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Virtual Project Collaboration

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Abstract

Virtual project collaboration which simply described as distributed work across different locations and/or working times is not a phenomenon of the last 15 years. With the rapid development of electronic information and communication media in recent years, distributed work has become much easier, faster and closer in two-way communication in real-time. Surveys show that, more and more companies are faced with the necessity to get the knowledge and expertise they require in different projects from different domains and areas, therefore, people from different companies often need to work together to bring the entire knowledge and experience that are needed for the success of a new product, process or service.

Therefore, we have chosen virtual project collaboration as the topic of this paper to review previous scientific researches and identify new solution within three main areas:

- Maturity models as a point of departure
- Describing preparation and implementation virtual team process
- Develop a decision support tool to implement a more virtualized form of project work.

Problem description

According to day to day technology innovation and global changes in different areas (such as world economy, market change, population growth...), companies try to accommodate their system and organizational pace with efficient and reasonable up-to-date methods. One of these approaches in terms of project implementation is virtual projects. Due to this issue and also because of author background virtual team collaboration is considered as the topic of the following research. The paper is based on three main parts:

- Maturity models as a point of departure to investigate the challenges facing organizations wanting to implement a more virtualized type of project-oriented work.
- Describing preparation and implementation as a process with a special emphasis on managerial challenges.
- Develop a tool that can be used as a decision support tool by companies wanting to implement a more virtualized form of project work.

The research is started by study of challenges in implementation of virtual projects which describe definition, demand and virtual management demands and difficulties. In continue, general maturity model and virtual maturity curve are described and tried to match and compare it to virtual team attributes to find organizational and managerial steps which should be passed to reach maturity level in project implementation and management. It should be mention that support of empirical data and case studies are needed to have comprehensive and practical research which due to lack of time and lack of companies' support that was not possible. But as far as possible, I tried to compensate it by doing comprehensive research on large amount of literature.

Table of Contents

Abstract	1
Problem description.....	2
Part I - Virtual project challenges and maturity models.....	5
1. Background.....	5
1.1 The emergence of virtual teams.....	5
1.2 Definition of virtual team	6
1.3 Expansion of virtual teams’ applications.....	6
1.4 The need for virtual work place.....	6
1.5 Technology’s role in virtual team.....	7
1.6 When virtual team is the most suitable.....	8
1.7 Benefits of virtual teams.....	8
2. Main challenges of virtual team.....	10
Time.....	10
Trust.....	11
Culture	11
Communication.....	12
Technology	13
Leadership.....	13
Communication-related project risks.....	14
3. Maturity of Team and Organization:	16
3.1 Project management maturity:.....	17
3.2 Risks for mature organizations	18
4. Project Management Maturity Models	19
4.1 General maturity model:	19
4.2 Virtual team maturity curve.....	32
5 Part I – Summary:	35
Part II - Preparation and managerial challenges in process of virtual projects implementation	38
1. Hertal et al. (2005) model.....	38
2. Rad and Levin (2003) model.....	43

3. Brown et al model (2007).....	48
4. Duarte and Snyder model (2001)	51
5. Nemiro et al. model (2008)	55
6. Paul Mahon (2001).....	60
Part II - Discussion:.....	64
Part II - Conclusion:	66
Part III – Decision support tool for virtual team implementation	67
References	74

Part I - Virtual project challenges and maturity models

1. Background

1.1 The emergence of virtual teams

Globalization has conducted many changes in the nature of project team work. Many international companies have projects spanning variety of nationalities, involving great geographical distance and a range of time zones. Academic research has represented on the increasing number of geographically distributed project teams working within matrix organization, and it is assumed that their work is very difficult. (Oertig M 2006)

Pazderka and Grechenig (2008) argue that: *“due to the increasingly globalized nature of the World's economy, more and more business, especially in large, multinational and technically oriented organizations, is conducted in geographically distributed ("virtual") project teams”*. Using virtual teams make it possible for organizations to have cheaper employees and also best talent without geographical boundaries. Virtual teams can also be partly attributed to the fact that business tools which support remote workers and distributed team collaboration are getting more and more sophisticated. The need for strong project management standards due to distributed projects is going to be really challenging in many larger technical services companies. (Pazderka M, 2008)

Modern business world has always worked in teams, but today the phenomenon of virtual teams and virtual projects are becoming more common. Organizational members can be oceans parts or they can work in several offices but complex project require collaboration across boundaries (Larsen K R T 2002). However, Hertel et al. (2005) believe that distributed work across different locations and/or working times is not a phenomenon of the last 15 years - there are many instructive examples that show how people collaborating across larger distances in earlier times. Maybe virtuality has become more focused because a whole industry (IT) has made it a catch-word or organizations have better tools for handling it and because the context encourage them to use it more than before. With the rapid development of electronic information and communication media in the last years, distributed work has become much easier, faster and closer in two-way communication in real-time. The attribute “virtual” defines distributed work that is predominantly based on electronic information and communication tools (Hertel G 2005). Surveys show that, more and more companies are faced with the necessity to get the knowledge and expertise they require in different projects from different domains and areas, therefore,

people from different companies often need to work together to bring the entire knowledge and experience that are needed for the success of a new product, process or service. Virtual teams represent enlarge pool of know-how which seems to be a promising source of companies' growth. (Ahmed S 2010)

1.2 Definition of virtual team

Virtual team is defined as temporary (has no common history or future), electronically mediated (team member interaction does not rely on face-to-face communication), culturally diverse and geographically dispersed team members (Karpova E 2008). Karpova et al. (2008) believe that to establish effective communication, global teams need to develop and maintain mutual understanding without face-to-face interaction.

Handy (1995) believe that in terms of production of information in virtual teams: "if there is an office in future, it will be more like a clubhouse: a place for meeting, eating and greeting, with rooms reserved for activities, not for particular people."

1.3 Expansion of virtual teams' applications

According to research on Communication of the ACM conducted by Intel Corporation in April 2009, approximately two-thirds of company's employees were on virtual teams (all the time or some of the time). Similarly Google reports that at least 50 percent of Google employees are working on virtual teams at any given time (Derosa D 2010).The Wall Street Journal reports that more than half companies and with more than 5000 employees use virtual teams. Also a recent survey by the Gartner group represent that more than 60% of professional employees work in virtual teams. Estimates represent that in US alone; as many as 8.4 million employees are members of one or more virtual teams or groups. Today, organizations try to create "hotelling" options for their employees in their projects, in which they have no longer assigned offices, and increasingly it becomes common to use telecommunication and virtual teamwork in their projects.

1.4 The need for virtual work place

Lepsinger and Derosa (2010) explain three factors as the important reasons for organization to use virtual teams in their project. First, organizations are looking for best available talents regardless of their geographical locations, which have encouraged them to use virtual collaboration. For instance Google believe that there are many talented people all over the world and they have numerous locations to access talent. Second, quick shifts in marketplace and responding to customers' need is another reason

that organizations try to use virtual teams in their projects and meet these needs earlier than competitors. In addition, they also can deliver solution to clients all over the world rather than simply drawing on local talents in one area. And finally, technology is the third reason for the growing popularity of virtual workplace. There is no denying that innovation and advances in technology now help organizations to reach greater levels of efficiency and cost savings. For instance in Norway in terms of cost saving, The Norwegian law gives the employee strong protection against being fired. By using virtual teams you can utilize external capacity and capability without hiring them as permanent members of your organization. Every year, introducing new technologies make it even easier and more efficient for globally dispersed teams to work together no matter how far they are physically from one another. In addition Wayer F. Cascio (2000) briefly summarizes some of the business reasons for establishing virtual areas as below:

- Remove unnecessary offices for some employees expect those who really need it.
- Achieving higher profit and new sort of advantages due to new technologies
- Improving customer services through face-to-face relationship
- Enhance the ability to respond to market demand and gain competitive advantages via access to global market
- Making environmental benefits by reducing the amount of commuting

Improved understanding of how virtual teams develop and mature provides managers with important insight that might increase team's contribution to firm performance. Globalization and technological advancements are considered as important factors to increase using virtual teams in projects.

1.5 Technology's role in virtual team

The growing prevalence of virtual team in projects and technological and organizational development has mutual influences on each other. These influences are along with a range of business benefits associated with using this type of teams. Team members in virtual projects use technology to communicate with one another across geographic, organizational and other boundaries that makes virtual projects as common working place in organizations. The impact of modern Information and Communication Technology (ICT) tools on business in recent years is relatively obvious. Key ICT tools such as the internet, intranet, and extranets have provided businesses (including those in the construction industry) with the opportunity to overcome time and space constraints in value delivery.

By day to day improvement in communication and network technology, many organizations are using the diverse capabilities of individuals by teaming up employees from different countries and cultures as well as individuals from other organizations which may introduce something fundamentally new to group work in general. (Wong S 2000)

1.6 When virtual team is the most suitable

Wayne F. C. (2000) argues that virtual projects are not appropriate for all kind of jobs, managers and employees. Jobs in sales, marketing, project engineering and consulting seem to be high scored for virtual workplace. Moreover, those Managers who try to focus more on result rather than time and has better supervisory skills could be more successful and effective in managing virtual teams and in terms of function. The members of virtual teams must also have specific competencies. Fisher and Fisher (1997) approach to virtual team concept pointing out four competencies of virtual team members: a desire to improve personal knowledge, specific technical skills, a team-working approach and a strong problem solving and decision - making capability. (Fisher K 1997)

In addition, Duarte and Snyder enumerate essential competencies for virtual teams by different options such as: project management, networking, and appropriate use of technology, self-management, cultural and interpersonal awareness. (Duarte D 1999)

These ideas are parts of virtual team issues which can be categorized as internal issues. While external issues such as environment, team interaction and relation with outside also can be considered as factors which can affect implementation of virtual teams.

1.7 Benefits of virtual teams

Modern ICT tools relied on by virtual actors (e.g. internet) can also give online access to massive detail information at relatively cheaper cost than the traditional methods of communication (Brima O K B 2009).

Furthermore, to retain and attract more employees, especially knowledge workers, organizations are increasingly offer remote working option to their employees. Overall, virtual working provide an effective structural mechanism for handling travel cost, coordination and communication, time and cost associated with bringing together geographically, temporally and functionally dispersed employees to work on a common goal. (Martins L 2004)

Furst (2004) enumerates advantages of virtual teams as: increased knowledge sharing, employee job satisfaction and commitment as well as improved organizational performance. In addition, Karpova et al. (2009) explain advantages of using virtual teams including: team members exposure to different sort of ideas, perspectives and approaches for problem-solving, creativity and social development, a gain of sophistication in building arguments and position-taking. Furthermore Ahmed et al (2010) also found advantages associated with virtual team work such as: reducing relocation time and costs, reduced travel costs, greater degree of freedom to individuals involved with the development project, respond quickly to changing business environments, sharing knowledge, experiences, and enable organizations to respond faster to increased competition. It is logical that achieving these advantages in implementation of virtual teams will not happen automatically rather virtual teams be seen as a facilitator these days considering the growth and introducing new technology, but still dependent on other conscious actions. The studied virtual team advantages which are stated by authors normally are situational specific and they may not be true for all organizations. As stated above, successful implementation of virtual team is also dependent on the situation, infrastructure, facilities, and organization conditions which define and help manager to determine when and how should migrate to virtual teams or even the is it necessary for their organization to be virtual or not.

2. Main challenges of virtual team

Although advantages of virtual teams have been accepted by many researches, virtual team may also have a number of challenges that prevent them to reach successful outcomes. Challenges like (1) logistical problems such as communicating and coordinating work by different time zones and places, (2) interpersonal relations such as establishing effective working relationships with team members in the absence of face to face communication and (3) technology issues, such as identifying, learning and using technology might take into consideration (Furst S A 2004). Moreover, Wayer F. C. (2000) point out challenges of virtual workplaces as maintenance costs, loss of cost efficiency, cultural clashes and lack of trust.

In following sections, we discuss some of the main challenges of virtual projects which have been studied in literature.

Time

Time is one of the important challenges in implementing virtual projects because there are different time zones all over the world and it may be difficult to gather all team members together at the same time. When virtual projects need synchronous collaboration, setting a meeting time can pose a major problem, especially when a team is comprised of members from across the world (Kurash D 2010). This corroborates findings of the case study done by Kelley and Sankey (2008) in which time zone issue is identified as one of the unique challenges of virtual teams. RW3 Culture Wizard consultancy has done a survey by sending 30,000 forms to multinational corporations which 64% considered their team to be an example of a virtual team. In this survey, different time zones (81%) presented the greatest general hurdle to virtual teams who found it very challenging (15%), challenging (27%), or somewhat challenging (39%). (RW3 CultureWizard 2010)

Nemiro et al. (2008) try to look at this challenge from different point of view. They mention that different time zones and this freedom to work anytime and anywhere may also weaken the bond between organizational members and their employer, possibly resulting in a reduction in employee commitment to the organization and job satisfaction. (Nemiro J 2008)

Trust

The importance of trust role in virtual teams will be more impressive by how information will be transferred during the course of virtual work. The quickest way for managers to build trust in a virtual team may be to treat team members in a logical and fair way and deliver on their promises (Malhorta A 2007). People in virtual teams trust others when important information they share stay confidential. Nemiro et al. (2008) believe that well maintenance of trust in virtual teams is given to another based on the professional reputation and integrity of the team members. Research shows that virtual teams that maintain high trust relationships produce higher-quality work. (Nemiro J 2008)

Trust in virtual teams grows through team member reliability, consistency and responsiveness when dealing with other team members or clients (Kirkman B 2002). However, Jarvenpaa and Leidner (1999) argue that trust might exist in global virtual teams but in a very fragile form. By analyzing a series of descriptive case studies, they suggest a model of communication behaviors and members actions that encourage trust in global virtual teams. Similarly, Paul and McDaniel (2004) studied “trust” in virtual teams and they explain four different types of interpersonal trust: calculative trust, competence trust, rational trust and integrated trust and studied the relationship between these different types of trust and how they associate with virtual collaborative relationship performance. Finally, they suggest that organizations must pay appropriate attention to integrated interpersonal trust in virtual teams.

Culture

Cultural differences are considered as one of the specific challenges of virtual teams (Kelley and Sankey 2008). Kursha et al. (2010) believe that values, management style and ethics will differ between team members when team consist of members who live across the globe and cultural differences can impact interaction among team members.

Nemiro et al. (2008) argue that in virtual team each member looks at the job and the organization through a particular lens consisting of ways of seeing, thinking, deciding, relating, and so forth that have been learned and absorbed over many years of life. They define culture as a shared set of values, beliefs, and norms – in short, a shared language (unspoken) and perspective that helps diverse individuals within that environment work together in harmony. To deal with cultural barriers they suggest that members must recognize the differences that cultures create in their approach to work and then talk about them and create a shared approach to all aspects of the work that involves all members.

