Success of virtual environments: Support for high-performance virtual teams

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Encyclopedia of Virtual Communities and Technologies

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CROSSING BOUNDARIES

While work has been conducted across geographical distances as long as humans have been engaged in work, advances in technology as well as changes in the global economy have increased both the requirement and the potential for teams to work together effectively across geographical and organizational boundaries (Hinds & Kiesler, 2002). Research conducted in the 1960s and 1970s on group development process provides a foundation for understanding and supporting the development of high-performance virtual teams (Tuckman, 1965; Tuckman & Jensen, 1977). Coupling group development process with groupware, Computer-Supported Cooperative Work (CSCW), and new peer-to-peer technologies, virtual teams have the support to move through the development stages until they become high-performance virtual teams. In fact, a recent benchmarking study determined that virtual teams have the potential to function even more productively than co-located teams (Majchrzak, Malhotra, Stamps, & Lipnack, 2004).

VIRTUAL TEAMS

According to Katzenbach and Smith (2003), a team consists of a relatively small number of people, working together to achieve a common set of goals. Teams are usually established in such a way that they include members with complementary skills. Members are expected to work together in order to achieve specific results for which they hold themselves and each other accountable (Katzenbach & Smith, 2003).

A virtual team may be referred to as a Geographically Dispersed Team (GDT) and has the following characteristics:

- A group of people working together
- Team members work interdependently and share a specific purpose
- Team work is accomplished across boundaries of space, time, and/or organizations

- Virtual teams use technology to support their work as a group (Lipnack & Stamps, 2000).

A number of factors underlie the current trend toward establishing virtual teams (Lipnack & Stamps, 2000):

- Employees with specialized skills may be located in various places
- Workers themselves desire flexibility in where they live and work
- Knowledge workers expect to be supported by advanced technologies
- With virtual teams, organizations can be more agile and therefore more responsive to customer needs and changes in the market
- Members of virtual teams can spend less time traveling to and from work or meetings
- Increased globalization affects both tasks and organizations
- Depending on the location of its members, a virtual team may work different shifts and be able to cover more than eight hours in a work day
- Current work environments require cooperation among different organizations as well as competition between them
- There has been a shift in expectations of ways that workers participate in their organizations
- The transition from production to knowledge or service types of work promotes the move to virtual teams
- Human resources are more apt to be geographically and structurally distributed in a more horizontal organizational structure.

Interactive technologies are now available and collaborative tools are under development to support teams sharing information and resources and working together across time zones and continents. Virtual teams engage in rapidly changing, fluid environments, which demand good teamwork and clear communication. Many virtual teams encounter problems and do not succeed because they do not adequately address issues in team building or group process or they do not adjust to the differences which stem from working at a distance (Lipnack & Stamps, 2000).

C R I T I C A L S U C C E S S F A C T O R S

The following equation describes the components of virtual teams:

Virtual teams = teams + communication links + groupware

Lipnack & Stamps (2000) identify four words as describing the essence of virtual teams:

- People – who lead and participate in virtual teams
- Purpose – which drives the focus of the team
- Links – the interconnections through relationships, channels, and interactions, which are supported by technology
- Time – the milestones, schedules, calendars which the team must meet.

Hartzler & Henry (1994) indicate two important characteristics of virtual teams that directly affect the effectiveness of virtual teams:

- The team views all members as accountable for the results of the team
- Joint problem-solving and decision-making occur among team members.

However, Hackman (1990) believes that most distributed groups do not become real teams in that they do not maintain a stable and consistent membership with a shared working process and pursue a common goal that the team embraces and knows can only be achieved through the work of the team.

Research has demonstrated that teams experience five different stages in the development of their group (Tuckman, 1965):

- Forming - orientation, introductions, agreeing on initial goals for the group
- Storming - dealing with differences of opinion and conflicts
- Norming - resolving difficulties and focusing on the work at hand
- Performing - functioning as a team, working together on a group project
- Adjourning - terminating their work together when they have achieved their performance goals.

In effective teams, members are not only committed to the purpose and goals of the team but they are also committed to each other (Katzenbach & Smith, 2003).

Meyrowitz (1985) feels that the patterns of information flow determine the nature of the interactions among virtual team members and that a feeling of "groupness" is achieved through three aspects of group work that underlie the formation of virtual teams:

- Identity based on sharing some privileged information among themselves that is not shared with people outside the group
- Socialization which is handled through both formal methods of orientation and training and informal methods of sharing suggestions on how things are done within the group
- Rank and authority, which depend on access to places containing knowledge restricted to those of a certain rank in the organization.

