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The Impact of Emergent Web 2.0 on Virtual Teams

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ABSTRACT

Project management as it is known today is relatively new. The concepts and theories of managing projects and teams have developed over the past several decades. A large influence on project management has been in the utilization of information technologies to manage projects and teams. Emergence of Web 2.0 tools has made it easier for companies to conduct projects using virtual teams. This paper reviews the concept of virtual teams and tools available to enhance the virtual team's ability to communicate, collaborate, and contribute. A review of virtual team development will provide foundation for how risks and trust play an impact on team performance. For these virtual teams trust is a major factor in their success or failure. Another factor impacting team performance is employee satisfaction, their need for networking and how they perceive bonds within their networks.

Key words: project management, social networking, virtual team, Web 2.0

INTRODUCTION

The concept of teams working together on projects has been around since the beginning of civilization. In some cases individuals would travel days, weeks, or months to work as a team to complete a project. As the study of project management gained in popularity as did the demand for development of tools and methods to improve management of projects and teams. As computers became necessity, project management needs evolved. Information technologies provide project managers with new methods of organizing, staffing, budgeting, directing, planning and controlling projects. As information technologies improved, companies are further testing various possibilities of operating project teams in a virtual environment.

Managing virtual project teams can be a daunting task for the project managers. Often they are managing and communicating with the virtual project team using information technologies such as Web 2.0 applications, cell phones, faxes, email, web pages, and intranets. Project managers, companies, and individuals can use these available technologies as a way to increase efficiency and productivity of virtual teams by enhancing their ability to contribute, collaborate and communicate. The availability of these technologies can also improve the project manager's

ability to track risk factors and create a knowledge management system. The knowledge shared through Web 2.0 applications can be stored and accessed by management or future teams. This paper will not only focus on how information technologies enhance project management, but the impacts on virtual team performance.

The success or failure of virtual teams can also be impacted by an organizations culture and the development of trust. If a company's management is unsupportive of new technologies the performance of a virtual team could be impacted. Another issue with virtual teams is the lack of face-to-face communication. In co-located project teams, trust is developed when individuals are able to meet face-to-face, in a virtual team environment this communication method is lost and can create issues for the project manager in developing trust with team members and between members. As Web 2.0 applications gain popularity many individuals associate satisfaction with being virtually connected and are increasingly trusting their virtual bonds for support. In the past activities such as participating in community or church filled an individual's sense of belonging, they now use Web 2.0 applications to connect and fill this void. This change in culture is making it easier for individuals to accept assignments to virtual teams.

VIRTUAL TEAM AND PROJECT

The use of "virtual" can be applied to many items. In the business world virtual has often been linked with terms such as teams, meetings, tour, groups, communities, or project. According to Merriam-Webster's online dictionary (m-w.com) there are several definitions of virtual, the one applicable to project management is "being on or simulated on a computer or computer network" and "occurring or existing primarily online." This definition applies to the business virtual environment discussed throughout this paper. If a team is a group of people who share a commonality and interact with each other for purpose of meeting specific objectives, then a virtual team would share same characteristics. The key difference is the virtual team operates in mainly an online environment.

In project management the virtual team is organized by either the project manager or management. Hertel, Geister, and Konradt (2005) point out in some cases that virtual teams can come from virtual groups. The virtual team would execute a project schedule and tasks similar to a project team with a few exceptions. Unlike a co-located project team who would function predominately in a face-to-face environment. According to Adams and Adams (1997), the virtual team would consist of members who were geographically separated and would rely on electronic communication tools since face-to-face communication is nearly never used because either schedules or distances do not permit. When a virtual team is created due to issues with distance there are other factors which impact the team's performance. These can include time or schedule constraints and communication costs. A team operating in different time-zones potentially face schedule constraints. Some members may have to work flexible schedule in order to communicate with other members. In addition, the project manager would need to be concerned with costs associated with communicating at a distance. Over the past decade advancements in information technologies have made available several applications or tools project managers can utilize to reduce communication costs.

Another type of member who would participate in virtual groups or teams is a telecommuter. This member will work from home and office, taking advantage of information technologies to communicate, collaborate, and contribute to the team and project completion. With telecommuters the project manager is able to meet with the member face-to-face for communication and evaluate performance.