The team's ability to successfully work in virtual mode is based on how well diversity of virtual working is understood, appreciated and leveraged. (Malhorta A 2007)

Based on Oertig and Buergi's research (2006), cultural differences and lack of familiarity in virtual team work can be sources of conflict. Selecting creative leaders with a collaborative leadership style and excellent communication skills, investment in language and intercultural communication training and facilitate face-to-face communication and relationship building can help to solve this issue.

Communication

Communication among team members in virtual projects need to be carefully managed to take into account because of cultural differences among team members and professionals due to different perceptions of reality and different languages. It is very important that geographically dispersed virtual team members how precisely address their questions or pass on information to their team mates. (Vinaja R 2003)

Kursha et al. mention the communication in virtual team as the biggest disadvantage to meeting virtually because the lack of access to observe and interpret non-verbal communication. Piccoli and Ives (2003) suggest that due to obstacles to effective communication, environment is very fertile for incongruity which leads to trust decline. This study corroborates Wiesenfeld et al. (1999) findings about the important role of communication and information technology in building and maintaining of a common identity in virtual organizations. They point out that in virtual contexts creating organizational identification is much more challenging due to dispersion of members which may strain the psychological ties between organization and its members. They also conclude that the effects of communication on organizational identification may vary with individual's status in organization. Moreover, Maznevski and Chudoba (2000) emphasize the significant role of communication on dynamic and effectiveness of virtual teams. By studying literature and carrying out a case study, they propose that "effective global virtual team outcomes are a function of appropriate interaction incidents and the structuring of those incidents into a temporal rhythm." By the way, today's tools are much better suited for communicating explicit information than tacit. At the same time, videoconferences should, at least to some degree, be able to convey body language and other non-verbal cues. It can be true to say the most challenging situation in virtual team is because members are not accustomed to "read" other people through virtual media as well as we do through face-to-face interaction.

Technology

Vinaja (2003) believes that current state of technology is such that virtual teams can technically function well to interact with each other in large parts of the world. However some employees living in some regions that cannot access to new communications infrastructure like rural areas.

Kurash et al. (2010) also declare that technology makes virtual meeting possible, but it also creates unique set of challenges and team members may need to become familiar with new technologies prior to the meeting. Nemiro et al. (2008) believe that an understanding of collaborative technology, team processes, organizational culture, and meeting effectiveness will guide to effective collaboration. It can be challenging to keep up with technology, but those who are willing to invest the time to be update with technology, will be rewarded with the knowledge that they are building the foundation for a new way of working. High-quality human interaction through technology brings together diverse approaches to create innovative solutions and designs that are greater than the sum of the minds that created them. (Nemiro J 2008) Communication technology in virtual teams can be categorized as electronic messaging systems (E-mail), audio and video systems (teleconferencing and videoconferencing) and collaboration supporting systems like web conferencing and blogs. But it should not be disregarded while attempting to censor the internet in some countries can create some delays or outright prohibition for some technologies.

Leadership

Virtual team leaders must overcome coordination barriers with working across distance, time, cross cultures and language barriers, trust and team cohesion barriers created when team members have limited opportunities to identify common values. In addition leaders have to overcome member feelings of isolation, build team cohesion, establishing norms of coordination and knowledge sharing and motivate team members to achieve maximum team members' commitment (Malhorta A 2007). Team leaders in virtual work environment should coach virtual team members to avoid long lags in responding, unilateral priority shifts and failure to follow up on commitments (Kirkman B 2002). Ambrose et al. (2009) investigate how emotional intelligence may affect effectiveness of the virtual team and satisfaction among team members.

Nemiro et al. (2008) identified functions of a virtual team leader as motivation, coordination and team development. Providing a compelling message, managing conflicting goals, and establishing team

identity are three their findings as motivational challenges for virtual leaders. It has been suggested that working virtually places restrictions on communication, making coordination more difficult and adds a layer of complexity that requires more coordination. Relationship building, choice of communication medium and coordination techniques for face-to-face meeting are identified as challenges that managers face within coordination task. Developing the virtual team into a mature and capable work unit does not occur instantaneously; however, team development should be viewed as a process. Team building, team coaching, and gathering performance information for feedback purposes are activities that virtual leaders should consider for team development. (Nemiro J, S and L. 2008)

Communication-related project risks

Grabowski and Roberts (1999) stated that four main approaches can contribute in risk reduction in virtual organization. These methods entitled: “necessity of paying attention to organizational structuring and design”, “focus on communication at interfaces”, “developing a shared organizational culture of reliability across all members” and “development of trust among members”.

According to Olssen (2007) research, managing risks is really vital for project success and it is one of the responsibilities of project manager during project design and implementation. He believes that risk management is an inherent part of project management. When it comes to virtual project it gets even more importance due to remote communication between project team.

A survey was done by Reed and Knight (2009) among nearly 150 information technology groups in wide variety of industry in order to explore differences between some communication-related risks in virtual project and co-located projects. In order to make comparison between the levels of communication risks among these two distinct project area, they consider three options as main risk factors related to poor communication during the project implementation both in Co-located projects and virtual environment. The first factor is “*Lack of or inadequate communication*” which is mostly dealing with the level of details should be provided for an audience. Second risk factor named “*Technical connectivity issues that hinder communication*” which is emerging technological failures that might influence communication among project team both in co-located teams and those which are using virtual environment. And the third factor called “*Insufficient knowledge transfer*” which is showing how information exchange can contribute in communication-related risks both explicitly and with usage of methods like documentation, training and interviews and implicitly with informal ways of sharing knowledge such as storytelling and mentoring or coaching.

The result of questionnaire shows that there are not significant differences in impact of risks caused by lack of adequate communication and technical connectivity problems in successful completion of project both in virtual way and employing team in one location. But insufficient knowledge transfer has greater impact on projects which are doing remotely rather than those which project team are coming together in one location.

3. Maturity of Team and Organization:

Maturity, according to the Random House dictionary, is defined as full development or a perfected condition. In terms of project management, maturity links to capabilities that can produce repeatable organizational success in project management processes and to the skills that prevent common problems in project implementation. It also represents the strength of an organizational infrastructure that supports success of projects. (Rad F. P, 2003)

Rad and Levin (2003) believe that the maturity of a given team and the maturity of the parent organization are closely linked to each other. It seems to be hardly possible that a mature team would survive in an immature organization. It would be equally surprising to find a very immature team within a very mature organization. (Rad F P 2006)

However, Pazderka and Grechenig (2008) found that in established maturity models, they lack the best practices which have been specifically designed with an organizational focus on virtual teams. To further analyze the relationship between maturity models and virtual teams, it is necessary to first understand which additional challenges a virtual team has to face, and which level of project management maturity models these challenges could have impact on. A recent study has identified the following obstacles virtual teams may face, which will be used as the major criteria:

- language barriers
- lack of face-to-face communications
- information redundancy
- time
- proper security
- motivation
- cultural differences
- conflict resolution
- trust
- project team knowledge and cross-team collaboration (Pazderka M, 2008)

After project management methods and standards which apply to a single project, such as the Project Management Body of Knowledge (PMBOK), Project Management maturity models are the next logical step in the evolution of the project management discipline. According to Pazderka and

Grechenig (2008), the concept of maturity applied to an organization refers to a state where the organization is in a perfect condition to achieve its objectives.

Organization can use formalized maturity evaluation as a baseline to improve success rate of the projects that for this reason, metrics can be used as enablers of project management maturity. If an organization has not been fully matured in project management discipline, a significant amount of effort, organizationally and within the project might have to be done to develop procedures to manage the project. But when the organization matures, the total project management expenditure associated with managing the individual project will decrease while proactive functions are maximized. (Rad F P, 2006)

Rad and Levin (2003) also identified team performance as sum total of the performance of its individual members, therefore the perfection and maturity of a team can be inferred from performance of team members and maturity of their interaction. Researches represent that organizations at higher maturity levels encourage their clients to become more involved in distinguishing and specifying performance metrics and in setting quality goals.

3.1 Project management maturity:

Rad and Levin (2003) believe that project management maturity can be defined as both organizational and team member attributes and should be considered when developing or using maturity metrics. They know that the project management maturity of an organization has direct relation to the success of collective projects of that organization, which in turn is related to the success of individuals (persons, groups and projects).

Rad and Levin (2003) said that: *“As organizations move toward a management-by-project concept, the project management practice must continue to mature”*. In addition, all aspect of projects and the organization must be in formed to acquire and sustain a competitive advantage for organization.

A detailed description of organizational strengths and weaknesses in project management can be revealed by a formalized assessment of the organization’s current project management activities and capabilities. In addition, this assessment can help the system to provide the impetus for establishing a uniform and enhancing project management practices within the organization. (Rad F P, 2006)

Continues improvement procedures provide a well baseline for maximizing the benefits from experience on one project to another one. In other words, baseline means foundation which has been provided base on the experiences obtained by facing different situation in the process of improvement. This baseline can be considered as a foundation for organizational improvement and guidance for advancement. Rad and Levin (2003) mentioned that the metrics associated with organization maturity

can be used to expose how often and how regularly project personnel follow effective procedures, which, in turn, will discover effectiveness of project management policies and procedures.

3.2 Risks for mature organizations

Mature systems may be immune to failure but cannot also guarantee the success. Successfully activated systems often begin to show signs of future problems. Moreover, a Mild Failure could easily become either a big failure or, in extreme cases, an unmitigated disaster. Just because a new system goes live on time and under budget does *not* mean that an organization is out of the woods.

Systems can and often do begin to experience major difficulties after even successful activation, attributable to the following: (Simon P 2011)

- System upgrades and the decommissioning of older versions of the application
- The introduction of additional functionality within a system
- Changes to business processes
- Acquisition of a company and the integration of additional legacy systems
- Unwise expansion
- Key employee turnover (voluntary)
- Staff reductions/layoffs

This last risk has increased significantly over the past two years, as organizations have had to deal with the worst economic crisis in the past 75 years. Often, companies were already lean and lacked appropriate backups in the event of employee departures. Recent cutbacks in IT budgets—and related personnel—have left many organizations even more exposed to system failures.

4. Project Management Maturity Models

4.1 General maturity model:

A maturity model, and its accompanying assessment tool, will enable the team to construct a program of improvement and team efficiency. The maturity assessment will also assist the team in setting priorities for those immediate actions that are consistent with the team's current maturity level, typically expressed as one of five ascending levels of maturity:

- **1 Initial:** Ad Hoc, Basic, Inconsistent (The Team Uses Inconsistent Procedures and Lacks Formal Guidelines)
- **2 Develop:** Consistent, Abbreviated, Repeatable (There Is Isolated Implementation of Formalized Project Management Processes among Team Members)
- **3 Enhanced:** Integrated, Focused, Defined (The Team Implements Successful Project Management Processes)
- **4 Advanced :** Comprehensive, Managed (The Team Commits to a Project Management Culture and Captures Quantified Performance Data)
- **5 Leader:** Optimizing, Adaptive

(Maturity Level Description) (Rad F. P, 2003)

The model above is a general model which in most of the books is referred for project management maturity and in continue will be adopted with considering virtual team challenges and attributes. In the following, at the end of each level, it is tried to match level attributes with virtual team challenges and in summary of this part all these issues are categorized.

Within the project management community, the concept of project management maturity models has recently been receiving a lot of business and research attention. Although the structure of most models has now been well defined and is quite sophisticated, a lot of potential exists in extending the currently described best practices that are part of these models by additions for specific problem areas, such as working with virtual (geographically distributed) teams. However, to reap the most benefits, organizations need to gain full control and measurability of their project management processes, allowing them to use maturity models to benchmark them against industry-established best practices in order to avoid a competitive disadvantage, or even to just survive on the market. Using maturity models helps organizations find out how efficient and sophisticated their approach to project management is

compared to the industry (depends on reliable data from the rest of the industry and a keen eye for identifying possible competitive advantages), and determine in which areas further improvement is possible and/or necessary. Currently, little research exists that is concerned with the impact of this virtualization on the processes and best practices championed by project management maturity models. It is therefore the aim of this paper to investigate how the introduction of virtual teams may change certain aspects of maturity models. (Pazderka M, 2008)

In the same fashion that organizational maturity assessment models measure the sophistication of an organization in carrying out its mission, a team maturity model would measure the collective ability of a project team to deliver projects in terms of meeting specifications, on time and on budget. Primarily, a team maturity model would describe the key attributes of a fully effective project team environment. In addition, the model would categorize these attributes in progressive stages that signify maturity levels. The maturity model can be used for benchmarking among different teams, across divisions of an organization, and across different organizations. Considering the presence or absence of a certain amount of sophistication for these attributes, one can arrive at a ranking of Levels 1 to 5 for the maturity of the project team in executing project management processes. The established ranking scale of the maturity model will provide plateaus for the purpose of continuous improvement of project management capabilities for virtual teams. These plateau level indicators are usually based on the assessment of the sophistication of key attributes of the team's behavior. The expectation in establishing these maturity level designations is that higher maturity values will become a source of pride and that lower maturity values will provide incentives for improvement and refinement.

However, relevant variables which influencing team maturity may be not easily measurable but can be evaluated in comparison with successful projects and organization. These variables also can be assessed by considering empirical data from successful projects which reached to their final goals and targets. Maybe it is not correct to say that always mature teams outperform more than less mature team but it should be considered that mature teams are more efficient to reach their goals.

The maturity level of the team is related directly, although not necessarily linearly, with the appropriateness of the processes used in the everyday activities of the team. For purposes of clarity, the attributes of the virtual team have been grouped under the following three major categories:

- **Enterprise attributes:** This category addresses the environment in which the virtual team must operate. The implication is that a virtual project, or any other project for that matter, does not

thrive, or even survive, in an unfriendly environment. The attributes listed in this category describe the organizational friendliness toward virtual teams, involvement of virtual teams in organizational strategies, and recognition of the virtual team concept by the parent organization.

- **People attributes:** This category addresses the team members' interrelationships with one another, with a focus on teamwork issues such as trust, collaboration, competency, communication, and conflict.
- **Project attributes:** This category addresses the performance of the team in terms of efficiency, productivity, and deliverables. It includes treatment of topics such as progress monitoring, procedure enhancement, historical data collection, and development of best practices. (Rad F. P, 2003)

Level 1: The Initial Level

This level is called Initial and might also be referred to as ad hoc, basic, or inconsistent. At this level, the team does not have, nor does it use, any standard processes or procedures. Most processes are ad hoc and are reinvented for every project. Processes appear chaotic because managers have no reliable way of estimating the project's scope, schedule, costs, or resources. Projects that are conducted by a level 1 team tend to lose control of requirements, scope, cost, and schedule. Some project team members make personal sacrifices, such as overtime and lost vacation and holidays, in order to finish projects with satisfactory results.

