

Leadership and coordination mechanisms for virtual teams

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Abstract

This paper seeks to provide insight into the effect of virtualness on coordination mechanisms for virtual teams. An overview of team virtualness and its impact on teams is presented on the basis of literature. Insights from literature are checked with a number of virtual leaders in interviews, of which the results are reported next. After discussing the impact of virtualness on team coordination with virtual leaders, we present an overview of literature on best practices for virtual team coordination. The paper is concluded with a discussion of findings and presentation of a model to guide future research.

1. Introduction

Global market developments and the large-scale use of diverse applications in the area of information and communication technology have been key factors in the emergence of geographically distributed teams. Such teams are often referred to as *virtual teams*. Virtual teams enable collaboration between people across traditional boundaries and offer tremendous opportunities for various achievements. Businesses are no longer tied to a single time zone. The Internet as the almost universal medium for interaction across boundaries has created an infrastructure that enables many organizations to launch virtual teams. Hardly any technical obstacle for communication and collaboration across geographic boundaries remain as these processes are supported by high tech collaboration solutions, such as email, videoconferencing, electronic blackboards and sophisticated forms of groupware.

Virtual teams have a number of opportunities that are not found with co-located teams, such as involving rare expertise. For example, a group of eight globally distributed scientists from different organizations rapidly developed a revolutionary rocket engine design (Majchrzak, Rice, Malhotra, King, & Ba, 2000). The complex and innovative design could not have been developed without the expertise of the 8 highly specialized scientists. However, the design was not only a result from a careful combination of expertise but required a number of interdependent iterative ‘virtual’ brainstorming sessions among the team of rocket scientists. All these activities were performed through a collaboration tool called “the internet notebook”

Virtual teams are defined in various ways. The term generally implies groups of geographically and culturally dispersed co-workers using a combination of communication and information technologies to accomplish an organisational task (Townsend, DeMarie, &

Hendrickson, 1998). The term ‘virtual team’ is therefore a geographically dispersed team that communicates (completely or partly) through the ICT media.

Although being virtual has several advantages, it also has its downside. Virtual teams have to work under special circumstances. The communication is ‘mediated’ which generally means a lack of non-verbal cues. Unplanned social encounters are not possible. ICT tools and infrastructures are often incompatible or not well working, global virtual teams may also have to deal with additional issues of differences in time zone, language barriers and cultural differences (Dubé & Paré, 2004). The aforementioned circumstances make communication, coordination, cooperation and therefore team- and trust building relatively difficult.

Within this context, traditional means of co-ordination are under pressure. Direct supervision and daily face-to-face interactions between managers and employees are no longer possible. The use of on-line tools and applications may, on the one hand, open ways for managers to measure activities of groups or individuals in a way that could never be done before. On the other hand, due to the use of applications for remote access, a first-line supervisor cannot oversee subordinates’ actions as directly as before. Furthermore, some technical applications may even form a substitute for some managerial roles. This paper will focus on the nature of team virtualness and its implications for virtual team coordination.

2. Virtualness

The answer to the question: “what is this thing called virtuality?” is not a straightforward one, as will be shown in this section. Some core dimensions are discussed in almost every

conceptualization of virtuality, i.e. geographical distance, time dispersion and mediated communication.

Geographic dispersion. Geographical distance has a very strong influence on interpersonal contacts. Even small distances between employees in the same building can hinder effective communication and cooperation. However, the nature of geographic distance between members in virtual teams is more complex than can be reflected by a single indication of geographic distance. Just as important is the number of geographically distributed locations and the distribution of members over these locations.

ICT use. The simplest and most widely introduced forms of technology are telephone and email. Recently applications such as audio and videoconferencing and specific project management and groupware tools have been added (Andriessen, 2002). Technology enables work across distance, and is therefore one of the catalysts of the rise of virtual teams. To compare teams on the basis of ICT use, the percentage of communication that members typically perform via mediated means, in relation to face-to-face communication should be measured.

These two aspects together constitute the concept of ‘virtuality’.

Is this the whole story? Well, this is where the elusive part begins. The concept of virtuality can be defined in terms of these two aspects, but virtual teams in actual practice often appear to differ also in other ways from traditional, more or less co-located teams (Bell & Kozlowski, 2002; Dubé et al., 2004).

Temporal distribution. The influence of temporal distribution on coordination of the virtual team is quite complex. Several factors influence the possibility for coordination across time zones. The first one is of course the degree of time differences between team members. If intervals are dispersed several hours it is often simply a case of contacting team members

in the morning or afternoon solely. However, if time differences grow larger, there comes a point where direct communication cannot be arranged during working hours. Team members can in such cases choose to reschedule some of their working hours and contact colleagues early in the morning or late in the evening. If team members have to rely on technology in the workplace, and cannot communicate outside office hours they are limited to asynchronous forms of communication by for instance e-mail or voice mail. In cases where individuals do work a few hours synchronously across locations it is very important to adapt the media form to the purpose of the communication instance (Maznevski & Chudoba, 2000).

