

December 2001

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Jack Becke
University of North Texas

Rodger Ballentine
University of North Texas

Karon Tedford
University of North Texas

Angelique Lee
University of North Texas

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Recommended Citation

Becke, Jack; Ballentine, Rodger; Tedford, Karon; and Lee, Angelique, "Best Practices for Managing Collaborative Technology Tools and Virtual Teams" (2001). *AMCIS 2001 Proceedings*. 122.
<http://aisel.aisnet.org/amcis2001/122>

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BEST PRACTICES FOR MANAGING COLLABORATIVE TECHNOLOGY TOOLS AND VIRTUAL TEAMS

Jack D. Becker

Information Systems Research Center
University of North Texas
becker@unt.edu

Rodger D. Ballentine

Center for the Study of Work Teams
University of North Texas
rodger@unt.edu

Karon S. Tedford

Center for the Study of Work Teams
University of North Texas

Angelique Lee

Center for the Study of Work Teams
University of North Texas

Carole Townsley

Center for the Study of Work Teams
University of North Texas

Abstract

From 1998 to 2000 the University of North Texas' Center for the Study of Work Teams (CSWT) and Information Systems Research Center (ISRC) conducted a cross-disciplinary benchmarking study of collaborative technologies used for virtual teaming. Approximately 140 surveys were mailed to over fifty companies; 46 usable replies from 41 companies were used in this study. While the sample was primarily a convenience sample from firms that were closely affiliated with one or both of the research centers, many of these firms were Fortune 500 companies. Organizations were classified in a Virtual Teaming Matrix according to both their stage of collaborative technology development and their teaming maturity. Finally, the management practices for both the highest and lowest performing virtual teaming organizations were compared. A number of "best practices" for high performing virtual teams have started to emerge. Due to sample size limitations this research is considered still exploratory in nature.

Keywords: Virtual Teams, Collaborative Technologies

Literature Review

From Johansen (1979 and 1991) to Coleman (1997) most virtual team-based studies have focused on the technology needed to support teams of workers that are separated by time, distance, and culture. However, recently Ballentine et. al. (1999), and Becker et. al. (1999) proposed that the success of virtual teams (VTs) required more than merely good collaborative tools. They proposed that the success of virtual teams required an equally important amount of attention to developing a high-quality collaborative work group environment. Other researchers have examined additional factors, such as, management styles, individual and task characteristics, and group dynamics, that help ensure the successful implementation and management of virtual teams (Horvath and Duarte, 1997). This paper focused on identifying the management practices that appeared to best differentiate the more mature virtual teaming organizations from those organizations that are just beginning to develop virtual teams.

Collaborative Work And Virtual Teams

Prompted by global competition and recent advances in computer and telecommunications technologies, organizations are re-evaluating their structure and work processes. In an effort to boost productivity, many companies have developed some form of

collaborative (e.g. team-based) work group system (Hamel and Prahalad (1996). It is widely acknowledged that teams outperform individuals acting alone, especially when performance requires multiple skills, judgments, and experiences (Katzenbach and Smith, 1993; Mohrman, Cohen, and Mohrman, 1995).

Globalization and advances in information technologies have spawned a new type of team structure, i.e., *virtual teams*. Virtual teams are small groups of people working across time and distance supported by new computer and communications technologies (Lipnack and Stamps, 1997). Organizations are investing large amounts of time, money, and effort with the expectation that the impact of their virtual teams on the bottom line will justify their costs. Many organizations are disappointed in the results, however, and few are getting the returns they expected. The challenge facing many organizations today is how to fulfill the potential of teams *and* information technology (Mankin, Cohen, and Bikson, 1996; Ballentine et. al., 1999). For the sake of simplicity, this paper uses the term *virtual team* as a euphemism for the generally more accurate, but cumbersome term, *non-co-located collaborative work group*.

Collaborative Technology Tools

A set of telecommunication and computing technologies, including desktop video-conferencing, collaborative software, and Internet/intranet systems, are evolving to form the basic foundation for a new workplace--one which is unrestrained by geography, time and organizational boundaries.

Furthermore, a large number of researchers have examined both synchronous and asynchronous meeting facilitation using Group Decision Support Systems [GDSS] tools. Recently Briggs, Crew, and Mittleman (1998) cited eight factors necessary for asynchronous GDSS meeting success, while Maghnouji, Wijk, and De Vreede (1998) proposed a more systematic Balanced Scorecard method for using GDSS. GDSS impacts on meeting quality have also been reported by Shin and Reinig (1998), and Teegarden (1995). Their findings indicate that GDSS tools provide structure to decision-making, enhance meeting efficiency, and facilitate full participation of all attendees.