Teams that are at this level apply inconsistent work force practices during the team formation and team development stages. As a result, team members generally have poor attitudes and exceptionally low morale, as manifested by the team's high turnover rate. It is rare for the project manager to even consider dealing with human resource problems, partly because managers lack the tools and training necessary to deal with these problems. The focus is not on the people aspects of the project but on the other basic aspects of the project.

If a project team member is successful in some of his/her duties, it is likely that he or she has informally observed, and learned from other successful project teams. It is also possible that the occasional success is sheer luck. Some team members work harder and more diligently than others, possibly with the same inconsistent results. Improving the competency of personnel is not a top priority

item. Competency levels throughout the organization in initial level are not complete, and thus there is a serious shortfall of competencies in some areas.

Virtual team: A virtual team is ranked at level 1 if the team's operational emphasis is on individual accomplishments and individual objectives, rather than on team objectives. In such a case, the prevailing view among the team members is that the project might be completed through additional integration of individual contributions, rather than through collective efforts. There is no shared vision among the team members. Project managers of a level 1 virtual team tend to develop their team management skills through on-the-job exposure. On level 1 teams, quality shortcomings, cost overruns, and schedule delays are common.

Level 1 Enterprise Attributes

- Individual decision making
- At times, team members support the virtual project, but primarily their commitment is to projects located in their on-site environment. Consequently, team members tend to work on the virtual project only when absolutely necessary.
- Little guidance is available to the virtual team members as to how to best perform their work. Training is not provided in the use of technology for communication and collaboration, nor is training provided in methods of self-motivation and self-management.
- Staffing decisions are made on the basis of availability rather than specific expertise. Roles and responsibilities are not clarified.

Level 1 People Attributes

- Mistrust atmosphere, not much normal communication, and not very helpful group members
- Team members lack knowledge of one another's capabilities
- Infrequent Team interaction, using group email for communication
- Lack of Confidence
- Conflicts are seen as personal attacks because of possible cultural diversity and conflicts are considered destructive, not constructive. Individual differences can become magnified in areas where cultural diversity could facilitate sharing of insights in order to promote innovation.

Level 1 Project Attributes

- As a result of a lack of common purpose for the team, individuals are left unguided. Thus, team members perform their technical and cost/schedule duties according to their own personal agendas. Because of the absence of a common mission, opportunities are pursued by individuals rather than by the team as a whole.

Level 2: The Developing Level

At Level two, there are best practices which sometimes can be specified, documented, and repeated. Project team members are able to repeat the successful practices if by chance they can identify those practices that have worked in previous projects.

The project manager is responsible for obtaining needed staffing, coordinating commitments, negotiating for resources, managing performance, developing skills, and making compensation recommendations. The project manager accepts personal responsibility for implementing good human resource management practices, such as interviewing effectively, providing feedback, and conducting performance evaluations.

Individual units or departments in the organization have some autonomy in developing project work balance and determining project skill needs. The project manager focuses on individual performance and individual contributions to improve the unit's overall performance. If there is success, it is achieved only by ensuring that project team members have the appropriate competency for the assigned task. There is a system for regular performance reviews.

Virtual team: The manager of the virtual team might have been trained in team building as applicable to virtual teams. The virtual team manager has knowledge of the use of technologies to support the project, and training is provided to team members in the use of the technologies that are selected.

Level 2 Enterprise Attributes

- The project manager secures organizational support for implementing the virtual team concept. This support is announced formally through an organizational policy statement which deals with virtual teams and virtual projects.

- There are some policies regarding collection of project data and compiling the data for future use.

Level 2 People Attributes

- Team members establish communications principles.
- Team members plan the project work collectively, estimate the time required to accomplish their work packages, and agree to commitments collectively.
- Team members have a sense of personal responsibility and motivation to support the virtual project.
- Individuals are integrated into virtual teams through standard processes.
- Simple and direct communication is used to reduce the risk of misunderstanding. A system of regular communication, regular reporting and reviews is established.
- There is some effort to provide a smooth transition for the team members as they look ahead to the next project.

Level 2 Project Attributes

- The virtual team charter might include some, although not all, of the following items:
 - Statement of the project's mission
 - Project commitment statement
 - Objectives
 - Scope and boundaries of the team's work
 - Project sponsor
 - Project manager and team members
 - Time frame for the project
 - Deliverables
- Operating procedures designed to disseminate basic discipline into the team's activities, including administrative activities, methods to handle conflict, procedures for escalating problems and issues to the next managerial level, and communications principles, including standards for availability and responsiveness
- Roles and responsibilities of virtual team members are known. Assignments consider skills, expertise, and availability.
 - A resource breakdown structure is prepared and disseminated.
 - A virtual team organization chart is prepared and disseminated.

- A virtual team directory is prepared and disseminated.
- A common data interchange format is available.
- A system for compiling and maintaining virtual team information is established and can be accessed by any team member at any time.
- Project lessons learned are documented and include ideas for improving the effectiveness of working on the virtual team.
- The team reviews its progress against its commitments and makes changes as required.

Level 3: The Enhanced Level

At level three, the best practices are integrated into organizational guidelines and policies that are disseminated and used throughout the company. Team members are trained in these best practices. This represents the fact that there is widespread consistency of procedures. Project progress data are routinely collected, analyzed, and archived. There is a culture of common practice, because there is a general trust in those common practices.

The organization has developed a catalogue of work force competencies, and these categories are used in the formation of work groups that align these competencies with overall business strategic objectives. The focus is on identifying common practices among skills across organizational units in order to identify those that are the most effective. Strategic plans and specific action items are prepared for developing specific competencies. This approach enables the organization to accelerate development in areas that are more critical.

At this level, the team and/or the organization has an established career path for project professionals. Competent people are empowered and given freedom and responsibilities. Business performance data are readily provided and accessible.

Virtual team: This maturity level is characterized as one in which the team successfully proves the viability of the use of virtual teams and virtual projects in support of the overall organizational strategic goals. Based on the success of the virtuality of the team, the organization formally recognizes the desirability of virtual project teams for its continued and expanded success. The team members value their association with a virtual team in the same way as they would value working on a collocated team, maybe even more so. The distinguishing characteristic of this level is the emphasis on team discipline

and self-management. In this environment, the team routinely sets and/or modifies its collective goals and disseminates feedback on its collective and individual performance. Level two and three seem to be more important levels for teams which tend to migrate to upper levels and be a mature team.

Level 3 Enterprise Attributes

- The virtual team plays a key role in defining and shaping the organizational management strategy.
 - Managing virtual teams has become a specialty.
 - The project manager of the virtual team does not also manage a co-located project team.
 - Experienced managers of virtual project teams are made available for consultation and mentoring.
- Training is provided to assist individuals in working in the virtual environment in terms of communications skills and in the use of selected technologies.
- Open communication without fear of reprisal and that supports communications flow in all directions is fostered as part of a documented set of values for work on virtual teams.
- The work environment enables individuals to concentrate on work of the virtual project without unnecessary, or inappropriate, distractions from the on-site environment.

Level 3 People Attributes

- Expectations between team members are known.
- A team vision of the project outcome is created, with specific goals established to achieve this outcome.
- Team members agree with the project's goals and objectives, have a common definition of the project's scope, and support the project plan to achieve the goals. They are committed to schedule, cost, and performance goals.
- Standards for decision making are established for when coordinated decisions are required among different team members, and when consensus decisions are necessary among the entire team.
- Team formation is smooth and quick for virtual teams.
 - Resources are deployed in such a way that each team member can handle specific tasks in a timely manner.
- A participatory culture is established among team members. Open interaction is encouraged with fact-based problem solving.
- Team members share information freely.

- A team orientation session is held to determine communication technologies and protocols to use.
- Common tools (both software applications and hardware platforms) are available for the virtual work.
- Team members respect and value the knowledge and experience of their teammates. Problem-solving, administrative, interpersonal, and technical skills are equally valued.
- There is a sense of mutual accountability among team members. Team members are accountable for their individual contributions, their collective contributions to the team, and the overall goals and objectives of the project.
- Cultural differences are embraced and understood. Different views are accepted and considered necessary for effective problem solving.
- The team undertakes team-building activities to improve effectiveness.
 - Each individual establishes a personal development plan.
 - Individual performance criteria that complement the team's performance criteria are developed.

Level 3 Project Attributes

- Team charter highlights processes to determine how the team's work is managed, how information is stored and shared, how documents are reviewed, and how problems are detected and resolved.
- There are standard virtual-specific templates for requirements definition, stakeholder identification, estimating, scheduling, risk identification, risk analysis, progress monitoring, and change management.
- Periodical review of virtual team processes and template based on lessons learned during their use in each project.
- Comprehensive performance evaluation system. Evaluation system is reviewed and approved by the project manager and sponsor. Results-based evaluations are conducted.
- Upper management provides formal feedback on team and individual performance.
- Quantified measurements of team performance are collected and analyzed.
- Performance criteria are periodically reviewed to determine if changes are required.
- The collection of project data is done systematically and according to prescribed procedures. There is a prioritized list of data that are to be collected and compiled.

Level 4: The Advanced Level

At Level four, organizational performance is viewed in conjunction with project performance. Project performance is analyzed and characterized for a large number of projects. Corrective actions might be prescribed across the organization based on analysis of data that are specific in terms of knowledge areas and project and organizational success factors. The performance assessment is based on quantitative data. Project planning data and project performance data are readily available.

The organization seeks to integrate organizational work force competencies, empower the project teams, and manage performance based on reliable quantitative data. As a result, the organization benefits from the well-suited competencies of individuals. Upper management places a heavy reliance on the results produced by people in the organization, who are competent thanks to organizational planning. Project managers empower work groups within individual projects.

Virtual team: The success of the team in previous projects provides documented proof that, given a good match between each virtual team member and the corresponding project component, unusually high effectiveness can be predicted for the project. The team is aware of, and encouraged by, the fact that virtual teams are established as the preferred organizational structure for an increasing number of the organization's projects.

Level 4 Enterprise Attributes

- The virtual team receives full organizational recognition by being listed as a key component of organizational strategy. As such, the organizational vision and mission openly support the operations of the virtual project team.
- Participation of the project manager and virtual team members regularly in project selection activities and other long-range organizational activities.
- The project manager periodically assesses the overall performance of the virtual project team from a process perspective to assess future needed support.

Level 4 People Attributes

- Team members are able to establish, and change, the environment for their work in the form they believe is most appropriate for the specific project.

- An atmosphere of trust exists among the virtual team members because their concerns can be shared openly, and their workload can be modified easily.
- There is collaborative leadership and shared responsibility among team members of different skills and different levels of technical expertise.
- There is a sense of cohesion and cooperation among team members.
- The focus is on learning from and helping one another since everyone believes that individual accountability to the team promotes learning.
- Team members model and encourage supportive behavior and learning among team members is a value.
- On-line interaction is so successful that face-to-face communication is not viewed as a necessity.
- A climate of open communication is available, which in turn enhances group problem solving and decision making.
 - Information is shared beyond that which is necessary to do one's job.
- The work experience is rewarding and enjoyable for team members on a personal level. Team members want to sustain the relationships they have built with other team members.

Level 4 Project Attributes

- All team members monitor the effectiveness of their procedures.
- Team members are recognized and rewarded for creativity and innovation.
- Team members review processes developed, including task and working relationships, at various intervals throughout the project to enhance the quality of their work. Periodically, reviews are conducted to ensure that all established processes are followed to identify areas in which improvements may be warranted.
- Team members openly communicate about ways to enhance performance and provide feedback to others.

Level 5: The Leader Level

At Level five, the organization has a clear picture of how virtual projects work in all aspects of their performance and the foundation for their success. Improvement actions can be readily identified. Improvements are either modifications of existing procedures or the implementation of entirely new

procedures. Carefully collected data are used to isolate problems and to recommend corrective action in a seamless fashion. Change management is a consistent organizational process.

The organization is recognized for its competent people at all levels. The organization focuses on continuously improving and aligning personal, work group, knowledge management, knowledge transfer and organizational capability.

Differences in work styles and approaches are identified and quantified, as a start point to encouraging individuals to make continuous improvements to their personal work processes. Thus, considering all of the projects and all of the business innovations, the organization is collectively recognized as one of the best in its class.

Individual performance is in line with organizational objectives. Lessons learned are collected, analyzed, disseminated, and easily accessible. Knowledge profiles are prepared and updated on a regular basis in order to highlight the specific expertise of team members. Individuals are encouraged to make constructive suggestions to one another for improvements in overall efficiency. The organization regularly evaluates the latest practices, participates in benchmarking forums and learning communities, and uses widespread performance data to forge future improvements.

Virtual team: The virtual project team delivers results that always meet, and sometimes exceed, customer requirements. Team members view one another as essential for the team's overall success. The organization regards virtual teams as a strategic tool toward its success. Finding the best person for each project and sharing people between projects is streamlined, which in turn improves overall organizational performance. When the team is at this level of maturity, each person develops his or her own personal learning agenda in concert with organizational goals. The project manager openly and actively encourages team members to experiment and practice with new approaches.

Level 5 Enterprise Attributes

- Virtual teams are recognized as a strategic resource for organizational success.

Level 5 People Attributes

- There is collective acknowledgment of similarities and differences among team members, with a plan developed to take advantage of different contributions to the project.

- Team members earn and maintain high levels of trust.
 - Team members openly share concerns and problems.
 - Any problems in terms of team dynamics are discussed throughout the project, rather than allowing them to escalate into a major conflict.
 - Team members respect the confidentiality of team issues and concerns.
- Team members are expected to take risks, because risks are viewed as opportunities.
- Team members work together to plan risk response strategies so that risks do not turn into problems.
- Team members enjoy an environment conducive to thinking, sharing, creating, innovating, learning, and community.
 - Open and honest communication is considered essential for success.
- Team members want to continue the relationships they have built in the virtual team even when the project is complete. Accordingly, opportunities for future collaborative work are developed for the project team.

Level 5 Project Attributes

- The team charter is considered a key success ingredient, and its continuous enhancement is emphasized.
- Team members regularly conduct continuous evaluations of team operating processes and performance.
- Individual and team achievements are acknowledged and celebrated throughout the project to increase both individual and team satisfaction.
- Individuals, and the team as a unit, quickly learn from their experiences.
 - These inputs are analyzed, and feedback is provided.
 - Knowledge profiles are established and maintained.

4.2 Virtual team maturity curve

In maturity curve model, virtual team will be investigated in terms of team members' characteristics and personalities. For virtual teams, the level of comfort and readiness are characterized to operate in a virtual environment on the "virtual team maturity curve". It's important to understand the maturity or readiness of a group or individual to work in a virtual team in order to determine which tools and processes will need to be used in order to have them work effectively. For example, this model represent that, in teams where the members know each other or have worked together before, they are able to get started in a virtual environment more quickly. However, simply having worked together face-to-face in the past is not a guarantee that they will be successful in a virtual environment; there are other factors to success related to tools and processes. (Jones R & Pace R, 2005) For instance, a group which develop into a team in research or a common work cannot be considered as highly matured rather it depends of their relation in past and also their background.

