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Motivation in Virtual Project Management

On the Challenges of Engaging Virtual Teams
and the Features of Project Software

Project Management

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Summary

The current increase of virtual projects and their economic importance has led to a new set of challenges that project managers need to overcome. The lack of face-to-face interaction has distorted the traditional ways in which motivation was fostered within project teams. Projects that used to heavily depend on the synergies of team dynamics, can no longer rely on the social aspects of work life. With that in mind, a new approach needs to be applied to effectively motivate teams that work in virtual environments. The current theories of motivation lead the way to a new paradigm where progress and inner work life are the major drivers of motivation. Project managers must rely on a new set of tools and technologies to reach their teams. The software industry has evolved to provide solutions to remotely manage and coordinate teams and projects, but it is still far from being a solution to the challenge of motivating a virtual project team.

This study aims to explore the characteristics of motivation in the virtual environments, its contribution to enhance virtual project outcomes, and the role that virtual project management software plays in fostering motivation in dispersed teams.

This thesis follows a three-pronged approach with the aim of answering its research questions. First, a in-depth literature review that lays out the major characteristics of virtual project management and of motivation. Second, a qualitative study of the ways motivation is handled in real life virtual projects, done through semi-structured interviews to a group of eight experienced project managers. Third, a quantitative study of the features of current software aimed to manage virtual projects, by benchmarking their features and analyzing the motivational aspects in them.

This study shows the importance of motivation in project settings as well as the special challenges that it poses when translated to virtual environments. It shows that project managers can no longer rely on the traditional motivational strategies, due to the lack of physical interaction. It also shows that the idea of progress and self accomplishment is probably the strongest motivator for dispersed teams, and that project managers should try to foster a positive inner work life to keep the members engaged. The benchmarking shows the lack of motivational features in the current software for manage virtual projects. Finally, the study explores the possibilities of gamification as an approach to bridge the gap of motivation within project software (or projectware).

Keywords

Motivation, Virtual Projects, Project Management, Virtual Teams, Progress, Virtual Project Management Systems, Projectware, Gamification.

Abstract

As global markets transcend nationalities in search for key advantages in cost, quality and flexibility, the once unbridgeable limit of geographical location is overcome by faster Internet speed lines, online services and tools that allow individuals and businesses to interact regardless of space and time.

This thesis studies the transition from traditional project management to virtual environments and the impact that this new paradigm has over dispersed teams and their interactions among themselves and the project manager.

The focus of the study lays on the concept of motivation within virtual project management and the role of the project manager to overcome the specific challenges of this new working scenario. Additionally, parallels are drawn on the motivation features that virtual project management systems offer to project managers as well as team members.

This study shows the importance of bridging the difficulties of motivating dispersed teams and how traditional techniques of motivation have a much lesser impact on team members. The idea of progress and self accomplishment are brought forth as the strongest motivators for dispersed teams.

Finally, this study exposes the shortcomings of current projectware as a tool to motivate teams and explores the idea of applying gamification techniques to these software packages to lift the motivation responsibilities off the shoulders of project managers.

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I like the concept of meanders. If I were to subscribe to the metaphor of life as a river, mine would be a meandering one. Constant bends, exploring different places and sandy patches, and when you thought you were to stay, you turn again. Always determined to continue to the sea (hopefully the Mediterranean Sea), but taking my time while I do it.

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List of abbreviations and acronyms

CSCW - Computer Supported Cooperative Work

GDSS - Group Decision Support System

GDT - Geographically Dispersed Teams

HCI - Human-Computer Interaction

ICT - Information and Communication Technologies

IS - Information Systems

IT - Information Technologies

PDM - Participatory Design Making

PM - Project Management

PMBOK - Project Management Body Of Knowledge

PMI - Project Management Institute

PMO - Project Management Office

SaaS - Software as a Service

SCT - Social Cognitive Theory

SDT - Self-Determination Theory

SMB - Small and Medium-sized Businesses

TAM - Technology Acceptance Model

UX - User Experience

VO - Virtual Organization

VPM - Virtual Project Management

VPMS - Virtual Project Management Systems

1 Introduction

The purpose of this chapter is to cover the problematization of fostering motivation within virtual working environments. The intention is to introduce the shift within organizational processes in moving from traditional projects to virtual ones and covering the challenges that this entails. It continues by defining the research questions that the study intends to answer, including the information needs, as well as the research design to the study. Finally, the chapter ends presenting the purpose of the study, detailing expected results, providing the disposition of the thesis along with a list of terms and definitions, and discussing the boundaries and limitations of the study.

Virtual projects face tougher challenges than traditional projects. It is harder for virtual teams to be successful than traditional teams. One of the reasons is the difficulty to create the proper environment and to foster motivation for the team, directly affected by the lack of face-to-face interaction (Pazderka & Grechenig, 2007). The ramifications of low motivation can be directly connected to increased difficulty in monitoring the team performance, misunderstandings and perceptions of isolation within projects.

The current increase of virtual projects and their economic importance within the industry of project management make it a compelling case to research the factors that affect virtual teams success. This study aims to explore the characteristics of motivation in the virtual environments, its contribution to enhance virtual project outcomes, and the role that virtual project management software plays in fostering motivation in dispersed teams.

1.1 Background Area - Going virtual

In the last two decades the growth of information-led economy has derived into advances and innovations in the field of Information and Communication Technologies (ICT) that have expanded the level of international connectivity, allowing to effectively unite the concepts of decentralization and efficient business processes.

The phenomenal growth of mobile technologies, as well as the massive and global adoption of the Internet, have altered the way people access and share information. The technical knowledge divide brought about by cultural differences and historical inequalities that fragmented societies and individuals' capabilities, has been rapidly overcome by faster and cheaper knowledge interfacing and sharing (Roux, et al. 2006). This provides technological literacy to a wider range of cultures and communities around the world, thus opening the possibility to incorporate international workforce with minimal needs of expansion (Hertel, Geister & Konradt, 2005). Global markets transcend

nationalities and search for key advantages in cost, quality and flexibility. The once unbridgeable limit of geographical location is overcome by faster Internet speed lines, online services and tools that allow individuals and businesses to interact regardless of space and time.

Simultaneously, the IT industry centered its efforts in creating solutions aimed at harnessing the power of the newest innovations and connectivity advances, expanding their functionalities, creating new paradigms in business organizations. Already in the late nineties, Wills (1998) identified this trend:

“As business has become more global, partnering has become more common and the need for wide scale communication across company boundaries, country boundaries, technical boundaries and different time zones has become more common. In response, new technologies have emerged with new breeds of IT products.”

The estimates that some analysts are working with predict a soaring increase in investment on distributed project management solutions, which went from two billion USD to seven billion USD in 2007. In addition to offshoring, outsourcing, and sourcing of services, application development and maintenance are managed and deployed between multiple geographically dispersed organizations (Qureshi et al. 2006).

This new shift in decentralized long-distance business organization fosters the creation of virtual teams (also called geographically dispersed teams), a group of individuals who work across time, space and organizational boundaries, with links strengthened by web communication technology (Lipnack & Stamps, 1997). In the global economy, virtual teams increasingly signify an important portion of project-structured organizations and are particularly important in globally disperse enterprises (Robey, Boudreau & Storey, 1998).

The introduction of virtual teams supposes a large set of inherent benefits, such as a larger pool workforce skills, access to talent, long active working shifts with disperse teams, internalization of software, centered virtual knowledge base, smaller sites, reduced international investment, and lower labor costs by reaching lower-wage markets (Anjum, Zafar & Mehdi, 2006). From the perspective of team members involved in remote work, there is a substantial number of acknowledged benefits. A 1,000+ respondent survey created by Wrike, Inc. shows that, the top three benefits identified are time savings (41%), increased productivity (29%), and the opportunity to focus on work, rather than office politics (10%). On the other side, the main challenges identified by those respondents are lack of direct communication (38%), hindered data accessibility (21%), and bad visibility into colleagues' actions (19%) (Filev, 2013).

The ramifications of virtualization of project teams, however, go deeper than results, benefits or challenges. The organizational shift requires new structures to oversee knowledge transmission, to adapt the Project Management Office (PMO) (Curlee, 2008), and to regulate the interactions between team members themselves, their team managers, and the organization.

According to (Lebedieva, Matvijkiv & Lobur, 2011) the system by which virtual teams collaborate for a finite time period towards a specific goal is what the literature generally calls, Virtual Project Management (VPM). Project managers, regardless of the project's typology, are not capable to accomplish their work without the aid of a project team and the proper assessment of stakeholders. Therefore, an effective project manager should be able to obtain a balance between technical, interpersonal, and conceptual skills, in order to help the manager to analyze and interact appropriately (PMI 2008). The Project Management Institute (PMI) identifies a series of important interpersonal skills such as: leadership, communication, team building, motivation, influencing and negotiation. These skills will assist the manager effectively in accomplishing the project successfully (PMI 2008).

The increase of virtual project teams, especially through outsourcing and offshoring deployments is undeniable (Reed & Knight, 2010). Furst et al. (2004) estimate at least 8.4 million employees in the USA who work in one or more virtual projects. As many as 83% of workers in organizations, from small and medium-sized businesses (SMBs) and Fortune 500 corporations, have some type of recurrent remote collaboration (Filev, 2013). And the number is only rising. A report from analyst firm Gartner, Inc. (2011) predicts an even more dramatic proliferation of virtual projects:

“By 2015, 75% of knowledge-based project work in the Global 2000 will be completed by distributed virtual teams, but the complexity of virtual projects elevates their level of risk.”

Gartner's prediction, while boosting the growth expectations of virtual projects, already introduces the issue of risk. Remote collaboration and geographical dispersion poses new challenges in various dimensions that need to be addressed by organizations, project managers, and team members. The proper combination of integrating tools, personal interdependencies, and organizational adaptations should allow virtual project management to accomplish the team's goals. However, it is necessary to assess the renewed strategies that need to be applied in this new paradigm of project management.

1.2 Problem discussion

The idiosyncrasies of virtual projects allow organizations to surpass the constraints of geographical distance, time zones, and cultural differences, however they are not deprived of specific challenges. Nauman & Iqbal (2005) identify four major areas in which the management of global virtual teams face significant challenges: communication, culture, technology, and project management. The main point of interest of this study lays in this last challenge. Virtual teams, as groups that are geographically and organizationally dispersed, tend to feel alienated from the rest of the organization and team members. Accordingly, management and leadership need to take a new direction in virtual projects. As knowledge workers, brought together across time and space through information and communication technologies, and on an “as needed basis” in

response to specific customer needs (Piccoli & Ivess, 2000), lack of motivation becomes one of the pivotal risks for virtual teams (Wallace & Keil, 2004). The differences from the perspective of project management between traditional and virtual teams are more than apparent. However, it is unclear whether project managers acknowledge these differences, or if they effectively try to implement initiatives that foster motivation in such environments.

With the permanent rise of virtual projects, it is particularly important to adapt management and leadership strategies to the new paradigm. Project management knowledge and techniques need to be applied on both virtual and regular projects, however, reduced direct human interaction, technical complexities and other characteristics require that project leaders of virtual teams address various issues of enhanced difficulty when approaching virtual environments. Across the literature, other issues are identified, such as: knowledge sharing and knowledge management; effective communication; fostering trust and motivation.

These challenges are thoroughly discussed by an extensive body of literature. However, the challenge of effectively motivating dispersed teams has been sparsely covered in the academic circles. The gripping effect that a wide variety of factors have on workers' motivation makes for a difficult approach. Motivation stems from a variety of factors, both internal and external, that are adopted in an extremely different way by each individual. In 2012, Mikaelsson and Sjölund conducted a study on *The art of motivating a project team remotely*. Their study resembles the aims to this study, but the perspective is laid in the leadership aspect of motivation. The present study tries to tackle the problem of motivation from the way it is experienced and assessed in virtual teams and with a particular focus on the role the ICTs play in motivating those teams.

1.3 Research questions

With the background setting laid out, there is a need to narrow down the study's focus. As a starting point, the main research question that will drive the study is:

RQ₁: How do virtual team project managers assess and develop motivation in virtual environments?

In order to further discuss the motivation theme, the following sub-questions are proposed:

RQ₂: Are there differences in the approaches to foster motivation in virtual and traditional project management?

RQ₃: Are there clear relationships between virtual project management tools and the project team's motivation and performance?

RQ₄: Is the project manager the sole source of motivation in virtual projects?

1.4 Information needs and research design

When finding the nexus of a major sociological aspect such as motivation within managerial and information systems (IS) fields, such as virtual project management, it is particularly easy to digress. The challenge is to keep the study within the restraining parameters of the research questions. To do so, it is important to identify the information needs that can answer those questions. The relevance of these pieces of information provides a reference for a research design to follow throughout the study.

The first factor to be identified is the current theoretical framework behind the concept of motivation, as well as its implications in organizational and professional settings. This particular factor will be important to provide answer to RQ₁ and RQ₂.

The second factor to be identified is the practical application of the theoretical background in real-life settings. The parameter for those settings, in the premise of this thesis, is virtual project management. For that reason, an extensive look into actual VPM strategies and approaches is extremely important to correctly assess the current state of motivation within VPM. This factor will be specially important to help answer RQ₃ and RQ₄.

Finally, the third factor to be identified are the active and passive motivators embedded in software and online tools that are directed to manage virtual projects. An assessment of the solutions for virtual project managers will provide answers to RQ₃.

These information needs make this research project a three-pronged approach using different methods for data collection, both qualitative and quantitative. Thus, the research design was structured according the following phases:

The first phase establishes a theoretical framework that revolves around motivation, virtual project management, and information systems.

The second phase develops the empirical research study, including the data collection process. The *virtual* field work, includes capturing, first-hand, the experiences and perspectives of individuals who interact daily with VPM, as well, as testing VPM software and online tools.

The third and final phase consists in setting the parameters for data analysis that will serve as main sources of information for the final discussion.

1.5 Purpose and expected results

The aim of this study is to assess the actual state of motivational efforts in virtual project management. This assessment is primarily focused on the role of the project leader in order to keep team members engaged and motivated in virtual environments.

Undoubtedly, it is only through the prism of the individual, that the gradations of motivation can be understood. A certain level of flexibility is needed to understand that the setting of the study offers only an interpretation of concrete factors. Aiming to find a unilateral model that works across projects, industries, and cultures, is not only naive, but would prove ineffective once introduced widely.

The present study particularly focuses on studying the suitability and potential enhancements of virtual project management tools that already exist and that are used by project managers daily. This includes the study of how both project managers and virtual teams could benefit from online technology in fostering motivation from their respective points of view.

As a secondary goal, there is an intention to have a thorough look to some of the most common online tools especially crafted for virtual management, and examine their current implications in motivational initiatives.

In order to fulfill these goals and understand the process of fostering motivation in virtual environments, the data is collected from various different sources: the body of literature on the field, project managers, virtual teams, and virtual management tools. The main purpose is to understand how project managers and team members deal with motivation in virtual projects, and assess whether there is a mismatch of expectations between their views and what motivation theories propose. There is also the intent to lay a preliminary mapping of the current virtual project management tools in terms of motivation, hoping that it could lead to further research in an attempt of improving the systems according with the actual needs of project members.

The expected results are difficult to assess. While literature clearly points to motivation as one of the challenges of virtual project management, there is a general suspicion that the effects of motivation in a virtual team project are underestimated, that project members do not offer feedback regarding these issues to the leader, and that the current virtual project management tools focus too lightly on trying to raise motivation across the group.

1.6 Boundaries and limitations

A project that studies motivation in virtual projects carries along a varied set of limitations and boundaries. At first glance, the complexity of the concept of motivation can prove to be a difficult theme. The difficulty is twofold: in one hand, motivation is a highly personal feature that does not necessarily follow a pattern nor can be generalized; on the other hand, even though this is one of the reasons for choosing this topic, literature and research on motivation in virtual projects are rather scarce. Furthermore, some individuals can consider the issue of motivation a personal one and might not want to share their real opinions with an external research group.

Another limitation can be finding the proper target group to study. The idiosyncrasies of virtual project management implies a geographic dispersion of

project teams, increasing the difficulty of meeting them all at once. This limitation can be overcome precisely with similar tools that actual virtual projects members use to communicate themselves. However, finding projects managers that might want to share their experiences, especially those of negative outcome, might be an arduous task.

Thematically, this study operates within the boundaries of virtual project management, dispersed teams, motivation, and project software. While there is a look into difference between virtual and traditional management, no research efforts *per se* have been dedicated to study traditional project management. Similarly, the notions of coordination and communication, have also a mere support role in this study. They are contributing factors to positive motivation, and have a capital role in virtual project management. However, the intention is to investigate purely motivational efforts in VPM, thus leaving coordination and communication out of the scope of the study.

In terms of data sources, the boundaries are clearly delimited by the needs of information outlined in *Chapter 1.4 Information needs and research design*. However, it is worth mentioning that the respondents to the interviews are based in the USA as this allowed for a group of individuals with extended experience. Finally, the number of projectware analyzed in the quantitative section of the study was 10 software packages from a preliminary list of 48 packages, as these were the ones that fulfilled at least two of the following criteria: appears in most rankings, was mentioned by respondents, and had been previously used by the researcher.

1.7 Terms and definitions

The target group of this study are practitioners and researchers that are interested in the application of project management in virtual settings, or that are intrigued in the way motivation is assessed within dispersed teams. For that reason, the main consideration that most of the terms used in this study is well known to the reader. However, for the uninitiated, four definitions of key terms are given here as means of introduction.

Virtual Project Management

One of the most prevalent project management document is the Project Management Body of Knowledge (PMBOK) edited by the Project Management Institute (PMI) defines Project Management as “the application of knowledge, skills tools, and techniques to project activities to meet project requirements.”

A definition for Virtual Project Management, should append to PMI’s definition the notion that those project activities happen in virtual project environments. In the new, “virtual project environment”, team members seldom share a common workplace, may rarely see each other, may never have worked together before, and may never work together again after the project is complete (Adams & Adams, 19997). Virtual environments are also characterized by a high

technological component, heavily relying on ICTs to communicate and coordinate teams and activities.

In other words, when traditional project management has to manage virtual teams, it becomes virtual project management.

Virtual Teams

Across literature there are multiple definitions of virtual teams. In the literature section there is a wider definition. An introductory definition is the one that Ebraim et al. (2009) summarize from their own literary review:

“A virtual team is a small temporary groups of geographically, organizationally and/or time dispersed knowledge workers who coordinate their work predominantly with electronic information and communication technologies in order to accomplish one or more organization tasks.”

A much more in-depth look into virtual teams will be done in the literary review chapter.

Projectware

Projectware is a largely contested term without a consensus definition. For the purpose of this study, projectware are web-based software packages that combine the project management features of software packages identified as Virtual Project Management Systems (VPMS), and collaboration features characteristic of Computer Supported Cooperative Work (CSCW) tools.

With this in consideration, projectware could be defined as integrated project collaboration software that covers project management functionalities as well as social collaborative features, and is designed to run virtual projects online.