APPLICATIONS OF INFORMATION TECHNOLOGIES

In the Internet's early stage it was basically viewed as a content repository where individuals viewed and downloaded data. The Internet also provided an environment for individuals to shop and email. At that time, virtual teams would have relied heavily on landlines for fax and telephone support and Internet for email. It would have been expensive to operate a virtual team. The reliance on telephone and email as sole communication tools to manage virtual teams was detrimental to team performance. Communication between project managers and team members would be limited to speed and response of email delivery, which also would not allow for real time communication with immediate feedback (Furst, Reeves, Rosen, & Blackburn, 2004). Telephone communication was costly with long distance charges. This communication relied on schedules, members tied to specific location, and for members to be available for at specified time for discussion. As a result, virtual teams were not favored for project assignments.

As the number of users and businesses using the Internet increased, programmers are tasked with developing a platform that improves collaboration and permits users with ability to modify documents online. The new platform has come to be referred to as Web 2.0. This advanced technology changes how we interact with the Internet and improve the applications available for teams to communicate. Prior to Web 2.0, content and applications were no longer created and published by individual. Rather, they could modify, communicate, contribute, and collaborate (Palvia & Pancaro, 2010). With rapidly expanding global business, companies need new tools to support their project managers and virtual teams. The Web 2.0 technology improves information exchange and communication within virtual teams. These teams are now able to use Web 2.0 tools like blogs, communities of practice, cloud, wikis, Web conferencing, online document sharing and collaboration, and social networking sites. This technology provides project managers and virtual team members to manage and run applications and software in an online platform, which allows users to operate from anywhere. The tool available to virtual teams that is beginning to gain popularity is social networking.

The concept of social networking dates back to the 1970s, when computers were in limited demand by everyday users due to their size and cost. Bulletin Board Systems were utilized by individuals to communicate with other users and download files (Nickson, 2009). These Bulletin Board Systems traditionally consisted of local users due to long distance costs and were the first signs of virtual communities. It did not take long for corporations to take notice of the benefits these systems could have for their engineers in sharing of expertise. Nickson suggests CompuServe is responsible for wider acceptance of discussion forums where companies could grant a group of employees to share ideas or comments. CompuServ and Bulletin Board Systems set the stage for businesses to begin communicating on projects. The forums and message boards

permitted engineers geographically separated to share technical knowledge, create business knowledge, and establish expert panel in knowledge management.

Figure 1. Social Networking Unique Users in United States.
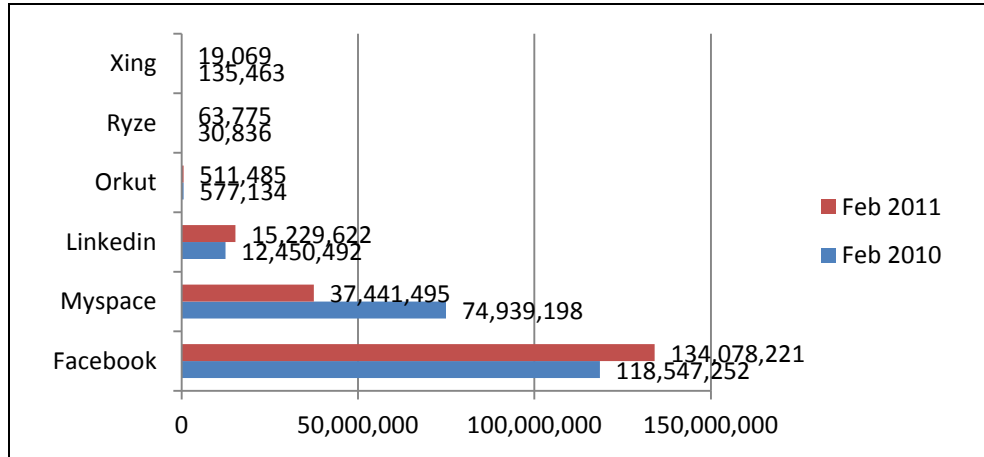
With Web 2.0 platform, social networking sites are able to create virtual environment where individuals could communicate, collaborate and contribute. The sites are either originally classified as personal or professional. Figure 1 displays the number of users signed up in February 2010 and February 2011. The change in users over the year for top social networking sites is provided in Figure 2. The professional sites include Xing, Ryze, and LinkedIn. Of the three, according to data pulled from Compete reflects LinkedIn as having gained an additional 22.32% of users between February 2010 and February 2011. Of the personal sites, only Facebook has benefited in a 13.10% increase in users over the same period. While originally classified as a personal social networking site, Facebook has marketed itself as a tool for organizations to utilize for marketing, communication, and team-building.