The virtual team maturity curve acts as an indicator of the likelihood of the organization or individual to be successful in a virtual team environment. The curve looks like the following:

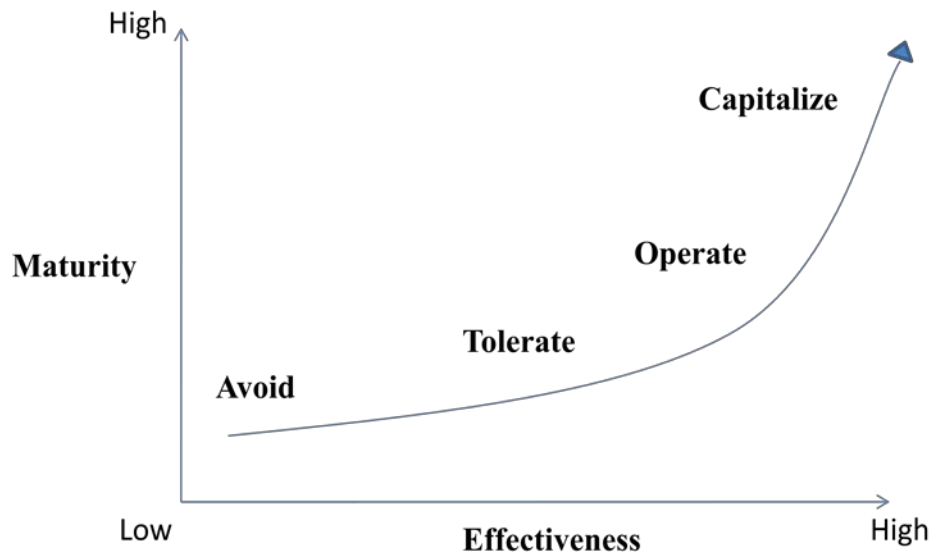


Figure 1: Virtual Team Maturity Curve (Jones R & Pace R, 2005)

Individuals and organizations that are in the "avoid stage" typically are uncomfortable or unwilling to participate in a virtual team environment. Typically, in a large population, this stage represents the fewest number of people. People in this stage are unlikely to move up the curve. Individuals in the avoid stage typically look for projects or careers that allow them to work face-to-face.

Ensuring that people in this stage spend the majority of their time with a local team or meeting face-to-face will maximize their contribution and satisfaction with their work rather than trying to force them to other parts of the curve. Typically, people in this stage who have supervisory or managerial responsibilities will not be successful at managing a virtual team.

People in the “tolerate stage” would much rather work in a face-to-face environment, but understand that as a result of the current business environment (i.e., cost restrictions, project requirements, lack of local expertise, etc.), virtual teams are necessary, but they still prefer working in a face-to-face team and believe that is the most effective model. People in the tolerate stage are flexible, able to adapt to a virtual team environment, and can be very efficient when exposed to virtual team tools and best practices. However, they will not be the ones who will be advocates for virtual teams and may even feel some resentment toward the virtual team model.

Typically, one-third of an organization is at the Tolerate stage. If they have enough bad virtual team experiences in the future, they may even move to the left of the curve to the Avoid stage. Here is a list of things to make people in this stage successful:

- Select one or two recommended tools - people in this stage will use tools but won't spend time to figure out which one is best for them
- Show examples of when a virtual team model has been successful
- Ensure people understand the benefits
- Ensure that myths are addressed
- Make some portion of a project face-to-face, if possible.

When put in a situation where they see virtual teams working, they may move to the next stage - Operate.

The “operate stage” typically represents the largest portion of a population, with over one-third of people at this stage. This group is comfortable with working in a virtual team, probably spends most of their time in virtual teams, and uses some advanced techniques. They are probably involved in cross-functional teams and possibly involved in a matrix organization with multiple “dotted-line managers” in addition to the manager who is responsible for their salary. This group is open to using new tools and can be a way to introduce new technology to improve effectiveness. For example, in HP, within a period of 12 months, without any formal program, 75% (about 60,000) of the employee population had installed some sort of public instant messaging tool. After four months of a formal program, about 40,000 had installed the enterprise standard instant messaging (IM) tool.

People who are in the “capitalize stage” are the ones who are actively driving the use of virtual teams in an organization and try to take full advantage of the diversity, cross-functionality, and distributed nature of virtual teams. People in this stage either can be managers who take advantage of virtual teams to give their organization a competitive advantage, or individuals who are heads for the virtual team model. There are some people in this stage who feel that face-to-face interaction is not necessary at all or that technology will solve all problems. They may sometimes be frustrated that the tools that they have are not rich enough to perform the advanced tasks that they want to do.

They are typically the ones who are willing to try out the latest technologies and techniques before they are ready for the mainstream population. People at this stage:

- Can be the catalysts that push the organization forward in the virtual team maturity scale. However, they need to remember often or be reminded that while they pave new paths and move forward, they need to sometimes slow down, or turn around to make sure people are following them and not left-behind.
- Are sources of the most advanced thinking around virtual teams?
- May be a channel for sponsoring or demonstrating new technologies and processes.
- Need to be reminded that the majority of the population is in the operate stage, not the capitalize stage.

It should be mentioned that this scale is not intended to imply that being in the avoid stage is bad and that the capitalize stage is perfect. Rather, it is an indicator of how successful a person or group will be in a virtual team environment. Groups will need to decide for themselves where on the curve they feel they need to be in order for their organization to be successful. Some may decide that because of the nature of their activities, being in the avoid stage is fine and that moving to any of the other stages is unnecessary. Others may decide that they should move from the tolerate stage or to the operate stage. In any case, the virtual team maturity scale can help to understand in which stage an individual or group is what their perspective is on virtual teams, and what their role can be in the overall ecosystem of virtual teams.

5 Part I – Summary:

The beginning of this paper is based on study of challenges in implementation of virtual projects which describe definition, demand and virtual management challenges. In continue, general maturity model and virtual maturity curve are described and tried to match and compare it to virtual teams to find organizational and managerial steps which should be passed to reach mature level in project implementation. Maturity model is studied as a point of departure to investigate the challenges facing organizations wanting to implement a more virtualized type of project-oriented work.

The benefits of a structured assessment of project management maturity lie in setting direction, prioritizing actions, and beginning cultural change rather than in understanding the current level at which an organization is performing. It is important that the assessment itself be repeatable, provide consistent measurements and results, and also provide some degree of benchmarking with other organizations. This provides the basis for any assessment to be utilized as a “checkup” tool to measure progress, and to identify the next logical steps forward.

Achieving fifth level of maturity is not for everyone. Each organization needs to determine the minimum level of maturity at which the return on investment (ROI) is achieved and then determine the ROI associated with achieving the next level. It is important to realize that these levels are evolutionary steps. (Crawford J. K., 2002)

It is recommended that clients establish an incremental improvement program with specific focus and measurable goals that allow their organization to realize some benefits within a short period of time. Crawford (2002) also found it beneficial to maintain project management maturity synchronized with other corporate process maturity, including financial management, software engineering, etc. For instance, implementing mature project management processes such as earned value tracking is not very logical if the organization has not implemented time reporting processes. Experience shows that advancing project management practices far ahead of other corporate processes can cause disorder and mistrust.

All studied models (general and maturity curve) express maturity levels of virtual team, in comparison with virtual team challenges which are summarized in following table.

Level Name	Description	Enterprise attribute	Virtual member attribute	Project things attribute	Best practice in VT at project level	Description	Challenges addressed	Best practice in VT at organization level	Description	Challenges addressed
1 Initial (Avoid stage)	Processes are ad-hoc and chaotic. No stable environment. Success depends on "heroes" and not on mature processes.	Individual decision making, Little available guidance, Roles and responsibilities are not clarified	Mistrust atmosphere, not much normal communication, Infrequent Team interaction	lack of common purpose for the project	Include face-to-face meetings in baselines, try to create shared vision and purpose among the team members	Face-to-face meetings have to be factored into the cost and schedule baselines during the project planning phase	Lack of face-to-face communication, motivation, conflict resolution, trust	Cultural diversity awareness	Educate employees on cultural diversity, and empower them for working in a multi-cultural environment	cultural differences, trust, conflict resolution
2 Managed (Tolerate stage)	Requirements, work products, processes and services are managed. Status of the work products visible to management at predefined points.	Project management support, policies regarding collection of project data	sense of personal responsibility to support the virtual project, team members normal communication, individual integration to be a VT	Establish virtual team charter, more discipline in the team's activities, roles and responsibilities of virtual team members are known	Use of the project charter effectively, establish a system for project info documentation, technology training	obtaining needed staffing, coordinating commitments, negotiating for resources, managing performance, developing skills, and making recommendations, A system of regular reporting and reviews	Still feeling lack of face-to-face communication, risk of misunderstanding	Introduce common documentation language	Agree on a main language in which all processes, practices and intellectual capital contributions are available. Provide training to employees who need to improve their proficiency in this language	language barriers, project team knowledge and conflict resolution
3 Defined (Operate stage)	Processes are well-defined and understood, and are described in standards, procedures, tools and methods.	Common culture and general trust, open communication	Different expectations are known, team vision is created, standards for decision making are established, information sharing, normal cooperation	Available standard template for virtual team charter, comprehensive performance evaluation system, periodical review	Require intellectual capital (IC), more emphasis on team discipline and self-management, self-management and self-	Create a process that requires the project manager and team members to investigate the IC database before deciding to create a deliverable from scratch. Require documentation of this process step.	information redundancy, lack of face-to-face meetings, project team knowledge and cross team collaboration	Implement flexible working model, organizational guidelines and policies, establish organizational framework and strategic plans	Enhance employee availability, flexibility and work-life balance by enabling them to work outside of the traditional office setting.	Time, motivation, knowledge and cross team collaboration

			among team members	of virtual team processes and template based on lessons learned, prioritized list of data	motivation training					
4 Quantitatively Managed (Operate stage)	Quantitative objectives for quality and process management are established and used as criteria for managing the process.	The virtual team has the explicit support of the organization, periodically performance assessment	collaborative leadership and shared responsibility among team members, The focus is on learning from and helping one another, supportive behavior, A climate of open communication and trust is available	monitoring the effectiveness of team members' procedures, processes review by team members to enhance the quality of work	Security policy propagation, empower work groups	Require all outside resources having access to protected data to implement and sign off a set of minimum security policies	proper security, trust	Create intellectual capital (IC) repository, empower the project teams, integrate organizational work force competencies, performance management	Create an intellectual capital (IC) repository which stores all valuable data from past initiatives or projects with a potential to be reused.	information redundancy, project team knowledge and cross team collaboration
5 Optimizing (Capitalize stage)	Process performance being continuously improved through both incremental and innovative strategies, knowledge transfer	Virtual teams are recognized as a strategic resource for organizational success	high levels of trust, risks are viewed as opportunities, thinking, sharing, creating, innovating and learning project environment, open and honest communication	Team charter and its continuous enhancement, conduct continuous evaluations of team operating processes and performance	Proper virtual resources interlock, empower competent people and continuous improvement in their work processes	Implement regular interlock and status calls with virtually managed resources, keeping knowledge profiles update and improve individual performances	information redundancy, motivation, project team knowledge and cross-team collaboration	Secure collaboration, Improvements or either modifications of existing team procedures, change management	Define a secure standard procedure for communicating with outside resources over the course of the project, e.g. VPN-connections to a secured online team-room.	Proper security, lack of face-to-face meeting

Part II - Preparation and managerial challenges in process of virtual projects implementation

Virtual teams are groups of individuals who work on interdependent tasks, share responsibility for outcomes, and who work together from different locations. Information technology can support their activities by reducing travel costs, enabling expertise to be captured where it is located, and speeding up team communication and coordination processes. Unfortunately, these distributed teams are not always productive. For example, team members may have difficulties in coordinating work with their remote colleagues, or they may not be comfortable using the technology. (Pauleen D J 2004) But Pauleen (2004) in other part of his book states that virtual teams are now being used by many organizations to enhance the productivity of their employees and to reach a diversity of skills and resources.

According to books and researches which have been done in this field, it is not possible to say using virtual teams in projects definitely will increase organizational productivity or not whereas it depends to the organization facilities, resources, management and the way that they choose to implement this kind of projects.

Due to this challenge, part II is considered to investigate different authors' point of view about virtual projects implementation methods. In continue, the implementation processes are studied and categorized in to process models.

1. Hertal et al. (2005) model

Due to increasing de-centralization and globalization of work processes, many organizations have responded to their dynamic environments by introducing virtual teams, in which members are geographically dispersed and coordinate their work predominantly with electronic information and communication technologies (e-mail, video-conferencing, etc.) (Hertel G and Konradt U 2005). Hertel et al. (2005) believe that the rapid development of new communication technologies such as the Internet has accelerated this trend so that today, most of the larger business organizations try to employ virtual teams to some degree.

Virtual teams can be found in various fields, such as R&D, problem solving task forces, or customer services, and they also exist in non-economic organizations such as virtual collaboratories in sciences. In this way and among studied articles, Hertel et al. state one of complete lifecycle activities and possible challenges that project managers may experience. In continue the model will be described and evaluated.

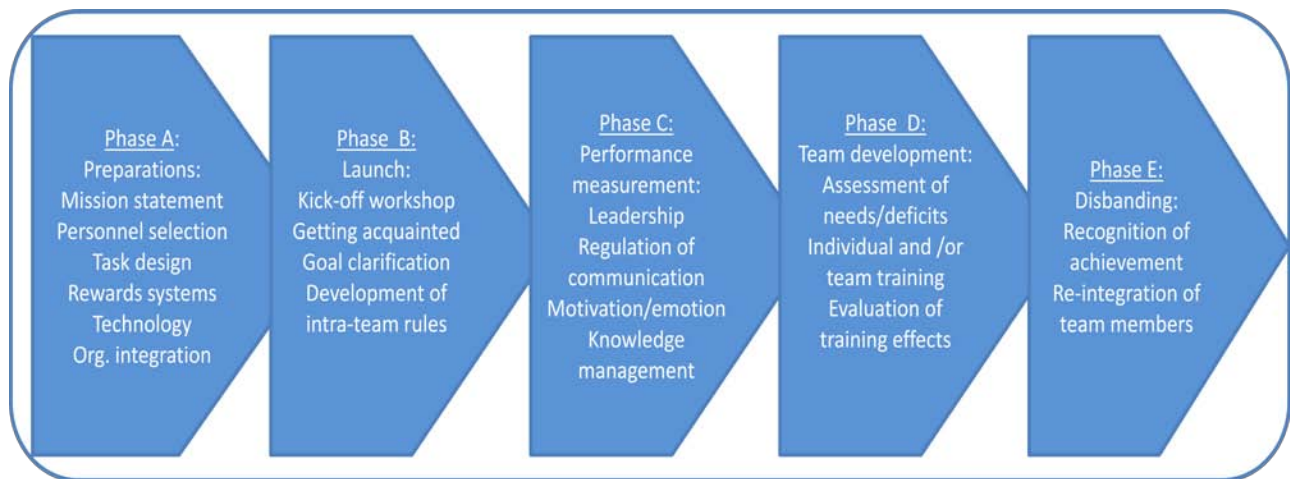


Figure 2: key activities in the lifecycle of virtual management Invalid source specified.

