Cisco is regarded as one of the world’s most innovative companies. It does very little R&D and acquires most of its technology from external sources” (Gassmann, 2006)*

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Introduction to key concepts

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### The need for collaboration (con't.)

“Product proliferation” tends to create a “collaboration proliferation” that firms must learn to deal with (Staudenmayer et al., 2005; Terwiesch et al., 1998)

Projected value of the market for offshore systems development in 2007: about \$15 billion (Sakthivel, 2005)

Siemens’ estimation of the number of distributed projects within its network of international business units: about 1,000 projects (Lasser & Heiss, 2005)

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Introduction to key concepts

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## Research on distributed, collaborative work is very diversified (Brass et al., 2004)

**Various perspectives:**

- Innovation management and economics
- Organizational studies, management
- Information systems
- Engineering

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**Various levels of analysis:**

- Between firms (alliances, JVs, etc.)
- Between organizational units
- Between individuals

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**The nature of the collaborative, distributed activity**

- Supply-chain related activities (operations)
- R&D, innovation & design ('design chain')
- Collaborative tools

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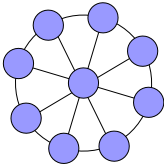
Introduction to key concepts

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## Collaboration and 'distributedness'

Collaboration and dispersion of team members are different concepts, although closely related in the case of innovation (projects)

*Dispersion (geographical, cultural, etc.) and other forms of 'discontinuity' refer to the way teams are organized in space-time (structure)*



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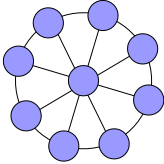
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**Proximity**

Some authors would rather use the 'proximity' concept (geographical, time, cognitive, organizational, etc.)

(Knoben & Oerlemans, 2006)

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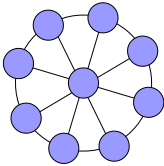
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**Configurational Dispersion**

*"The number of geographic locations where members reside along with the number of people at those locations"*

(Polzer et al., 2006; O'Leary & Cummings, 2002)

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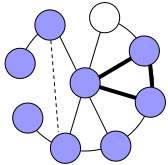
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Collaboration and dispersion of team members are different concepts, although closely related in the case of innovation (projects)

*Collaboration focuses on the nature of the links and dynamics between teams and stakeholders*

- Formal, informal relationships
- 'Active,' 'passive' behavior of actors
- Sub-groups' dynamics
- Evolution of relationships over time



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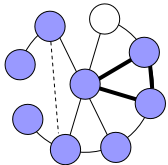
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"70% of a software engineer's time is spent on collaborative activities" (Sarma, 2005)

**In Software Development, collaboration involves...**

- Communication
- Artifact Management
- Task Management



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Introduction to key concepts

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## Collaboration and 'distributedness': new concepts ?

**Evolution of the product value chain**

Product value chain

Upstream logistics   Production   Downstream logistics   Sales   Service

Increased need for coordination of work between dispersed stakeholders

Inter-dependence

- 
- +
- pooled
- sequential
- reciprocal

(Malone & Crowston, 1994; Thompson, 1967)

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Introduction to key concepts

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## A diversified vocabulary

Distributed...  
Dispersed...  
Virtual...  
Global...  
...teams

Most definitions of distributed teams/projects include the following concepts:


1. A boundary between members (generally of a geographical nature)
2. The necessity for team members to communicate via information and communication technology

(Hertel et al., 2005 ; Bell & Kozlowski, 2002; McDonough et al., 2001)

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## 1<sup>st</sup> group: distributed vs. not distributed


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*Virtual vs co-located*

- Several researchers have examined the impact of team dispersion (or proximity) on various measures of performance
- Results are inconsistent; no consensus among researchers, probably because of the large number of dimensions considered, and the type of studies (e.g. experiments)
- Overall, the dispersion of teammates tends to induce difficulties (lack of efficiency, lack of effectiveness) for the firms engaged in collaborative work
- Several contextual dimensions seem to impact the relationship between dispersion and performance: size of project, type of task considered, experience of team members, ...

*(Martins et al., 2004; Powell et al., 2004)*

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## Studies on Trust in Virtual Teams

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(Krebs et al., 2006)

- Effectiveness of computer-mediated groups in reducing the negative consequences of dissimilarity (e.g. age dissimilarity negatively related to trust in FTF groups but not in computer-mediated groups)
- As for FTF groups, trust in computer-mediated groups increases over time

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## Examples:

➤ A study of 145 software development teams showed that **proximity** of workers is associated with higher quality **teamwork** (Hoegl & Proserpio, 2004)

- Quality of communication
- Quality of coordination
- Mutual support
- Balance of member contribution
- Level of effort
- Cohesion

➤ A study of 43 R&D international teams (300 participants from US-Europe) showed a strong link between geographical **dispersion** and predominance of interpersonal conflicts, as well as task-related **conflicts** (Hinds & Mortensen, 2005)

*However, 'shared identity' tends to moderate the effects of distribution on interpersonal conflicts, as does 'shared context' on task-related conflicts*

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## Examples (con't.):


➤ After a recent study of 40 teams of computer specialists, researchers suggested a connection between geographic **dispersion**, quality of **processes** and work **efficiency**

*Dispersed teams have fewer performing processes than co-located teams. Team dispersion would negatively impact work efficiency (Cramton & Webber, 2005).*

➤ In a study on the **creativity** of R&D groups, those using **dispersion**, communication tools and mechanisms of coordination showed more positive results (Krstzer et al., 2006)

➤ Another similar study showed that the key determining factor was not "dispersed" or "non-dispersed," but rather **the way firms alternated** between the two options during the project lifecycle (Lakemond & Berggren, 2006)

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## 2nd group of studies: *taking into account team dispersion*, what are the success factors most commonly found in practice ?