Management structure. Virtual teams, by their distributed nature often span boundaries of departments or organizations in general. Even within one organization different geographical locations can have different procedures for hiring, training, evaluating and rewarding employees. Organizations that use virtual teams often resemble a matrix structure, which implies that team members often have more than one manager to report to. On top of this, spanning different geographical locations often implies that two or more managers are sharing the responsibility of managing employees of one virtual team.

Diversity. The strength of the 'virtual team' concept is the possibility of combining the expertise of people from various places and from various disciplines. The downside of this is that virtual teams in actual fact often consist of very different members. They differ not only in discipline or organisational role (which is quite common in all project teams), but are also diverse because they are coming from different organisations and countries. This implies often not only a variation in culture but also in language. People tend to interpret information on the basis of their cultural filters. Misinterpretations are therefore likely to emerge in culturally diverse virtual teams (Kayworth & Leidner, 2002). It also appears quite

difficult to develop common ground', i.e. shared ideas, norms and knowledge (Cramton, 2001; Maynard & Gilson, 2004). Coordination between actors can only occur when they use the same conceptual language and share thoughts and beliefs regarding the task. Team leaders in virtual teams have sometimes extra responsibility to anticipate and prevent communication problems between members from different cultural backgrounds.

Multiple Roles. Virtual teams often consist of (some) members, who also have roles in other teams, i.e. they allocate only part of their time to one team. This does not only make the coordination difficult but may also imply less identification with and therefore cohesion within that team.

Member stability. Stability of team membership is less common in virtual teams than it is in co-located teams. Members of whose expertise is suddenly needed can flow into the team and leave just as abruptly if their task is fulfilled. This fluctuation of membership in the team makes team membership less visible, and communication and coordination more complex. It is said (Bettenhausen, 1991) that the flowing in and out of team members triggers adaptation processes that cost time and energy. If these adaptation processes are constant in nature this can severely interrupt with the team's ability to reach its desired goals.

Group evolution. When people start working together it takes some time before they are welded into a smoothly running team. They often go through stages like orientation, norm development, strategy choice and execution (see e.g. McGrath & Hollingshead, 1994). According to these authors virtual teams tend to focus exclusively on the task, excluding group maintenance activities. This reflects an over-concentration on task achievement as a consequence of the geographical and social distance in distributed groups. Virtual teams appear to start with a form of swift trust (Jarvenpaa & Leidner, 1998), i.e. trust based on the role occupied by the person, even when the person is not yet known (Meyerson, Weick , &

Kramer, 1996). However, this form of trust is fragile and temporary. The role of the team leader is regarded as very important (Bell & Kozlowski 2002).

Subgrouping. Virtual teams run a greater risk than normal groups that dysfunctional ‘subgroups’ occur. Dubé and Paré (2004) give the example of a virtual team that exists of individuals at two locations. Members at one location worked closely together while largely ignoring team members at a distance. At some point one sub-team actually replaced the distant team members by local experts to speed up the decision making process.

Required ICT proficiency. Since virtual teams are mostly very dependent on, sometimes quite sophisticated media to communicate, to work together and to store their common information, experience and competence to handle these tools appears to be extra important in virtual teams.

Task interdependence refers to the degree to which individuals or groups must rely on one another to perform their tasks effectively. According to Thompson (1967) it is not only the degree of task interdependence, but also the *type of task-interdependence* in a group or organization that determines the way the group or organization should be coordinated. Thompson distinguishes three types of interdependence:

- *pooled interdependence*, where the members of a group each make a contribution to the group output, without the need for direct individual interaction, e.g. a group of typists;
- *sequential interdependence*, where the output of one is the input for the other, e.g. work on an assembly line;
- *mutual (or reciprocal) interdependence*, where people exchange products or information for a common goal; the group members generally have different but prescribed roles and perform different parts of the task in a flexible order, e.g. a surgical team;

- Ven van de and Delbecq (1976) defined a fourth category, *team interdependence*, where group members, without having separate roles, jointly diagnose and solve problems, and co-operate to complete a task; this is probably the case in most virtual teams.

According to Cascio & Shurygailo (2002) task interdependencies between members should be a rough indication of which members are to work in close proximity and of team boundaries in general. Distribution of specific resources across team members should also be an indication of where and how work should be done.

The above mentioned factors appear to be barriers for smoothly coordinating virtual teams, and will be called in this project '*complicating factors*'. In this study these factors are differentiated from the first two, based on the idea that they are not required for a team to be labelled as a virtual team. The dimensions of virtualness and complicating factors can serve as variables on the basis of which teams can be categorized. An example of such a categorization is presented by Casio and Shurygailo (2002). This categorization is based on ¹the number of sites a virtual team is working from and ²the number of leaders that are involved in managing a virtual team.

The use of typologies can be very useful for research on virtual teams, especially when teams under study are teams in organizations with team structures 'as given' to the researcher. Different typologies can be used to cluster teams for the purpose of answering different research questions in such cases.

So far we have discussed dimensions of virtualness and complicating factors on the basis of literature. In the next section of this text we will report results of a number of interviews with leaders of virtual teams in organizational practice.