Figure 2: Annual Percent Change in Users of Social Networking.
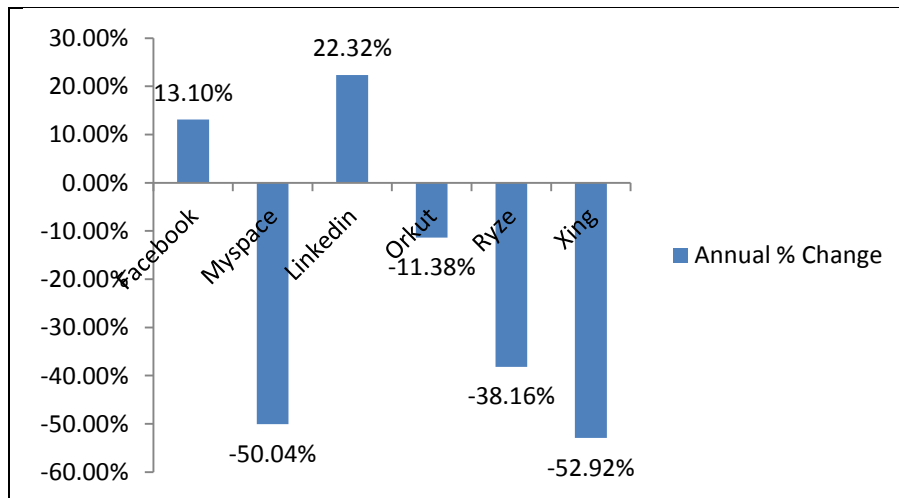
These sites are often portrayed as a personal due to their main functions being photo and video sharing, status of personal life, and ability to follow interests such as musicians, actors, and

sports teams. However, they also provide a valuable resource for professionals. These sites permit professional development and ability to communicate, contribute, and collaborate with teams. For professional development, users are able to build their professional network by contacting other users who share business interests, careers, or other selected data. In addition, provides members access to mentors. Through this medium the mentor and mentee can develop career goals and set-up control system to monitor and evaluate progress. Social networks assist project managers by providing communication tool to interact with clients. These tools can provide clients with progress or status checks. In addition, project managers can communicate with remote team members.

Utilizing these sites as a professional allows users to load qualifications into their profile. They can identify any skills they possess. For project managers they can use these "electronic resumes" to select team members. The Institute for Corporate Productivity surveyed a group of professionals in 2007 and found 65% use social networking. This same survey revealed 52% of those who responded stated their business uses these sites to allow interaction of management and employees with remotely located employees ("Biz," 2007).

The benefits of social networking fall into one of three categories--community, collaboration, or contribution (Bennett, Owers, Pitt & Tucker, 2009). The category of community refers to a users feeling of wanting to belong. Team members will share personal information such as photos, videos, and interests with the virtual group, community, or team. Other benefits of social networking fall within collaboration. Here team members will share information and work together on solutions. Through collaboration team members will solve technical issues. Finally, according to Bennett et al. (2009), team members will contribute toward project completion by providing inputs and sharing knowledge management.

Along with social networking there are several other Web 2.0 tools and information technologies virtual teams can utilize to improve performance and contribution. These technologies will contribute toward user's ability to collaborate on projects and feel like they are part of a community. The following technologies are just a few of the ones available to project managers and virtual teams:

1. Instant Messaging: Peer-to-peer communication is an essential aspect for successful virtual teams and key to team performance. Being able to communicate with immediate feedback is vital for flow of information and team collaboration. Today virtual teams can use AIM, Yahoo Messenger, and Facebook, to name a few.

2. Wikis: This type of tool allows users to collaborate on developing output. Virtual teams can use these wikis to begin the collection of knowledge management or use as a memory for risk management (Iandoli, 2009).

3. Forums: Virtual teams can create forums based on project tasks with sub-forums for specific areas. These forums provide area for members to communicate. Project manager can retain moderator role so he or she can monitor and evaluate team progress.