Gamification

Deterding et al. (2011:b) defined gamification as a process that incorporates game design elements in non-game contexts, to improve the user experience.

In other words, a gamified system is a system that has been adapted with the aid of components, mechanics and dynamics in order to engage and motivate users. There are several elements that can be used to gamify a system and the approaches are endless. The potential of gamification is still new, but offers a promising alternative to actively engage and motivate virtual teams.

1.8 Disposition of the thesis

Chapter 1 - Introduction sets the background and rationale that supports the study. A quick problematization of motivation in virtual environment is given in order to set a starting point for the study. The research questions are presented, as well as the information needs and research design, the purpose of the study and expected results, and the boundaries and limitations that delimit the study.

Finally, the first chapter ends with a list of terms and definitions that might be valuable to the reader, and the disposition of the thesis.

Chapter 2 - Theory and literary review offers the theoretical foundations of this study. The outline follows the virtualization process of project management, the characteristics of virtual teams, and the virtual project management systems that are used to manage virtual projects. A quick look into classic theories of motivation is provided, followed by a presentation of some of the contemporary theories and views on motivation. The chapter concludes with a brief overview to the concept of gamification.

Chapter 3 - Methodology brings forth the methodology used in order collect and analyze data that could lead to answering the research questions that motivate the study. The research methods are directly linked to the information needs established in the first chapter. This chapter also mentions the data sources and makes a note on validity and reliability.

Chapter 4 - Data collection and empirical research describes the process on which the data was collected, how the study was performed, and how the methodological framework was applied. The group of respondents is introduced and the software packages to be analyzed are defined.

Chapter 5 - Empirical data and analysis contains the empirical data of the study and the subsequent analysis of the data. A description of the themes emerged from the content of the interviews is presented. The software packages are benchmarked and the data is presented and analyzed.

Chapter 6 - Discussion and conclusions presents observations on the analysis of the data and provides a set of answers to the research questions outlined in the first chapter. The chapter then follows with a concluding set of remarks, followed by the academic and practical contributions of the study. As a final note, a few suggestions on future research are offered.

The body of this thesis is completed by a list of references on which this study is build upon, and an appendix that comprises the framework used to conduct the interviews.

2 Theory and Literature Review

This chapter allows for an exploration on both classic theory and the current scientific literature, research around the themes of motivation, virtual project management, and virtual project management systems. Additionally, the chapter introduces an exploratory view on the concept of gamification.

The objective of this study is to investigate the points of interaction between motivation and virtual project management. The approaches and strategies applied by project managers towards motivation within a setting of dispersed teams, are inherently influenced by the characteristics of the virtual context.

As VPM provides a new organizational *milieu*, the needs for a new range of tools and perspectives that redefine traditional project management theory arise. While the virtual nature of dispersed teams does not necessarily mean a substitution of traditional project management, it is clear that the rapid development of this new organizational paradigm has generated a large body of knowledge. Similarly, motivation theories in organizational contexts have been developed and studied thoroughly in the scholar realm. However, there is a lack of research between the concept of motivation and the context of dispersed team.

This chapter starts by mapping out the evolution of virtual project management using Evaristo and Van Fenema's (1999) Typology of Project Management, and Hertel's (2005) Five Phases Model. By setting the parameters for VPM in regards to traditional PM, there is a need for further look in Virtual Teams and their success factors.

The particular characteristics of VPM call for modern and reliable software that tackle the new challenges. Accordingly, the chapter continues examining current research on this type of tools based on Zigurs, Evaristo, and Katzy's (2001) theoretical framework for Virtual Project Management Systems (VPMS). The needs for this particular type of research fits this study, as the intention lays in examining the nexus between the two main concepts involved in the study, VPM and motivation, in the form (or aid) of VPMS.

One of the stronger theoretical basis for this study comes from Amabile and Kramer's (2011) Progress Principle and their approach to motivation through the concept of "small wins". While the study briefly covers traditional and well-established theories based on needs, such as Mayo's Theory of Human Relations, Maslow's Hierarchy of Needs, and Herzberg's Motivation-Hygiene Theory, it is Amabile and Kramer's psychological intrinsic-extrinsic motivational model, as well as Pink's requests for an upgraded motivation, that resonate particularly well with the characteristics of VPM.

Finally, a quick review on the concept of Gamification is explored in order to set the stage for links and connections between the concept of *small wins* and *progress*, and VPMS.

The exploratory journey of this chapter aims to follow an interconnected path of a narrative nature. The theoretical framework given in this study starts by setting the stage of VMP to then cover what helps virtual projects to work (VPMS), what makes virtual team work (Motivation) and an approach for sharing the responsibilities of engagement (Gamification).

2.1 Virtual projects and information technologies

There is a multiplicity of factors that can explain the ever-growing adoption of virtual project management in the current international workplace. These factors are interweaved in a way that feeds each other in a ebb and flow of the trends of virtualization.

The outcome of the industrial revolution and scale economies led to expansive aspirations by most organizations. At the same time, technological advances allowed the expansion of the universal idea of globalization, global markets, and knowledge societies. A well-equipped and capable international workforce became suddenly available, due to the decreasing prices of technology and the advances in telecommunications. Email was introduced in the 1980s as a one-to-one, one-to-many, fast and asynchronous system of written communication. Furthermore, emails could be classified, kept and used as documentation. The next big step forward occurred in 1995 with the appearance of the first virtual teams and workplace software, that allowed for many-to-many communication, with the added ability of sharing files and organizational documentation. Roughly around 2005 the first web-based virtual team collaboration software appeared, introducing a relatively cheap, simple and integrated virtual workspace that dislodged the needs for geographic rootedness (Coleman & Levine, 2008, p. 71). Suddenly, large organizations could provide services to multinational markets with relatively smaller investments, and could reach talent without the boundaries of space and time, but also without the costs of sending large teams overseas.

This new paradigm is best described by Grove's (1995, p. 229) famous statement:

"You have no choice but to operate in a world shaped by globalization and the information revolution. There are two options: adapt or die...You need to plan the way a fire department plans. It cannot anticipate fires, so it has to shape a flexible organization that is capable of responding to unpredictable events."

The flexibility of which Grove speaks refers directly to the possibility of a large company to operate everywhere, with everyone, continuously. Transcending the parameters of space and time without the ties of a large multinational infrastructure brings an edge that all international competitors aim for. However, rising up to this challenge requires a re-evaluation of their structure and work processes, tending to horizontally-structured organizational structures (Townsend, DeMarie & Hendrickson, 1998).

2.1.1 From traditional projects to virtual projects

This horizontal disposition calls for smaller units that tend to organize productive working processes in the form of projects. However, what once was defined by the simplicity of having one team working in one location is shattered by the introduction of new locations to do business with and new cheap technology to do it with.

Evaristo and Van Fenema (1999) offer a new typology of project management in order to acknowledge the emergence and evolution of these new forms of projects. Figure 1 shows their contribution, starting from a Traditional Project, which is characterized by a single project in a single location, and a Co-located Program, which is a multiple set of projects in a single location. The figure also shows the five new type of projects that occur in multiple locations. Evaristo and Van Fenema (1999) give the name of Distributed Projects to single projects that occur in multiple locations.

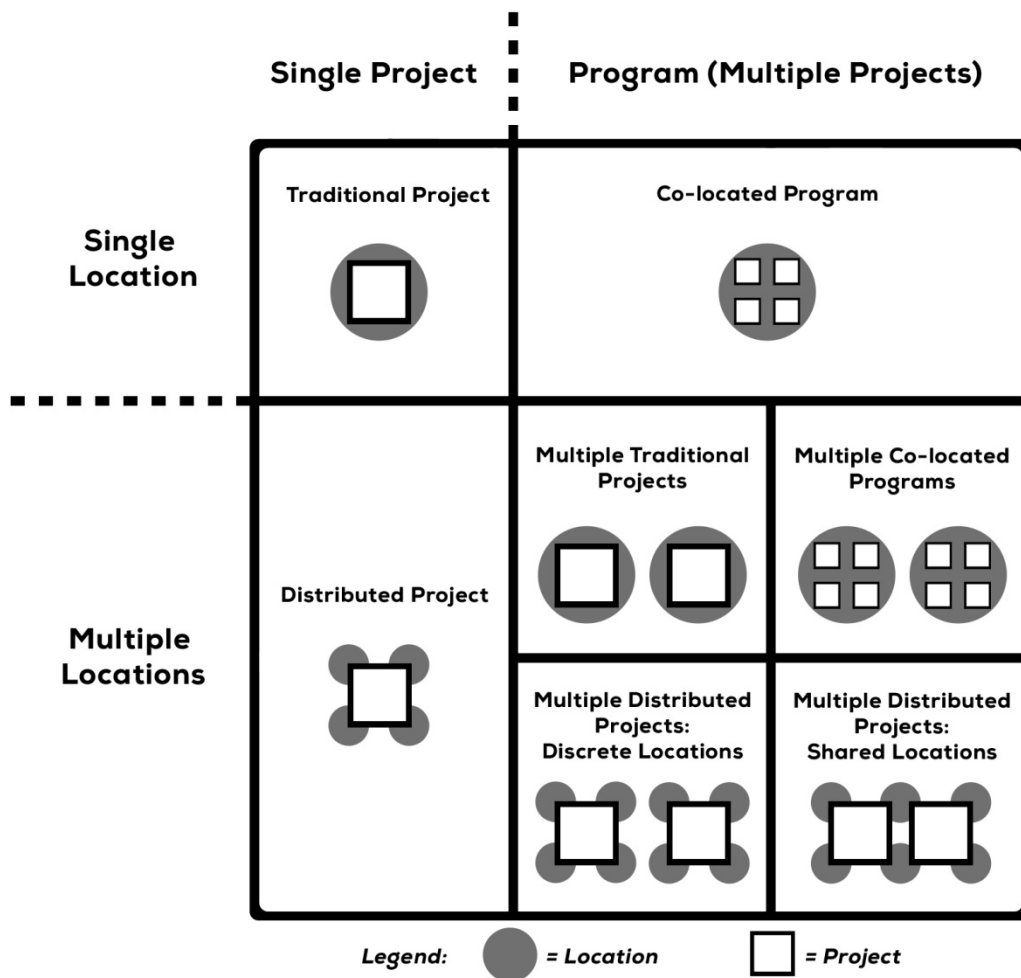


Fig. 1 Project Management Typology. Adapted from Evaristo and Van Fenema (1999, p.277)

The new typology of projects is then completed with a three-level model that depicts the evolution of project forms. This model is shown in Figure 2 (Evaristo

& Van Fenema, 1999) offering the paths that these working structures take to evolve into new paradigms.

The model abides for an incremental evolution from a traditional project to two variables (number of projects and number of locations). The authors recommend not to transform an organization too fast jumping across levels (i.e. from Level A to Level C), as it could lead to organizational problems. This way, Level B offers three options: one project/various locations (2), multiple traditional projects (5) and multiple project/one location (6). Level C offers a higher level of complexity with a multiplicity of paths to evolve from Level B. Each system in Level C offers an equally complex array of options with a different combination of variables, but in all three cases, with multiplicity of both.

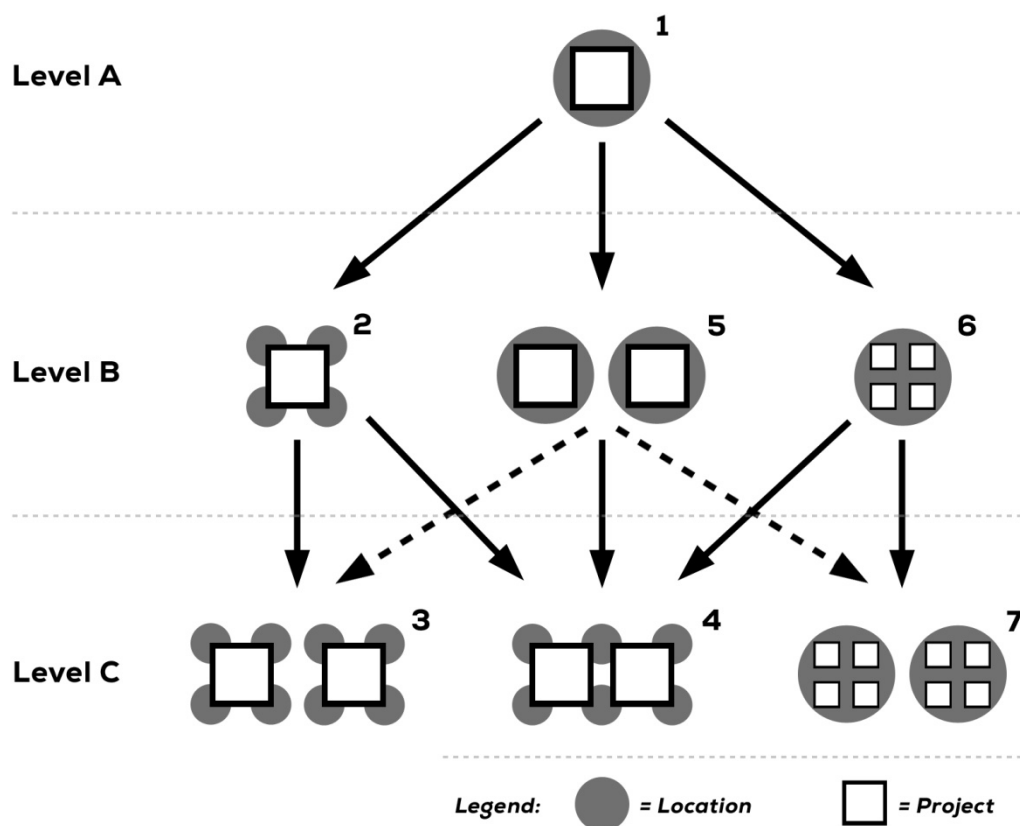


Fig. 2 Evolution of Project Forms. Adapted from Evaristo and Van Fenema (1999, p.279)

While the typology and evolution model offered is still valid, there is one type of project that is largely one of the most contested terms in literature. This is the next logical level of evolution in dispersed organization, the Virtual Organization (VO).

The concept of VO is an approach from multiple perspectives, offering a wide range of definitions. The discordance stems from the participants of the organization. The original meaning, as Mowshowitz (2002) defends, claims that the VO is an organization network. In other words, a network of autonomous

organizations that cooperate based on complementary competencies with interconnected information systems for cooperation. However, in the current state of telecommunications, and with the advances in software engineering, the idea of VO can part from an organization where all interactions happen electronically. The possibility of rapidly forming a VO, allows for a custom-made scale of organization with intangible settings (Camarinha-Matos & Afsarmanesh, 2007). This new premise would imply that a purely virtual project would could occur when one project shares no location. The premise is debatable, of course, because the participants are physical entities. However, the organization itself (and hence the participants) have no rooted physical nature. Thus, the project's location depends on where the participants are. Since location could be mobile and therefore ever-changing without affecting the outcome of the project, it makes the factor of location completely irrelevant.

2.2 Virtual Teams

The idea of virtual teams carries an etymologic duality that resides in spatial distance, and information and communication technology (ICT). While it is very probable that a current collocated team that works in one office coordinates, communicates and documents projects in an almost purely electronic way, it still remains a collocated team. Arguably, it would happen similarly with teams that while being dispersed, communicate themselves with the aid of, let's say, pigeons. They would be a dispersed team, and quite surely a slow one, however, they wouldn't be a virtual team. Thus, the characteristics that distinguish virtual and conventional teams are spatial distance (distributed/proximal) and information, data and personal communication (technologically mediated/face-to-face) (Bell & Kozlowski, 2002).

This leads to slightly fuzzy and vague definitions across literature that seem to vary minimally from author to author. There are gradations of *virtuality* (like telecommuting, working in different headquarters or completely remote) that play differently. Hertel et al. (2005, p.71) in their review of current empirical research on managing virtual teams offer a “minimal consensus” definition:

“Virtual teams consist of (a) two or more persons who (b) collaborate interactively to achieve common goals, while (c) at least one of the team members works at a different location, organization, or at a different time so that (d) communication and coordination is predominantly based on electronic communication media (email, fax, phone, video conference, etc.).”

While this is a particularly solid definition, the notion of location or distance remains unclear. To clarify this point, Lipnack and Stamps (1997) introduce the 15 Meter Rule (Figure 3) in a model that covers the collocated to virtual distance:

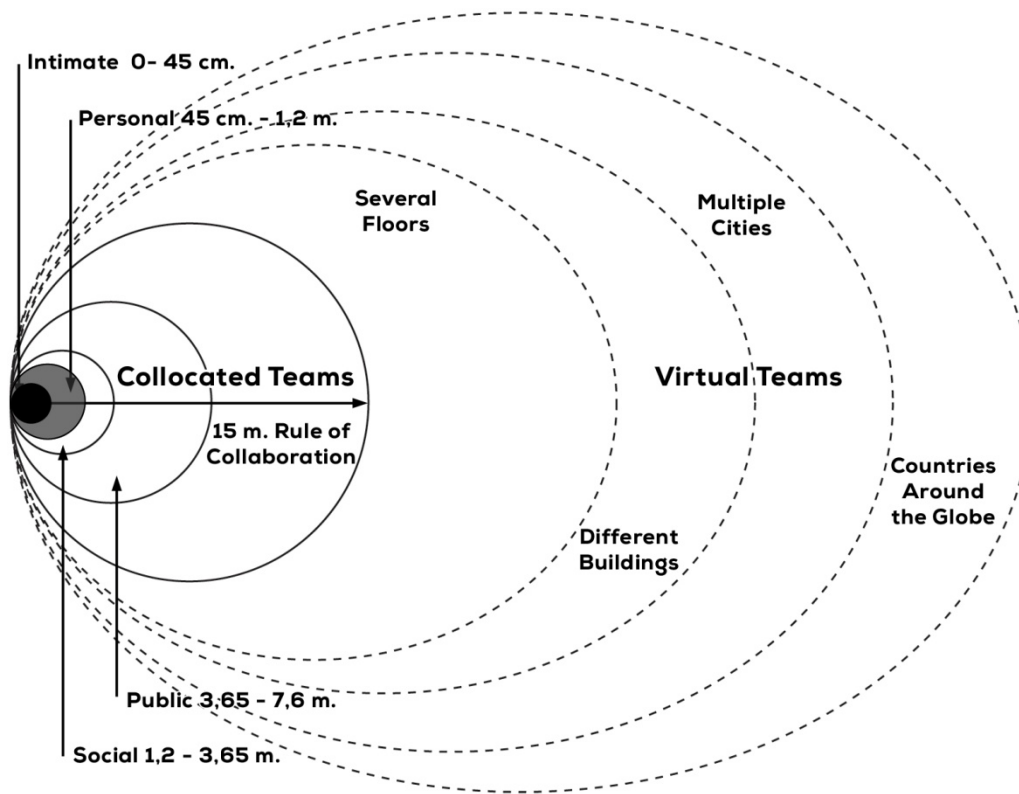


Fig. 3 Collocated to Virtual Distance. Adapted from Lipnack and Stamps (1997, p.9)

From this model, it can be seen that the collocated teams involve the personal layers of intercommunication. In this case, within the range of the Intimate, Personal, Social, and Public layers, and up to 50 feet, the team would be considered collocated. Thereafter Virtual Teams (also known as Geographically Dispersed Teams, GDT) would start at the very distance of several floors of the same building and up to different countries around the globe. It is worth noting that this is a North American approach, and the notion of large buildings and social proximity are somewhat different to the ones in the European continent. From Europe's perspective it is difficult to imagine being a few floors apart as a solid notion of virtuality.