Horvath & Tobin (2001) view three areas as forming the core of high performance in teams:

- Context
- Process
- Psychosocial traits.

Furthermore, empirical research has demonstrated a positive relationship between the performance of virtual teams and the following six competencies:

- Communication
- Relationship Building and Management
- Leadership
- Decision Making and Implementation
- Collective Understanding
- Swift Trust (Horvath & Tobin, 2001).

G R O U P W A R E

Virtual teams are supported by groupware technologies and Computer-Supported Cooperative Work (CSCW). According to Saikali and David (2001), CSCW proposes a set of tools and methods that cover three fundamental aspects:

- Communication: to enable the exchange of information among team members

- Cooperation: to provide tools that support team members working together, including a shared workspace, where team members can share the same tools, files, documents, and data
- Coordination: to manage interactions among team members and tasks.

Groupware can be divided into three main categories of applications:

- Document and forms-based groupware
- Transaction-based high-volume information management groupware
- Organizational communications groupware.

A common way to explain different types of groupware systems is to place them in a framework using the two dimensions of time and place. Groupware systems can be characterized as systems that support cooperative meetings or work in the following four ways (Khoshafian & Buckiewicz, 1995):

- Synchronous and coincident: same time/same place. Examples include: electronic whiteboards, electronic meetings, team rooms, and peer-to-peer synchronous environments.
- Synchronous and displaced: same time/different places. Examples include: videoconferencing, document sharing, and teleconferencing.
- Asynchronous and coincident: different times/same place. Examples include: virtual rooms, electronic bulletin boards, and document management systems.
- Asynchronous and displaced: different times/different places. Examples include: email, workflow, routing and notification.

V I R T U A L C O L L A B O R A T I O N

It is worthwhile to consider a recent finding from a benchmarking study demonstrating that teams may increase their productivity through virtual collaboration (Majchrzak, Malhotra, Stamps, & Lipnack, 2004). With projects requiring a variety of specialists who are often geographically-dispersed, it is encouraging to find that virtual teams supported by online team rooms and shared workspaces are able to avoid a number of the problems that adversely impact face-to-face teams. In order to achieve such increases in productivity, the team's process and social dynamics require management, tracking decisions and action items and resolving conflicts as they arise.

This trend toward greater productivity of virtual teams represents the co-evolution of human-based and tool-based capabilities (Engelbart, 1992, 2000). With more sophistical knowledge management tools, it is possible to increase collective intelligence, resulting in a high-performance organization. Since groups in an organization are continuously engaged in an ongoing process of analyzing, digesting, integrating, collaborating, developing, applying, and re-using their knowledge, Engelbart proposes the development of an infrastructure providing key capabilities for organizations to use. This capability infrastructure is referred to as The COncurrent Development, Integration and Application of Knowledge (CODIAK) (Engelbart, 1992, 2000). The CODIAK infrastructure includes the following features:

- Hyperdocument mail
- Hyperdocument library
- Global and Individual Vocabulary Control
- Multiplicity of Look-and-Feel Interface Choices

- Shared-Window Teleconferencing Inter-Linkage between Hyperdocuments and other Data Systems.

Peer-to-peer architectures provide another emerging technology to support collaboration among virtual team members. Changing the paradigm from a closed individually-focused system to a multi-user environment with high bandwidth, the open Croquet project offers a peer-to-peer collaboration architecture supporting a 3D virtual environment, designed to act like a high-bandwidth conference call among team members. Croquet is a complete development and delivery platform for doing real collaborative work, which focuses on interactions inside a 3D shared space that is used for context based collaboration, where each user can view other users. In a similar manner to links between pages on the World Wide Web, Croquet provides spatial portals as dynamic connections between virtual worlds (Smith, Kay, Raab, & Reed, 2003).

C O N C L U S I O N

If we understand and apply the process of group development to virtual team development and choose technology that supports the work of the group, we have the opportunity to build high-performance virtual teams, capable of working productively across geographical and organizational boundaries. Technological advances in knowledge management, peer-to-peer architectures, and virtual environments allow teams to increase their organizational intelligence and engage in deep collaboration. While barriers to the success of virtual teams arise from the social and technological obstacles confronting distributed workgroups, emerging technologies and an increased appreciation of critical success factors support a deeper level of collaboration, more effective sharing of resources and ideas, and more efficient completion of tasks when action items and commitments are tracked.