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- Team characteristics and nature of task
- Work processes, organizational support
- Type of collaborative tools, how they are used, etc.

➔ The objective: to identify the most prevalent conditions for an 'ideal' team (trust, cohesion, etc.)

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## Team composition

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Team **diversity** (cultural, organizational, functional, etc.) provides mixed results. In some cases it is seen as an **advantage**; in others, especially if the dispersed team has a low level of communication, such diversity may rapidly create **conflicts** and misunderstandings

Some studies have tried to investigate whether or not some cultural dimensions (e.g., Hofstede's dimensions) lead to more success in the case of virtual teams. No conclusive results have been found

*“Primary conditions include technical competencies and openness towards others. Information technologies don't make you more intelligent!!”*  
(Team participant, international project, Aerospace industry)

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## Distributed team members' competencies

*In addition to the usual teamwork-related competencies, distributed teams require other types of competencies when working at a distance (KSA: knowledge, skills, abilities)*

- Professional / technical KSAs
- Cognitive abilities
- Taskwork-related attributes
- Teamwork-related attributes
- Attributes relevant for telecooperation

potential

→

performance

motivation

↓

*(Hertel et al., 2005)*

*"A pre-condition for collaboration at a distance is that people are sufficiently competent and have the authority to act according to the context. This does not seem to be the case all the time (lack of product knowledge or domain understanding)."*

(Project Manager in charge of an international team (North America, Europe, Asia))

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## Organizational sponsorship and support

Organizational support is generally seen as a key success factor for both project management and innovation. Very few studies have looked at this dimension in the case of distributed projects (Hertel et al., 2005)

**Key dimensions:**

- Training, team development, mentoring
- Incentives
- Motivation for the creation of distributed teams (e.g., outsourcing)
- Level of expectations and resources adapted to the distributed context
- Corporate policies on the use of tools, methods, etc.

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## Work processes

Very few studies have investigated the work processes within distributed teams. Most have focused on two types of processes:

- **Task**-related processes: planning, control, coordination, etc.
- **People**-related processes: trust and conflict management, cohesion building, etc.

Overall, teams appear to have more **difficulty implementing these processes** in a distributed context. This also creates an impact on project performance (McDonough et al., 2001; Cramton & Webber, 2005)

Time and experience, however, may act as moderating factors

*"In our project with Australian engineers, we had to learn how to better organize ourselves; overall, our approach was much more structured and effective than if we had worked locally"* (Manager, Canada-Australia Project, High-Tech Firm, 2006)

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## Collaborative tools (e-collaboration)

A large number of studies aim at collaborative tools. In itself, this is a very wide field of research, ranging from the design, selection, implementation and impact of these tools on collaborative work

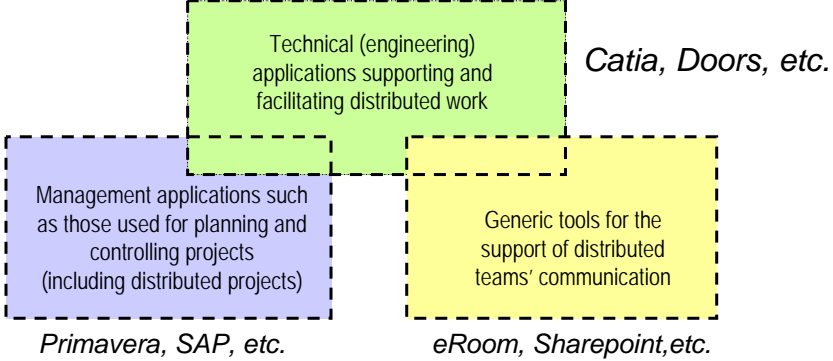
```
graph TD; A[Tool design] --> B[Tool selection and implementation]; B --> C[Tool-task fit to work context]; C --> A;
```

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## Collaborative tools: very diversified !

Various typologies of tools are proposed. One way to categorize the tools is according to the type of information that is exchanged: technical (artifacts), management, general communication, etc.