3. Team coordination and leadership – input from practice

The next step in the project was to check the dimensions of virtualness and complicating factors and their impact on virtual team coordination with virtual team leaders in organizational practice.

Coordination has been described as “the management of dependencies among actors” (Malone & Crowston, 1994) The phenomenon has been studied by various scientific disciplines, among which Organization Science, Economics, Psychology, Information Sciences and Linguistics. These perspectives can be clustered in three levels of analysis (Andriessen (2003):

- Co-ordination of interpersonal communication
- Co-ordination of task
- Co-ordination of organisational processes

We focus on coordination of tasks and use the definition of Andriessen (2003) *Co-ordination is the use of mechanisms to manage interdependencies between activities performed to achieve a goal, involving the allocation, planning and integration of tasks by individuals or groups.*

We were specifically interested whether leaders experienced problems due to the virtualness and complexity factors in their teams. Team leaders were asked to report about their personal experiences with a number of practices and coordination mechanisms, we derived from literature (Fenema, 2002; Mintzberg, 1979) (see figure 1). Interviews were also used as a source of ‘new input’ from practice. Team leaders were explicitly asked for issues that made their work as virtual team leaders different or perhaps more difficult than they previously experienced in leading co-located teams.

- The leader role
- Selection and training of team members
- Appraisal and reward practice
- The use of ICT
- Face-to-face meetings
- Dealing with multiple leaders and part-time members
- Dealing with collocation and distribution within a single team
- Cultural influences within the team
- Development of shared understanding in virtual teams

Figure 1: aspects of virtual team coordination

Method

Interview participants

Contacts of faculty members within two multinational organizations were asked whether they knew individuals in their organization who were leading or coordinating teams that worked distributed over two or more geographic locations. On the basis of this question a total of eight individuals were suggested as possible informants. Most of these individuals were direct leaders of virtual teams, two were coordinators of several virtual teams and one informant was a consultant who fulfilled a central role in a virtual project team. Two of the interviews were double interviews, in which one team was discussed with two team leaders. Interviewees varied in their experience with virtual team leadership.

Procedure

Before interviews, participants were asked to fill in a short checklist, which was focussed on the team's structure and coordination mechanisms. Table 1 summarizes the data on team structures. The results from these checklists were used to save interview time, and to focus on specific issues that were relevant to the team in question. Depending on virtual team structure some questions were highlighted, others were discarded. In general interviews took approximately one and a half hours. Interviews were recorded for further analyses of data.

	Team 1	Team 2	Team 3	Team 4	Team 5	Team 6
Informant(s)	Team coordinators (2 persons), both responsible for 6 project teams	Team leader/ coordinator of large intelligence community (1 person)	Team leader/ multiple team coordinator (1 person)	Team leader/ learning professional (1 person)	Consultant, responsible for gathering requirements	Team leaders (2 persons)
Task Description	Development of software product	Gathering and sharing intelligence about competitors	Sharing knowledge and improving their field of expertise	Designing, developing and implementing a learning tool	Designing, developing and implementing a sales configurator tool	Designing and developing software for a printer and scanner
Task interdependence	High	Low	Intermediate	High	High	High
Team size	25-30 individuals	11-15 individuals	20-25 individuals	5 individuals		20 individuals
National cultures	France Netherlands USA	USA Malaysia Netherlands Great Britain Russia Etc.	USA (multiple sites) Canada Netherlands Saudi Arabia	Netherlands Portugal Great Britain Sweden	US France Netherlands	Netherlands France
Number of locations	Four	More than five	More than five	Four	Three	Two
Average time spent in this team (%)	50-70%	10-30%	10%	30-50%	Full time	Full time
Duration of work in the team so far	one year	9-12 months	six years	more than a year	5-8 months	1-6 months
Member stability	Low	High	High	High	High	High
Previous member shared work experience	Yes	No	Yes	Yes	Yes	Yes
Face-to-face meetings	On as needed basis (ad hoc), never with all team members	Never, the team leader visits every member individually on a yearly basis	Once a year, with all team members attending	Meetings were held every three months, with all members attending	Several times a year with developer team and project management	Never with the whole team, team leaders meet on a weekly basis
Available technologies	e-mail/chat Telephone/fax Audio/videoconferencing tools Meeting/decision support tools Groupware tools	e-mail/chat Telephone/fax Audio/videoconferencing tools	e-mail/chat Telephone/fax Audio/videoconferencing tools Meeting/decision	e-mail/chat Telephone/fax Audio/videoconferencing tools Meeting/decision support tools Groupware tools	e-mail/chat Telephone/fax Audio/videoconferencing tools Groupware tools	e-mail/chat Telephone/fax Audio/videoconferencing tools Groupware tools

Table 1: An overview of informants, team structure and coordination mechanisms

Results

When we consider the six teams that were discussed in interviews, a categorization on the basis of task type and task interdependence is relevant. Two of the teams in interview can be considered as knowledge sharing/improving expertise teams (teams two and three). The other four teams were project teams with a clearly determined end product or service. Teams in the first category in general had a longer lifecycle and less clear team boundaries, in contrast with teams in the second category which were working with clear deadlines and clear team boundaries.