It is important to point out that a virtual team is not necessarily the same as a group of teleworkers. Teleworkers (or telecommuters) are defined as individuals who work from home, generally with the aid of ICTs. However, teleworkers need not to be part of a team or a project, and simply conduct their usual functional activities from a networked location other than the office (usually home). Virtual teams can be working from home, but also from offices that have different geographic locations.

2.2.1 Virtual Teams typology

As Figure 4 (Coleman & Levine, 2008) shows, virtual teams reside within the interaction of three larger systems: people, processes and technology. These are

the components of virtual teams, and as such, need to be addressed in order to have a successfully collaborating team.

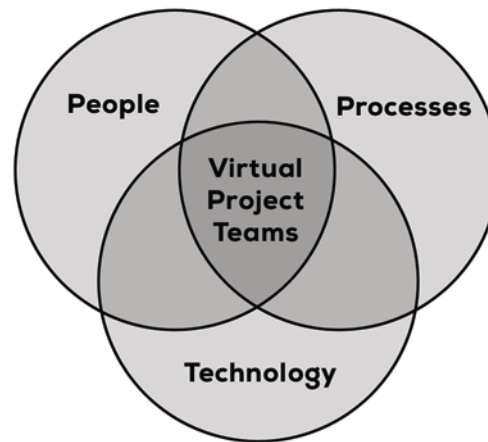


Fig. 4 *People, processes and technology as components for VP teams. Adapted from Coleman & Levine (2008, p.23)*

However, in different degrees of interactions, this model could be translated and applied to traditional teams. As it has been shown, virtual teams main characteristic derives from the lack of physical proximity (Bell & Kozlowski, 2002). The tasks, goals, or missions that they intend to accomplish do not introduce necessary differential aspects, however, it is the way these tasks are accomplished, and the unique constraints they face, that differentiate virtual teams from traditional ones. Member roles, lifecycle, boundaries, and temporal distribution are Bell & Kozlowski's (2002) characteristics that distinguish different virtual teams, but there are literally dozens of plausible delimitations of these factors.

Thus, one of the most realistic typologies of virtual teams is introduced by Duarte & Snyder (2011), on which two dimensions are entangled to define the type of teams; on one side the team description, and on the other team complexity.

According to the team description, the following types of virtual teams can be found:

- *Network*: A team where membership is diffuse and fluid, without clear boundaries with the organizations, and members come and go as needed.
- *Parallel*: Clear and distinct membership and boundaries. Short-term approach towards improvements of systems and processes.
- *Project or Product Development*: Fluid membership but clear boundaries. Well-defined client, requirements, and output, with decision-making authority and long-term approach.

- *Work, Functional, or Production*: Distinct membership and clear boundaries. Regular and on-going work within a functional area.
- *Service*: The team has distinct membership and supports a client.
- *Management*: Distinct membership and its activities are focused on leading corporate activities.
- *Action*: Focus on immediate action, tending towards emergency situations. Membership can be either fluid or distinct.

The second dimension, the complexity, builds upon nine different variables: multiplicity of organizations, multiplicity of functions, transitioning team members, geographically dispersed over more than three time-zones, dispersion of members over 8-12 hours apart, more than two national cultures, different native languages, different access to electronic communication and collaboration technology, and has members who are not formally assigned to the team. According to Duarte and Snyder's (2011) model, if a team covers one or two of these variables, it is considered of *some complexity*; if incorporates three to five variables it is considered of *moderate complexity* and from six to eight is considered of *high complexity*.

Finally, it is important to look into the key activities in the lifecycle of virtual team management. While tradition team dynamics lifecycle stages are defined by Tuckman (1965) as Forming, Storming, Norming, Performing, and later on Adjourning, Hertel, et al. (2005) devised a Five Phase Model to adapt Tuckman's model into a virtual setting.

The first phase is Phase A: Preparations, where the mission of the project is developed, team members are assigned, tasks are designed, rewards systems are defined, technology is selected, and an organizational integration is planned.

Phase B: Launch starts with a Kick-off event, on which team members get acquainted, the goals are explained and clarified, and a set of intra-team rules are set.

The third phase, Phase C: Performance Management revolves around leadership regulation of communication, assessment of motivation and emotions, and knowledge management.

Phase D: Team development is the fourth phase, and holds the assessment of needs and deficits of the team. Individual and/or team training is conducted, as well as the evaluation of the effects of the training.

Finally, Phase E: Disbanding offers a time for recognition of achievements, and a re-integration of team members into the organization or other projects.

2.2.2 Virtual Teams challenges

In a way, Duarte and Snyder's (2011) dimension of complexity offer a proper interpretation of what the challenges for virtual teams are. In a wide summary, most challenges identified relate to some of the special characteristics of virtual

teams. As it has been pointed out, space and time are some of main characteristics, however, these factors have four main causes for concern: geography, culture, organization, and social issues (Lojeski & Reilly, 2007).

There is a myriad of challenges deriving from these topics that dispersed teams need to overcome. Current research points to several different challenging factors, however, there seems to be a dichotomy between those who name factors that have a bigger impact on virtual environments but that also affect traditional teams, and those who identify challenges that are only present in virtual project management. Even in these two realms, there is a clear fuzziness on what are the challenges only innate to the virtual spectrum of project management. Technically speaking, geography, culture, organization and social issues offer serious challenges in all types of projects (Bergiel et al. 2008), or even, any type of enterprise that has a wide-territory over-reach, and that involves a multiplicity of individuals. Incidentally, it is true, that virtual environments are affected more severely from these challenges. Thus, the only truly challenge that is only present in virtual teams that has not relation in collocated ones resides in the lack of face-to-face interaction.

As a good example of this, Lojeski & Reilly (2007) identify as “the big 3” challenges posed by virtual workgroups, as the building of trust, the innovation in virtual spaces, and developing effective leadership skills. These are clear challenges that in virtual environments, offer specific extra difficulties to project managers. However, trust, innovation, and leadership are challenges that exist in collocated teams, as well. On the other side, there is the proposal of Townsend et al. (1998) who identify challenges in structure (organization, trust and cohesion), technology (technophobia), and function (social interactions, burnout and stress), while recognizing that these challenges exist in traditional work settings. Similarly, Jarvempaa, Knoll and Leidner (1998, p.30) point out this duality of challenges in their example of trust:

“Although trust is important in any type of team, trust is pivotal in preventing geographical distance from leading to psychological distance in a global team. Trust is even more essential in global virtual teams.”

With this in mind and as a fitting broad summary of virtual team challenges, it is worth focusing on Kirkman et al. (2002) five challenges. The first one is precisely building trust within the team, which in virtual environment stems on performance consistency, rather than social bonds. The second challenge is maximizing process gains and minimizing process losses, which has to do with the ability of finding and creating synergies. The third challenge deals with overcoming feelings of isolation and detachment associated with virtual teamwork. The fourth challenge is balancing technical and interpersonal skill among virtual team members, which links back to selecting the right individuals for specific virtual environments, due to their technical skills rather than interpersonal skills. Finally, the fifth challenge, the assessment and recognition of virtual team performance, is linked to the limited nature of social cohesiveness.

For the purposes of this study, the focus lays precisely on the third challenge which deals with team engagement and can be a decisive demotivator. This study will also touch upon the fourth challenge as a connection to virtual project management systems, and the fifth challenge, which shares a clear connection with motivation, or at least the way that virtual project members see motivation.

2.2.3 Virtual Teams success factors

It is a serious challenge to summarize factors that should lead to virtual teams success. Multiple studies tend to take a variety of perspectives that make for an almost unmanageable list of factors. Some of these perspectives are taken from the perspective of team-organization environment, or from the quality of interactions between members and the manager, or even from the stages that a virtual team should follow to reach success.

A good example of this “stages” approach is shown in Figure 5 with a solid set of guidelines introduced by Beranek et al. (2005), that project managers should follow in order to lead virtual teams successfully across the lifecycle of a project.

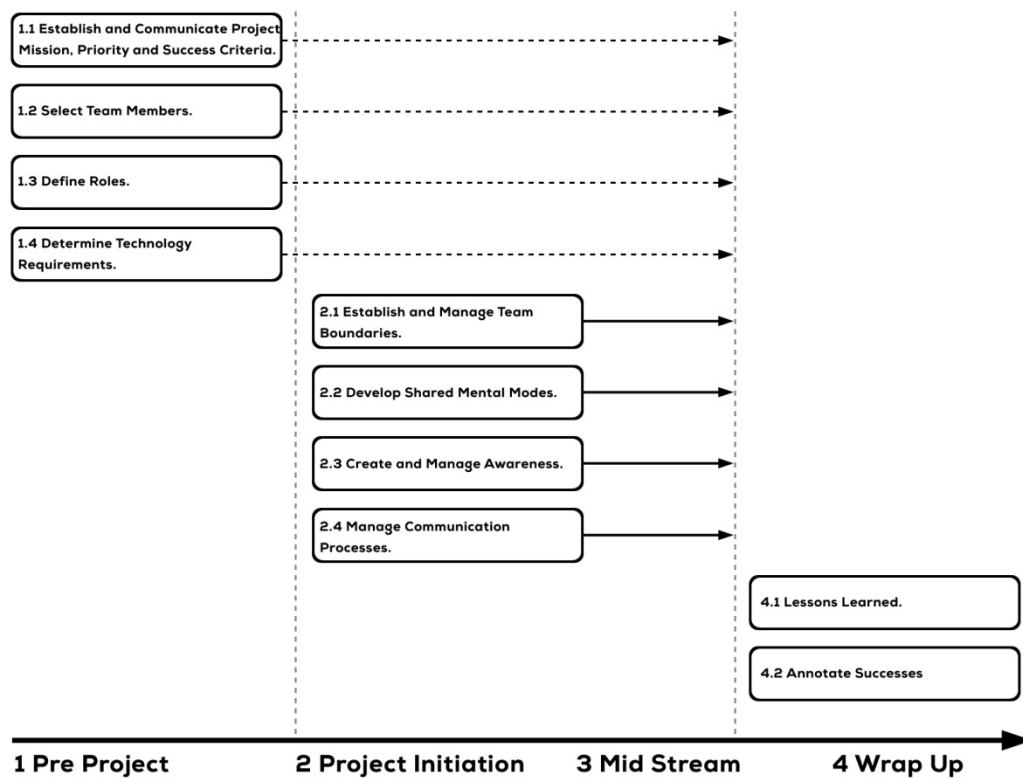


Fig. 5 Guidelines for managing virtual teams over the life of a project. Adapted from Beranek et al. (2005, p.249)

This approach is useful during the implementation planning process, as it could allow team members and the leader to map a route to follow, in order to attempt for success maximization.

A different approach is that of the social interactions between team members. Based on a combination of literature and a longitudinal study, Maznevski & Chudoba (2000) developed a grounded theory of global virtual team dynamics and effectiveness. The theory offers a series of seven propositions that describe what that effective virtual teams are, based on interaction (a set of communication incidents that are dependent on the team's structure and process), a rhythm (temporal regular intensive face-to-face meetings), and the structural characteristics of each project context (like tasks, groups, and technologies).

Table 1 offers the propositions that, according to Maznevski & Chudoba (2000), constitute effective global virtual teams.

Table 1 - Propositions of global virtual team effectiveness

Proposition 1	The higher the level of decision process served by an incident, the richer the medium appropriated, and the longer the incident's duration.
Proposition 2	The more complex the message content of an incident, the richer the medium appropriated, and the longer the incident's duration.
Proposition 3	If a rich medium is not required, the most accessible medium will be used.
Proposition 4	If an incident serves multiple functions of messages, its medium and duration will be shaped by the highest function and the most complexity.
Proposition 5A	The higher the task's required level of interdependence, the more communication incidents will be initiated.
Proposition 5B	The more complex the task, the more complex the incidents messages will be.
Proposition 6A	The greater the organizational and geographic boundaries spanned by a global virtual team's members, and the greater the cultural and professional differences among team members, the more complex the team's messages will be.
Proposition 6B	The stronger the shared view and relationships among global virtual team members, the less complex the team's messages will be.
Proposition 6C	Other things being equal, in effective global virtual teams the receiving member's preferences and context determine an incident's medium.
Proposition 7	Effective global virtual teams develop a rhythmic temporal pattern of interaction incidents, with the rhythm being defined by regular intensive face-to-face meetings devoted to higher level decision processes, complex messages, and relationship building.

It is debatable whether team effectiveness equals success, however, it is clear that a more effective team has a larger probability of success. It is obvious that a well functioning team is not the sole factor for success and that without organizational factors it is difficult to achieve the project's goals and aims (Schiller & Mandviwalla, 2007). For that reason, the approach for organizational environment takes an important part in this literature review.

One of the organizational approaches to identify success factors for virtual teams is provided by Duarte and Snyder (2011), on which they name the following factors: human resource policies; training and development; standard

organizational team processes; use of electronic collaboration and communication technology; organizational culture; leadership support for virtual teams; team leader and team member competencies.

It is worth pointing out that these approaches are non-exclusive and hence, the avid project manager can try to combine them in order to implement and build a team that has even more chances of succeeding.

2.3 Virtual Project Management Systems

Traditional project management is accompanied by a large and well-established body of knowledge regarding project management methodologies. From a Work Breakdown Structure, to Gantt charts, the tools to control and coordinate processes and tasks are plenty. In addition, communication, progress and quality control, and the management of people have no additional barriers.

The contrary happens when translated into a virtual setting, as some of these methodologies become hindered by the lack of face-to-face interaction in all, or most of the stages of the project cycle. This creates a tendency to lay the focus on the tasks and grade performance through accomplishments (Katzy & Ma, 2002).

As interactions between members are transferred into a digital workspace, they become more and more dependant of technology. Virtual teams need to shape their electronic version of an office, establishing channels of communication, systems of collaboration, and methodologies that are adapted to the teams particularities and context.

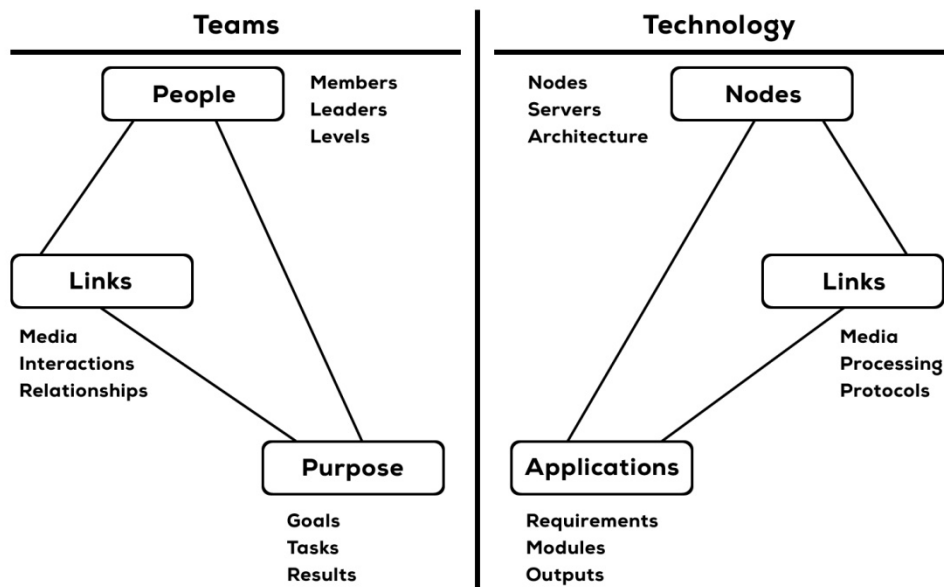


Fig. 6 Virtual teams and technology principles. Adapted from Lipnack & Stamps (1997, p.180)

Figure 6 (Lipnack & Stamps, 1997) shows the strong relationship between the adequacy of technology tools available in order carry on with the project's work processes, and the teams that need to execute those processes.

In the recent years there has been a huge proliferation of software, tools, and systems directed to manage teams and projects online. Zigurs and Qureshi (2001) identify collaborative systems and web technologies as the responsible for this shift, introducing an unprecedented field for relationships and connections, regardless of the type and reach. Electronic technologies allow developments that unite specialists and other stakeholders that, otherwise, would not have been able to work together. In small scale teams and projects, this is particularly important.

In this new paradigm, organizations need to work together in planning, sourcing and production of physical goods and/or services. Virtual project management and the assessment of dispersed teams require the means for these types of collaborations between organizations, finding the matching stakeholders, planning the dynamics of resources and demand, and the management of projects that eventually will deliver the desired outcome of the organization. The systems and tools need to be available in order to feed the cycle of electronic organizational structures.

While the differences are not entirely evident to some users, it is worth making the distinction between different set of tools and systems.

The first pieces of software exclusively directed to deal with distributed teams in networked organizations are Group Decision Support Systems (GDSS). These tools use the advancements of ICTs to enable and connect teams, and are designed to support meetings and team work. Common GDSS software are: audio/video conferencing, document sharing, voice mail, instant messaging. Their purpose is to facilitate electronic social interaction within a virtual space, however, their focus lays on the task of communication. GDSS improve the effectiveness and efficacy of preplanning, participation, collaborative meeting atmosphere, among other benefits (Burdwell, 2006).

The second pieces of software to aid virtual teams are Computer Supported Cooperative Work (CSCW). These tools are built upon interacting patterns to facilitate dispersed collaboration. Their focus lays in processes rather than tasks, with an attempt to properly design virtual spaces that support a continuity of tasks, remote interactions, and communication and interaction (Ackerman, 2000). Common CSCW pieces of software are electronic meeting systems, group calendars, shared documentation, data repositories, bulletin boards.

The third type are those included in Virtual Project Management Systems (VPMS). In Zigurs, et al. (2001) words, VPMS are:

"Integrated systems of technology, people and process that cover the dimensions of coordination, knowledge and process of managing distributed projects."

The software involved in these systems transform traditional project management methodologies and translate them into virtual environment redefining project perspectives of a continuous process of creating and dissolving projects (Katzy & Ma, 2002). These tools tend to integrate CSCW approaches in terms of collaboration, integrated with time-tracking, task management, to-do lists, milestones and plenty of other strictly project-related methodologies. Some of these systems allow for even complex methods, like PERT, BWS, Gantt charts, etc. Common VPMS applications are MS Project, Basecamp, ActiveCollab, Wrike, Zoho PM, Teambox, etc.