Technical (engineering) applications supporting and facilitating distributed work  
*Catia, Doors, etc.*

Management applications such as those used for planning and controlling projects (including distributed projects)  
*Primavera, SAP, etc.*

Generic tools for the support of distributed teams' communication  
*eRoom, Sharepoint, etc.*

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Survey on the use of collaborative tools (150 respondents) 

**With the exception of email, technically sophisticated communication tools are not as widely used as one may think and this fact is under-represented in the literature. The reason most often cited is cost and corporate policies**

*“A chat system is very useful for virtual teams. Unfortunately, it is not allowed in our company”*  
*“Very few tools are available to the employees. The company leads its projects with minimal resources”*

**Inter-operability, compatibility and security problems rank high on the list of problems associated with collaborative technologies**

*“There is a major compatibility problem regarding the tools used by the companies involved in the project ... the client's tools do not correspond to the level of security we require”*  
*“I encounter many inter-operability problems with the numerous applications I use. Greater compatibility would allow technical review meetings to be conducted online”*

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## Survey on the use of collaborative tools

(con't.)

**Technology itself has limits, according to respondents. It cannot “solve” all the problems encountered in a distributed project. Companies still need to make provisions for face-to-face interactions**

*“Direct contact is essential for solving problems and getting approvals”*


**Often times, the low rate of technology use is due to implementation problems (training, lack of support, etc.). The mixed level of individual competencies within a distributed team may impede the use of sophisticated tools**



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### Survey of Empirical Studies



## Adoption and use of e-collaborative tools

*Like other ITs, adoption of e-collaboration tools raises important challenges that are not only technical*


Examples of factors that influence tools' adoption and implementation  
(Case study in two large global companies; Munkvold, 2005)

- Organizational and geographical scope
- Local stakeholders' autonomy
- Alignment with existing work practices
- Cultural diversity
- Degree of heterogeneity of technological platforms in place
- External relations
- Information access policies

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### Collaborative tools

(Empirical approach – information systems development projects – US - Europe)  
(Sarker & Sahay, 2004)

Types of problems	
Geographical separation	<ul style="list-style-type: none"> <li>▪ Work synchronization difficult due to different time zones</li> <li>▪ Limited human connection due to lack of physical proximity</li> <li>▪ Ineffective communication due to lack of well-accepted norms regarding turn-taking and virtual presence</li> <li>▪ Increased level of suspicion based on the inability to verify actions in the physical location of remote members</li> </ul>
Different cultural contexts	<ul style="list-style-type: none"> <li>▪ Mismatch of language preferences and different levels of language competencies</li> <li>▪ Misunderstandings due to dissimilar styles of conversation</li> <li>▪ Performance expectations not adjusted to different festivals, holidays</li> </ul>
Different profiles - technical resources	<ul style="list-style-type: none"> <li>▪ Mismatch in philosophies and approaches</li> <li>▪ Differences in skills and training</li> <li>▪ Differences in expertise with various technologies and techniques</li> <li>▪ Differences due to mismatch in IT infrastructure</li> </ul>

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**What we know...**

**What needs more investigation...**

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## What we know...

- Burgeoning and diversified research work. **Not much consensus yet.** Dispersion still raises challenges: lack of efficiency, lack of effectiveness, lack of “performance.” Solutions vary (not only related to technologies)
- **Distributed innovative work expands.** New organizational form? If the answer is yes, organizations must face the challenge to better support actors on site

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Future investigation

## Themes to investigate further (1)

- Many researchers criticize the **lack of theoretical foundation** in the current research: ““The foundations and theoretical development of virtual team research remain unclear (...) an important way to move forward is to accelerate the process of theorizing and theory appropriation” (Schiller and Mandviwalla, 2007) See '[Small Group Research](#)' - 2007
- Most research has been conducted in **controlled environments** with groups of students. More fieldwork in organizational contexts is needed to increase knowledge
- More research is needed in **varying environments** (innovative products, innovative services, etc.)
- Some research suggests that dispersed team behaviors, like other team behaviors, evolve over time. **Longitudinal studies** would allow greater understanding of this phenomenon.

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Future investigation




## Themes to investigate further (2)

- Dispersed team characteristics need further investigation: size, team **composition, duration, decision-making autonomy**
- Most studies take for granted the total **autonomy** of dispersed team members (dedicated team). In fact, project members are often involved in many projects (multi-project context)
- **Knowledge management** is not specifically addressed in dispersed team literature

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Future investigation



## Themes to investigate further (3)


- Team members' and team leaders' **expertise** and **skills** are rarely discussed in the literature

*“Too often, I saw people avoiding their responsibilities ... . Therefore, I insist on monitoring their tasks ... . Delegation in dispersed contexts is not easy”*  
(Project manager, international project, NPD)

- With regard to processes, some authors propose to develop a **maturity model** (inspired by SEI, PMI models) for collaborative dispersed teams. These maturity models could favor more effective collaborative work and the development of organizational competencies

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Future investigation



## Themes to investigate further (4)



- With regard to technology, tools evolve constantly, offering additional functionalities and better performance. **Impacts on processes and behaviors are significant.** Researchers need to keep up with technology and re-evaluate their studies' results.
- In management, most research **on e-collaborative tools is limited to 'communication' tools.** It is difficult to capture actors' exchanges if research does not focus on other collaborative tools (technical data and/or artifacts).

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