The leader role

When we compare the two categories of teams in this study a difference regarding the leader role becomes clear immediately. Within the virtual project teams team leaders have a clear output responsibility. These projects have customers that demand for their products to be finished within a certain time-frame. Leaders therefore are highly involved in managing output as well as process of their teams. Developmental roles of these leaders were less pronounced. Project team leaders often share their leader role with others inside their own team. They also coordinate with leaders from functional departments within the matrix organization.

Leadership in the knowledge sharing teams was much more focused on personal development and gaining expertise. Although in the case of team three clear goals were set, work in teams two and three was less focused on deadlines of product or service delivery. This is very clearly a result of the different nature of the task, when compared to project teams.

We asked team leaders what they thought were the most important differences between leading a conventional team and a virtual team. One team leader commented:

...virtual teams require for a team leader to delegate his tasks to the team itself. Everyone has to be able to make his own decisions; therefore the team needs a flat hierarchy. As a team leader you need good communication skills, you have to be able to see and feel what is going on with your team members via e-mail and telephone. You have to lead your team in uncertainty and invisibility, experience is important here...

We asked virtual leaders to comment on their style of leadership. Leaders of the teams mentioned that their leadership style was largely coaching (team two), facilitating (team three) or more in line with creating a vision (team four) and setting goals (team six). Coaching leadership was mentioned in terms of helping team members and giving them advice on how to work on their tasks. It was indicated that development of team members' competencies was central. Adapting the style of leading to team members' degree of seniority and experience with virtual work - by providing more or less structure - was also mentioned as key to virtual leadership.

Arranging meetings, booking hotels and making an agenda were central to the facilitator role. Much of the facilitator work is 'behind the scenes'. It involves getting team members together during meetings, which is not an easy task, given the busy schedules of team members.

The visionary role was typical in helping team members to identify long term team goals and helping them to get an understanding of dependencies between members.

It was indicated that providing members with a vision and an understanding of work in the team was often performed indirectly, by bringing certain team members together through task assignment.

Setting goals and keeping deadlines was central to leadership in team six. In addition to the facilitator and visionary roles, the team leaders of teams three and four also fulfilled the role of subject matter expert. These leaders indicated that they tried to create the conditions for effective teamwork. They indicated that much of the leadership in virtual teams consists of 'self leadership'. When we compare leadership in the teams on the basis of task type, differences become visible. The leaders of the knowledge sharing teams perform coaching and facilitating roles with relatively little project management. The nature of the project teams demands for their leaders to focus more clearly on progress and output in the team.

Selection and training of team members

For most of the project teams the composition of the team was largely based on expertise and availability of members across locations. Most of the team leaders did not select team members themselves. The leader of team two selected his team members personally. He was looking for people who were enthusiastic and mostly in supporting roles, such as marketing support. The leader also looked for a specific spread of members over locations, different expertise's and seniority levels. Within team three members (of one specific technical background) were assigned to the team from different plants. No specific selection mechanism was spoken of. For the fourth team, a few highly experienced experts were selected largely based on their expertise and years of experience with virtual work. Spread over different geographic locations however also played a role (members had to be spread

over Europe). The informants of teams five and six could not report of selection procedures, because they were assigned to pre-existing teams.

Appraisal and reward practices

Appraising and rewarding team members are complex issues, specifically in virtual teams. The reason for this complexity is the participation of members of sometimes more than one complex matrix organization. Even when only one organization is involved, locations in different countries are represented by independent matrix organizations with different procedures. Evaluation of team members' performance was in the teams' discussed often considered the responsibility of functional team managers. These are the leaders of the departments where virtual team members are *physically* located. However, these individuals are in some cases unaware of more than half of the work of the individuals they are evaluating, therefore coordination with the virtual team leaders was necessary. One of the team leaders commented:

...performance appraisal with multiple managers is a tedious and subjective process. Within ABC we use peer groups to evaluate the relative performance of individuals. In general the pace of organizational changes is simply too high for evaluation systems to adapt accordingly...

Team based rewards that were mentioned in interviews were often instrumental (team three used a crystal globe as a recognition award) with only a very limited monetary component. To make matters worse, in some cases leaders of virtual teams do not have any control over incentives of their team members. Rewarding virtual team members for good performance is therefore a difficult exercise.

Team based rewards were in general considered as ideal, yet in most cases rewards were still linked to individual performance. One of the team leaders illustrated that individual rewards were used, despite the fact that team rewards were preferred in the context of multi-cultural teams:

...team rewards are not working within ABC, team members are rewarded individually because the formulation of a uniform system for team evaluation that is acceptable for all companies is almost impossible...

Rewarding virtual teams becomes ever more complex when teams span greater geographic distance, with resulting differences in culture and economic standards. One team leader recalled a situation in which a team bonus of 10,000 dollars had to be divided over the team, about this he stated:

...it is not easy to determine who gets what. What is a year's salary in Vietnam is not more than a Christmas bonus in the US...