4. Blogs: Utilized by virtual teams to start and build a dialogue regarding the project or tasks needing to be accomplished. Razmerita, Kirchner and Sudzina (2009) identified five uses for blogs as follows:
   - Provide other users with project status
   - Attempt to influence users through opinionated posts

- Request other users to offer feedback
- Share thoughts
- Release stress by sharing emotions

5. Web conferencing: With programs such as WebEx, Fuze Meeting and GoToMeeting members can attend virtual conference calls. Another popular application is Skype. This program has gained significant market with younger generation because of its versatility. The project manager can use these applications to monitor and evaluate team performance with face-to-face communication.

6. Social Networking Sites: As discussed in more detail earlier, these sites authorize members to build profiles. These sites can enhance team-building and build trust among members.

7. Cloud: This new technology permits users to operate software and applications from an online environment. Users can store data on remote location and is accessible from any Internet-connected device. Virtual teams can store all project data in one shared location. Chance of document redundancy on different computers is reduced. Single location ensures the document's most current version is utilized.

8. Document Sharing and Collaboration: Companies such as Google, offer free collaboration enterprise solutions. With Google Docs virtual teams could collaborate on a single document simultaneously online. Like cloud technology ensures only one version is used by members.

9. Virtual Worlds: It is a 3D virtual environment where individuals can interact with each other using "avatars and software agents". Individuals can communicate and collaborate in this virtual world on a professional or personal level. Some companies are exploring virtual worlds as environments for virtual teams and other contexts (Owens, Davis, Murphy, Khazanchi, & Zigurs, 2009).

The use of these tools will enhance the communication, collaboration, and contribution of virtual teams. Project managers using Web 2.0 technologies will enhance virtual team's ability to interact and create a strategic advantage (Razmerita et al., 2009). With older technologies virtual teams could not operate to their fullest potential due to delays in technology delivery speeds and costs; however, with Web 2.0 technologies virtual teams can interact in real-time where members are able to provide input, receive immediate feedback, and respond without delays.

Web 2.0 technologies improve the project manager's ability to manage knowledge. As mentioned earlier virtual teams can use Wikis, blogs and forums. Companies such as IBM are encouraging virtual teams to create, change, and delete data from Wikis. The information shared in these blogs is technical expertise that is difficult to replace. IBM retains this knowledge so future project managers or teams can access to assist in risk mitigation, cost analysis, project estimations at any other point in the project life cycle. Some individuals are reluctant to provide the knowledge because it is a form of power and release of this power could result in job loss (Razmerita et al., 2009).

Another company using Web 2.0 technologies is Nevsun Resources. The company uses a software called Unifier to communicate between Vancouver and South Africa. Nevsun also utilizes Web 2.0 tools to improve internal teamwork. Wikis are the preferred method of Mark Brewer. He and other executives at Seagate Technology use Wikis and blogs to communicate with employees and collaborate with suppliers (Soat, 2009).

VIRTUAL TEAM DEVELOPMENT

A major concern with virtual teams is team-building. With a co-located project team the project manager can offer immediate guidance to help the team resolve conflict or work through Tuckman's four stages of development. However, with a virtual team modifications to the development stages may be needed. Table 1 below provides insight into the four stages based on research collected on virtual teams from Lee-Kelley, Crossman, and Cannings (2004), Furst et al. (2004) and Meredith and Mantel (2009). The table provides comparisons and challenges for the virtual tea.

Table 1. Four Stages of Team Development: Co-located Teams vs. Virtual Teams.

Stage	Co-located Teams	Virtual Team Challenges
Forming	• Project manager creates team • Members introduce each other • Face-to-face communication. • Build trust • Establish informal communication at breaks	• Project manager creates team • Introductions have to be completed using electronic communications • Difficulty building trust • Lack of face-to-face communication • Longer to develop relationship, may never achieve high-quality • Difficulty engaging in informal communication during breaks • Electronic communication creates further challenges: ○ Mistaken first impressions ○ Lack of nonverbal creates faulty stereotypes
Storming	• Team members vie for power or position • Conflict emerges • Project manager can influence through negotiations or conflict resolution • Project manager could assign roles	Use of electronic communications may prolong this phase Lack of nonverbal cues or voice tones can create misunderstandings No accountability; with conflict members could refuse to respond Lack of trust could lead to team not having informal leader (if not assigned)
Norming	• Members agree on rules, norms, strengthen relationships • Trust is increased	Difficulty coordinating tasks Rules should be established on communication type and response frequency Lack of structure; imperative team establish timeline and schedule for communication and task coordination Members may lack necessary discipline to fulfill team obligations Members may be reluctant to be critical
Performing	• Members are working toward project completion • Members collaborate to help complete tasks	Competition from local management or office could impact performance Failure to meet deadlines Lack of focus