In the general public, there is little distinction between CSCW and VPMS tools, receiving most of them the name of “team collaborating tools” or the common name of *projectware*. However, the evolutionary step of VPMS as an integrated application designed especially for collaborative project management bridges most of the final challenges that Virtual Projects managers faced. As most of the systems revolving around traditional project management are being successfully translated into technological virtual environments, the only challenge that remains unaided by projectware is engaging and motivating the team to take the project to a successful outcome. As Mathieson (as cited in Burdwell, 2006) points out, the problem with the actual use of many information systems is that some users are unwilling to use systems, even if IS could increase their job performance.

Another important mention is the overwhelming trend in the industry to deliver software via the internet. The traditional system of buying physical software packages and maintaining them is declining in favor of buying subscriptions and accessing the packages via web browser, directly from the software developers' servers, who now host their own applications (Dubey & Wagle, 2007). There are several reasons from this shift, but speed, continuous updates, and reduced costs tend to be the most common.

This approach is widely called Software as a Service (SaaS) and while its application to the software industry is uneven, the new project software is broadly applying this model, as it shares similar ideas of virtual projects. By providing access to a packaged solution as an online software-based service, the provider can reach to customers across a wide area network from a central data center, usually on a subscription or rental basis, regardless of space and time (Papazoglou, 2003).

2.4 The motivation of progress

The problem for conceptualizing the idea of motivation lies in its extremely multifaceted nature. The high complexity of its psychological, behavioral, cognitive, and social features tends to induce over-simplification, trying to reduce and pinpoint human driving forces. However, the context surrounding individuals can produce an extremely different range of experiences and reactions in personal motivation (Ryan & Deci, 2000:b). The array of factors is shockingly varied and is internalized differently by each individual.

As it tends to happen in a highly atomized concept, a large amount of theory is created from an equally large amount of perspectives and approaches.

2.4.1 Three main classic theories of motivation

The fact that motivation is positively related to productivity makes it an area worth to be invested in. Research in motivation within organizational settings has been fertile, to say the least. Long gone are the days of Taylor's Theory of Scientific Management and behaviorist approaches that simply postulated that workers are motivated solely by monetary rewards in exchange for their work.

Mayo's participation in the highly controversial Hawthorne studies lead to one of the stepping stones out of the grim working conditions of the industrial revolution. One of the founders of the Human Relations Theory, his work, contrary to Taylor's, contributed in providing the working movement with the social perspective, and linked motivation to social aspects, two-way communication, and leadership. Mayo identified the needs of belonging and social needs of workers, and already identified monetary incentives and working conditions to have less effect on workers' motivation than belonging (Bottom, 2009).

Maslow's Hierarchy of Needs departed from the purely "reward approach" and took the cognitivist path, a psychological approach to explain human behavior. His theory revolved around a hierarchy of needs that should be met incrementally. In other words, the needs at the bottom need to be fulfilled in order to get motivated and advance to the next level of needs. The pyramid-like hierarchy scheme is composed, from bottom to top, by Physiological needs, Safety needs, Belongingness needs, Self-esteem and Self-actualization (Maslow, 1943). Thus, a perception of unsatisfied needs will trigger/motivate behaviors that challenge that deficiency (Gordon Rouse, 2004). Once those needs are satisfied, the individual advances to a higher stage of the pyramid, showing a *progress* in the dimensions of satisfaction/motivation.

There are parallels to be drawn between Maslow's theory and Herzberg's Motivation-Hygiene Theory, as it also results from an acknowledgment of workers' needs. As Wu et al. (2008) clearly state, Herzberg's theory identifies two types of work factors influencing motivation: hygiene factors and motivation factors. Hygiene factors refer to the contextual features of the working environment, such as salary, working conditions, interpersonal relations, etc. Motivation factors refer to the characteristics of the work itself, such as sense of achievement, responsibility, advancement and growth; in other words, *progress*.

One of the interesting findings of Herzberg's research is the fact that hygiene factors are associated with dissatisfaction, and thus, when hygiene factors are perceived in a negative way, they contribute to deep dissatisfaction. However, when perceived adequately, they do not necessarily lead to satisfaction. Motivation factors, on the other hand, work in the opposite way (Jansson & Ljung, 2011). When these factors are perceived as negative, the results are not of dissatisfaction. However, if adequate motivation factors occur, they lead to

satisfaction and motivation (Herzberg, 1966). Admittedly, this leads to the conclusion that hygiene factors are necessary to dissuade dissatisfaction, even though they will not lead to satisfaction on their own. It is only by providing a positive outcome on motivation factors that can bring longstanding motivational environment.

2.4.2 Current views on motivation

With the legacy of Maslow and Herzberg's findings, current research on work motivation theory has produced an overwhelming amount of literature and research. In their extensive review, Latham & Pinder (2005) conclude that in the decade between 1993 and 2003, goal-setting, social cognitive, and organization justice theories are the three most important approaches to motivation in work settings. Horizons have been expanded into a much broader research perspective. On top of the theories of needs, values, cognition, affect and behavior are new approaches to research on motivation.

Latham & Locke (1991) shed new light in the study of goal setting, both in the creation process and in the outcome of the goals. With a participatory decision making (PDM) approach, they found a particular increase in performance. What is more interesting is the incremental loop of performance cycle that shows that high goals leads to high performance, which then leads to rewards. This feeds satisfaction, boosting self-efficacy, and increasing the perception of capacity to achieve future challenges, through setting even higher goals (Latham, Locke & Fassina 2002). These results define a clear image of *progress* in the performance and efficacy, which leads to higher states of motivation.

Bandura's (2002) research on social cognitive theory (SCT), brings forth a motivational paradigm that resides in the combination of environment, behavior, and cognition. The consequences of a particular setting induces self-regulation of motivation influencing an incremental *progress* of development.

Finally, organizational justice theories find the links of employees' responses to organizational outcomes according to the perceptions of fairness by the same organization. Fairness or justice is deemed individually and consequently becomes particularly difficult to handle. The effects on motivation are also clear, as the concept of reciprocity is present. If organizations are perceived as fair, employees will feel motivated to return the sense of fairness in the form of commitment (Greenberg, 1990).

Interestingly enough, this motivational theoretical background finds certain intersectional points.

Firstly, all theories heavily rely in the dual typology of motivational genesis. Intrinsic motivation and extrinsic motivation refer to the individual sources of motivation. Deci & Ryan's (1985) Self-Determination Theory (SDT) defines intrinsic motivation as "*doing something because it is inherently interesting or enjoyable*" and extrinsic motivation as "*doing something because it leads to a separable outcome*". Hence, intrinsic motivation is the one that comes from within, from

internal factors, and extrinsic motivation is the one that responds to external inputs and outputs. This acknowledges the individual needs for competence, autonomy, and relatedness. The beauty of SDT is the concept of *internalization* and *integration* of values and behavioral regulations. Through internalization, an individual takes in a value or regulation, and through integration, an individual transforms the internalized value and transforms it into his or her own so that it will eventually come from within. In Ryan & Deci's (2000:a, pp. 60-61) words:

"Thought of as a continuum, the concept of internalization describes how one's motivation for behavior can range from amotivation or unwillingness, to passive compliance, to active personal commitment. With increasing internalization (and its associated sense of personal commitment) come greater persistence, more positive self-perceptions, and better quality of engagement."

The figure below (fig.7) presents Ryan & Deci's (2000:b) taxonomy of human motivation. It offers various types of motivation with a corresponding gradation in the degrees of autonomy or self-determination. This gradation takes the individual from a state of amotivation through a set extrinsic types of motivation which increasingly raise autonomy to the other end, the internalized intrinsic motivation.

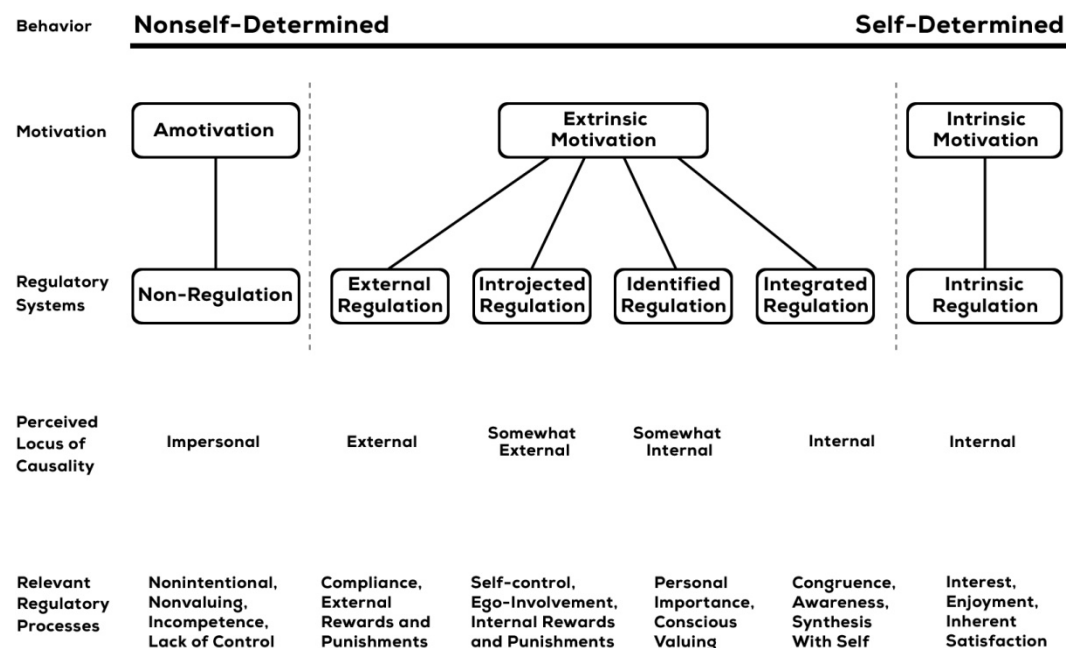


Fig. 7 The self-determination continuum showing types of motivation with their regulatory styles, loci of causality, and corresponding processes. Adapted from Ryan & Deci (2000:b, p.72)

Secondly, they all share the idea of *progress*. In a way or another, all the theories presented so far derive into a notion of progress of the individual in order to either get motivated, or reach higher levels of motivation. There is no necessary interdependencies between theories, however, they all share an underlying idea

that if an individual experiences the notion of progress, the sensation of moving forward for a better set of contextual and internal factors, motivation is bound to increase.

Strangely enough, *progress* is not one of the factors identified as “common” in current research. Beecham et al. (2008) in their extensive systematic literary review on motivation in software engineering identify 21 motivators and 9 motivating aspects of software engineering field. None of those is *progress*. Motivational theories merely hint the idea of progress, probably because progress is less tangible and offers an abstract experience that is difficult for individuals to acknowledge.

2.4.3 The progress principle

In the book *The Progress Principles*, researchers Amabile and Kramer (2011) narrate a set of experiments that studied creativity in the work place. The starting point in their qualitative study is the individuals' Inner Work Life. This concept is *the confluence of perceptions, emotions, and motivations* that people encounter when interacting with their working environment.

For the purpose of this study, the focus is kept within the confines of motivation. As components of inner work life, it is true that perceptions and emotions still have an effect (both positive or negative) on motivation. However, the researchers acknowledge *that the primary source of influence of inner work life is motivation* (p.39). Accordingly, within the lines of this study, perceptions and emotions will only offer a positively connected participatory role.

Amabile & Kramer's (2011) approach to motivation's influence in the inner work life system is mostly task oriented, focusing on the desire to work (what to do, whether to do it, how to do it, when to do it). However, they take an intrinsic/extrinsic approach to the factors that influence motivation. The fluctuation of motivations is decided through extrinsic and intrinsic motivators. Additionally, they introduce another factor, the relational or altruistic nature of social beings. In a single touch of grace, Amabile and Kramer (2011) wipe out most shifts of motivation that cannot be explained by extrinsic or intrinsic motivators, and that can only be explained through the internal gears of each individual.

Through the examination of hundreds of diary entries by workers who detailed the happenings of everyday work life, Amabile and Kramer (2011, p.68) found what in their words, was the most important finding of the entire study:

“[...] we had been witnessing the power of progress. This is one of the most important findings of our entire study: that making headway on meaningful work brightens inner work life and boosts long-term performance.”

This sense of accomplishment leads to positive inner work life creating a loop of progress that feeds itself through self-reinforcement. Another important finding shows that when the progress is acknowledged more often and in smaller

iterations, it has a longer-standing effect in boosting inner work life. This is identified by the authors as *small wins*.

2.4.4 Motivation 3.0

Progress appears to be a clear persisting theme in theories discussed in this chapter. Albeit, these theories apply to contemporary work settings, and do not relate to preindustrial times, where blood, violence and fear countered the effects of gold, land, and sometimes coffee.

But the interesting factor of progress is its ubiquitous presence. It is present in each theory, attached to the context of its historical nature. As the characteristics of working tasks and process evolve, so do the characteristics of motivation. Work shape individuals and *vice versa*, and so, progress in the nature of work also means progress in the processes that motivate individuals, and hence, the way these individuals are motivated.

Daniel Pink makes an exceptional case out of this perspective. His perspective of progress in the realms of motivation use software terminology, in terms of versions.

In his book, *Drive: the surprising truth about what motivates us* (2009), Pink illustrates this theoretical summary with three types of motivation: motivation 1.0, motivation 2.0, and motivation 3.0.

Motivation 1.0 assumes that human beings strive for obtaining the most basic needs that would lead to a state of survival. This type of motivation, in relation to Maslow and Herzberg theories, lays at the bottom of their models and until satisfied, there is no progress in those human needs. After a historical shift that lead to the industrial revolution, nothing other than meeting the basic human requirement to survive were required in western societal structures.

Motivation 2.0 is an upgrade as a result of the industrial revolution (*progress*). This was the motivation of Taylor, the motivation of Ford, the motivation that relied in *carrots and sticks*, in rewards and punishments to motivate workers. This motivational style worked for a while, allowed workers to mindlessly achieve repetitive and meaningless tasks. The progress in working processes, allowed by the progress in technology, have rendered this style obsolete for a good part of the industrialized world. Amabile and Kramer (2011) have proven that rewards and punishments, in the current context of some industries, is ineffective to motivate individuals. Technology and needs have evolved, the motivational style has not. This type of motivation enabled an extrinsic type of behavior that Pink calls Type X. In relation to Self-Determination theory, competence, autonomy, and relatedness needs have to be satisfied through an internal process.

The problem identified by Pink relies on the fact the there is a miss-match between what science knows and what business does. Hence, Pink requests a new upgrade in motivation, a Motivation 3.0 that recognizes the new needs for motivation within the individuals. A drive to learn, create and to better the world, *progress*.

This new type of motivation identifies two types of tasks: algorithmic (established instructions down to single pathway to one conclusion) and heuristic (requires flexibility to experiment until a solution is found). It also identifies the Type I behavior, which relates to intrinsic needs. These needs are normally met when workers are involved in environments that foster autonomy, mastery, and purpose.

Pink acknowledges that changes in business do not follow a global pattern in the new *milieu* of heuristic tasks with Type I behaviors. Industries apply this progress according to their needs and processes. However, he argues that even for those industries that have made the jump, in most cases, the motivational style of Motivation 3.0 has not been met.

2.5 An introductory look into Gamification

Huotari and Hamari (2012) define Gamification as:

“(...) a form of service packaging where a core service is enhanced by a rules-based service system that provides feedback and interaction mechanisms to the user with an aim to facilitate and support the users’ overall value creation. ”

In other words, it is applying game design elements in non-gaming environments. It is usually build upon the approach of Mechanics, Dynamics, and Aesthetics (MDA) to understand games, bridging the gap between game design and development (Hunicke et al. 2004), in order to be applied to settings other than games.

The term itself dates back to 2008 and originates from the digital media industry. It gained traction and was widely adopted by 2010, however, this new term, is still fiercely contested (Deterding et al. 2011:b). The introduction of *gamified* applications to a wide range of users and audiences provides a new way to develop new heuristics, design patterns, and dynamics of games, with the aim of improving user experience (UX) and user engagement (Deterding et al. 2011:a).

The reasoning behind the application of gamification in web-based system is to enhance engagement, grant choices, reaffirm progression, and provoke social habit (Werbach & Hunter, 2012). Applied to virtual project management software, there is a vast opportunity to provide game elements in the systems that not only engage the team members, but also provide a sense of progress, and helps the members create the habit of using the software regularly without it being a tedious task. In addition, gamification provides the tools for other members to motivate their team members, or even applying automatized features where human-computer interaction (HCI) features motivate members automatically from the software. This is particularly important, as it widens the sources from which an individual receives motivational inputs.

Reviewing a series of experiments on extrinsic and intrinsic motivators, Deci et al. (1999) encountered that there are three factors, that, when present in a system,

tend to make people want to carry on a task because of themselves. These factors, as were named by Pink in the previous section, are *competence* (the users' sense of ability, they are accomplishing something), *autonomy* (the users feel in control, providing a sense of meaningful choices), and *relatedness* (the activity is related to something beyond the user's self). These traits of SDT, are found specifically in virtual environments. In a virtual team, a user has to be particularly competent, to perform the tasks in hand, but also to use the technology involved in the process. The user has to be autonomous, as the face-to-face interaction is minimal or non-existent. The user has a sense of relatedness, as it is a part of a bigger team that has a bigger task than those of the user.

This premise is a powerful one. It gives room for a potentiality of an amplification of Amabile & Kramer's concept of small wins. By applying gamification techniques to projectware, every small win remains small, but the effects are amplified by gamification feedback, provided by the software or other members. This amplification of small wins generates engagement, that prompts the social habit of using the system more often, and thus progress is experienced exponentially. The true beauty of this iterative development is that this process is fed into a loop of progress, which as it has been pointed out, is the ever-existing factor that drives motivation.

Furthermore, besides fostering motivation, one of the most interesting features of gamification is that it tends to mix intrinsic and extrinsic motivators, relying on constant feedback, focusing on the users' actions, and adding a balance of rewards and fun that fosters intrinsic motivation. It uses all the spectrum of motivators in a balanced and well-thought way to provide a fun and engaging experience, all included within the system itself. This particularity has the potentiality of lifting some of the responsibilities of motivating the team off the team leader's shoulders.

3 Methodology

This chapter brings forth the methods used for data collection as well as the methods used for the analysis of the data. The chapter continues by outlining the sources of data collection and the materials used in this study, and discusses matters of reliability and validity.

The methodology adopted in a research study is tightly linked to the type of information required to answer the question or questions that motivate the study. The research method defines the researcher's systems to collect empirical data in order to analyze it, and offering an interpretation of a real setting. The methodology adopted responds to a need of information generated by the research questions. Thus, each method is linked to, and justified through the nature of the information needs identified.

3.1 Research methods

The background area surrounding this particular study provides the ontological setting of the study, determining the connections with scientific research methodology. The theoretical and personal nature of the concept of motivation requests for a thorough theoretical framework contrasted with the subjective perceptions of individuals who participate in virtual project management. These personal perceptions need to be interpreted, offering certain limitations for quantification. Thus, this study follows a mostly qualitative approach.