R E F E R E N C E S

Engelbart, D. (2000). An In-Depth Look at “The Unfinished Revolution” presented at Stanford University, Palo Alto, CA.

Engelbart, D. (1992). Toward High-Performance Organizations: A Strategic Role for Groupware. *Proceedings of the GroupWare '92 Conference*. San Francisco: Morgan Kaufmann Publishers.

Hackman, J.R. (Ed.). (1990). *Groups that Work (and Those that Don't)*. San Francisco: Jossey-Bass.

Hartzler, M., & Henry, J. E. (1994). *Team Fitness: A How To Manual for Building a Winning Work Team*. Milwaukee, WI: Quality Press.

Hinds, P., & Kiesler, S. (Eds.) (2002). *Distributed Work*. Cambridge, MA: The MIT Press.

Horvath, L., & Tobin, T.J. (2001). *Twenty-First Century Teamwork: Defining Competencies for Virtual Teams*. Virtual Teams (Vol. 8). Amsterdam: Elsevier Science Ltd.

Katzenbach, J.R, & Smith, D.K. (2003). *The Wisdom of Teams: Creating the High-Performance Organization*. NY: HarperCollins.

Khoshafian, S., & Buckiewicz, M. (1995). *Introduction to Groupware, Workflow, and Workgroup Computing*. NY: John Wiley & Sons, Inc.

Lipnack, J., & Stamps, J. (2000). *Virtual Teams: People Working Across*

Boundaries with Technology. (2nd ed.). NY: John Wiley & Sons.

Majchrzak, A., Malhotra, A., Stamps, J., & Lipnak, J. (2004, May). Can Absence Make a Team Grow Stronger? *Harvard Business Review*.

Meyrowitz, J. (1985). *No Sense of Place: The Impact of Electronic Media on Social Behavior*. NY: Oxford University Press.

Saikali, K., & David, B. (2001). Using Workflow for Coordination in Groupware Applications. *People and Computers XV – Interaction without Frontiers. Joint Proceedings of HCI 2001 and IHM 2001*. London: Springer-Verlag, 399-411.

Smith, D.A., Kay, A., Raab, A., & Reed, D.P. (2003). Croquet – A Collaboration System Architecture. *Proceedings of the First Conference on Creating, Connecting and Collaborating through Computing (C5'03)*. IEEE Computer Society Press, 2-10.

Tuckman, B. (1965). Developmental Sequence in Small Groups. *Psychological Bulletin, 63,* 384-399.

Tuckman, B., & Jensen, M. (1977). Stages of Small Group Development. *Group and Organizational Studies, 2,* 419-427.

Terms and Definitions

CSCW - Computer-Supported Cooperative Work: a combination of an understanding of group process with the enabling technologies that support group work. CSCW systems focus on technologies and processes that support groups that work together in a cooperative, coordinated, and collaborative manner. CSCW systems are often categorized in terms of time and location, whether work is carried out at the same time (synchronously) or at different times (asynchronously) and whether work is done in the same place (face-to-face) or in different places (distributed).

Geographically Dispersed Team (GDT): A group of people who work together across boundaries of time, space, and organizations, usually supported by network and communication technologies. Team members generally have complementary skills, sharing an overall purpose and interdependent performance goals, along with an approach to work that the team adopts, by which members hold themselves mutually accountable.

Groupware: Software that supports teams of individuals working together via network technology, facilitating communication, coordination, and collaboration among team members.

Peer-to-peer: A network topology in which devices communicate directly with each other rather than through a server, as in a client/server architecture. Each system shares responsibility for initiating, maintaining, and terminating a session.

Team: A small number of people, usually possessing complementary skills, who work together toward a common purpose, with shared performance goals and an approach to work for which they hold themselves and other team members accountable.

Virtual environment: A place that is rendered to provide the illusion of a 3-D environment, which is replicated on the Internet.

Virtual organization: A combination of technology, expertise and networks to support an organization with little physical infrastructure, relying on connections through computer systems rather than shared presence in the same physical location.

Virtual team: A group of people who are located in different physical locations, who work together to achieve shared goals, supported by technology.

Workgroup: A group of individuals who share network resources in order to collaborate and communicate with each other while they work together on a common project.