Hertel et al. (2005) proposed model in which five phrases are distinguished in the management of teams with high virtuality: preparation, launch, performance management, team development and disbanding.

The first phase: “Preparations” consist of tasks and decisions that are relevant when an organization is planning to implement virtual teams (mission statement, personnel selection, task design, etc.). The initial task during the implementation of a team refer to the general purpose of the team working together with the determination of the appropriate level of virtuality to reach the goals. These decisions are usually determined by strategic factors such as mergers, increase of the market span, cost reductions, flexibility and reactivity to the market, etc. However, conceptual and empirical work is needed to examine what levels of virtuality are suited for projects objectives (Hertel G and Konradt U 2005).

One of the strategic reasons for virtual teams is to combine core competencies of specialists from different locations. In these cases, the main selection criteria for virtual team members are their professional or technical KSAs (knowledge, skills, and abilities) and expertise, for instance, specific sales or procurement skills. In addition, more general attributes of team members might be considered as well.

However, high degrees of virtuality require also attributes relevant for tele-cooperation, such as expertise with new media and groupware technology, self-management skills along with certain personality attributes, such as self-sufficiency, interpersonal and intercultural sensitivity, interpersonal trust, and dependability.

More general considerations of task design for virtual teams refer to the question which kind of work might be suitable for high levels of virtuality. Generally, tasks are better suited for virtual teams the lower their degree of physical work and the higher the degree of information-based work is (e.g., R&D, project management, sales, procurement). (Hertel G and Konradt U 2005) Another issue is that separation of subtasks (modular structure) should be feasible in order to reduce coordination requirements when subtasks are distributed among different locations. Finally, clear success criteria should be available to facilitate feedback processes across distance.

The second phase: “Launch” is about activities which are relevant at the actual beginning of the teamwork, such as conducting a kick-off workshop. The distinction between this “Launch” phase and the following “performance Management” phase declare that teams with high degrees of virtuality often need more time to establish reliable work processes compared to conventional teams. (Hertel G and Konradt U 2005) Almost all studies about conceptual work on virtual team management recommend that, in the beginning of virtual teamwork, all members should meet each other face-to-face. Crucial elements of such a “kick-off” workshop can be categorized as: getting acquainted with the other team members, clarifying the team goals, clarifying the roles and functions of the team members, information and training how communication technologies can be used efficiently, and developing general rules for the teamwork. Initial field data that compare virtual teams with and without such “kick-off” meetings confirm a general positive effect on team effectiveness, although more differentiated research is necessary. Experimental studies demonstrate that getting acquainted before the start of computer-mediated work facilitates cooperation and trust. (Hertel G and Konradt U 2005) Trust is a topic that comes up repeatedly in virtual team literature. More recently, Roebuck et al.’s (2004) practical advice for trust development in virtual team is to (1) define the team’s objectives (2) assess agenda items (3) identify appropriate members (4) establish a team leader and (5) leverage team members’ knowledge and to ensure that knowledge is shared across the team. (Roebuck DB 2004)

The third phase: “performance management” includes issues of leadership and the maintenance of motivation and communication within virtual teams. Hertel et al. (2005) know

leadership as central challenge in virtual teams. Particularly, all kinds of direct control are difficult when team managers are not at the same location as the team members. Empirical results on three leadership approaches are summarized that differ in the degree of autonomy of the team members: Electronic monitoring as an attempt to realize directive leadership over distance, management by objectives (MBO) as an example for delegate leadership principles, and self managing teams as an example for rather autonomous teamwork.

The available evidence on leadership in virtual teams suggests that principles such as electronic performance monitoring (EPM) are not well suited for virtual teamwork. Instead, more delegate principles are promising as they address the challenge of distributed work by shifting managerial functions to the team members. (Hertel G and Konradt U 2005)

Physical disconnectedness in virtual teams can lead to various challenges of members' work motivation due to any of the following reasons: It is more difficult to implement common goals, feelings of anonymity and low social control may lead to social loafing, self-efficacy is more difficult to maintain due to reduced feedback, and trust is more difficult to build. Team cohesion and team identification, as another group of process variables relevant for the regulation of virtual teamwork, are both related to motivation (e.g., valence of team goals) as well as cognitive processes within virtual teams (e.g., assimilation of team roles and norms). As with motivation, developing cohesion and team identification can be difficult in virtual teams due to reduced face-to-face contact, and both are usually lower in computer-mediated teams compared to conventional teams both in the laboratory (Bouas & Arrow, 1996; Warkentin et al., 1997) and in the field.

Another important issue for virtual teamwork policy is management of knowledge and development of shared understanding within the teams. The development of such "common ground" might be difficult in virtual teams because sharing of information and the development of a "transitive memory" (i.e., who knows what in the team) is harder due to the reduced amount of face-to-face communication **Invalid source specified.** However, for virtual teams it seems to be important to both increase mutual knowledge about the individual working contexts (e.g., by common experiences and mutual training), and at the same time to profit from technologies to enhance equal information distribution, systematic processing of unshared information, and a thorough documentation of existing knowledge structures. (Hertel G and Konradt U 2005)

The fourth phase: “Team development” entails evaluation activities of team processes together with team training and involving of new members. Both the third and fourth phases can be considered as major leadership functions that are critical in all teams.

The development of such training concepts should be based on an empirical assessment of the needs and/or deficits of the team competencies added to effectiveness of the trainings which should be evaluated precisely. **Invalid source specified.**

Virtual team managers may find it difficult to create team synergy and to overcome the absence of information, interactive learning. Generating synergy (and avoiding process losses) seems to be difficult because members rarely interact face-to-face. In response to this challenge Bradley (2002) proposes: extensive training in virtual team work helps overcome process loss. Training in virtual team leadership, conflict management and meetings management is particularly valuable for overcoming process loss. And also adaptation of decision-making software facilitates problem solving and decision-making. (Bradley L K 2002)

Finally, the fifth phase: “Disbanding” includes tasks such as the proper recognition of team achievements and the reintegration of team members in virtual team management. Particularly for virtual teams that often collaborate only for a short time-period, a careful disbanding process is an important issue because of experts motivation maintenance that can be combined again for future projects in a quick and flexible way. **Invalid source specified.**

Hertel et al (2005) conclude that when virtual project teams have only a short life-time (“transient” teams) and reform again quickly, careful and constructive disbanding is mandatory in order to maintain high motivation and satisfaction among the employees.

To date, not many empirical work is available that explores these considerations more systematically. More research is needed to examine which steps are helpful for a careful disbanding of virtual teams, and how experiences and best practices can be transferred to future virtual teams. **Invalid source specified.**

2. Rad and Levin (2003) model

By definition, the primary focus of the project team is the final deliverable of the project. However, the team must focus on the deliverable in conjunction with the activities that assure the delivery of the desired product, or the facilitation of the desired service, in the most cost-effective and efficient manner. The project team must plan the delivery of the product or service through adoption of best practices and consistent procedures. Then, during the implementation phase of the plans, which usually occurs in a dynamic environment, the team must manage emerging issues that influence its performance in delivering the desired results. (Rad F. P 2003)

The separation of things issues and people issues is only for purposes of topical coverage, because these two sets of issues are almost always interconnected. In order to characterize the success and effectiveness of the project manager, and the team, in achieving the desired project objectives existence of standardized processes and procedures, consistent conformance of the project team with those procedures, and the efficacy of these procedures need to be identified. The rationale for using this three-part system is to determine whether the success of the project manager was by accident or by design.

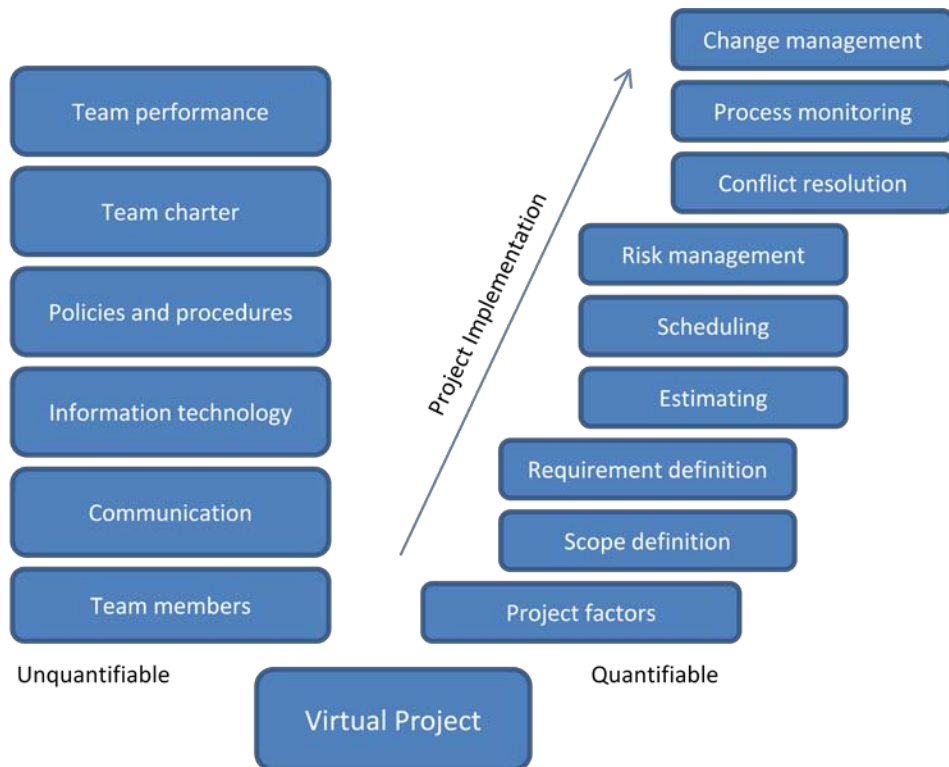


Figure 3: Rad and Levin (2003) suggested practices

Requirement management:

Most projects, particularly system development projects, are not fully defined when they are authorized. (Rad F. P 2003) The client's needs and requirements must be articulated and documented somewhat quickly, even though with minimal detail. Then, during the early phases of the project, the documented information must be made compatible with current technological capabilities. In these projects, there is a continuous dialogue between the project team and the client with regard to the attributes of the deliverable. Details of the deliverable will reflect the requirements of the user as well as business needs of the client. The requirements and needs of the client are provided in a set of documents that will in turn found the basis for the mission of the project. To the extent possible, the definition of requirements must be as accurate as practicable, because information obtained during the requirements definition process will be used to determine whether or not the project should be authorized. Later, as additional information becomes available, the updated set of requirements will be used to determine whether the project should continue or whether cancellation of the project should be recommended. The next step involves the development of a clear and concise statement of the problem. The narrative description of the problem is then expanded into a detailed technical specification of the requirements and functions. Finally, an ideal requirements development process must produce several alternative solutions, allowing the client to explore the advantages and disadvantages of each one. An effective requirements management process (including: gather stakeholder information, document requirements, validate requirements, define deliverable attributes, formulate project cost and duration, develop acceptance testing schema, analyze trade-offs, devise alternative approaches) will allow the team to craft the deliverables in full compliance with the client's current needs and requirements.

Once the initial requirements have been articulated and documented, then a baseline estimate for cost and schedule will be formulated in light of those requirements. Then, as the project progresses into implementation, requirements management activities include those tasks that are performed in order to keep a reasonable balance among the project's triple constraints. The objective of a midstream change in the project is, or should be, that the client ultimately takes delivery of a product that serves all of its reasonable business needs. The mission of the project manager is to do this while maintaining acceptable values for the project's cost and schedule.

Scope definition:

Scope definition is the process by which the client's requirements are transformed into the detailed description of the project deliverables. The scope definition documents may include technical descriptions of equipment and hardware, technical description of the software, and the details of size and capacity of the resulting system. Scope definition may also include quantified performance features of the final product, such as reliability, error rate, speed, response time, maintainability, and user friendliness.

Estimating and scheduling:

The process involves assigning resources to each element-specific activity through the use of a resource breakdown structure (RBS). Typically, an RBS is a detailed listing of all of the project's resources, divided into the following major categories: personnel, hardware, tools, and other expenses. The resource duration will provide elements that are necessary for the development of a schedule. The second item necessary for the development of a schedule is the sequence of activities that need to be performed for that element, or for the project for that matter. A fully developed project schedule will include start and finish dates for all activities of the project and, most importantly, a delivery date for the integrated project deliverable.

Risk management:

It is accepted that the project which progress through its life-cycle stages will encounter with unwanted and/or unplanned events. These unexpected events usually complicate the normal execution of the project processes by expanding the scope, increasing the cost, and delaying the delivery date. With a logical overall project risk management plan, and risk-specific response plans, the team can minimize the impact of these risk events on the progress of the project somewhat gracefully. At the beginning of the project, a database of all non negligible project risks must be developed and then continually maintained throughout the life of the project. This list of risks must be updated throughout the life of the project, since risk management is a continuous activity. Then, for each risk event, the probability of occurrence and its impact on the project will be estimated. The impact can be on scope, cost, or schedule.

Ideally, risk identification, quantification, and analysis should become routine activities, similar to other project activities. As such, a project risk management plan should include team reviews, task planning, tracking, monitoring, and control. Having regular and timely risk data, the team would view risk management as an integral part of project management, with routine risk identification and monitoring activities throughout all phases of the project life cycle. Thus, managing risks becomes part of the overall project management methodology, and not a stand-alone activity.

The advantage of using the team approach in the risk management process is that there is less likelihood that some risk information might be overlooked. The subtle objective is for the entire team to learn to think "risk" in order to prevent small task-related problems from growing into major project crisis situations. Formal communication dealing with risk events should not be just the sharing of issues on a case-by-case basis and not only at times when the project management team is certain that a problem is soon to develop. Rather, risk management should be integrated into technical interchange meetings, design reviews, and user requirement reviews. During these meetings, all team members should jointly identify those risks that are considered to have the highest probability of occurring and the greatest impact on the project deliverable. Through this joint effort, risks are identified, categorized, and prioritized before they evolve into major problems. Higuera et al. (1994) suggest that risk management should be even more in-depth by way of involving the full complement of the team members, the stakeholders, and the client representatives.