However, the inclusion of the current state of Information System tools, and online software designed to help project managers to run and manage virtual projects, provides some room for a quantitative perspective.

Though research methods carry epistemological commitments, and quantitative and qualitative research are separate paradigms (Bryman, 2012), the combination of both types of research methods, in this particular study, occurs in terms of triangulation. As Hammersley (1996) states, the triangulation aspect serves as an enhancement of validity, as the quantitative research is mostly used to corroborate the qualitative research findings. When used together, the two types of methods have different, complementary strengths, and can lead to a more comprehensive understanding of a phenomenon (Moody, 2002).

Epistemologically, this study adopts a critical realist approach. This perspective considers reality as an independent entity of what empirical observation may derive into. There is a physical difference between the concepts studied and the terms used to understand them (Bryman, 2012), as well as the deeper structures that lie beneath observable patterns. Similarly to positivism, critical realism can apply the same methods for data collection in natural and social contexts. However, critical realism recognizes the theoretical terms' validity, even if they are not directly observed in independent settings. As Mingers (2004) concludes, a critical realist approach has a special potential to fit well within the reality of IS

as an applied discipline. Additionally, Bhaskar (2002) points out that critical realism transcends the classic dualisms in the social sciences, such as positivism and interpretivism.

This type of hybrid epistemological perspective allows for a rather flexible data collection process. While a deductive approach has influenced the empirical design, it is an inductive approach the one that relates to the methodologies in use. A deductive reasoning often starts from theory, proposes a hypothesis, observes a field setting, to then confirm or reject the hypothesis. On the other hand, an inductive reasoning, takes a bottom-up approach, starting from the observation, finding patterns, creating a tentative hypothesis that can lead to theory (Bryman & Bell, 2007).

The flexibility given by this approach frees the researcher from the constraints imposed by strict separated methodologies. While it is true that the theoretical background can shape certain aspects of the research, the subjectivity factor opens a window for multi-faceted meanings that emerge from the data and that can be ultimately connected to an existing theory. The mixed methods used in this study respond directly to the need of information that can help answer the research questions. Each factor of information needs that are identified in *Chapter 1.4 Information needs and research design* carries its own complexity and nature, depicting a different type of method used to collect data.

3.1.1 Motivation and its implications in organizational settings, and current strategies and approaches to motivation within VPM

The aim of this study is to assess the actual state of motivational efforts in virtual project management. This assessment is primarily focused on the role of the project leader in order to keep team members engaged and motivated in virtual environments. The personal nature of the concept of motivation presupposes subjective perceptions of individuals who participate in virtual projects. This is precisely what makes a qualitative method approach more suitable to collect data for this particular needs of information.

A qualitative research can predominantly emphasize an inductive approach to the relationship between theory and research (Bryman 2012, p. 36). If a researcher is observing, studying the virtual project methods for motivation, from the result of that observation, it can be acquired how motivation methods differ in virtual projects from traditional ones. Also, this process makes it possible to explore the development prospects and possible implementation of new motivation methods in virtual projects.

It is important to gather data by allowing the subjects to offer their perspectives in order to get the full picture of the motivational process. What has been experienced by a project manager can be completely different than other project manager according to a large set of variables like industry, seniority, knowledge, etc. It is important to recognize the fact that subjects can express themselves and their feelings individually, and therefore, clarify the social and cultural contexts within which they operate (Dalcher, 2003). Accordingly, the qualitative method

used to collect data is semi-structured interviews with open-ended questions, in order to secure response rates and deepen the discussion. Furthermore, being motivation a predominantly individual matter, the flow of the conversation should be bidirectional, allowing the interviewees to expand their answers and engage them in a two-way communication. This way the flexibility needed to probe the subjects into different contexts is ensured.

The strengths of this method are the positive rapport generated by the interviewer and the interviewee; a high validity, as the interviewee is able to talk about the topic in detail and depth; complex questions and issues can be discussed or clarified; it avoids the contamination of the interviewer's preconceptions; and it is easy to capture the data. Interviews focus directly on the study's research questions and provide insights and perceived causal connections. On the other hand, this method poses some weaknesses too, as it highly depends on the setting and on the skill of the interviewer, who in addition, might give unconscious signals to the interviewee; it is time consuming and it can be expensive; it is not particularly reliable and it can present challenges in efforts of replication; it is also difficult and time consuming to extract and analyze the relevant data. Besides, there can be weaknesses in the responses, due to lapses of memory or reflexivity, which is a response given by the respondent because he/she thinks that is what the interviewer wants to hear (Yin, 2009).

As Remenyi (2011) points out, there are important advantages which semi-structured interviews have over questionnaires. The interviewer has the possibility to learn from the first interviews and improve his/her interviewing technique in order to obtain richer data from the following interviewees. Similarly, the researcher can fine-tune questions that might not be clear enough, or that conflict with other questions. Also there is a flexibility to clarify questions, as well as adding probes that can retrieve more in-depth information. The possibility of making field notes that can expand the understanding of the situations being studied is also a great strength of this method. This is of course not possible in a mass data collection technique such as a large scale survey using questionnaires.

The main concern lies in the reliability of the data. The content of the interviews offers personal recollections that are almost impossible to verify. As personal opinions, it is possible that the experiences of the interviewees do not relate with reality, as they are subjective accounts of what really happened. This does not threaten the importance of the study, as this scenario can confirm a misconnection between virtual project managers experiences in motivation, and the content of motivation theories. This is an important factor that is contemplated in critical realism (Smith, 2005). For this reason, complementing the data with a quantitative method is a good way to try corroborate the interviews' narratives with quantifiable data. The mixing of research methods is known as triangulation and in the context of this study it will be used to complement the qualitative data.

3.1.2 Active and passive motivators embedded in software and online tools

In order to gather information on the current motivators embedded in software and online tools, a quantitative approach within a cross-sectional design is the optimal way to go. Cross-sectional design within quantitative research methods includes four research methods; structured observation, content analysis, official statistics and diaries (Bryman 2012, p. 59).

Within the context of this study, the method used to gather information about the current tools used by organizations to coordinate and communicate within virtual project management is content analysis. The reasons behind this choice, as Bryman (2012, p. 304; p.59) claims, is that it is a highly flexible method, and can be applied to a wide variety of different kind of unstructured textual information; it is very transparent research method which makes it a particularly objective one. The disadvantage of content analysis is the difficulty to ascertain the answers to “why questions”.

This particular quantitative method fits the purpose of the study as it is particularly useful in media research for analyzing content and identifying the characteristics and meanings of content, while linking them to their intended effect (Krippendorff, 2004). Content analysis offers a particular ease in terms of selecting the features to analyze. While it is possible to sometimes get lost in content, being a participant observer allows collecting data unobtrusively, according to the categories used in order to select content (Wimmer & Dominick, 2010). In this particular context, the data is distributed online freely, and mostly condensed in software packages, which makes the research inexpensive and relatively straightforward. When the categories are few and well defined, this method can save a lot of time.

On the other hand, a personal definition of categories can lower reliability, as different researchers might choose different categories, and that would lead into alternate texts, thus resulting in different data collected, and the results would not necessarily be comparable (Bryman, 2012). Another limitation of the method is the strong reliance on the researcher to set the limits of the research. With a limited knowledge or experience by the researcher, there is a risk to have a distorted limit on which content to analyze. Hopefully, in this case, the accumulated experience of the researcher in the field of online project management tools, provides the required content to extract the necessary data.

The motivation lays behind the characteristic of content analysis of determining certain words or concepts in bodies of content. If virtual project IT tools and software are considered as content artefacts used to rule virtual project management, the goal is to analyze these *projectware* in search of motivation strategies, or features that project managers can use to engage and motivate team members, or that members can use to motivate other team members. The number of tools to be analyzed depends on the availability offered by the companies that create and develop these tools. The main goal is to find quantifiable data of

motivation on these software packages. The empirical data can be used to corroborate the opinions and experiences obtained through the interviews.

3.2 Methods for analysis

The analysis of the empirical data will be twofold: firstly, an application of the methodology provided by Bogdan and Biklin (1998) within the framework of thematic analysis, to analyze the qualitative data derived from the interviews. According to Braun and Clarke (2006, p.79), thematic analysis is a qualitative analytic method particularly suited for identifying, analyzing, and reporting patterns or themes within data. It minimally organizes and describes data sets in detail to the extent that it interprets various aspects of the research topic. The themes identified tend to capture important features and links that connect the data to the research questions, representing some degree of patterned responses or meanings within the data set.

This particular method suits this study because of the tight relationship between the nature of the raw data and the literature review. As Aronson (1994) points out, by referring back to the literature, the interviewer gains information that gives room to make inferences from the interviews. Once the themes have been defined and the literature has been reviewed, the researcher is ready to formulate theme statements to develop a narrative. As it is in this case, when the literature is interwoven with the findings, the narratives constructed are the ones that stand out. A properly developed narrative allows the reader to comprehend the process and motivations of the interviewer.

The quantitative data from the software packages included in the study will be analyzed by applying the benchmarking method introduced by Ziguers, Evaristo & Katzy (2001) and developed by Katzy & Ma (2002). This particular method allows for a clear understanding of the current tools offered by these VPMS, leading to understanding their outcomes from the design perspective, but also from the functionalities offered to managers and team members.

3.2.1 Interview data analysis

After conducting the interviews (as described in *Chapter 4: Data collection and empirical research*) each recording was analyzed and set into a series of 3-4 page interview summarized transcriptions in a converging format for all interviews. These interview summaries were created in reflection of the interview framework (*Appendix 1*), covering the main overarching themes, while identifying the most relevant data provided by the respondents. This process provided a first familiarization with the data, which is the first phase of conducting thematic analysis according to Braun and Clarke (2006).

The special formatting, discarding verbatim transcription, allows for a faster analysis giving way for an identification of patterns emerging from the data. Thus, only what was considered complete thoughts and experiences that were viewed as useful information was transcribed into the documents. Background

noises, interruptions and silences were not transcribed, as the intention of this study is not to judge the readiness or clarity of each respondent, but to analyze their views and experiences. A clear path to an answer with a plausible justification is the main parameter for transcription basis (Braun and Clarke, 2006)..

With this preliminary step, the initial level coding phase suggested by Bogdan and Biklin (1998) was already taken care of. The transcription, done within the framework of interview themes, already comprised data into data sets that could be more easily analyzed. This induces an initial data reduction that allows for a more focused coding. Themes were identified and the first units of meaning started to arise. Braun and Clarke identify the next 2 phases of thematic analysis in generating initial codes and searching for themes.

This focused coding was done on top of the transcribed summaries in order to eliminate, combine, or subdivide coding categories. The intention behind the focused coding was to identify repeating ideas and larger underlying themes that connect codes and categories. This represents the fourth phase, reviewing themes.

The categories utilized in the focused coding derived from the questions posed to the respondents, as well as the industry context, strategies, relationships, and processes embedded in the raw data. Linked to each theme, the data was finally coded in using the framework approach into matrices that combined the categories, or variables for each theme. These matrices are provided in *Chapter 5: Empirical data and analysis* and try to give a fast overview of the narratives derived from the interviewees. The matrices define and name the themes, which is the fifth phase of Braun and Clarke's framework.

3.2.2 Benchmarking collaborative VPMS

A secondary goal of this study is to understand some of the shortcomings in motivational efforts within projectware, software directed to manage VPM. This study tackles this goal by exploring the functionalities of a wide range of VPMS. The intention is no other than offering an overview of the current state of this type of tools and assess the degree of focus in bridging motivation challenges in virtual environments, while extending the theoretical knowledge derived from the current literature.

Following the steps of Katzy and Ma (2002), the study operationalizes the theoretical background of Zigurs et al. (2001) that conceptualizes VPMS as “*integrate system of technology, people and processes that cover the dimensions of coordination, knowledge and process of managing distributed projects*”. This allows Katzy and Ma to develop a three-dimensional benchmarking framework for comparing VPMS. These dimensions are:

- Coordination dimension covers the translation of traditional methodologies for project management, such as task coordination, Gantt and PERT charts, dependencies, etc.

- Knowledge dimension focuses in contextual information, tasks definitions, experiences, documentation, and information related to the project.
- Process dimension reflects team building process during the project lifecycle, dealing with the typical phases of group dynamics: forming, storming, norming, performing, and dissolving.

For the purpose of this study, this method is extended to a fourth dimension that looks into the Motivation dimension. While it is clear from the literature that motivation can be the sum of many other aspects within the environment and the inner life work of each individual, the focus here lays on individual functionalities and features that are aimed to motivate and engage the team members, precisely like what most of gamified systems offer.

Using this system to analyze the content analysis, resulted in a benchmarking data matrix offering values of each dimension for each of the ten packages tested. This matrix is presented in *Chapter 5: Empirical data and analysis*.

3.3 Data sources and materials

To gather all the information detailed in the previous chapters, a blend of data from primary and personal sources was utilized.

The key sources for primary materials are available online. The websites from the companies who offer software solutions and tools for VPM, offer not only access to the tools themselves, but also give a clear and detailed image of what are the main characteristics and solutions of the software. In some cases, there is a clear difference between promotional documents and guidelines that are offered as instructions to run the software.

The pieces of software studied also become primary data sources. The particularities of each tool make the grounds of testing heterogeneous. Some systems can be run from the provider's website with use of a web browser. Others need to be installed locally on a computer. A third option was to be installed in a client server and then accessed via web browser.

These primary sources of data are related to the third factor identified in the information needs, and thus, are meant to help answer RQ₃.

Additionally, there has been a heavy reliance of qualitative methods to gather data about the status of motivation in VPM. These personal sources, the interviews, poise a pivotal part of this study. The methods were appropriate, necessary, and provided valuable data that otherwise would have been lost completely.

The personal sources of data are related to the first and second factors identified in the information needs and thus are meant to help answer RQ₁, RQ₂, RQ₃, and RQ₄.

The way in which these sources of data and materials are used is covered in chapter 4 *Data collection and empirical research*.

3.4 Validity and reliability

In such a multifaceted study as this one, the matter of validity and reliability brings forth a tangible conundrum. It is widely accepted that the most prominent criteria for the evaluation of social research are reliability and validity (Bryman, 2012). And while the quantitative methods used in this research should easily conform with these tools of standardization, it is not as straightforward with the qualitative methods used.

Generally speaking, the reliability of a study relates to the probability of obtaining similar findings by performing the same research. (Priest, 2009). Validity on the other hand relates to the integrity of the conclusions that are generated from a piece of research (Bryman, 2012). In other words, an empirical account must be plausible and credible, and should take into account the evidence used in the study. This means that in a qualitative discipline, which is normally non-measurable, the idea of validity becomes a matter of trustworthiness and authenticity.

Bryman offers four alternative criteria for evaluating qualitative research, and that are summed up by the concept of trustworthiness. These criteria are credibility (which parallels internal validity), transferability (which parallels external validity), dependability (which parallels reliability) and confirmability (which parallels objectivity). Adapting quantitative research criteria links to the research approach of realism. The accounts are one of a number of possible representations rather than definite versions of social reality. Thus, thick descriptions, respondent validation exercises, and triangulation are strategies that help anchor the axis of realism.

This adaptation of reliability and validity for qualitative research allows the researcher to set a framework as a measuring bar for the quality of the work to perform. In this particular case, there is an actual intent to achieve and fulfil all four criteria to make this study trustworthy and authentic. Accordingly, there is a strive for credibility by following canons of good practice, linking methodology to the theory covered in the study, and aiming for respondent validation by giving scrutiny of the conducted research to those who were interviewed. The thin veil of external validity tries to be overcome by the aim for transferability with the inclusion of a thick description of the contextual uniqueness of the settings on which the study was conducted. Data sources are documented and kept with complete records, notes, interview summaries, the original recordings, and other data that originated during the course of the research. In doing so, there is an aim for dependability. Finally, aiming for confirmability, meaning that the researcher can be regarded as having acted in good faith (Bryman, 2012), is intended throughout the whole study. For this reason the interviews were conducted with Skype, in order to gain the benefits of face-to-face interaction.

4 Data collection and empirical research

This chapter covers the empirical side of the study in which the methods discussed are applied in a real life settings. It starts by mapping out the data collection process with a description of how the interviews were conducted. It continues by explaining the sampling process, and the introduction of the respondents. Finally, the chapter ends by providing a clear view of how the benchmarking of projectware was performed.

Retrieving empirical data happened in two different ways. The first one was done in a set of interviews, and the other was done through benchmarking some of the Virtual Project Management Systems that are currently available to run projects online.

4.1 Semi-structured interviews

The semi-structured interviews are the main data sources for this study and took place between March 24th and April 3rd of 2013.

The interviews consist of a series of open-ended questions followed by a series of possible probes or follow-up questions that aim for an extended reply or clarification. The questions are divided in 8 different overarching themes which at the same time can be grouped into three main blocks: background and experience of the interviewee, virtual projects, and motivation. Most of the questions can be traced back to the theory review and have a particular meaning.

Appendix 1 shows the framework used to conduct the interviews. The framework itself suffered two major modifications. The first one included a switch in the order of three of the overarching themes. The second one regarded the phrasing on two questions, and the addition of one question about project management certifications. The data regarding certification that was not asked to the first respondents was asked via email later on.

Prior to each interview there was a small introduction clarifying the motifs behind the interview, stating the time and date of the interview, the name of the respondent, and asking for permission to record and use the content of the interviews.

All interviews were held electronically. Eight out of nine were conducted with the aid of the program Skype, which allows for video and audio communication. On seven out of the eight there was a first contact with both audio and video to establish a face-to-face report with the respondent, then to ensure audio quality, the video was turned off, and it was turned on again after the main questions, to end the conversation. Each interview was recorded using two systems, one was the program called SkypeRecorder, and the other, used for backup, was Adobe Audition.

The longest interview lasted for 80 minutes and 46 seconds. The shortest was 29 minutes and 52 seconds. The mean, was 55 minutes and 25 seconds, and a total of 7 hours and 23 minutes of audio recordings. The shortest interview was conducted with the seventh interviewee, Anne, who regularly works from the San Francisco Bay Area, but that at the time of interview was located in Russia. She was the only respondent that had a time constraint that contributed to a faster paced interview. However, Anne was the only of the respondents who was not an experienced manager, so some of the questions either were cut short or did not need follow-up questions.

Two respondents requested the questions prior to the interviews. One of these respondents, due to time constraints replied the interview directly on a Word document. Later on, the document was examined with the respondent, so that follow-up questions could be made. These questions were made through Gtalk chat, so they were collected also in written form. Since this is the only interview that lacks audio and thus cannot be examined in the same way as the others, and lacks the same level of authenticity that rest of interviews offered, it was decided to drop this interview from the body of data sources analyzed for the study. Each interview is recorded as an MP3 file.