The challenges presented to virtual teams in each stage can be mitigated with the effective use of information technologies. In the forming stage the project manager role is to facilitate team development by attempting to remove obstacles toward team dynamics. Building trust, engaging in informal communication, stereotypes, and lack of face-to-face communication can be

mitigated through use of Web conferencing and social networking sites such as Facebook or LinkedIn. To develop trust, team members can authorize access to their social networking site profiles/bios so team members can identify with whom they are working with on project. Furst et al. (2004) suggests electronic communications can be detrimental for team development and building trust. They focus on the lack of nonverbal and verbal cues members who pick up on in co-located teams. However, with today's technology members are able to Web conference with cell phones or computers. Project managers should utilize this technology early on so teams are able to steer clear of mistaken stereotypes. The use of social networking sites can also provide the external source for informal communication often found within co-located teams.

In the storming phase, Furst et al. (2004) suggests as conflict arises co-located teams are better equipped at resolving differences in virtual teams. They imply the use of electronic communications in a virtual team can prolong this stage because of the inability of team members to identify and benefit from the cues individuals in face-to-face communication are able to pick up on. As suggested above project managers must utilize applicable Web 2.0 technologies to reduce these obstacles. By utilizing tools that offer real-time visual and audio communication project managers can provide face-to-face communication. Project managers can minimize the effects of this stage by appointing team leaders. These leaders manage conflicts and ensure role selection is skill based.

The norming stage creates additional challenges for project manager and the virtual team. In this stage the virtual team establishes norms or rules on how the team will operate to meet project goals established by project manager. Furst et al. (2004) recommends the norms established in this stage address not only the traditional norms encountered by co-located teams but specific attention must be given to creation of structured schedules, information sharing, communication methods and response time, use of shareware, and need for honest and critical communication. It is imperative that the team understand method of information sharing and communication. The use of wrong method could generate distrust amongst team members. Timeliness is another concern. With members potentially from different time zones or having local demands, norms must address discipline in meeting due dates and establishing priorities.

In the final stage of performing, the virtual team leader and project manager is concerned with keeping team members focused on project tasks and goals. There is tendency for team members to become overwhelmed with local demands, allowing their focus on team objectives to dwindle. The leader should address morale and if signs of competing pressures or issues of communication arise, they must immediately step in and motivate members back toward goals (Furst et al., 2004).

RISKS OF VIRTUAL TEAMS

Risk analysis is an essential part of the selection and planning processes of a project's life cycle. As analyst and senior management evaluates projects based on nonnumeric or numeric models, they must also consider the uncertainty of how a virtual team will be able to execute the project. While co-located and virtual teams share similar risks, there is an additional level of risk management required for virtual teams. As project managers and other stakeholders conduct risk

management they will need attempt to identify and control risks. With projects these actions should be conducted throughout a projects life cycle.

A recent study conducted by Reed and Knight (2010) focused on the increasing use of virtual teams in development of information technologies. Their research revealed seven risk factors showing notable differences between co-located and virtual teams. The seven factors, see Table 2, noted are knowledge transfer, team cohesion, cultural and language differences, inadequate technical resources, team inexperience, team member loss, and hidden agendas. By identifying risk factors more conducive to virtual teams, project managers can take action to mitigate these risks.

Table 2. Percentage of Respondents Indicating Risk as a Major Impact on Project Success.