Progress monitoring:

The objective and purpose of a progress monitoring system are to keep the project team informed of progress on the individual tasks and the progress of the full team. Additionally, progress is reviewed in light of the overall project objectives and organizational strategies. A progress monitoring process should be part of the organizational project management culture, rather than narrowly focused on the specific project at hand.

A monitoring system is most successful when it is formalized and fully embedded into the organizational procedures for managing projects. It is under these circumstances that project personnel would know what data are expected of them for input into the progress reporting system. Accordingly, the project personnel will have a clearer picture of the volume, quality, and

frequency of the reports that they will be receiving from the progress reporting system. The progress monitoring system must be a facilitative tool that informs the team members of their individual assignments, reminds them of forthcoming events, and warns them if there are significant variances.

Additionally, the progress monitoring system must centrally store the data for forecasting and for future customization of estimating and scheduling models. In order to increase the utility of the progress monitoring and reporting system, the data must be compiled, refined, and reported to the team members in a timely manner and at the level of detail that is useful to the recipient of the information.

Change management:

Changes in scope and in the implementation environment are inevitable in all projects. Change management is the process that is used in order to maintain a reasonable level for quality, cost, and schedule while delivering the desired product as close to the client's current expectations as possible. Because project changes occur in a continuous and evolving form throughout the project, it is necessary to have proactive tools that identify trends, manage trade-offs, implement changes, and report the changes to anyone who might be impacted by them. The success and effectiveness of the change management system depend heavily on the sophistication of the progress monitoring system.

The change management process is most effective when it is formalized and integrated with the enterprise project management policies and procedures. A formalized change management process will ensure that all project personnel, in all projects, follow a specific set of established procedures. A formal change management structure will have the added advantage of keeping the entire project stakeholders involved in, or at least informed of, the performance status of the project, thereby contributing to team spirit and good morale.

The objectives of the change management process are to track progress, compare the actual values to the planned values, analyze the impact of variances, and make adjustments in light of these variances. The progress data from the current project will be interpreted in light of current project specifications, historical data from previous projects, and benchmarking data

from other projects within the same industry. The impact of each change must be evaluated in terms of scope, cost, schedule, and resource demand.

3. Brown et al model (2007)

According to Brown et al. (2007) research, organizations use virtual teams for myriad functions, ranging from cross-functional project teams to task forces and line management. They believe that with virtual teams and teleworking opportunities expanding exponentially, managers are increasingly encounter with hiring employees, contractors, or consultants who will work and live far from the boss's office.

Hiring:

Brown et al. (2007) believe that as the first step before hiring someone, managers can improve organization's chances of finding a good fit by:

- Track industry changes to re-examine the skills which organization is looking for in a candidate, or give ideas for training and teambuilding.
- Evaluate project needs to know what skills do you need on your team? Are there certain character traits that would fit better with your team than others? And does organization need employees with lots of experience, or would an intern work better? How much supervision does organization anticipate providing?
- Develop an organizational chart that employees can clearly see functional and reporting relationships. (Brown K M and James-Tanny C 2007)

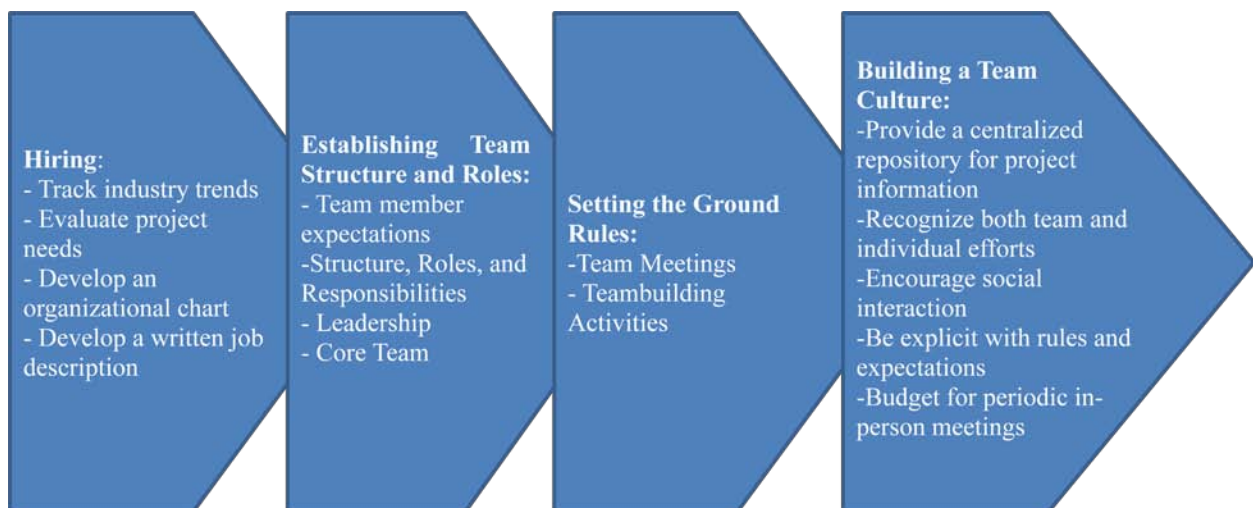


Figure 4: Brown et al. (2007) suggested practices

Establishing team structure and roles:

Referring to Brown et al. (2007) studies one of the advantages of virtual teams is that team members tend to focus more on getting the job done perfectly as compared to the office politics and gossip that often comes out of collocated teams. To facilitate this focus, managers and team leaders must try to be explicit about expectations, structure, and roles.

It is important to identify such expectations and to ensure that the team is focused on the same objectives and has the same expectations about the project during establishing the team. Project expectation can be considered as vision for the project, behavioral expectations, hierarchy, methodology for measuring success and relationship of project to other priorities.

Team structure and its relationship to the corporate hierarchy, forms the framework based on which the roles and responsibilities hang. The structure of the team defines how each functional area will work together, as well as who shows up for reviews, who manages changes, who works with whom, and how often meetings are held. (Brown K M and James-Tanny C 2007) In the other word, team structure and clear roles within organization can help to prevent overlap and conflict in responsibilities and project priorities.

Brown et al. (2007) believe that leadership in virtual teams is a shared responsibility. For example, team members who are experienced with working virtually typically take extra time at the beginning of the project to find ways of establishing a relationship of mutual understanding or trust and agreement with their distant colleagues, and are very proactive about their communication. Other team members are good at planning teambuilding activities, and connecting people comes naturally to them. Still others are highly competent technically and become the “go-to” person on some aspect of the project. A good team leader actively encourages these unofficial roles because the team becomes more invested in the project if each member feels that his or her contribution matters.

Setting the ground:

Based on Brown et al. (2007) model, once organization has established the team structure and has identified the core team (including project manager, documentation, design engineer/developer, marketing, testing/quality assurance ...), it is time to get the project started. In initial meeting, project managers set situation and status for the project, projects' expectation, and ensure that everyone understands the project's goals, deliverables, and schedule for the project. It is the best if this meeting can take place in person. The cost of getting everyone

together for a few days at the beginning of a big project will be saved many times over with fewer conflicts and better communication. (Brown K M and James-Tanny C 2007) In other words, shared experiences and goals are the fastest ways to build establishing a relationship of mutual understanding or trust within a team.

Within building a team it is important to ensure that everyone on the team feels included and welcome. If teambuilding activities not managed effectively, it can change core issues for team members around rejection, isolation, cliques, and social hierarchy. Regardless of whether the activity is virtual or in person, following steps can help team building process such as: get the team involved in planning some of activities, be aware of signs for social isolation, maintain a sense of humor and provide time to socialize casually after the activity.

Building a team culture:

The Final the challenge for managers to implement virtual teams is to build friendly work environment, mutual respect, effective communication, and productivity despite differing worldviews and physical environments. (Brown K M and James-Tanny C 2007) In brief, as a manager or team leader, he/she must take a disparate group of people and cultures, and develop a team culture that is a combination of cultures and strengths that the individual team members bring with themselves. Managers can facilitate building a team culture by: considering budget for periodic in-person meetings, facilitate an open discussion about team expectation, explicit roles and expectation, providing central repository for project information and encouraging social interaction among team members.

4. Duarte and Snyder model (2001)

Duarte and Snyder (2001) believe that virtual team leaders need to ensure from the start that they have the strong support of sponsors, stakeholders, and champions. They articulate the reason as because success of a virtual team often involves effective interaction with and the participation of constituents from a number of functions, locations, and external organizations. Sponsors, stakeholders, and champions link the team to the management power structure across locations and organizational boundaries.

Step 1: Identifying team sponsors, stakeholders, and champions

According to Duarte and Snyder (2001) “ a sponsor is the person (usually a member of management) who works closely with the team leader and who acts on the team’s behalf to cross organizational barriers, resolve conflicts of interest, obtain resources, and provide a link with upper management”. Stakeholders may be different persons from different functional areas, regions, levels of management, and partner organizations. The virtual team leader should take the time to plan and arrange the team’s inputs and outputs and relate them to appropriate stakeholders. A champion referring to their model has a strong interest in the team and may be found in different functions, regions, and in partner organizations. Part of the champion’s role is to create perceptions of the virtual team as successful and productive and to assist in the attainment of project resources, who may team’s champion be a member of the organization’s top management.

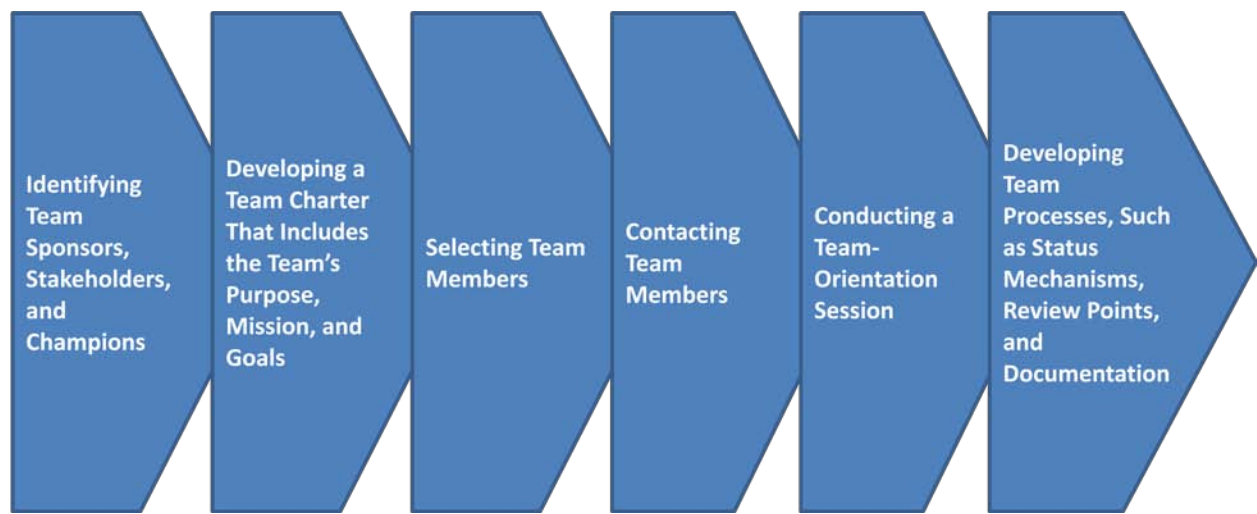


Figure 5: Duarte and Snyder (2001) suggested practices

Step 2: Developing a team charter that includes the team's purpose, mission, and goals

It is necessary to have a clear understanding about statement of direction at the beginning of any team. The team's charter shows a point of departure for more detailed plans. For traditional teams, if the starting point is properly aimed, the day-to-day contact of the team members can add meaning and reinforce shared understanding between team members. (Duarte D L 2001) For virtual teams, the lack of physical contact may not have the main meaning and understanding and make the link between team charters and work more tenuous. For this reason, preparation must be more thoroughly planned and reinforced. Developing the team's charter facilitates interaction and participation from all stakeholders in teams, especially when the team's task may later have to address issues regarding conflicts of interest or resource reallocation.

Step 3: Selecting team members

According to this model, when the sponsor and project stakeholders have been identified and the charter has been approved, the team leader can begin to identify team members. The optimal situation, however, is to select members who meet the demands of the task and who are well-suited to working virtually. Base on Duarte and Snyder (2001) point of view, most of networks, parallel, projects, and virtual teams have at least three types of team members: core, extended, and ancillary. They define core team members as individuals accountable for direct task output. Core members may include employees from distant locations, vendors, suppliers, and customers. Extended team members do not usually work with the team on a daily basis but provide expert support or advice when necessary. Extended team members may be considered as internal and external consultants, sponsors, and stakeholders. Ancillary team members do not work on the team but review and approve the team's work and deliverables. Ancillary team members include the team's client, major stakeholders, and certain high-level managers. (Duarte D L 2001)

After identifying individuals, it may be a good idea to check the logic of the selection (and the reputation of each team member) with the sponsor and stakeholders or champions. Sometimes a person has a good local reputation but is not regarded in other parts of the organization or in other functions.

Step 4: Contacting team members

Whatever virtual teams are more efficient, team leaders pay more attention to the first interactions they have with their team members. They carefully pay more attention on how team members meet one another and how new members are introduced. Duarte and Snyder (2001) state some very simple practices that experienced virtual team leaders engage in during this step:

1. They make sure that all team members clearly understand the team's task.
2. They arrange for appropriate amounts of interaction among team members before the work actually begins.
3. They make special efforts to facilitate the feeling of being part of the team. (Duarte D L 2001)

The objective for the team leader in this step is to facilitate interaction with each team member before the team actually begins their work. The team leader should have personal interaction with the team members and also personnel feel welcome to discuss with their managers.

Step 5: Conducting a team-orientation session

In terms of team orientation session, the ideal one that is cited as a best practice by virtual teams is a face to face meeting that is attended by all team members. Currently, no technology can provide feeling of human interaction, and the understanding that develop from a face-to-face meeting. The reason can be the orientation session outcome that is a plan for team performance, which includes team norms and communication protocols, which facilitate shared understanding. Duarte and Snyder (2001) believe that "such a session is especially important for team members from high-context and collective cultures who expect and respond to more personal contact". It seems to be more important when it comes to virtual teams. Using e-mail, bulletin boards, data-only conferencing, or groupware without video capability can help in the exchange of information prior to the session or afterward but they are not as suitable for events that require extensive interaction.