Since four of the respondents requested either not to be identifiable or made a distinction that their opinions were not those of their employers, the decision was to make this an anonymous group. Their real names are only available to the supervisor and the grading committee. For the purpose of this study, their real names have been changed. The interview dates and locations, as well as the sex and industry of the respondents are kept as they were.

After the interviews, the audio files were listened several times in order to compress most of the content in 3-4 page summarized transcriptions that compiled the views and experiences of each interviewee. Since there is a lack of need for complete depiction of certain responses and there is an attempt to grab the major narratives of each individuals, there was no need for verbatim transcription of the interviews. Summarized responses to the questions, including some worth-noting quotes were included in the summarizing files. This allowed for a much clearer and straightforward comparison, trying to collate similar narratives or pinpoint dissenting trends.

4.1.1 Sampling and introduction of the respondents

One of the targets of the empirical sides of this study was to approach individuals with extended experience and understanding of what virtual project management is. The ideal was a dual experience in both types of projects, if possible with experience as a team manager. This would provide a personal background fit for comparisons between both types of projects, with an embedded perspective of what leading such projects entails.

For that reason, the study required purposive sampling, which would provide and establish a good correspondence between research questions and the sampling itself. The reason for this choice is rather straightforward. Probability

sampling is out of the question, as it would require a certain degree of randomness, and the intentions of the study are not generalizing this study to general population. Although a convenience sample could have worked by going to local companies and find out if someone was available, this would have encased the sampling to a rather limited group of people, and it wouldn't have allowed to choose among a pool of people that offered certain variables that were aspired to obtain.

The research goals contain a well-defined software and IT-charged background. Motivation is the backbone, but how to channelize it through IT virtual media is an important part of the study. Also, the variable of experience was particularly important, as it could offer a certain depth in the evolution of the field. For that reason, a mostly North American sampling from IT and Communication industries were the choice for the target individuals.

The number of interviewees, for the scope of this study, was 8 individuals. To reach 8 individuals that followed the decided criteria (working in North America, with experience in virtual projects, industry that is technology-oriented), the social platform LinkedIn was used.

LinkedIn is a social network for professionals. As of December 31, 2012, the network has over 200 million users, of which 36% are located in the USA (LinkedIn). According to Blue Rise Media (2012), the leading sectors in LinkedIn are tech (15,3%) and finance (12,9%) industries, which would fit the profile for the study. Furthermore, LinkedIn has professional groups, and has several Project Management groups, as well as one Virtual Project Management group. Thus, by joining the groups, the network grants access to literally hundreds of individuals fitting the criteria.

A message was posted on each of these groups requesting respondents for the study. When replies came, their profiles were studied and the interviews were booked with the first 8 individuals that fit the criteria. The last interviewee was the one that happened only in written form and was substituted by another LinkedIn user that agreed to be interviewed.

Table 2 shows a short summary of the respondents and the interviews. The name given here is the fake name. The date and location show the actual moment of the interview, from the perspective of the respondent. Also shown in the table can be seen any Project Management certifications, years of experience with virtual projects, the industry of involvement and the actual duration of the interview.

Table 2 - Respondent Interview Overview

Subject	Date	Location	Cert.	Yr. Exp.	Industry	Duration
Terry	2013-03-24	Illinois	CSM, UPM	25	Telecommunications, Software development	0:57:21
Neil	2013-03-25	Pennsylvania	PMP	12	Innovation Technology, Software development	1:01:38
Douglas	2013-03-25	Massachusetts	PMP, CSM, ITIL	10	IT, Telecommunications	0:54:27
Ursula	2013-03-26	North Carolina	PMP	20	Banking	0:44:03
Robert	2013-03-27	California	PMP	10	Hi-Tech Companies, Telecommunications	1:03:22
Anne	2013-03-28	Russia		3	Software Development	0:29:52
John	2013-03-29	North Carolina	PMP	16	IT	0:51:50
Margaret	2013-04-03	Washington	PMP, SM, ITIL, v3F, PMI- RMP	11	IT	1:20:46

Terry is a program manager with more than 50 projects under his belt. He works from an office, but he has no office times, he simply goes there when he needs to. He has worked for world-renown telecommunications companies and chose this particular type of work because in his own words *“It’s exciting, it’s different, it’s not routine. If you give me something routine, always the same, I couldn’t stand it”*.

Neil has been working as a project and program manager for a large software development firm for a about 12 years, and has been working from home for 9 years. He acknowledges that while the choice of working with virtual projects *“seemed like it was the way to go in software development...it was a personal and an industry choice”*, he is particularly pleased to work from home, as he can find time for his young children, his masters education, and a full-time job at the same time.

Douglas ties with virtual project management are not only due to work, but also of personal interest. Apart from his 10 years of experience, he currently runs 6 projects, and he is an author and an instructor of virtual project management,

with a passion for optimizing productivity in working environments. When asked if he enjoyed working from home in virtual projects he said *"I absolutely love it. I would never change, I would find it very difficult to go back to a regular job if I had to"*.

Ursula has 20 years of experience as a project manager and currently performs as a senior program manager for one of the largest banks in the USA. She works full-time from home. She had the opportunity to choose between working from an office or working from home, and she chose the latter because *"there's no point in going to the office, everyone else is somewhere else in the country"*. Ursula has also been a PMI instructor in the past.

Robert has specialized in hi-tech companies and has managed over 100 projects in his 10 years as a project and program manager. He works full-time from home and enjoys doing so, as he skips the commute time. Robert's reason behind his relocation home was slightly different: *"It was a suggestion from my manager because I normally dealt with particularly chaotic projects, I would get very passionate and had to shout on the phone constantly. It wasn't suitable for the rest of the office, so I moved my office to my house"*.

Anne is a young marketing communications manager of a software development firm. She works in dispersed teams balancing working from home and from the office. She is particularly fascinated with virtual projects and the ability of working with talented people regardless of where they are located in the globe. In her opinion this is the way international work is headed: *"It's just very common to work like this. It adds to flexibility to be able to work when productivity peaks"*.

John has an extended career of over 16 years in virtual project management and has also worked as a trainer and consultant for large firms. He combines working from home and the office, but he affirms that location is no longer important. His involvement in virtual projects happened by accident. When asked if he enjoyed working this way he replied: *"Yes. It requires a lot of trust and a lot of focus to get teams engaged and not feeling isolated. I do enjoy that challenge"*.

Margaret has also worked as a consultant for a long time and recently gravitated towards an IT-solutions firm that works for 500 fortune companies. She has a background as a project management instructor and is active within the PMI network. When asked about if she enjoyed working with virtual projects Margaret replied: *"Yes, I've always enjoyed it. You get to work with people in other countries, not having to be tied to a place allows you to do lots of different things"*.

It is not entirely surprising the high level of enthusiasm towards this particular type of working structure. After all, these individuals volunteered to participate in a study that dealt with virtual projects and have a long experience within the field. Some of them are involved in deeper ways than in just the work life. However, this apparent positive bias in regards virtual projects has minimal relevance for this study. The aim is not to assess whether VPM is good or not for organizational purposes, rather than looking at its challenges when it comes to

motivating teams. The views of the group of interviewees is unaffected, as their approach towards motivation is deprived of positive or negative bias.

4.2 Benchmarking of Virtual Project Management Systems

By applying content analysis method to collect data regarding VPMS, the focus is place on quantifying content, or in this case, functionalities in terms of predetermined categories and in a systematic and replicable way.

The unit of analysis, which is the smallest portion of content taken into consideration in the study, are the individual functionalities offered by each software package. These features need to be confined within categories that limit the material analyzed. In order to define the categories, a link to the benchmarking method used of analyzing the data needs to be made. As introduced in chapter 3.2.2 *Benchmarking collaborative VPMS* the extended framework adapted by Katzy & Ma (2002) uses four dimensions that will serve to analyze the data. These dimensions act as the four categories to collect data as well, as both ends need to meet in order to offer a proper analysis of the raw data. These categories are Coordination, Knowledge, Process and Motivation.

The software packages used for the benchmarking were chosen according to three criteria: software used by the respondents, best ranked software in specialized literature, and experienced software. The first criterion simply is taken from the software that the respondents of the interviews named as software they used in their work. The second criterion is taken from specialized online articles that name the best VPMS in the industry. Finally, the third criterion involves the researcher's experience with these packages. From a preliminary list of 48 packages, each piece of software was cross-related to each criteria. The packages that fit in two or more criteria were picked. A list of final ten packages arose. The number of packages was taken from the typical "top ten" approach that specialized literature tend to use while comparing project collaboration software.

Table 3 shows the ten packages selected to be benchmarked in this study and their correspondence to the criteria used to select each tool. Only Basecamp fulfilled all three criteria: appears in most rankings, was mentioned by respondents, and had been previously used by the researcher.

Table 3 - Project collaboration software analyzed

Package	Respondents	Reviews	Experience
Basecamp			
Teambox			
MS Project			
KeyedIn Projects			
Smartsheet			
Activecollab			
Zoho Project			
Podio			
Wrike			
Teamlab			

Two notes need to be made at this point. While all packages are web-based solutions except MS Project, it is this last one the *de facto* standard for a relatively well-sized company. Primavera P6 is another package that fulfilled two criteria (being listed in literature and mentioned by interviewees), but was dropped from the comparison due to its Enterprise Portfolio Management nature, more than strictly project management approach. When compared to the dimensions of analysis, Primavera P6 would not apply in most of the categories, as it is actually a package in another category.

The reason for focusing on web-based (or Software as a Service, as it is called) packages is simply because they are becoming the trend in the industry. They tend to be scalable and flexible, and integrate seamlessly with other enterprise tools, too. Additionally, they are cloud base applications that can be deployed and delivered without installation requirements or lengthy implementation processes. The user only needs a web browser and the software is ready to be used. As a side note, MS Project has been evolved into the SaaS model in its most recent version.

Once the packages were selected, each software was tested and analyzed according to the four dimensions mentioned above: Coordination, Knowledge, Process and Motivation. This content analysis was done in two ways: it first involved creating an account with each software and start a project to test all the functionalities available. The average testing grounds for each package was around 40 minutes, as the goal is not to master each package, but to locate functionalities and categorize them according to each dimension; secondly, an analysis of the feature list of each vendor was made in order to corroborate the benchmarking. All the data was introduced in a matrix comparing each package against the four dimensions. For the sake of clarity, a name was given to each functionality identified, however, it is just the number of functionalities on each dimension that is important in this stage of the study.

5 Empirical data and analysis

The purpose of this chapter is to bring forth the relevant empirical data collected for the study and conduct a thorough analysis of such data. The chapter opens with the information originated from the qualitative research, distributed in summarizing matrices. Its analysis is done according to the 5 themes identified. The final part offers the data gathered of the quantitative research, as well as the analysis done by the benchmarking of projectware.

By using the methods for analysis described in *Chapter 3.2 Analysis methods*, the focus is set to provide the reader with the transcending content that distills from the raw empirical data. The information brought is by no means all the data collected, but a summarized version of the relevant data. A large amount of information was shared during the interviews, and while all of it was interesting, not all of it was relevant to this study.

The analysis derives directly from the coded transcriptions of the interviews and the resulting comparisons between respondents, analyzing the patterns that may emerge, as well as the matrix of systems benchmarked for the purpose of the study.

The structure of the chapter starts by following an iterative look at each of the categories identified, detailing a description of the category, its relevance towards the study and the theory, and the emerging patterns from the experiences gathered in the interviews. Each matrix identified through the thematic analysis is presented and analyzed with a brief summary that aims to engulf all aspects of each theme. It continues by analyzing the functionalities from the VPMS, with an intent to link both sources of data and analyze possible traces that may have emerged from the literature review. The matrix resulting from the benchmarking is introduced, followed by an analysis of its content.

Finally, there is an attempt to link both sets of data in a unified manner, with clear references to the literature.

5.1 Themes from the trenches

The data provided by the interviewees is dense and rewarding. Their enthusiasm is almost tangible in each of the interviews. The framework for the interviews (Appendix 1) allowed the interviewees to create their own narratives while trying to keep the conversation within the scope of the study. It is clear that the respondents understood this and offered a set of responses well balanced between concise answers and recollections of experiences that created a clear picture of their opinions, but also of the motivations behind those opinions. Their years of experience in the field of virtual project management has proved a source of valuable data and sound insight.

5.1.1 Theme 1: Virtual environments

Table 4 - Theme 1: Virtual environments

	Advantages	Disadvantages	Time Zones	Face to face
Terry	The challenge of meeting new cultures and establishing new relationships. Travel.	Language barriers. Making everybody understand what needs to be done.	It's not a problem. It's a challenge that can easily be bridged.	Depends on projects. Physical meetings once every 3 months.
Neil	Flexibility in working schedule. Reduced carbon footprint.	Not being able to physically interact with people. Difficulty of scheduling all the team members.	Not a problem. Accommodates to the rest of the team.	Normally there's no face to face interaction nor meetings.
Douglas	Access to talent, flexibility of working hours, higher productivity.	Scheduling everybody is difficult. Too much reliance on tech. People are less accountable for.	It's not a problem, there's software that calculates the best hours for everybody.	Depends on the project. If possible, every 6 weeks.
Ursula	Focus on the task leads to higher efficiency. There are less "office politics".	Not as much enthusiasm in team building. Lacks the social effect of working. Not feeling like a team.	Meetings around 1pm ET tend to work for everybody. Not an issue.	No face to face meetings at all.
Robert	Reduced costs of travelling. Flexibility of schedules. Wider variety of projects.	Difficulty to control the team. No investment in the team as a group. Stigma of working virtual.	He adapts to other people's time zone. Easy to get used to.	They try to have physical meetings at least once every 2 months.
Anne	More flexibility. Higher productivity as you can work with the best talent in continuous shifts.	It's hard to keep up with the progress of team members. Communication, documentation and access to data.	It's not a problem, it's a challenge.	It's important to do it as much as you can. They try at least a few times a year.
John	Continuous shifts, success and failure happens much faster. Relaxed nature of work place.	It can be difficult to assess people. Cultural barriers. Lack of brainstorming sessions.	It presents a unique challenge but it can be an advantage as you can work 24/7.	It depends on the project, but tries at least once every two months.
Margaret	Flexible schedule. Working with people all over the world. Focus on what's said instead of how it is said.	Cultural and language barriers. People can develop an attitude much faster. Not having control over people.	It's not a problem. She easily adapts to different time zones.	Almost no physical meetings. Once a month depending on the project.

The first theme identified is the one regarding virtual environments and how the interviewee experiences their particular characteristics. The four categories identified in this theme are the advantages and disadvantages of working with dispersed teams, the issue of having different time zones, and face to face interaction. Table 4 shows the matrix of a condensed general response towards this theme.

This theme shows interesting patterns that all respondents seem to have interiorized. Challenges, cultures, talent, focus are some of the words that are mostly used. However, flexibility is the most recurrent topic. Detaching your activities from a place, a schedule, and a group of people offers a flexibility that is expressed in many ways. From working from several locations, to working only the hours that the project or the team demand. The time variable is a particularly interesting one, as several interviewees show the advantage of higher productivity due to the possibility of having continuous shifts across the globe in different time-zones.

Time-zones, one of the other categories in this theme offers a curious finding. Unanimously, all respondents regard time-zones as a challenge, but do not consider it to be a problem. Some even consider it to be a possible advantage to enhance productivity. The key again relies on flexibility. The flexibility of their schedules allows for an easier adaption to other members' time zones, as well as some electronic tools that quickly identify the best options for the time zones involved. This particular category, with an overwhelming positive view towards time zones, does not reflect the polarizing debate in the literature. From one side there is a tendency to consider time zones as a problem due to the effects of temporal dissociation impacting on performance, and resulting in team member conflicts and disruptions of interaction flows (Rutkowski, et al., 2007; Lee-Kelley & Sankey, 2008, Qureshi, et al. 2006). Others, like Harasim (1990) and Berry (2011) consider location and time zones as traditional barriers that now can be bridged by new working environments like virtual projects. As Solomon says (as cited by Berry, 2011), virtual teams can follow the sun and utilize 24-hour work schedules with electronic communication, precisely taking advantage of being located in different parts of the globe and working on various tasks at different times. In a middle ground, there is Carmel & Agarwal's (2001) approach which abides for a balance between asynchronous and synchronous communication, to alleviate the problems of dispersed work, while reaping the benefits of continuous shifts.

The other two variables, the Disadvantages and Face to Face interaction show patterns as well, and in a way, are also quite related. The respondents identify communication, cultural barriers, language, interaction, control, and scheduling as disadvantages. These disadvantages coincide widely with the literature, and are potentiated by the lack of face to face interaction, as the pattern in the theme shows (Powell, et al., 2004; Montoya-Weiss et al., 2001; Wei et al., 2008). While some of the respondents try, physical meetings are a luxury that does not happen often (if ever) and has a dependency on the type of project. This is a major

characteristic of virtual projects (Townsend, et al. 1998; Kirkman, et al. 2002; Hongmin, 2009).

This “social” drawback of virtual teams is possibly best exemplified by a comment made by Ursula during the interview:

“[...] in the virtual environment, even if the web tools are great, it doesn’t replace that energy that you get in the room, moving Post-its across a board and categorizing, seeing the progress...basically, that functional activity doesn’t happen. It could put a virtual project in disadvantage.”
(Ursula)

Ursula continued explaining that, in her industry, the purpose of management when it comes to the team, evolves from team building to task orientation, and that for that reason, the lack of face to face interaction was not a particular problem. It was just the feeling that had changed.

A final, yet interesting observation is that 6 of the respondents, at different points of the conversation (not related to one particular question) acknowledged the importance of physical meetings, especially in the early stages of a project to the extent that Margaret made the following comment about multi-culture large projects:

“When I work with companies that are considered offshore vendors in large projects with more than 20 people., what I’ve noticed is that if you don’t have any kind of in-person contact with them to kick the project off, it takes ten times longer to get your point across because they don’t understand, because English is not their native language. Something always gets mixed up or lost, and in a complex project you really can’t afford that. So if you don’t have an initial contact and some type of recurrent in-person contact, I really feel that the project is doomed to fail from the beginning, because you didn’t set it up to succeed by having the people in person.” (Margaret)

This is a particularly strong argument. A “doomed to fail” project from an initial lack of physical meetings. However, the responses show that projects, even with the lack of face to face interaction, are completed on a regular basis.

5.1.2 Theme 2: Dynamics of Virtual Teams

The second theme derived from the data collected in the interviews is the Dynamics of Virtual Teams. Table 5 shows a matrix with a condensed summary of this data.