Risk Factor	Virtual Team % of Respondents	Co-Located Team % of Respondents	Difference
Knowledge transfer	28.04	14.89	13.15
Team cohesion	17.76	6.38	11.38
Culture/language differences	14.02	6.38	7.64
Inadequate technical resources	12.15	6.38	5.77
Team inexperience	27.10	8.51	18.59
Team member loss	31.78	19.15	12.63
Hidden agendas	27.10	14.89	12.21

Reed and Knight (2010) revealed both virtual and co-located teams found insufficient knowledge transfer to be second highest risk factor to project success. Knowledge transfer is the sharing of details or knowledge between individuals. The study found 28.04% of virtual team respondents stated knowledge transfer failure was a major impact. In co-located teams the transfer of knowledge may occur formally or informally as team members interact with each other. While in virtual teams members are able to share knowledge through Web 2.0 tools, they are not able to transfer information as quickly as teams co-located. The success of virtual teams relies heavily on the project manager facilitating knowledge transfer.

The next risk factor having impact on project success is team cohesion, 17.76% respondents. This risk is associated with conflicts or poor team development. As discussed above in team development, it is essential a virtual team progress through the first three stages. The selection of a strong team leader who can motivate members and facilitate communication is necessary. For co-located teams having the face-to-face communication and ability to interact in an informal setting helps build a strong bond. With the virtual team, members are geographically dispersed and there is possibility they feel excluded or isolated. Project managers or team leaders should encourage virtual gatherings. Owens et al. (2009) suggests companies utilize virtual worlds where members can create avatars who are able to communicate with other members in real-time using verbal and non-verbal cues such as facial expressions, hand gestures, body language and touch. They concluded team members using virtual worlds used the avatar in same manner as if they were participating in a co-located team.

As companies continue to take a cross-border approach with projects, virtual team members experience cultural and language differences and barriers that have not seen traditionally in co-located teams. Of Reed and Knight's respondents (2010), 14.02% felt these differences influenced the success of their project. This barrier is difficult for project managers to overcome. Possibility is for virtual team members who are likely to experience cultural differences complete an online training in diversity.

With virtual teams information technologies are essential in the success of team development and projects. The survey revealed 12.15% reported they did not have access to adequate technical resources. To ensure success virtual team members should utilize compatible technology with each other and with the company's information system. Virtual team information technology needs exceed those of co-located teams. Team inexperience, 27.10%, of respondents, can delay projects and effect overall success. Project managers must vet members to ensure they contain technical expertise needed for the project selected.

Another facet of risk management project managers must deal with in a project's life cycle is with team members who quit or are pulled for another project. 31.78% of respondents stated key loss of members was detrimental to the project (Reed & Knight, 2010). With virtual teams project managers are often able to acquire the cream of the crop since they have access to a global labor force, whereas with a co-located team the project manager is limited to available local or regional resources. A project manager can overcome this risk by ensuring cross-functioning within the virtual team. The loss of an expert could create an opening for another member to step up.

Hidden agendas created the third highest response, 27.10%, of individuals who indicated impact on success (Reed & Knight, 2010). With co-located teams it is difficult for members to hide their agenda because of the level of face-to-face interaction, allowing members to pick up on cues. However, with virtual teams there is little and in most case no visibility for members to identify cues. The project manager has little control over identifying and vetting out members with hidden agendas. Often these members do not reveal themselves until the project is already underway. To mitigate risks associated with hidden agendas the project manager should focus on team building to increase member trust and social capital.

TRUST AND VIRTUAL TEAM DYNAMICS

The word trust is commonly used in association with team-building. Project managers often speak of how trust is the foundation for project success. It is trust that team members have for one another that motivates them to work together to meet project objectives and goals. Research conducted by Lee-Kelley et al. (2004) concluded without the establishment of trust within the virtual team, they could not reach the performing stage. Teams can manage to move through the forming stage with low trust, but it becomes more difficult in the storming and norming stages if trust improved.

There is a difference in trust levels between co-located and virtual teams. With co-located teams the face-to-face communication increases the ability for team members to build trust needed to

achieve desired performance. Lack of face-to-face communication appears to be the main reason for low levels of trust among members of virtual teams. Adams and Adams (1997) identified several problems leading to low levels of trust. They include difficulty getting to know each other due to geographic separation and heavy reliance on electronic communications making members want to communicate less.

Building trust will improve team performance and dynamics. There is a correlation between high degree of trust and collaboration. Research study conducted by Holton (2001) revealed importance for project managers to develop strategies that permit team building. This could require the project manager to create opportunities for members to participate in online activities using video conferencing or virtual worlds. Holton states for teams to achieve high performance they need to first understand the team's diversity and develop a dialogue that permits personal interaction. The project manager and team leader wants to encourage team members to share their interests and values. The goal is to work on interpersonal relations so the team is able to function without the face-to-face communication or interaction.