The agenda for the orientation session according to Duarte and Snyder (2001), at a minimum, should feature the following:

1. An orientation to the team's task, including
 - An overview of the team's charter

- An opportunity for team members to react to and offer suggestions about the elements in the team's charter
 - A review of each team member's expertise and accountabilities
2. Development of team norms, technological plans, and communication plans
 3. Team building

Step 6: Developing team processes, such as status mechanisms, review points, and documentation

During the orientation meeting, the team leader should explain the processes that will be used to manage and control the team's work. Many high-performing virtual teams adopt project-management practices to control their work. It is quite easy to find project-management software packages that assist in this process. Many can be imported into standard groupware systems.

Teams also should plan how they will involve in regular, frequent reviews. This includes establishing agendas that address milestones, plans, problems, status vis-à-vis milestones, and costs. (Duarte D L 2001)

Discussion about the ways in which information about the team's history and progress will be documented, stored, and exchanged are considered as important part of this step. Information such as reference materials, historical information, plans, scouting reports, the status of related internal or external activities, and team generated products are valuable in orienting new team members. They also are valuable resources for future teams that are performing related tasks.

5. Nemiro et al. model (2008)

According Nemiro et al. (2008) point of view almost all collaborative effort requires well design, clear vision and goals, boundary setting, and explicit work agreements. The very nature of virtual teamwork requires more thought and greater design specificity than face- to- face work. If virtual collaboration is designed and led well, then the conditions for success are explicitly defined, and the probability of success will increase.

Nemiro et al. (2008) define the best chance of success for virtual collaboration when:

- The consequences of not collaborating are clear.
- Organizational success also is important to team members.
- The results are heavily dependent on team collaboration.
- The conditions (for example, time zones and cultures) are sufficiently challenging to encourage people to raise their individual creativity and performance levels.
- Leaders are specially selected and supported to be effective in managing the virtual collaborative work situation.

Principle 1: Select and position leaders for success

Nemiro et al. (2008) are agree with Hertel et al. (2005) about effective leadership that can be considered as central part to all aspects of designing and managing virtual collaborative work. Today's organizations perception is much different from yesterdays. Boundaries are blurred across geographies, countries and cultures, markets, supplier networks, and alliances. Communication is the vital competency for leaders of virtual collaboration work - "the capacity to create a compelling vision that takes people to a new place and to translate that vision into action". (Nemiro J, S and L. 2008)

Virtual team can be implemented by considering key competencies and attributes such as:

- Being curious learners by nature,
- Ability to teach, give positive feedback and coach others,
- Experienced and credible in the business but not stuck in their ways,
- Process and outcome focused
- Exceptional communicators and listeners which they have demonstrated skill in communicating face - to - face as well as virtually and to groups as well as one- to- one.

This model suggest that having an interactive high - energy work session to explore roles and responsibilities in the context of corporate objectives will be useful to position leaders for success in managing virtual collaborative work,. Senior executives as educators can help leaders in the vision and corporate outcome targets.



Figure 6: Nemiro et al. (2008) suggested practices

Principle 2: Engage all in a common vision, purpose, and destiny

. All design elements flow from team vision that is the essential and foundational element in the design process. It is almost impossible, for example, to set up work processes and measures of success if the vision and purpose are unclear. If appropriate for the organization, a vision statement can be drafted first with the leadership team and then presented and worked through with a design team or representative. To contribute to vision work, people first need context. Executives can help the team members in this issue by answering the following questions: What is the industry landscape? Who are our competitors? What makes them formidable? How do we compare? What are our customer requirements? How do we know? What product or service will we deliver? What is our strategy? How do we want to be known? When we are successful, what will that mean to our customers, our employees, and our shareholders? How would we describe our vision and purpose — our destiny?

Principle 3: Create the context for energy and understanding

Nemiro et al. (2008) believe that virtual collaboration takes energy and imagination that go beyond the normal working environment.

To create energy and build understanding, considering the following sorts of activities can be helpful:

- Invite customers to address the group and describe their business challenges.
- Invite suppliers or partners to address the group and describe their business challenges and what it is like to be a partner.
- Divide the group into teams, and assign each a competitor to research.
- Find a way to experience what it is like to be the organization's customer or supplier.

Principle 4: Create a universal language in operating principles

Having clear expectations is another issue that helps good organizational functioning and takes on heightened significance in virtual collaborative work. Trust, confidence, and outcomes are stronger when all people in the system are operating under the same principles and to the same standards. (Nemiro J, S and L. 2008)

When people representing the system which they have participated in creating its principles and standards, there is greater ownership and effort to uphold what has been created. The operating principles become a universal language and provide common focus that transcends time zones and cultures.

Principle 5: Document reliable, repeatable work processes

In this model creating work process is considered as the heart of the design. Designing understandable processes that can be easily followed in team work, increases the probability of desired outcomes will be met consistently. Documented processes are also important issue in virtual team work that facilitates periodic review of results to identify process improvement opportunities.

Nemiro et al. (2008) state that “leaders, as part of their preparatory work, should review and determine what the logical groups should be and which leaders will work with each design team group”. They believe that the use of templates will help organizing work processes and flow, help the process move along, and ensure that all teams use a similar approach. Leaders

should decide in advance such issues as level of detail and format for output. Work design groups should involve people from different business units, divisions, or functions to mirror the groups that will need to collaborate. The design work should proceed in high level detail within each team, punctuated by report - outs and check – and ask the whole group to review progress and get feedback.

Principle 6: Establish roles and accountability for decision making

According to Nemiro et al. (2008) one essential issue to avoid confusion is finding the right balance of collaborative and autonomous tasks. In other words, identifying roles and responsibilities in decision making is important in any work design, and especially in virtual collaborative work where real time face- to - face discussions are not always possible. Once work processes have been designed, teams across functions, units, and locations should be gathered to create a full picture of decision making. Job descriptions, training, and standards go a long way toward assisting people in understanding their roles and responsibilities.

Principle 7: Create goals and measures accessible to all

Creating goals that can be held in common across the project team is another essential factor for effective virtual teamwork. Nemiro et al. (2008) mention that: “The organizations of the future will be networks, clusters, cross - functional teams, temporary systems, ad-hoc task forces, lattices, modules, matrices — almost anything but pyramids. We don’t even know yet what to call these new configurations, but we do know that the ones that succeed will be less hierarchical and have more linkages based on common goals rather than traditional reporting relationships”. Another crucial issue is identifying measures that can be easily accessed through technology. Measures are important in any endeavor, and even more so in a virtual collaborative effort, as they help team members in pursuit of common goals that go beyond differences.

Principle 8: Set up mechanisms for feedback and celebration

Based on Nemiro et al. (2008) idea, building team from different functions, units, time zones, and cultures is essential to reinforce the notion that “we’re in this together.” If the connections are well managed to focus on learning and positive encouragement, people will look forward to the opportunity to participate and will tend to look for opportunities to improve. Working in virtual collaboration mode requires a review both within the immediate team and across the larger network of teams, functions, or locations. (Nemiro J, S and L. 2008)

Review within the immediate team can be possible by a checklist, or “scorecard,” that consist of key activities and tasks that reflect the agreed principles and standards and also features the key measures. Checklists and scorecards can go a long way to promote self - management, focus, and commitment, but nothing substitutes for leadership.

Principle 9: Create a plan to “cast” the net wider

In successful design, working with a design team or representative sample of the whole is an important factor, but it is not enough. If people and teams beyond the design team can also be involved in vision, creating work processes and measures, the whole system can be set up for success. The transfer of energy, information, knowledge, and commitment from a representative sample design team to the broader population can be a big challenge. Good stakeholder analysis at the start will ensure that all relevant parties are included as the net is cast wider. Leaders must help design team members prepare to educate and support other team members. Nemiro et al. (2008) believe that working in virtual mode heightens the need to have a consistent approach so that all people in the network experience the same education process.

Principle 10: Design for sustainability why it matters

In the words of Nemiro et al. (2008), “Nothing is constant but change.” Then design for successful virtual collaboration must therefore be dynamic. To be successful, the design must also be aligned with other corporate systems. For example, a virtual collaboration design will typically rely on technology for connection. If existing technology cannot support the process designed, results will not be optimal.

In the way of sustainability, setting up virtual checkpoints by teleconference, webcast, or videoconference at quarterly or semiannually (intervals that work for the business), seems to be useful. Also set up face - to - face checkpoints when significant shifts have occurred in the marketplace or corporate strategic direction in another issue. In addition to design checkpoints, using employee surveys to check how the system is working is important. Periodic checks will ensure that the design is working optimally and will enable participants to make course correction ahead of crisis points. (Nemiro J, S and L. 2008)

6. Paul Mahon (2001)

Mahon (2001) introduced eight steps model which can be used a guidance to set up a new - or verifying an existing virtual project.



Figure 7: Paul (2001) suggested practices

Step 1 - Establish high level project organization

As Mahon (2001) point of view the high level project organization as the first step of implementing virtual projects, includes two levels. The top level of organizational structure consists of the project management team. Members of this team, who are senior system engineers, establish the second level of the organizational structure consist of a system engineering and a set of product teams. Each team focuses on a well-defined customer deliverable product(s). The system engineering team has the responsibility for all the system engineering management activities common across all deliverable products. This includes infrastructure, process, and integration responsibilities.

Therefore to take the first step for implementing virtual projects, key activities can be:

- Assign team leaders,
- develop charters with clearly defined responsibilities,
- initiate project memory which provides critical project-specific information to implement part of ‘‘Virtual Culture’’ (Mahon P 2001)

Step 2 - Establish work split

Establishing work split within the team is the second step. Delay on defining work split can have devastating effects on a virtual project, because work split definition drives almost everything including process, tools, infrastructure, and support services as well as end-product responsibilities. Mahon (2001) believes that projects that fail to understand critical work-definition dependencies can quickly get into trouble trying hard to move forward without knowing where they are going. He suggests some key prerequisite tasks that must be accomplished before an effective project work split can be:

- establish and understand work split approach
- establish initial system architecture,
- establish component product development matrix (CPDM),
- define work split

Step 3 - System planning

The third step consists of three sub-steps: system build planning, requirements allocation, and integration planning. System build plan as the top level engineering road map on the project shows where key activities from a build perspective occur. Key strategies should include early project process-oriented factors that focus on development of environment tools, document production steps, and the fundamental initial target architecture. System requirements can be discovered from customer's demand review and project objectives which finally lead to project plan. The integration plan takes the project plan as an input, along with the work split allocation (global components) and creates the plan for integration of the global components. The integration plan feeds the detailed planning activity of each product team.

Step 4 - Special tasks: infrastructure and project rules

The project infrastructure can be categorized into three components: hardware, software, support. The hardware component includes the development of environment hardware and the integration hardware. Software component includes the development of environment and integration tools such as: requirements management tools, design tools, test tools, configuration management tools, debuggers, load management tools and ...

The support component can be considered as: configuration management (CM), quality assurance (QA), technical publications, system administration (backups, network management,

and load management). Experiences from implemented virtual projects indicate that greater payback could be achieved through a controlled degree of increased policies and formality. Documented project rules through an RFPM (Rapid Filtered Project Memory) are one example of the type of increased formality. (Mahon P 2001)

Step 5 - Establishing the third level of the organization

The third level of the organization is where the most of the engineering activities take place. This level is consisted of smaller working teams inside the second-level of deliverable product teams. Each third level working team has responsibility for one or more global component products. Once the third level teams are identified and their leaders assigned, detailed planning of the teams' activities can commence. According to Mahon (2001) research, in virtual projects, when a different order is followed a variety of project difficulties can quickly surface that step six should be followed.

Step 6 - Detailed planning

Building a executable detailed plan requires consideration of critical resources. This includes both infrastructure and personnel, both of which are site-specific. Third-level team leads should work with second level managers in completing detailed plans. This collaboration is important for third level team. Another reason why the third-level team lead should collaborate in the detailed planning is because different organizations have different cultures when it comes to detailed planning. Leaders need to be particularly sensitive to this issue.

Step 7 - Testing the concept of operation of the project organization

Mahon (2001) believes that new virtual projects will not instantly operate as efficiently as single-site organizations that have taken years to mature internal processes. It is also true that strong teams with strong interpersonal connections where responsibilities and expectations are understood and owned do not applicable in short time. Through key activities virtual team growth can accelerate rapidly that Mahon (2001) knows conducting a walkthrough of the concept of the project's operation as one of those key activities. He added that often at the start of a virtual project leaders do not know where to begin leadership discussions. This can be true when their own past experiences have been limited to a single culture. The following five

potential hot-spots have been known as factors which cause difficulties on past virtual projects should be closely examined:

- Task direction
- Task management
- Cross-site or cross-organizational interactions
- Integrated engineering responsibilities
- Customer communication

Step 8 - Execution with a focus on conflict management

By following the first seven steps, organization should be well prepared to execute a successful virtual project. Throughout the first seven steps team leaders have been sensitive to pitfalls experienced by others. Nevertheless, conflict must still be anticipated and managed when the project is going to be executed.

Part II - Discussion:

In first model Hertel et al. (2005) introduced almost complete life cycle virtual project processes which can say that they considered all necessary steps for successful management. At the beginning, the authors emphasis in his book on strong preparation for virtual team selection, assigning personnel tasks and reward system. These preparation steps are different from organizational maturity evaluation that reveals the situation of organization in terms of readiness for using virtual teams. The model also propose good points about performance management and team development especially where they mention knowledge management that is one of important issues in virtual collaboration. There is a step called “launch” which obviously is one the most important phase in project management for achieving desired goals. As a suggestion, maybe more analyze and investigation is needed for this step of model to clarify and discover more details about this important phase such as change management policies or risk management rules. As the end process they have a good point about team disbanding and reintegration which one of important challenges especially in virtual teams because the type of the team. But overall, Hertel et al. (2005) model can be considered as one the complete processes among others while their findings have strong empirical observation by many scientific evidences.

Rad and Levin (2003) proposed model divides management tasks in to two parts depending on being quantifiable or not which is suggested to be implemented in parallel. The authors have a strong emphasis on project quantifiable issues such as scope definition, scheduling, risk management and progress monitoring which were described above. Establishing team charter, communication and feedback system, risk management, process monitoring and change management are known as key elements in this model. Comparing to other researchers’ results, considering knowledge transfer system, cultural issues and team disbanding and reintegration need more attention in this model. And as a disadvantage, against to Hertel et al. (2005) the second model has no support from empirical evidences.

In third model, Brown et al. (2007) present a general model comparing with other five models that consist of four steps which more concern about team members’ issues than other aspects of the projects. The authors have a strong emphasis on team chart, task descriptions, team structure and expectation, leadership and team building. Refer to authors’ descriptions in their book, they tried to have model which is very practical and very detail about team issues. But

again they do not present empirical evidence to show these suggestions are efficient and useful for all virtual teams with all conditions or for specific situation and specific conditions. Although the model is general but the authors have precise advices for manager who want to use virtual teams in their projects.