In spite of a large quantity of research no standard set of collaborative technology tools has emerged. This study used the eighteen types of collaborative technology tools proposed by Becker et. al. (1999). This scheme is a modest refinement of Johansen's (1979, 1991) seventeen information technology support mechanism for work groups and Coleman's (1997) categories of GroupWare.

The Becker et al. (1999) taxonomy contains the following set of eighteen collaborative tools: E-mail/ Electronic Messaging , Audio Conferencing, Collaborative Presentation Software, Conference Rooms, Video-conferencing, Desktop Videoconferencing, Discussion Databases, Document Management Software, Electronic Whiteboarding, Group Authoring, GDSS, Group Scheduling and Calendaring, Knowledge Management systems, One-way Bulletin Boards (BBS), Personal Communication Tools (includes laptops, cell phones, pagers, etc.), Project Management Software, Remote Dial-Up Access, Web Browsers, and Work Flow Management Systems.

Virtual Teaming Grid

A two-dimensional model, including collaborative work group formation and collaborative tool implementation, was used to compare each organizations virtual team development. S-Curved stage models for both teams and technologies were used as the basis for the development of this model: First, Tuckman's Model of Group Development (1965) was used to determine the stage of team development and then, and Nolan-Norton's Stages of IT Development (1973). Tuckman's (1965) model proposes that groups or teams go through four stages of development: Forming, Storming, Norming, and Performing. A 5th stage, Adjourning, was added by subsequent researchers (e.g., Harris and Sutton, 1986; Ginter, Duncan, and Swayne, 1992). When laid out on a grid with Time as the x-axis and performance on the y-axis, these five developmental stages of teams form a type of S-Curve. A classical hypothesis is that team performance may actually drop during the storming and norming stages as the organization culture undergoes a sometimes-painful transformation.

Nolan-Norton's (1973) Five Stages of IT Development are Initiation, Contagion/Expansion, Control, Integration, and Maturation. Norton proposed that the S-shaped curve reflects organizational learning and maturity as computer technology related management and control systems were applied to business processes.

When these two models of development are integrated, the result is the Unified Stage Model for Virtual Teaming. This theory proposes that virtual teams evolve through developmental stages in a manner similar to the processes proposed by Tuckman and Nolan-Norton.

Methodology and Results

The Questionnaire

A thirteen-page questionnaire was used to ask a variety of in-depth questions on the following topics: 1) What collaborative tools were being used and for what purposes? 2) How frequently are they being used? 3) What percentage of the company population was using each tool? 4) How effective were the virtual teams? 5) What factors were most important for increasing team effectiveness? 6) What were the most important factors for a successful implementation of virtual teams? And 7) What were the most significant changes that your organization made to support your virtual teams?

Approximately 150 questionnaires were sent to 50 companies from November, 1998 to December 1999. Forty-six usable surveys were completed and returned, representing 41 companies. Industries responding included Manufacturing, Consulting, Oil and Gas, Computing Technology, Financial Services, and Healthcare companies. The single largest group of respondents was information technology (IT) managers and directors (46% of the sample), followed by CIO's and VP's (23%)

Stages Of Technology And Team Development

Based on survey responses it was possible to create measures for both the stages of team development and the level of collaborative technology tool implementation. First, a *team effectiveness measure* was defined to be the product of the average of perceived team effectiveness (questions 6 and 12) and the perceived stage of development (question 3.d.). Hence a team at the Norming stage (level 3), but with effectiveness of only 3 would result in a weighted average team effectiveness score of 9. The most effective teams (4 rating) at the Adjourning (or mature level 5) would have a team effectiveness score of 20.

Next the collaborative tools measure was defined as the weighted sum of the frequency of usage and its extent of usage for each of the eighteen collaborative tools. The frequency of usage (daily, weekly, monthly, yearly), and the extent of usage (percentage of employees that use the tool) for each collaborative tool were reported in survey question 16. For example, email was generally used daily (score 4 for daily usage, 3 for weekly usage, 2 for monthly usage, 1 for annual usage, and zero for not used) by nearly 100% of the employees in an organization; hence its score would be close to 4.0. Tools with scores close to 4.0 were considered to be pervasive tools; hence this metric was called a *pervasiveness measure* of collaborative tool utilization. Finally, the pervasiveness scores for all 18 tools were averaged together to get an overall collaborative technology tool score (See Figure 1). Team effectiveness scores shown next to points on the Virtual Teaming Grid ranged from 2.2 to 17.5, while pervasiveness ranged from close to zero to 2.5.