Research by Lee-Kelley et al. (2004) revealed co-located teams were able move through the Tuckerman's forming and norming stages due to face-to-face communication and ability to develop trust. Without dialogue trust and commitment cannot be achieved making it difficult for virtual teams to perform. Both Lee-Kelley et al. and Holton (2001) research suggest virtual teams can engage in synchronous and asynchronous communication. While it is difficult to achieve spontaneous synchronous dialogue such as a co-located team, scheduling such communication can occur. Holton suggested several solutions to generate the dialogue. First, there needs to be openness so team members feel encouraged to provide honest critical feedback. Next, is for the virtual team to conduct informal gatherings. Co-located teams are able to meet informally during coffee breaks or over lunch. While virtual teams are separated by distance, they are not prohibited from having their own virtual coffee breaks or social hours. The team can decide how often and when to conduct these informal gatherings. With some social networking sites like Facebook, teams can remain in touch in a personal or professional manner. Facebook and similar sites have provided members with an opportunity to quickly get to know other members. These actions provide electronic human contact and can help reduce the feeling of isolation.

Along with building the human contact, teams must improve their communication techniques. Although email is an excellent tool in communicating, it does not provide the real-time communication teams sometimes need. In addition, email is difficult to share information to the entire team, receive feedback and respond. Email communication provides teams with an excellent tracking mechanism of team goals and member responsibilities; however, members may not always communicate clearly due to poor word choice. This can create opportunities for virtual team miscommunication and misunderstandings which can hinder team member trust development and overall goal achievement (Holton, 2001). With web conferencing or IM, teams can create a real-time dialogue to get immediate response to shared information. While IM is still a written format members have the luxury of quickly clarifying choice of words to ensure fellow members understand meaning. Web and video conferencing would provide virtual team members ability to immediately understand the tone of communication or other subtleties missed in written communication.

Virtual team performance relies on each member being satisfied with their role within the team. Communication and team participation not only reduces the feeling of isolation, it helps members meet their need to belong to or be part of a community. This feeling of belonging can also impact the team's movement through Tuckman's four stages of development. Member satisfaction from virtual teams can also impact Maslow's Hierarchy of Needs. Web 2.0 technologies can assist in helping virtual team members satisfy four of the five needs. Table 3 defines the four needs and the satisfaction member gains from using information technologies.

Table 3. Maslow's Hierarchy of Needs with Regards to Web 2.0 Technologies.

Maslow's Hierarchy Need	Need Defined	Satisfaction Member Gains
Self-actualization	Morality, creativity, spontaneity, problem solving, lack of prejudice, acceptance of facts	Go-to-person for other social networking users, being the lynchpin of a group, having others seek your input on ethical or morale issues
Esteem	Self-esteem, confidence, achievement, respect of others, respect by others	Participating in blogs, contributing to Wikis, receiving praise from friends/family/co-workers, collaborating on successful projects
Love/belonging	Friendship, family, sexual intimacy	Satisfies need to belong, avenue to interact with friends and family, to build friendships and romances
Safety	Security of body, of employment, of resources, of morality, of the family, of health, of property	Provide guidance, support system, counseling, ability to remain in contact with immediate and extended family

Iandoli (2009) suggests individuals join virtual communities for "intrinsic hedonic rewards" and "socio-psychological rewards". What exactly does these mean? Basically, individuals are not interested in money. Instead, they are satisfied with sense of belonging or being member of team. However, Grabner-Kräuter (2009) mentions individuals may participate for utilitarian value and would be motivated through accomplishment of task. Another area of satisfaction virtual team participation can be linked with is social capital. According to Palvia and Pancaro (2010), social capital deals with the number of individuals a member is associated with in their online network. Resources also affect a member's satisfaction level. Zhang's research (2010) found community as an important trait in members. His findings concluded higher satisfaction was result of stronger feeling of belonging or community.