The use of ICT for communication

In general telephone and e-mail were used most often for communication and coordination. In many cases team members met via teleconference, which was sometimes combined with the use of Microsoft net meeting or web x meeting to exchange images and presentations. E-mail was used mostly for informing all team members about specific issues, while teleconferencing was used more for discussing issues within the team.

Additionally video conferencing was used to meet “face-to-face” as well. Different interviewees however commented that the effective use of videoconferencing is very much dependent on the initiatives of participants in the meeting. It was also mentioned that use of this tool is only meaningful when images are of good quality. In other cases video images are merely a distraction. Working with video conferencing across different time zones is sometimes complicated because of absence of technical support, when conferences are held outside of office hours. A video meeting can be severely disrupted if the machinery at one location does not work well;

...doing a teleconference across time dispersed locations is much easier than a video meeting. Team members do not have to show up at the office at absurd hours, in stead they can choose to take the call from their home. Support is another issue. There is always something wrong with the video equipment at one location. With video meetings late in the evening support is simply not around. Often meetings fail to reach their objective because of this...

Team leaders mentioned when more than two locations are involved in a video meeting, a meeting manager should be assigned. This person then determines which location appears at screens at different locations. Also when meetings are held with large groups, a camera operator should be present to zoom in on the person who is speaking.

It was mentioned that good quality video conferencing tools are generally present at the larger organizational units. These are the locations where this application is at its best.

The use of ICT for coordination

In addition, file sharing systems were used in different forms such as 'outlook shared folders' and 'life link' an application from 'open text'. For file sharing systems to be effective, all members have to file and manage their documents consistently, which is sometimes not happening. The systems were also circumvented by sharing and distributing files via e-mail.

Some of the teams were using IBM Lotus workplace (former quickplace) to manage the projects. The informants for teams five and six stated that much of the coordination within and between software design projects is happening where software applications are interrelated:

...The interface is a prerequisite for working together effectively. In other words, you have to set up good modules. Communication is happening almost exclusively in the area where different applications touch and have to cooperate. This is where face-to-face contact is absolutely necessary...

The use of face-to-face meetings

Face-to-face meetings were considered as important by most of the team leaders in interviews. However, of the six teams discussed only one team actually held a face-to-face kick-off meeting with all members attending.

Face-to-face meetings were used to varying degrees in the teams. Leaders of the teams mentioned different reasons for organizing face-to-face teams. Team three for instance used F2F meeting solely for presenting progress to higher management:

...We use face-to-face meetings to report to the RLLT (Leadership Team). Meetings are held once a year, and are considered 'a big thing'. These face-to-face meetings are typically organized around dozens of presentations on a single day...

The leader of team four indicated that he thought face-to-face meetings should be explicitly used for strategy discussion. Within this team meetings were held every three months, with the whole team. These meetings were interspersed with tele-meetings. The leader commented:

...Together these meetings formed the 'heartbeat' of the team. The meetings were largely used to 'synchronize' team members, to discuss about strategy and to develop 'shared understanding'...

Within team one it was stated that face-to-face meetings are generally organized when specific issues came up, or when conflicts arose in the team:

...When I have a difference of opinion with someone who is located here at XYZ, I can have a serious conversation with such a person. At a distance this does not work, you simply can't solve conflicts over telephone...

Although face-to-face meetings were used in most of the teams to a certain degree, not all meetings were involving all team members. Face-to-face meetings were often held between members who were working at the smallest geographic distance. In some cases members would meet for other reasons, outside of the team. These meetings would then be used also for work in the virtual team. Although most teams do plan their meetings, not all teams

planned their face-to-face meetings far in advance. In the case of team five meetings were intentionally never held with all members. Within this team, a large part of the team was working in co-location on the development of a sales configurator tool in Chicago. The person responsible for gathering requirements from the French operating company that was involved in the pilot (our informant), indicated that this meeting strategy was explicit:

...Project management and I myself fly over to the US or the French opco when necessary. The developers in the US have never met the French end users. You can't let end users influence your developers directly, as this would lead to as many requirements as you have end users...

Leaders stated that organizing a face-to-face kick-off solely is insufficient because members are flowing in and out of the team during its lifetime. Ideally face-to-face meetings would be organized with every major change in team composition.

Dealing with multiple leaders and part-time members

Multiple leaders were a fact of life for most of the virtual teams that were discussed in interviews. Different configurations are however possible. In most cases virtual team leaders have to coordinate with managers from functional departments, where their members are physically located. In some cases the virtual team itself also has more than one leader. During interviews it was mentioned that coordination with functional leaders was considered as 'business as usual'. Conflicts however could arise; specifically when team members were working part-time in the virtual teams. In such cases the virtual team leaders had to negotiate with the functional manager for time of his team members. Specifically when time pressure was experienced at any of the two locations (functional department or virtual team), team

leaders reported they had to ‘fight for their time’. In addition they commented that local deadlines are often interpreted as having a higher priority. Team members seem to have a higher commitment to their co located manager, which can cause problems. The complex leadership structure of virtual teams is sometimes experienced as frustrating, as the leader of team six mentioned:

...I coordinate this team with a team leader in France, who does not want me to directly address ‘his’ team members. All coordination with team members in France has to go through this person. However, sometimes I address French team members directly, to save time. This is not well received. I think it is a cultural thing; I have experienced it before in other teams...