Organizations were later interviewed to validate the correctness of their placement on the grid. A remarkable level of consistency was observed. The Virtual Teaming Grid was then divided into somewhat equal grouping of firm and defined as follows: Quadrant I was referred to as the Low Techno-Teaming quadrant (18 firms), Quadrant II was referred as the Techno-Enthusiasts quadrant (10 firms), Quadrant III was the Teaming-Enthusiasts quadrant (10 firms), and Quadrant IV was the High-Performing Virtual Teams quadrant (8 firms). Several of the major consulting firms were found in Quadrant IV.

Best Practices Observed

When the management practices of the Quadrant I teams were compared with the management practices of the Quadrant IV teams the following significant differences: Quadrant IV firms placed a much higher premium on collaborative tool training, ease of collaborative tool usage, quality and availability of technical support, and the importance of a face-to-face kickoff event for new virtual teams. Quadrant I firms placed more importance on the need for group facilitation or leadership. Both groups placed high importance on the ability to communicate non-face-to-face, setting well defined goals, assessing performance, planning and managing task completion, and defining a standard set of collaborative tools.

Summary and Conclusions

This study took a cross-disciplinary view of the deployment of virtual teams (usually collaborative work groups) within organizations that were widely dispersed, but not necessarily virtual enterprises. Our sample of 41 firms includes many Fortune 500 companies. While the study tried to understand the characteristics and management practices for virtual teams, we discovered that most organizations that even regarded themselves virtual teaming organizations were not yet 'Quadrant IV' virtual teaming organizations. A taxonomy of eighteen categories of collaborative tools was used to assess the pervasiveness of collaborative technology usage in each organization. In addition a measure for teaming effectiveness was also defined for each of the 41 firms using Tuckman's teaming stages. Firms were then grouped according to their teaming and technology scores in the Virtual

Teaming Grid. High-performing virtual teaming organization were compared with low-performing virtual teaming organizations. While a number of management practices and characteristics of the high- and low-performing organizations emerged as being quite different, the size of the sample precluded any rigorous analysis of the findings. However, there does appear to be sufficient evidence and incentive for many more studies of this nature.

Footnote: The most pervasively used collaborative tools within industry today include Email, personal communication tools, Web browsers, audio conferencing, group calendar scheduling, remote dial-up.

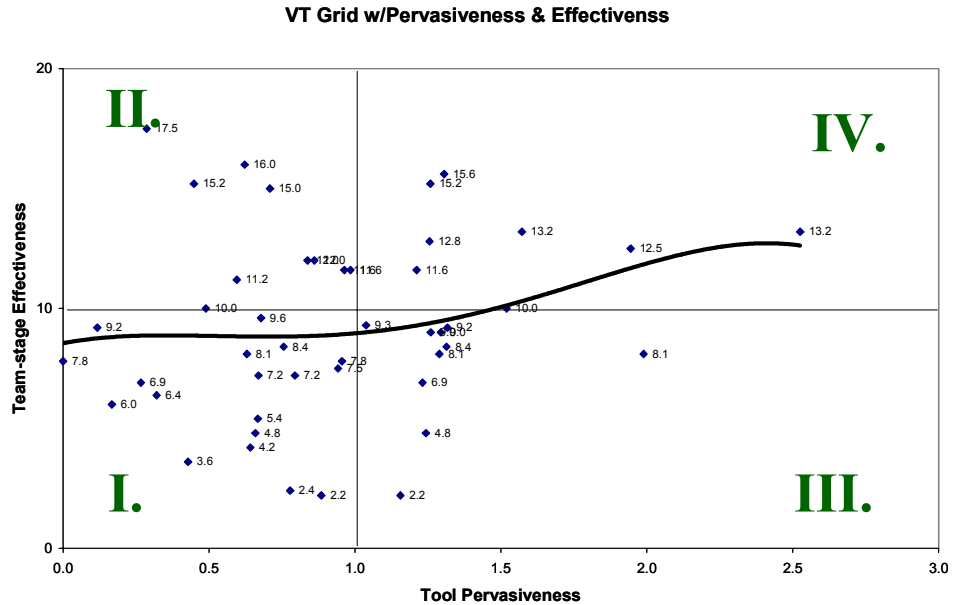


Figure 1. Virtual Teaming Grid

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