Table 5 - Theme 2: Dynamics of Virtual Teams

	Forming	Storming	Norming	Performing
Terry	Teams formed by vendors and clients. Extensive number of people oversees. Not participant of forming the teams.	Team harmony and positive peer pressure are infectious. One-on-one phonecalls tend to work better, though.	90% of communication happens via phone and conference calls. Teams are encouraged to communicate.	Knocking down barriers. Encourage communication. Enforcing autonomy for achieving their own goals.
Neil	Teams are mixed with client and team members. Limited access to picking team members.	Teams are approached on one-by-one basis with weekly virtual team conferences.	Communication is done with email, IM, phone. The frequency varies each stage.	Aim for a very open environment so that everyone can communicate any direction they want.
Douglas	Project team members vary from project to project. Usually from client side, too. Sometimes he can choose the team.	Team dynamics are difficult to get going. Having a sense of belonging. Balance between team harmony and one-on-one calls.	Daily Webex meetings with tasks assigned in meetings and followed by emails. Other members know roughly the progress of others.	Using the pyramid of communication. Between face-to-face and email, try to aim to the closest to face-to-face (pyramid top)
Ursula	Teams formed with company members for American clients. However members are dispersed. She doesn't chose team members.	The stress lays in the planning phase, instead of brainstorming. Task oriented approach. Usually there's no issues with members.	Communication is constant with email, instant messaging and webex. The least intrusive as possible.	The worry is not on creating a nice team feeling, we take the emotion out of it, and we focus on the methods and tasks.
Robert	Mostly US-based projects with clients, resellers, and own team members. Has some influence in creating teams.	Problems are dealt on one-by-one basis or escalated.	Tasks are delivered one-on-one via webex, sharepoint and a custom-made application.	There is no look for team building, however they are asked to collaborate with each other.
Anne	Teams are created with the company's members.	We haven't had conflicts so far. All communication is tracked through software.	Collaborative software allows for easy access to documentation and data. No need to send emails around.	We aim for a tight team, we share photos, news, we try to do conferences as often as we can.
John	Teams are assembled by other people and hold different stakeholders.	You need to overcome leadership and communication. Failing that will lead to problems.	Daily and weekly communications. Email, active team pages, sharepoints.	Use a team site where people can share things or show their profiles to create team harmony.
Margaret	Try to get in the process of picking team members if possible. Teams have client and vendor members.	Problems are dealt on one-by-one basis or escalated to their managers.	Multiple communication a day. With email, instant messenger and Skype if possible.	Figure out who's the person that everybody listens to and try to work with that person. Have people agree.

The categories chosen for this theme are taken directly from Tuckman's (1965) stages of group development model, however these stages must not be taken literally. According to Johnson et al. (2002) Tuckman's approach describe better than other frameworks how virtual team dynamics evolve, but he acknowledges diversions in the model. The particularities of the virtual teams make these stages much more ephemeral, as physical interaction is practically non-existent, and communication happens in a combination of synchronous and asynchronous ways. This makes the storming almost non-existent, as tasks take the light spot. Thus, the forming, storming, norming, and performing categories have to be taken in consideration with the background idea of each stage rather than in the traditional sense of the model. As it has been pointed out, Hertel et al. (2005) introduced a similar approach called the Five Phase Model that relate to virtual teams in a more concrete way, however, for this particular section of the study, a subjective parallel to the classic Tuckman's approach is more appealing.

The patterns that emerge from the first category are the way the teams are created. The teams are assembled normally by a multi-organization approach with different (and sometimes conflicting) roles and goals, and normally are delivered to the project managers already assembled. This relates particularly to the magnitude of the companies involved in these projects. Literature shows that projects from smaller companies usually have different creation stages.

The second category, since is symbolically linked to the storming stage (which Johnson et al. 2002 consider inexistent in VP) deals with the dynamics that teams follow when interpersonal problems arise. The narratives of the respondents are surprising when they try to think about this process. Five respondents mentioned that either they did not experience problems, or that the problems between team members where very scarce due to the limited interactions and the higher task oriented nature of VPM. However, those who had such experiences, detailed a pattern of one-on-one approaches with those who may have generated the conflict, warning them with the possibility of escalating to their functional managers about the situation.

The third category, the norming stage defined by Tuchman, responds to the dynamics on which virtual teams communicate or how tasks are assigned and delivered to the teams. There are different degrees of communication, with frequencies that vary according to the type of project and the phase of the project. Phone, email and other pieces of software, like instant messengers, Webex or Sharepoint are the media used to deliver tasks to the team members.

At this point there was a phrase by John, who provides a good summary of the pattern offered in this category.

"I assign the tasks through a master plan according to the major deliverables. I do it one-on-one or by using Sharepoint or a collaborative software. At the end of the day, you really need some good team leadership who can help individuals understand their part in the bigger picture." (John)

This relates to the fourth category of this theme, Performing, which relates more to the way the team performs as a team, instead of the actual tasks and process produced and delivered by the team. In this particular way, there was a duality in the interview related to approaches for team harmony or one-to-one approaches.

With the exception of Ursula, all other team members acknowledged that there is an aim for team harmony, but that eventually it is not always possible and that they need to rely on one-on-one approaches to reach the team members. Margaret puts this into works brilliantly:

"In a perfect world, I want team harmony, realistically, at least civil."
(Margaret)

The stark and clear discrepancy coming from Ursula's response is clearly tied to the industry she works with. An extreme task-oriented approach takes the needs for team harmony out of the question as far as tasks are delivered timely. Ursula's statement may seem harsh, but is consistent with literature, which clarifies that task-oriented projects need less creativity and thus, much lower social interaction (Amabile, 1997).

"The worry is not on creating a nice team feeling, we take the emotion out of it, and we focus on the methods and tasks to do." (Ursula)

This might sound too crude, but is more than understandable due to the industry of Banking. The approach aims to produce the type of project that needs to be carried out methodically, and dehumanizing the tasks sets the basis for an easier approach.

5.1.3 Theme 3: Information systems and virtual projects

The next theme deals with the Information Systems tied to VPM, that is the software packages used to run and manage virtual projects. The framework for this theme is shown in Table 6.

This theme derives from the necessity of using information systems to counter some of the effects of virtual environments. The technology is obviously there, but the way it is used by the respondents took unexpected turns.

Table 6 - Theme 3: Information systems and virtual projects

	Importance/Reliance	Packages	Integrated	Missing features
Terry	We rely on software for communication. That is vital. Strictly PM methods help but are not essential.	MS Project, Primavera, Instant Messengers, Google Apps (very helpful for collaborative files).	No.	A balance between too bloated and too simple. Is difficult to have similar levels of expertise in the team.
Neil	It's important, but not much more than in traditional project management.	MS Project, Excel, Instant messengers, Custom-made file repository.	No.	Nothing in particular.
Douglas	It's particularly important for communication and getting the deliverables.	Webex. Custom-made document repository. Basecamp.	No.	Maybe removing features. Declutter software.
Ursula	It's important to communicate and keep the progress at hand.	Webex, Sharepoint, Instant messengers, Custom-made application.	No.	There's so much missing. Seeing the dynamic interactions between tasks. Interdependencies.
Robert	Has its place, but it's not necessary if you have a good methodical background.	Webex, Zoho Project. Custom made software in the cloud.	No.	The ability to track dependencies between tasks.
Anne	Pretty much we run the whole project through our software.	Wrike	Yes.	Integration with different tools, like file sharing, etc.
John	Software is at best secondary. Nothing really hit all the sweet spots.	MS Project, Sharepoint.	No.	Work flow for passing tasks, moving tasks, reject tasks, and documentation.
Margaret	It's very important, however it changes for every organization, as security is a big issue that renders software powerless to firewalls.	MS Project, Sharepoint, Basecamp, HP PPM, Primavera P6, Team Foundation. Skype.	No.	A cross between Primavera and Team Foundation Server.

The first category relates to the importance of software packages' role while managing virtual teams. The general response is that software played only a supportive role in the process. There is a clear recognition by the interviewees of the unavoidable dependency of the information systems that directly relate to communication, such as email, instant messaging, or conference software such as Webex. However, the coordination and collaborative features of the systems are only considered as very important by Margaret and Anne.

Parallels can be drawn with the clear pattern shown by the type of systems they use. Only Anne, with the Wrike package, uses an integrated system to run projects. This could explain why in her organization, the use of the software is considered vital, as it offers an all-in-one approach to the features needed to run a project in a virtual environment. Another good insight comes from a comment made by Margaret:

“One of the problems with software is that for big companies, the issue of security is very important and it is enforced. So team members from other organizations can’t use the software because it is behind firewalls, which makes it difficult for everyone to see the whole picture. It usually happens that very useful tools are not cleared for lack of security. I have to use Skype on my own, because normally companies don’t allow Skype.”
(Margaret)

When it comes to actual software packages, a distinction needs to be made between group decision support systems (GDSS), computer supported cooperation work (CSCW), and virtual project management systems (VPMS). The distinction is done to raise awareness of the needs (or tendencies) of software usage in virtual environments. As seen by the responses, there is a proclivity to use Webex, which according to Burdwell's (2006) framework is a well renowned GDSS, and to use Sharepoint which would fall in the category of CSCW. Webex introduces the communication tools for virtual meetings and Sharepoint implements information repositories and some social aspects. However, these systems do not offer actual project management features, even though they offer a supportive value to managing virtual projects.

As pointed before, the actual *de facto* project management software is MS Project, which is a standalone installation software intended for traditional project management. It is clear that users of virtual projects simply adapt and use the package according to their own needs.

An integrated system, would include several categories of groupware, communication tools, coordination support, information repositories, sociality, (Bäckbom, 2008) plus the features to run and manage projects, like tasks, milestones, progress, risks, etc. These systems are also known as *projectware*, however, the term is generally used in the industry including a mixture of CSCW and VPMS.

But knowing that only Anne is working with one truly integrative project software, it is understandable that most of the respondents either do not want or miss newer features in the software, or would like to see some efforts to simplify and de-clutter the applications. Anne, on the other way, would like to see even more integration with others services in the already integrated software she uses. This is a clear indication that she feels comfortable with the integrated nature of Wrike.

As a side note, there was a question that was not added as a category, because it was a probe for respondents who used software to build up team harmony. This

question is if the software has any “purely motivational features”. Anne responded this:

“The software doesn’t have any approach to motivation, however, it intends to make things smooth, quick, and easy...with that, work becomes stress free. I think that helps keep people motivated, as they can see the big picture.” (Anne)

This is a particularly important factor that relates to software and motivation from an indirect angle. It is not purely motivational, but it certainly adds to a motivated team.

5.1.4 Theme 4: Motivation in virtual projects

The next theme emerging from the interviews is Motivation. Since this theme holds more categories, is presented in two tables, table 7 and 8.

This theme is one the key themes of this study. It expands for at least a third of the interviews, and therefore offers more information to analyze. It is also the one that offers more varied type of data. The intention is to match patterns and showcase them as organically as possible.

The first category relates to the interviewees' sense of importance of motivation in virtual environments. The importance of motivation was provided in two ways. The first one in a scale from 0 (not important at all) to 10 (critically important). The second one in relation to traditional projects. The responses show a very definite pattern. The value of importance averages 8,25, which signifies a high importance of motivation in virtual teams. However, almost all respondents clarified that the importance of motivation is equal in any type of project, virtual or not. Incidentally, they all agree that fostering motivation in virtual projects is particularly more challenging and difficult than in traditional projects.

“If you don’t have a positively motivated team you’re not going to meet your goals, people will just not care, and it’s like a cancer. Negativity in a team can bring the others down.” (Terry)

The next category is the logical next step to the previous one. If motivation is important, how do managers see if the team is motivated or not. The trend here is slightly more diffuse. The narratives of the interviews lean towards a task completion approach. If the individuals are doing their work, on time, and as requested, that is a sign of a motivated individual. This is clearly identified by Katzy & Ma (2002) and would fit in the idea of *progress* identified in the literature review. If the project continues its course and moves forward, if it progresses, motivation should be high. It is worth noting that the line of thought behind this assertion carries no traits of causality, but it is mostly an estimation, or an assumption. In this case, it is not because of progress that team members are motivated, it is because managers see progress that they assume the team members are motivated. It is a subtle but important difference.

Table 7 - Theme 4: Motivation in virtual projects (1/2)

	Importance	Visibility	Motivators	Demotivators
Terry	8/9 out of 10 It's similarly important than in traditional projects.	With similar cultures it's easy to see if they're motivated. Overseas is more difficult.	Important to set goals together and build relationships in the beginning.	Layoffs. It's difficult to maintain high motivation if people fear for their jobs.
Neil	7 out of 10 It's equally important but much more difficult.	Being virtual is a challenge. Having experience in the field is a big leverage point.	Knocking down barriers for the team. Focus on communication and the good things.	Big changes in the direction of projects. Normally comes from the client.
Douglas	7 out of 10 It's just as important but more challenging.	The best way to see if they're motivated is by looking at the completion of objectives.	Meaningful work. Listening to the team and the individuals. Show appreciation.	Bossing people around. Barking orders demotivates people.
Ursula	8 out of 10 It's less important but is much more challenging.	It shows because people don't do what they have to.	Choosing the right personality for virtual projects. Task driven people will be motivated.	Can't think of anything, right now.
Robert	9 out of 10 Just as important but much more difficult.	You're not there so you need to take other cues, like tone of voice, enthusiasm or responsiveness.	I use leverage appealing to their professionalism. Sometimes you can't motivate people.	Bad interactions between people or negativity from clients.
Anne	10 out of 10 It's probably more important in virtual teams so that the team is tighter.	I think you can measure motivation through results.	That everything works as it's supposed to, without having problems.	If managers see virtuality as a weakness, it can demotivate people.
John	8 out of 10 Motivation is universal, but it's more challenging in VP.	Usually the work output speaks for itself.	Sharing personal information, engaging people outside of the work, sharing information.	The time distance, language and cultural barriers. Lack of understanding.
Margaret	8 out of 10 It's important, but you can't have everyone motivated all the time.	It's not difficult to notice. You can see the attitudes and communication in team meetings or one-by-ones.	Adding a little fun, like little trick questions, little random prizes to keep engagement. Sometimes praise works just fine.	Bullying individuals. They bring destructive and negative attitude towards the project. The threats of layoffs.

However, while it is debatable if such claims are true, there is an obvious common denominator here: it is difficult to find out if people are motivated due to the lack of face to face interaction, therefore, different cues need to be analyzed to perceive motivation.

"It is difficult, because you are not there, you don't see their body language, so you have to rely on their tone of voice, or on their perceived enthusiasm. At the end of the day, it is how responsive they are to the project what tells you if someone is onboard." (Robert)

The third and fourth categories try to capture the interviewees experiences in regards of motivators and demotivators within a virtual project. It is worth pointing out that these factors are not necessarily different from those of traditional projects, as, for example, the threat of layoffs is a well known demotivators in any kind of working environment.

Admirably, the trend motivators that the respondents identify as strategies or factors that help motivate relate to intrinsic motivators or to foster what Amabile and Kramer (2011) call the *inner work life*. Making sure everything works as it is supposed to, preventing barriers, sharing personal life information, praise, fun, meaningful work, show appreciation. All these factors are aimed to boost intrinsic motivators. Admittedly, the narratives derived from the interviews acknowledge certain limitations to these approaches. Their functionality is not universal and sometimes, when these do not work, they need to resort to extrinsic motivators (usually the threat of escalating to their functional managers) in order to readdress the situation.

"This one gentlemen kept giving excuses for not providing the deliverable, which wasn't urgent, but the excuses kept repeating and were irritating everyone. During the meeting I slam the fist on the table and I said "goddamn it, if you're not going to do your fucking job, we'll find someone who'll do it". Everyone went silent, he said Ok, and the meeting continued. I was shaking. A little while after I apologized to everybody, he apologized as well, and the next day he sent in the delayed deliverable." (Terry)

This particular example by Terry, is remembered with anguish and a certain sense of guilt, but at the moment it was the only course of action available to Terry, as aiming for intrinsic motivators had failed to work.

Similarly, Margaret shares one of her recent experiences:

"Senior people are definitely more difficult to motivate. They have a much clearer idea of what they want, and have a big difficulty of adapting and being flexible. They don't respond that well while trying to motivate them." (Margaret)

This clear example also relates to the problematic nature of intrinsic motivation. When individuals, represented here by senior team members, have a clear picture of what they want and that picture dissents with the general outline of the project, it is particularly difficult to boost intrinsic motivation, because it comes from within. As Margaret points out, keeping the same intrinsic tactics too long can be seen as trying to change their views and produce a negative reaction.

But negative reactions can happen from other different sources. That is the nature of the fourth category, Demotivators. While the word does not really exist, it clearly links to factors that reduce motivation or have a negative impact on motivation. The trend in this category is always external, or what could be called "*extrinsic demotivators*", which are accounted for in two different groups, organizational environment (in the shape of layoffs or big changes in the project

planning) or happen by disruptive or negative interactions with other team members. The second ones tend to lead to enforced changes in order to readdress a problematic situation.

The next table (8) presents the fifth category from the theme of motivation.

Table 8 - Theme 4: Motivation in virtual projects (2/2)

	What motivates you?
Terry	Diversity of projects and dealing with different people around the globe.
Neil	New challenges. See the group complete a project successfully motivates me.
Douglas	Learning new technology. Pushing myself to more difficult levels.
Ursula	I'm motivated by the extremely large paycheck I get at the end of the month.
Robert	Having a clear path to follow. Then I know what I need to do and don't stop until it is done.
Anne	The sense of responsibility when I know that my part of the work makes a big contribution to the overall project. I get motivated when there's a good feeling in the mood.
John	I like to see people engaged. I get pride when I get people to work together to work on something bigger.
Margaret	Becoming better, getting things done, improving. Self-accomplishment.

This category is probably the most important of all, as provides a self-reflection quality that puts in perspective the other answers.

It is particularly interesting that all but one responses refer to purely intrinsic motivators. Diversity of projects, new challenges, learning, pushing oneself, attaining the goal, the sense of responsibility, pride in accomplishing something bigger, becoming better, self-accomplishment. Again, a direct and clear connection with the notion of personal *progress* identified in the theoretical background can be seen. All these factors are related to the internal gears that drive each individual and have little or no connection to external factors.

Obviously, this does not mean that without extrinsic motivators, like a salary, or recognition, these individuals would continue working with the same motivation levels. What it means is that when given the opportunity of reflecting on what drives them, they think of factors that come from within.

Even more interesting is that, the only person that acknowledges an extrinsic motivator as the primary source of motivation is Ursula, the only one that works in the banking industry and considers her work to be extremely task-oriented.

This resonates directly with Amabile & Kramer (2011), Pink (2009), and Deci & Ryan (1985) theories about motivation in the work place.

5.1.5 Theme 5: Gamification and motivation through projectware

Within the narratives of the interviews, other topics were touched upon, like performance, leadership, and gamification. The notion of leadership is vital to succeed in virtual projects, however, the leadership style has not been properly identified in the literature. Interestingly, most leadership studies focus on physical interaction, providing an extensive number of leadership models and style, but none addresses the particular needs of virtual environments (Arnold, 2008). On this note, all respondents agreed that a leader in virtual projects needs to be highly adaptive in his or her style, and that failing to do so, would surely lead to serious problems in the evolution of the team.

From these other topics discussed in the narratives provided by the respondents, only gamification and motivation through projectware, due to its direct and innovative approach to motivation, was considered an extra theme to this study. Due to its preliminary and tentative nature, the questions regards this new phenomenon were only two. The first one was if the interviewees knew what gamification was.