Dealing with co-location and distribution within a single team

One of the team leaders in interview referred to the emergence of an ‘us versus them’ mentality in a situation where communication opportunities were not spread evenly over members and locations.

Members who are able to communicate face-to-face have an advantage over members who are working from a remote location. Therefore in an ideal situation, all team members in a virtual team should be forced to work virtually. Organizations however do often not desire such a team configuration, because of the unnatural limitations that are forced upon team members. Nor is such a structure easily feasible when members work in close proximity.

Cultural influences within the team

According to Bell and Kozlowski (2002) virtual teams in which boundaries of either professional, organizational or National cultures are crossed provide a huge challenge to virtual team leaders. Integration of individuals with diverse cultural backgrounds demands for leaders to anticipate the different worldviews of individual team members and respond to them accordingly. Team leaders have to anticipate problems that can result from integration of different cultures within a team.

Rewarding team members for outstanding performance can be complicated across cultures as one team leader commented:

...several years ago I was working in a global team, with Asians and Americans. The American operating company had a system with bonuses based on individual achievements. These were handed out publicly, which was part of their culture to reward high achievers. In this case one of the team members was nominated for a bonus; he received the bonus in the team by public announcement. For the Asian team members such an occasion was unheard of. In their culture a team would be rewarded for team effort, and naturally the reward would be handed over to the leader. This ceremony was very uncomfortable for the team as a whole...

Virtual leaders also have to be aware of cultural differences regarding prioritization, which can result in miscommunication. Having a teleconference scheduled with members of your virtual team can be perceived as more or less a priority, depending on culture, as was mentioned by the leader of team four:

...in some cultures (Spanish) having a face-to-face conversation on location is considered as most important. In such cases someone can not look at his watch and end the conversation by saying he has to attend to a

teleconference. In this case we would just start the meeting and discuss the issues important for this person later on...

Decision making processes in virtual teams can be frustrated by the use of inadequate means of communication, as was discussed in the section on ICT. However, the fit between the technologies used and regional decision processes was also considered as highly important, which was illustrated by the leader of team four. In this example the decision model is composed of several experts and a senior person with decision making authority. As soon as this group can no longer discuss issues in a face-to-face manner, isolated from the meeting, the system fails.

...having a decision making round with a team of Japanese in a face-to-face context can work, provided that the decision model (all the necessary people for a decision) is completely present. This process can still work in a virtual context, as long as the decision model remains intact. However the process fails when a meeting is held via teleconference. The experts start giving avoidant answers. At this point suspicion of malingering at the other locations results...

Shared understanding in virtual teams

Virtual team literature indicates that development of shared knowledge (Cramton, 2001), shared understanding or team mental models (Cannon-Bowers & Salas, 2001) is central to effective coordination of virtual teams (Martins, Gilson & Maynard, 2004).

Our interviewees mentioned that development of shared understanding is perceived as crucial for work in their teams. Team leaders indicated that having a good understanding of the team's task and the responsibilities of individual members for this task is important. The

leader of team six reported that he had weekly face-to-face meetings with his French colleague, in order to make sure leaders were conscious about events happening at the other location, specifically when these had a big impact on the team. The leader of team two indicated that he would travel to every individual team member at least once a year, in order to get an idea what this person's world and working environment look like. The leader of team four mentioned the importance of having a shared understanding of stakeholders of the team. It is important to have a team consensus on who is influencing the team and who is dependent of it. Team members also have to be aware of responsibilities of their fellow team members outside of the team, as this information is usually invisible to virtual team members.

Results from interviews have made clear that dimensions of virtualness and complicating factors that were derived from literature could be identified in organizational practice. The more virtual and complex virtual teams become, the more difficulties can be expected to emerge for team coordination.

Next we will present an overview of suggestions of how to deal with the issues discussed in interviews, on the basis of literature. When possible, best practices are discussed on the basis of literature.

4. Team coordination and leadership – theory and best practices

Leadership

The specific circumstances that leaders are confronted with in virtual teams can provide quite a challenge. Leaders are expected to monitor and manage team performance and also

shape and develop team processes, without much of the face-to-face interaction that is common in conventional teams (Bell & Kozlowski, 2002).

When we consider performance management activities, the leaders' focus has to shift from input management to facilitating processes and managing outputs of team members. Team leaders will increasingly have to rely on the development of structures and protocols to ensure task accomplishment. Leaders are expected to distribute aspects of the leader role to team members, enabling them to manage their own performance to a large extent. In order to enable team members to be self managing, it is important for team leaders to provide clear goals and an engaging direction (Hackman & Walton, 1986) According to Bell and Kozlowski (2002) the establishment of clear direction and goals will enhance team members' ability to self regulate and to monitor their own performance.