Fourth model is from Duarte and Snyder (2001) which has high emphasis on team members' issues like Brown et al (2007). The new point that is exclusively pointed in this model among all others is identifying team stakeholders and sponsors at the first step. This phase, identifying team stakeholders and sponsors, normally is known as very important issue in project planning and implementation. It can be assumed that other authors considered this step as part of planning phase. To improve this model maybe it can be considered to merge three or four phases in to one or two and then consider more issues like requirement identification, team culture, risk and change management. As the final step authors suggest developing team processes which is very useful in knowledge transfer, documentation and feedback system. The advantage of their suggestions is they have support of empirical studies which have been done by companies such as NASA or NORTEL.

The fifth model is introduced by Nemiro et al. (2008) which highlight team leadership, cultural issues, team rules and responsibilities and team sustainability. They suggest selecting team leadership as the first step that is somehow different from other's point of view. Normally, models propose hiring or team member selection as the first step which in this model maybe this issue is considered as part of leadership selection and positioning. Like previous models, cultural issues, team member communication and feedback system are also reflected. The authors recommend new phase named designing team sustainability which is about creating a plan to survey leaders and employees to check system effectiveness and make course corrections. It may be considered somehow similar to last step of Hertel et al. (2005) and Duarte and Snyder (2001). Studying this model and authors' descriptions represents that they tend to present very practical model which is supported by empirical studies. Like previous models, some steps can be added like risk and change management, but overall like Hertel et al. (2005), it can be categorized in comprehensive models.

And finally, the sixth model is presented by Paul Mohan (2001) which has high emphasis on organizational infrastructure, planning and execution phase of the projects. He first has

interrogated virtual project pitfalls and base on that suggest practical steps for execution. In this way several questions from start to finish project process were examined and then he tried to recommend effective and empirical solutions.

Part II - Conclusion:

Studies by different authors show that there are many models for virtual team implementation within different organizational structure. Based on organizations' experiences within using virtual team in their projects, different attitudes and models are proposed. Organizations depend on their situation and resources will select the proper model to use virtual team for their projects. By considering all models which reviewed in part II and other studied models, it can be concluded that all models applicable in organizations. There is no certain model to guarantee 100% success of virtual team in organization rather the success of this issue is also depend on organizations' situation and conditions. Some suggested models have also the support of empirical data whereas the others are based on theories. In this paper six models were examined which can be considered as representative of many other models that analyzing all of them need plenty of time. Therefore it is depend on the organization and managers point of view to choose the way and the model that they know as the best way of virtual team usage and implementation. Part I of this paper can be a guideline that organizations decide about using virtual team or not or which levels they should meet for using this kind of team in their projects. Part II in continues helps to decide about the model and processes which managers should respect in the process of virtual project implementation. Preparing resources such as infrastructure, team members, knowledge, ...and successful implementation are depend on organization structure and project management who decide about resource and model selection.

Part III – Decision support tool for virtual team implementation

This part is considered to develop a tool that can be used as a decision support tool by companies wanting to implement a more virtualized form of project work. It is somehow summary of previous studied models in part II, companies’ experiences in virtual team implementation and literature reviews about virtual team challenges and specification. The processes below will show the way that organizations can consider it to have successful virtual team implementation. In addition, some checklists as supporting tolls will be introduced to help managers as decision support tool.

Although working in geographically distributed teams is becoming more widespread in organizations today, how to do it effectively is not fully understood. The following model from is a summary of models in part II and also theories about how to form and what makes virtual teams effective. It can be suggested that there is value in combining the best practice perspectives from the multiple aspects: “organizational practices”, “management and team leader practices”, and “team member Practices”.

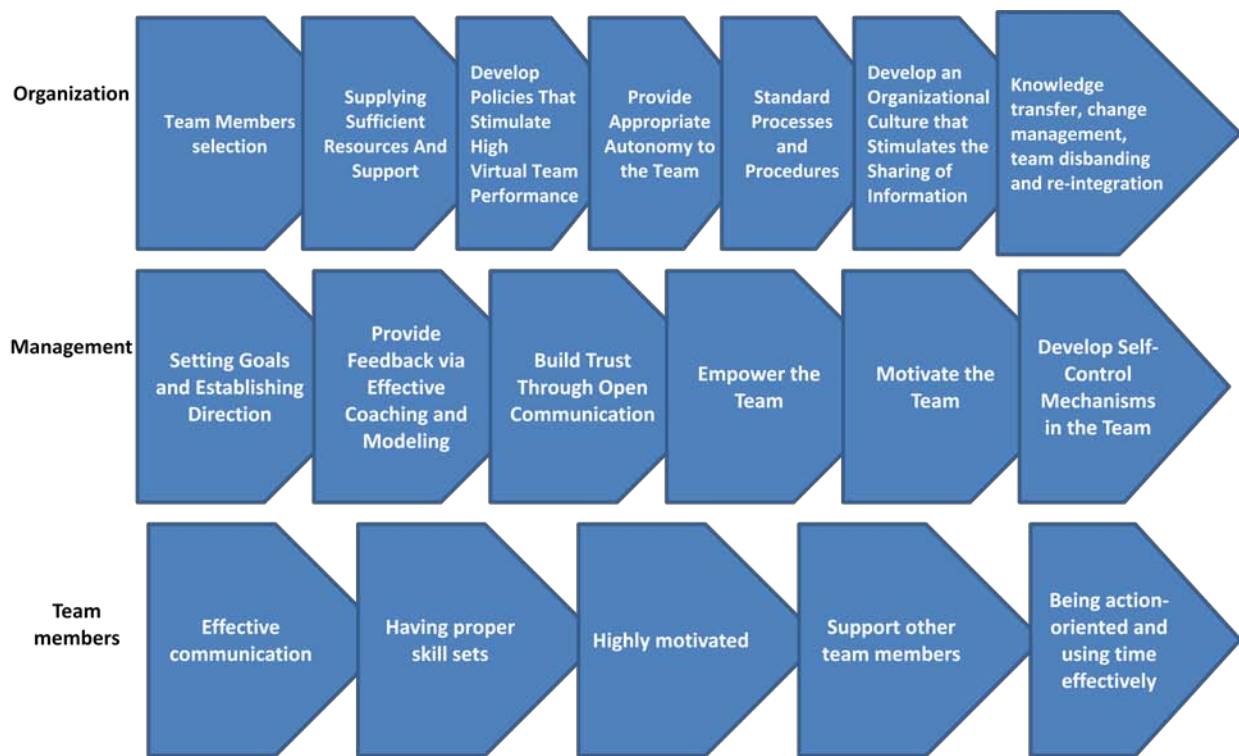


Figure 8: Decision support tool for virtual team implementation

Organizational practices

Based on models and studied practices about virtual teams, working in a virtual team can produce a diversity of backgrounds, experiences, ideas, thoughts, competencies, perspectives, and views which somehow can be considered as advantages for this sort of team. (Pauleen D 2004) Virtual teams might also involve employees from different functional areas. Pauleen (2004) mentioned that: by involving those individuals who are closer to the action, virtual team structures allow the team to hear “the real line rather than just the official line”.

All virtual team models of effectiveness consider team composition as an important input variable. Next step is virtual team resources and support. The resources include such things as financial resources, time, facilities, hardware, software, communication channels, technical equipment, and proper training. It is essential that virtual team members be provided the technical resources and support for working virtually. Policies should be in place to provide the virtual team with technical support, and all members should have access to electronic communication and collaboration technology. IT training by itself is not enough. Organizations also need to provide adequate training for how to work in teams and provide team-building activities for team members. Another way an organization influences the resources a virtual team has is by controlling the number of people that are on the team. In situations where the team leader decides team selection, organizations should provide the resources necessary for that team leader to select the best possible team members with the appropriate levels of diversity of skills and access to resources. (Pauleen D 2004) The virtual team literature also suggests that organizational practices and policies shape the effectiveness of virtual teams. At the organizational level, supportive and well-designed human resource policies are key to a virtual team’s success.

While organizations are encouraged to supply appropriate resources, they are also encouraged to leave decision making to the team leader and team members. Organizations should give team members the power to take action and make decisions about work and business performance.

The organizational culture plays a large role in determining how well a virtual team functions within the organization, because it influences how individuals in an organization behave. The traditional team research also identified the importance of having a supportive

culture. Organizations should strive to ensure that there exists a cooperative work environment that reinforce and support team behaviors, such as sharing information, responding appropriately to team members, and cooperating. Finally change management, knowledge management and team member disbanding and reintegration, team development and sustainability are also important issues which organizations should consider within implementing virtual teams in their projects.

Management and team leader practices

Summarized in this section are best practices ideas relating to the leadership and management of the team. First step can be assumed as setting goal and direction which is one of important practices that help organization to implement successful virtual team. Setting the team direction, goals, and objectives of the team with realistic time lines should be compatible with the expectations of team management. Next, the critical path through the project should be identified. Focusing on milestones and deliverable dates will help members keep the big picture in mind when working on their individual tasks. In order to set goals, the overall purpose of the team must be clear. The virtual team literature strongly suggests that effective leaders understand the importance of defining a vision for the virtual team (Fisher & Fisher, 2001; Grenier & Metes, 1995; Lipnack & Stamps, 1997; O'Hara-Devereaux & Johansen, 1994). As discussed above in virtual team models, almost all authors have considered this practice as one of important step of their models.

Effective coaching is another factor which team leaders can provide to team members to help them work more effectively. It helps team members ensure that their activities and goals are in line with the team's overall goals. In terms of individual coaching, team leaders need to provide members with timely feedback about their performance so that team members know what they can do to continuously improve their performances. (Duarte D L 2001) In addition to providing feedback, effective virtual leaders should demonstrate a mentoring quality characterized by concern for members, understanding, and empathy (Leidner & Kayworth, 2001). Staples' (2001) empirical study of virtual team managers' activities supports the importance of regular feedback and communication. The manager's ability to support virtual team members with advice and help significantly improves team effectiveness. Without doubt, one of the most important things that team leaders need to do is to build trust between

themselves and the team and within the team. To build trust, it is important for team leaders to communicate openly and frequently with team members. Perhaps the single most important variable that affects trust is honesty. While a manager or team leader is expected to set guidelines, milestones, and goals, they should still give the team members the power to decide how to reach these goals. Pauleen (2004) believe that team leaders also have to provide the appropriate level of autonomy, setting overall team goals and establishing direction, while allowing individual team members to decide how they carry out their specific tasks. Team member motivation is another important issue for virtual team that team leaders can play a key role in this way. Keeping virtual team members motivated seems to be very difficult because of the team specification and geographically dispersed location of team members but have a significant role in team outcome. Another issue is self-leadership which has direct affects on team performance because team members will be encouraged to perform behaviors that improve their performance. A leader's role in a self management system is to facilitate the development of employee self-controls, so that they can lead themselves. (Pauleen D J 2004)

Team member practices

Five general characteristics of effective members of virtual teams are communicating effectively, having appropriate skills, being motivated, being supportive of other team members, and being action oriented. Effective communication is challenging in a virtual team, where face-to-face communication and meetings are infrequent, if not impossible. One way to accomplish this is to develop or find the right communications tools that make up for the loss of face-to-face time and provide for informal interactions. Pauleen (2004) argue that the virtual work depends on a high level of communications and trust. Teams must develop the capabilities to work with information and communication technologies in stressful situations, with a variety of competencies in people from several locations and organizations. Communication builds trust, which in turn, builds better communication; this is a positive feedback loop that virtual teams want to feed, not constrain. In addition to the communication skills, the studied models and literatures declare that team members should have the ability to organize effectively, a strong competency in an individual's functional area of responsibility, adequate technical skills to use the information and technology tools available, and good time management skills. In other words, the effectiveness of a team depends on the collective knowledge and skills of its members. The virtual team literature and the telecommuting literature also identify the

importance of having skilled team members. People should first know how to use the electronic communication tools they have available and then be able to use an electronic social network to build and sustain team-wide relationships, develop skills in using virtual tools, and maintain cross-cultural dialogue. Specific social skills may involve learning how to negotiate creatively, mediating online disputes, and making new members of the team feel included. (Pauleen D J 2004)

In additions to factors above, supportive team environment is a key for a successful virtual team. Pauleen (2004) believe that a respectful team environment where members were not afraid to openly discuss ideas and the ability to get along with others help virtual team in terms of efficiency. And finally an action – oriented approach is a key when participating in a virtual team. Successful virtual team members “organize their thoughts into actions or proposals that get a good buy” or influence the rest of the group. Telecommuting research also suggests that virtual workers have to be self-disciplined and be able to work on their own to get their tasks done.

In addition to three level processes above, some practices which have been suggested by Paul (2001), Duarte and Snyder (2001) and Ubell (2010) are summarized as a checklist which also can help organizations to apply virtual team in their projects.

Virtual team leader selection focused criteria	
Strong communication skills	
Open mind – willingness to consider alternatives	
Strong conflict management and resolution skills	
Technical – management experience and knowledge and attitude	
Team leaders are experienced in working in virtual environments	
Team leaders are experienced in working across organizational and cultural boundaries	
Multicultural Class Component Checklist	
Creating a sense of community	
Clear expectations	
Socialization/orientation process	

Clear, unambiguous language	
Socialization–Orientation Checklist	
Introductory conference	
Multicultural team formation	
Create team areas	
Team socialization events	
Language Checklist	
Language Checklist	
Simple and clear language	
Use of paraphrasing for clarity of understanding “English” is not the same everywhere	
Use visualizations and graphics where possible	
Feedback Checklist	
Appropriate and timely feedback	
Positive in tone and constructive in nature	
Consistent with class and team expectations	
Offer prescriptive suggestions and recommendations	
Team feedback should be team oriented	
Avoid value judgments, be positive in tone, neutral in language, connected to objectives	
Clear, unambiguous, and consistent	
Assessing critical success factors	
Career-development systems address the needs of virtual team members.	
Reward systems reward/recognize working across boundaries and working	

virtually.	
Team members are experienced in working in virtual environments	
Training and Development	
Good access to technical training	
Access to training in working across cultures	
Methods available for continual and just-in-time learning, such as Web-based training	
Mechanisms, such as lessons-learned databases, for sharing across boundaries	
Standard and agreed-on technical team processes used throughout the organization and with partners	
Adaptation of processes	
Standards for electronic communication and collaboration tools across the organization	
People from all functional areas have equal access to, and are skilled in using, electronic communication and collaboration technology	
People from all geographic areas have equal access to, and are skilled in using, electronic communication and collaboration technology	
Organizational Culture	
The culture can be described as “high trust”	
High trust between this organization and its suppliers and partners	
People from different cultures are valued here	
Leadership	
Leaders set high expectations for virtual team performance	
Leaders help gain the support of customers and other stakeholders	
Leaders allocate resources for the training and technology associated with virtual teams	

Table 1: Summary checklist for virtual team implementation

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