Virtual team members are selected for their expertise and fit. Part of being successful and increasing social capital is for members to network. Networking is an essential role in carrying out project tasks and achieving buy-in from stakeholders. Bennett et al. (2009) research suggests there is a correlation between an employee's network and the success of a company's projects. Virtual teams help members build a global network of professional and personal contacts which increase the size of their support system. A larger network provides access to untapped

resources. As they work on virtual projects they can reach out to their social network to seek guidance or expertise.

When members are selected to participate on a project, whether co-located or virtual, it satisfies their esteem need. Employees gain confidence and increase self-esteem knowing the company and others respect their work or contributions enough to request their participation on the team. Project managers can contribute to esteem by ensuring virtual team culture consists of respect. Praise is essential in virtual team success and satisfying member needs. Lee-Kelley et al. (2004) identified virtual team members seek recognition for project performance success and that receipt of recognition improves the likelihood they would participate in future projects. Whether in a virtual team or co-located team, individuals are looking for a way to satisfy their esteem. Project managers and leadership should utilize Web 2.0 technologies to communicate with virtual team members to emphasize expectations and recognize team or member performance. Specifically, Lee-Kelley et al. (2004) results revealed senior leadership should communicate with the virtual team at the commencement stage of project to establish relationship, develop trust, and achieve buy-in; intermediate stage of project to clarify any misunderstandings and praise performance; and finally at the winding-up stage to resolve any issues and recognize project success.

The trust level of a virtual team is impacted by the type of relationship between team members and members and leadership. Team members must feel safe within the virtual team. According to Grabner-Kräuter (2009), individuals can either have strong or weak bonds. Depending on the strength of these bonds will determine the level of trust between members. Grabner-Kräuter's research revealed strong bonds are formed by members with friends and family who the member classifies as close. Weak bonds are developed between the member and their professional network. In some cases these bonds could form between member and any social networking friend. This type of bond is built on a relationship that is more distant. However, the member can develop a stronger trust level with this bond. As trust increases between the two parties the member places a higher value on this relationship because they feel the weak bond will offer truthful feedback that is innovative. Using Web 2.0 technologies to communicate informally will allow team members to develop trusting bonds with one another.

A member's trust level with online networks varies between generations with Generation Y members having a higher degree of trust. Research conducted by Childs, Gingrich and Piller (2009) reveals 78% of these younger members trust the opinions and feedback presented by peers. These same members are "five times more likely" to trust someone from their respected weak bonds than the mentor assigned by company (Leader-Chivée, Hamilton, & Cowan, 2008).

The Gen Y'ers are accepting Web 2.0 technologies with open arms. As new tools are introduced to the market the Gen Y'ers are actively involved. Childs et al. research (2009) reflects 96% of Gen Y'ers have profiles and actively use some form of social media. In most cases they are members of two or more. These users are willing to share information about their day-to-day activities by posting status messages for family and friends. In addition, Generation Y'ers are willing to follow the lives of both their personal and professional networks through social media. These members want Web 2.0 technologies to be part of their job. Leader-Chivée et al. (2008) revealed 80% would be dissatisfied with their job if they didn't have access to these

technologies. Virtual teams are ideal for Generation Y'ers since they offer members opportunity to collaborate using Web 2.0 technologies.

CONCLUSION

This research began with a desire to better understand why virtual teams experience problems not faced by co-located teams. The use of Web 2.0 tools improves collaboration, contribution, and communication. Virtual teams can use these tools to interact with one another, internal employees of the company, suppliers, and other stakeholders of project tasks. Each tool offers the virtual team distinct benefits. The ability to manage knowledge will provide future teams with historical records. The various tools improve team connectivity, productivity and performance.

Review of Tuckman's four stages of development revealed similarities of co-located and virtual teams. Both project teams progress through the stages, but as discussed virtual teams often take longer mainly due to low trust. With co-located teams face-to-face interaction supports the development of trust between members and toward the organization. However, virtual teams are limited with face-to-face interaction and as such suffer lower levels of trust which results in these teams progressing through initial stages longer.

This study became aware that there was little data that supported Web 2.0 current technologies and virtual team performance. Information technology changes rapidly, what is current today could be outdated tomorrow. With Web 2.0 technologies, significant developments of virtual teams have been made in last five years. Further research should be conducted in the area of virtual performance utilizing current Web 2.0 technologies. In addition, social networking is changing people's perceptions of virtual environments. It would be interesting to study if these psychological changes improve perceptions of virtual teams.

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