The process development functions of virtual team leaders have been discussed in literature in several domains. Topics that have received relatively much research attention are the prevention of feelings of isolation, the development and maintenance of trust and enhancing cross cultural communication over distance (Connaughton & Daly, 2004b).

Literature indicates that teams with very short life cycles prevent leaders from attending to team building activities. Team leaders will only have time to attend to the most pressing needs (Dubé & Paré, 2004).

Virtual team leaders often have to coordinate their performance management and process development functions with other leaders within and outside the virtual team. Virtual team members who are mostly working in matrix organizations might have a functional head, one or more virtual team leaders and perhaps a country or regional director (Connaughton & Daly, 2004a). For well functioning virtual teams consistency of goals and messages

formulated by these different managers is crucial. Communication between these managers is key to preventing misunderstandings. Formally assigned team leaders will increasingly cope with emergent leaders; people who have influence over part of the distant team on the basis of knowledge, experience or expertise. Formal leaders have to acknowledge this emergent leadership and try to use it to get the team's tasks accomplished.

Literature suggests that there is no "one best way" for leading virtual teams. It is suggested that leadership in virtual teams should be fitted to the team context, technology and nature of the task. Avolio and Kahai (2002) propose that leadership in virtual teams can exhibit the same content and style as face-to-face leadership.

Appraisal and reward

Appraisal and reward structures in organizations can be implemented to fulfil different roles such as attracting and retaining personal, motivating performance, promoting skill and knowledge development, shaping corporate culture, reinforcing and defining structure and determining pay costs (Lawler, 2003). Rewards are often tied to the individual, and can in general be based on the person's job, or the person himself in terms of competencies. Rewards on the basis of individual competencies generally provide the best fit with most types of teams, although variations on the basis of team type are present. We will here discuss the unique characteristics of reward structure for one specific type of team; the project team. This choice is made because most of the teams in this study can be considered as virtual project teams. Project teams seem to have very specific needs considering reward structures, when compared to other team types. Traditional pay for performance systems focus mainly on evaluation of performance of individuals on an annual basis. Neither of

these practices is consistent with motivating project teams (Lawler, 2003). Project teams often require a reward structure specifically designed to support them. A virtual project team reward system should be based on group performance and accomplishments. However, this can become complicated when team membership is not stable and efforts are not equally divided over team members. Team rewards are especially important in cases where teams are comprised of members coming from two or more organizations. When team lifecycles are very short, and team performance itself is difficult to measure timely, members can be rewarded on the basis of gain-sharing plans or stock ownership. In some cases individual rewards are necessary. Caution should be applied to prevent this reward type from weakening the integrative impact of the total reward structure. In general evaluation of individual members should be performed by peers, as they are considered as most knowledgeable about individual performance.

Because of the often complex structure of virtual teams, combined with limited direct contact with team leaders, ideally performance appraisal should be performed by means of peer review, as peers are considered to be most knowledgeable about their team mates' work in the team.

Selection

According to Bell and Kozlowski (2002) team members in virtual teams are expected to have technical knowledge, skills, and abilities that enable them to contribute to team effectiveness and to work effectively in virtual conditions. This implies that for selection of virtual team members not only knowledge of their specific domain of expertise is relevant. Just as important are their 'virtual competencies' (Vartiainen, Hakonen, & Kokko, 2003). According to Connaughton and Daly (2004) managers have to select team members who are

comfortable to work independently. A characteristic of team members that is celebrated in this regard is being a 'self starter'.

Use of ICT and face-to-face meetings

When considering the use of technology, equal access to ICT across different sites is very important. Choosing the right ICT for the particular message or purpose is mentioned as very important as well. Media richness theory provides us with insight into the nature and richness of information that different ICT are capable of transferring (Daft & Lengel, 1984, 1986). Face-to-face interaction is considered as the richest medium possible, because it provides for direct interaction (synchronous) and it provides information through the highest number of possible channels, verbal as well as nonverbal. It also provides for immediate feedback. This kind of interaction is perfect for making important decisions and for sharing a vision. E-mail on the other hand can be interpreted as an ICT low in media richness. It provides information based on text in an asynchronous manner. This application can be used very effectively for providing information updates for a large number of team members at once.

Literature suggests that work in virtual teams should ideally start with a face-to-face meeting (Lipnack & Stamps, 2000). Connaughton and Daly (2004) mention that face-to-face meetings are critical especially in virtual teams. The challenge for leaders is to incorporate these meetings into their routine. Face-to-face meetings are considered absolutely critical for trust-building and for the development of shared understanding with distant team members.

Cultural diversity in teams

Cultural diversity between members can result in large differences in individual perceptions as was shown by the work of Hofstede, (1993). More subtle cultural nuances can also play a role, specifically in culturally diverse virtual teams. For instance, not being aware of regional holidays can lead to misunderstandings in a team. Differences in the ways different cultures communicate can prevent subtle messages from transferring their intended meaning. Another issue mentioned by Connaughton and Daly (2004) is the perception of time, which can be quite diverse across cultures. For instance, what is considered as the appropriate time span for someone to answer an e-mail is culturally dependent.

5. Discussion

Team virtualness and ‘complicating factors’ were discussed in the light of virtual team leadership and coordination mechanisms. Information we gathered from interviews indicates that many of the complicating issues mentioned in literature are found in virtual teams in organizational practice. Teams discussed in interviews reflected many of the complicating factors found in literature. Virtual leaders indicated that virtualness and complicating factors have an adverse effect on the development of common ground and awareness within the team.

An overview of best practices for virtual teams was presented on the basis of literature. Changes in the need for leadership as a result of increasing team virtualness were mentioned both in literature and interviews. Leadership preference seems to vary between individual leaders, and the need for leadership seems to vary with the virtual team task domain. Future research should focus on the effectiveness of different types of leadership (e.g.

transformational, transactional) in virtual teams with differing degrees of task interdependence and team structures.

Literature provides us with insights on how to deal with many of the complexities in virtual teams. Suggestions were presented for effective use of selection, appraisal and rewards in virtual teams. Data from interviews suggests that virtual team leaders were aware of many of these ideal best practices from literature. Team leaders however were often unable to apply best practices because of large differences between organizations, differences in economic standards across locations, and cultural differences. These factors seem to stand in the way of a uniform approach to virtual team coordination. Although difficult to apply in a uniform way, appraisal and reward practices are likely to have a profound impact on virtual team effectiveness. Future research should focus on the effect of different types of appraisal (individual or team), based on different methods of evaluation (leader or peers) in virtual teams.

Media richness theory provides us with insights about the usefulness of different communication tools for different purposes. However team leaders mentioned that videoconferencing was considered as a difficult tool to use effectively. Team leaders did report of using different media for different functions. Face-to-face meetings were mentioned as very important, yet their use was differentiated over teams, and varied with the team structure and budgets allocated for travel. Face-to-face meetings were used for progress evaluation and reporting to management, discussing strategy and synchronizing team members, building trust and for decision making.

In the teams we discussed with team leaders, ICT were also used as a direct source of coordination. Workflow and project management software are examples of ICT that provide a team with structure and a clear schedule with targets and deadlines. ICT are also used in the form of data repositories that enable team members to find information about their own and other members' tasks. It would be interesting to investigate the influence of the presence of project management software on team effectiveness. It is likely that the presence of project management software and data repositories will help team members to find information about their tasks, and team members. The presence of shared understanding about task and team could be a mechanism that explains why teams are more or less effective.

Although literature provides us with suggestions for effective leadership for virtual teams, these insights are largely based on insights derived from research on conventional teams. The effect of different forms of leadership on virtual team processes and effectiveness has received little research attention.

Shared understanding seems to be more difficult to develop in virtual teams as a result of limitations on face-to-face interaction. This issue is mentioned both in literature and interviews. Ironically, shared understanding seems to be more important for virtual teams than for conventional teams, because of the absence of face-to-face interaction. Being able to work in a coordinated fashion without the possibility to discuss every issue places a high demand on the degree of shared understanding that virtual team members experience regarding their team and task.

Specifically interesting is the role of different leadership types in helping team members develop shared understanding. To investigate the relationship between leadership, ICT, shared understanding and virtual team effectiveness we propose the following research model.

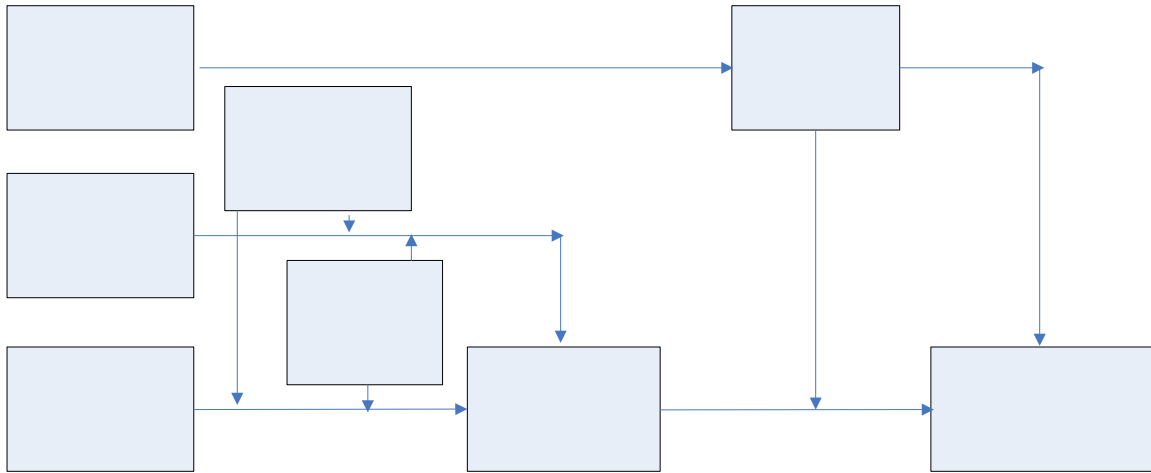


Figure 2: Research model

Appraisal & reward structure

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