On their entirety, the group either had never heard of the term, or where remotely aware of it, but never saw it in action. Obviously, this last remark means that even if they experienced it, they were not aware of the concept at the time. After explaining the concept and giving some examples, the second question was raised *“could it be useful to boost motivation in a virtual project setting?”*. The response was widely positive, but with a high curiosity of how such a concept could be applied in a virtual environment.

Douglas and Neil seemed interested in the idea, but voiced their concerns:

“It could be very interesting to see how to add interaction at that level. Adding more tools can be stressful and counterproductive in a very stressful environment.” (Neil)

“It is vital that members motivate other members. However, the implementation could be extremely difficult due to the difference of the projects out there. The metrics could be almost not applicable.” (Douglas)

However, others foresaw very positive outcomes for such strategies:

"I think it could be very helpful. Just like scrum, seeing that daily progress would be very helpful and motivation. It would work if it wasn't too bureaucratic, if you found the fun key. Positive peer pressure is infectious." (Terry)

"It sounds kind of fun. Oh my god, I would love to be able to use something like that for work." (Margaret)

"I think it's possible, I don't know how it would work. Motivation needs to be a collaborative thing. Peer pressure doesn't have to be a negative thing in every case. It's merely an instrument. Getting the peers to help out motivating the team is particularly important. However, it has a generational bias. Older people might not care about something like that. There are probably some aspects that could work nicely, especially if you can have automatic triggers for others to use." (John)

"It could definitely have a positive effect. Since we don't aim for the relationship, taking that next step could work very well." (Ursula)

"If you can make the interface of any software more fun and less tedious, it would be very helpful." (Robert)

"Yes, I think it could easily work. It could add creative aspects to collaboration. It should work. Social technologies, they're making their way in the business software space. There's more emphasis on the team work and of the social component of the collaboration, so you don't think just about how to get things done, but you also think of some ways of how to collaborate with your team in a more natural way and in a stress-free way. I think that praising achievement could be a small but very useful and pleasant feature." (Anne)

The response to this exploratory theme was generally highly positive with different degrees of enthusiasm. In all fairness, the questions about gamification were introduced as a personal interest of the researcher, and it is possible that a certain bias was inadvertently enforced to the respondents into saying what they thought was the right or encouraging answer. Nevertheless, the positive attitude and response towards an exploratory inquiry about gamification is very encouraging.

5.2 Projectware feature benchmarking

For the purpose of this study, the data collected from the benchmarking of software developed to manage virtual projects is only related to the features within the categories of coordination, knowledge, process and motivation. Table 9 represents a quick overview of this data.

Table 9 - Projectware feature benchmarking

	Coordination	Knowledge	Process	Motivation
Basecamp	Daily progress, shared calendars, real time collaboration. Stakeholders coordination.	File sharing and repository. Web-based text documents.	To-do lists, milestones, time tracking. Integrates with 3rd party apps for Gantt charts and other features.	No social, motivational, nor gamified features. Connects with other apps for social context.
Teambox	Email notifications, progress monitoring, communications are tracked in various levels. Scheduling and collaboration.	Files management, documentation repository, connects with 3rd party storage services.	Tasks management, Gantt charts, time tracking.	No social, motivational, nor gamified features.
MS Project	Resource planning, progress tracking, team planner. Offers limited features for collaboration.	Allows for project documentation, but is usually done via MS Sharepoint to deliver to the team.	Pert, WBS, critical path, costs calculations, Gantt charts, schedules, etc.	No social, motivational, nor gamified features.
KeyedIn Project	Progress tracking, real time collaboration. Status reports, automate scheduling, roles.	Project governance, deliverables, project standards, program and portfolio management.	Planning, budgeting, risk management, tasks progress, resources, constraints, dependencies.	No social, motivational, nor gamified features.
SmartSheet	Centralized discussions, crowdsourcing, alerts & reminders, calendars.	File sharing. Connects with external storage services.	Tasks status, budgets, Gantt charts, checklists, timelines, dependencies.	No social, motivational, nor gamified features.
Activecollab	Different roles and permissions, project negotiations, collaborative features.	Files history, 3rd party repositories, email integration.	Tasks manager (breaking down tasks), milestones, progress monitor.	Limited social features. No motivation nor gamified features.
Zoho Project	Team status, schedules, tasks progress, tracks communication, collaboration features.	File management and sharing, version tracking.	Different project templates. Tracks deadlines and dependencies. Gantt charts, time sheets.	Intranet for team pages, chats, forums. No motivation or gamification features.
Podio	Unified schedules, leads, progress, time tracking, different apps with lots of features.	File repository. Apps for procedure tracking. Notes, client leads, candidates.	Milestones, Gantt, WBS. Plenty of collaborative apps.	Lots of social apps. Has one app called the Happy Pack with motivational features.
Wrike	Automated daily planning. Team scheduling. Integrated with email.	File-Sharing. MS Project imports, file sharing and document repository.	Flexible hierarchy. Tasks, Gantt charts, collaborative features granting autonomy.	Has social features. No direct motivational or gamified features.
Teamlab	Shareable calendar, online presentations, CRM, online document editing.	Document management file sharing and integration with online storage services.	Tasks hierarchy and priorities. Milestones, objectives, team progress.	Social features, like blogs, forums, and discussion. No direct motivational or gamified features.

Each package is obviously different, and lays focus on each feature differently. This decision seems to be done primarily according to the type of client each company targets. If the focus is on teams and collaboration, the coordination and knowledge features will be highlighted. If the focus is placed on the management type, the collaboration aspect will appear with less relevance, in favor of process.

What is clear is that, even if social features are starting to appear in these types of software, they are majorly left out of the packages. In particular, purely motivational features are not present in any but one of the packages, Podio.

Additionally, the reason for Podio's "Happy Pack" app, lays behind the package's differential development model. Podio relies on apps, or packs, that are added to the main basic features. Each pack adds new features to the experience of the software. Some of the packs are developed by Podio, but most of the packages are developed by third party companies. When searching "Motivation" in Podio's App Market, only one pack was found, the Happy Pack. The description of the Happy Pack reads as follows:

"Promote happiness, motivation and energy at work.

It's no secret that happy teams are more productive, creative and motivated. This pack contains 6 simple, fun Podio apps created by some of the world's leading experts on happiness at work. The apps are: High-five: Praise people who do good work. Mystery co-worker: Get to know your teammates better. We rock: Celebrate your victories. Happy-o-meter: A simple way to gauge if people are happy or unhappy at work. Hero of the month: Nominate and vote for your hero of the month. Reasons to be happy: Share why you are happy at work today. Add these apps to any project to create more happiness at work - and hence more profits :o)."

Kjerulf, 2012

This is a great and refreshing example of purely motivational and gamified features applied to project management. Needless to say, it is only a third-party add-on in a benchmarking of ten software packages. That is an extremely limited number, almost anecdotal, when compared to the other categories analyzed. Even if in an often uneven degree, coordination, knowledge and process are well represented in VPMS, and the only differences are seen in the level of concretion or stress of each set of features in each package. Nonetheless, the category added to the framework for the purpose of this study fails to appear in the features offered by these packages, which is surprising when seeing the increasing adoption of gamification techniques in other fields, and the recognition of the importance of motivation in the work place.

6 Discussion and conclusions

This chapter starts by offering a set of brief observations of the data that has been collected and analyzed through the course of this study. Such discussion stems from empirical data, but it is influenced by the theoretical framework presented in Chapter 2: Theory and literature review, and the personal views and experiences of the researcher. It continues by trying to reply to the research questions that motivated the study. These answers are supposed to derive naturally from the overall discussion offered in this chapter. The chapter concludes with a personal view regards the theoretical and practical contributions of the study, as well as introducing ideas that could spark interest in future research.

6.1 Observations on the analysis

There are several observations to be made on the analysis of the empirical data that this study produced. For the sake of clarity, such observations are made following the order in which the analysis is made, starting by the first theme of the interviews until the final benchmarking of the software packages.

The main observation about the first theme, *Virtual environments*, is the fact that almost all advantages noted by the respondents have a background of own personal enrichment. Flexibility, challenges, meeting other cultures, efficiency, working with talent. However, the disadvantages are linked directly to the social aspect of virtual projects. Team building, communication, misunderstanding, language barriers, enthusiasm, all seem to fit in a pattern of social interaction. This characteristic could respond at one of the main traits of virtual projects, which is the lack of social face-to-face interaction. As a side note, it is particularly surprising that no-one named “lack of face-to-face interaction” as a disadvantage, yet most of the disadvantages identified derive precisely from this particular trait. When asked directly about face-to-face interaction, most of the interviewees pointed out on the importance of that factor, however, it didn't appear spontaneously in their own narratives.

The second theme, *Dynamics of virtual teams*, presents one of the main challenges of virtual teams and some of the problems that may derive from it. The lack of physical meetings and face-to-face interactions introduce a difficult dilemma. If social interactions are what holds a team together, how should they be approached when those social interactions are reduced to software mediated interactions. The group of interviewees, show some of this duality. On one side, wanting to foster team harmony because that is how it is supposed to be, but on the other side, relying on one-on-one communications because that is the approach that has proven to be more effective. Other solutions need to be applied to bridge the lack of face-to-face interaction, but the importance of the social nature of team dynamics still permeates the way teams are looked at. Taking a distant reference to Tuckman's model for team dynamics within the virtual

paradigm, all the stages, forming, storming, norming, and performing, merely brush the social aspects. As the data points out, teams are assembled and placed together with almost no physical contact. The same happens during the next stages, so managers need to rely on other aspects, like previous experiences, phone conversations, etc. Particularly revealing is the case of Ursula, who, in an industry that has a completely task-oriented approach, levels the playfield and acknowledges that the general intent is to pay little attention to the social component of the teams.

The third theme, *Information systems and virtual projects* is a complex one. If statistics are to be believed, the dramatic rise in the industry of VPMS points to an undeniable increase of the use of software to manage and collaborate in virtual projects. The links of causality seem undeniable, if collaboration, communication, and coordination are challenges that particularly affect virtual environments, and virtual environments are increasingly being implemented, then the tools that help overcome those challenges should be used more. The volume of money invested in the industry also points in that direction. However, the group of respondents tend to think and behave differently. An interpretation of the reasons can be found in some of the particularities of the interviewees. All of them, except for Anne, are highly experienced project or program managers that work for large corporations. In these settings, the scale tends to be quite massive, with a high number of stakeholders and organizations involved. Their approach seems to focus on managing virtual projects “locally”, and managing virtual teams “globally”. This means that planning and progress are run by themselves, by their own means (normally with MS Project or a simple spreadsheet), while control and coordination happen with personal one-on-one approaches to each member. Is a traditional project component translated to virtual environments.

Anne, on the other end, has a more limited experience, but the one she has is already in virtual environment. She does not make those translations from traditional to virtual. Besides, she works for a young and dynamic company with a much smaller scale. The dynamics happen at different levels. The internal organizational processes and team dynamics are more intertwined, and thus the suitability and importance of an integrated software is much more present. The new, web-based tools are particularly effective for small teams and small to middle-sized projects. As it has transcended by the interviews, if big corporations need features that work similarly to most of the current VPMS out there, they create a custom-made applications. However, as it has been pointed out, these custom-made applications normally work only within the environments of the company, which would render them useless in multi-organizational environments.

Motivation in virtual projects is the fourth theme emerging from the interviews and is probably the most revealing of all. The parallels between what the literary review provided regarding intrinsic and extrinsic motivators and the main personal motivators of each respondent are so strong that it is almost breathtaking. Nevertheless, is worth pointing out on the enhanced challenging

nature of motivating within virtual projects. This is a natural, somewhat obvious, challenge. When a new environment for communication that detaches personal interaction is introduced in a well established system (like project management), a new paradigm needs to be found to redefine the personal interdependencies of working processes. Motivation (or rather, motivating) is one of those working processes that managers need to reassess and restructure. Solutions evolve slowly, so it is still an on-going process, but it is apparent that the respondents know where the knobs and levers of motivation are placed. Their aim for achieving motivation through fostering a positive inner work life is well documented through the interviews. It is remarkable to sense a hint of regret and defeat in the tone of those who admit that sometimes they need to restore to extrinsic motivators in order to achieve their purpose. As it happens in the literature, the idea of progress is predominantly present as an underlying characteristic that mirrors the motivating factors identified by the respondents. Without the usual social links, virtual team members are even more dependent on that feeling of progress to boost their motivation.

The final, theme is *Gamification and motivation through projectware*. This theme emerged as an exploratory section of the interviews. The initial idea was to simply introduce the concept as a motivational and engaging technique that is gaining traction in the market. Due to the relevant nature and evident links with the way motivation could be tackled, it was included in the study. The response of the interviews is one of curiosity, anticipation, and veiled skepticism. The premise was inevitably set for this response. Through the interviews, respondents argued in favor of the need of motivating teams, the importance of doing so, but also the challenge that it poses. At the same time, the non-integrated pieces of software tend to be seen as too cluttered and nothing more than a mere tool that can be difficult to use by all team members. Thus, adding new features to software is looked with certain reluctance (and rightfully so), while the positive effects of those features can be worth the try.

Further in the study, a look into features of modern projectware (VPMS) provided quantitative data of the approach of these packages of software towards motivation. The data is overwhelmingly clear. While all the packages tackle some of the main barriers of virtual project management, like coordination, communication, knowledge management, and project management methods, none of the packages offers features directed to purely motivate the team members. Neither do they show any gamification techniques. Only one third-party developer offers a package (the Happy Package, for Podio) including these type of features to project managers. The explanation to this could have three different perspectives. The first one was already mentioned by Anne. The idea that providing coordination, communication between the team members, easy access to documentation, clear tasks and goals, so that productivity is ensured, is a clear way to foster positive inner work life and keep teams motivated.

The second one is the obvious difficulty to apply gamification or motivation techniques to a software that tackles such a broad topic as “virtual projects”. The implementation of successful strategies and techniques that could directly

address the problems of motivation in virtual environments is not to be underestimated, and could cause serious repercussions to an organization. Thus, taking this approach is sensitive issue.

The third one could be found on Pink's (2009) statement that science knows one thing, business does another thing. Virtual Project Management Systems are part of a relatively new industry. It is understandable that the evolution of these packages and systems has not fully caught up with some of the real needs of virtual teams. There is an undeniable theoretical benefit from applying gamification into projectware. It would automatically lift some of the responsibility of motivating a team off the manager's shoulders, and redirect it to the software and the interactions of the team, making it a much more tight and engaged team. However, there is risk, there is skepticism, and there is a whole lot to learn. These may be the key issues for such a low number of motivation features in projectware packages.

6.2 Answers to the research questions

According to the data gathered, the analysis made and the observations discussed in this study, it is time to look back at the questions that motivated this study and answer them.

6.2.1 RQ1: How do virtual team project managers assess and develop motivation in virtual environments?

Replying this question needs to be compartmentalized into two diverging factors: assessment and development.

Having considered the personal and complex nature of motivation, and the physical and technical barriers of social interaction in virtual projects, the assessment of motivation in virtual environments happens majorly through the individual response to the tasks and processes embedded in the project. In a way, project managers draw parallels between performance and motivation. It is clear that the rules of causality are flawed here. A performing individual does not necessarily have to be motivated to do the tasks that he or she does. However, against the difficulty of assessing motivation in its true form, performance becomes the accepted best indicator of motivation. Project managers assume there is a positive relationship between performance and motivation. And it is understandable. Good performance would be an indicator of a positively motivated individual. This seems a trait closer to behaviorism, as relies more on the task completion than on what are the processes of the individual, but as Kirkman et al. (2008) point out, trust in virtual teams is based on performance consistency rather than on social bonds. This is also true for motivation. As leaders have a difficulty assessing motivation through social indicators, they have to rely on performance.

Other factors derived from the results gathered by this study, show that bad attitude, distant or ironic tone, and constant conflicting behavior in the mediated

means of communication within virtual environments are a good indicator of low motivation. On the contrary, enthusiasm, engagement and quick response to contact with the leader and team members would be seen as indicators of a motivated individual.

When it comes to motivation development, the first intentions rely on fostering positive inner work life for the team members. That is ensuring that barriers are lifted, that tasks are clear, that procedures are documented, to make sure that progress is ensured and most important, perceived. If that fails, project managers often have to rely on enforcing extrinsic motivators, especially in the form of talking with the member's functional manager.

6.2.2 RQ₂: Are there differences in the approaches to foster motivation in virtual and traditional project management?

While the response of the respondents clarifies that motivation is equally important regardless of the setting, they also postulate that there are differences between fostering motivation depending on the setting, and that it is more challenging in virtual settings.

The narratives derived from the interviews show that most differences fall within the social realm of team dynamics and the degrees of virtuality. While traditional project management and collocated teams enjoy of the energy and synergies of working together, virtual environments need to find alternative strategies to foster motivation.

The examples provided by the respondents talk about brainstorming sessions, bouncing ideas, writing in white boards, and performing non-work-related activities that tighten the links of the teams. These approaches require a huge reformulation in order to work with dispersed teams. Meetings become conferences, non-work activities become Sharepoint pages, synergies become asynchronous communication and available documentation. Quite dramatically, different settings call for different approaches.

6.2.3 RQ₃: Are there clear relationships between virtual project management tools and the project team's motivation and performance?

From the results and literature review there is not a clear or straightforward answer to this question.

The respondents clearly link motivation to performance. And in most of cases, without the tools there would not be good performance. However that is stretching the rules of causality a tad too much.

If focus is placed on the virtual project management tools, there are certainly some relationships, however, these relationships are somewhat indirect. As taken up in the discussion, and supported by the quantitative data, there are no actual motivational features embedded in the projectware examined. Thus, VPMS are not directly responsible for motivating teams in virtual projects. However, the

indirect relationships arise from the fact that these software packages focus in features that lay the path for better inner work life. Accordingly, there are indeed relationships between the tools and the motivation of the team.

When it comes to performance, the relationship is much clearer. While data points to a limited necessity of the software, there are positive relationships between performance and the tools that help achieve such performance.

Thus, the answer to this question is that yes, there are clear relationships between VPMS and team performance, and there is a supporting (or secondary) relationship between these tools and team motivation.

6.2.4 RQ4: Is the figure of the project manager the sole source of motivation in virtual projects?

The answer to this question, according to the results derived from the study is, no, there are other sources of motivation in virtual projects.

However, depending on the degree of virtuality, there are narratives that can challenge, if only theoretically, that answer.

In settings where the degree of virtuality is extreme, and the only interactions between members happen through the figure of the project manager, it is possible, given that the projectware does not necessarily motivate team, that the tasks of motivation rely almost exclusively on the project leader. That is a valid argument as long as intrinsic motivators are not considered a “source” of motivation.

However, in a real life setting, the organizational context, the interaction with team members (however brief), and the characteristics of the software could become important sources of motivation. There are several narratives in the interviews that affirm the quintessential source of motivation should come from the teams interactions, especially at similar levels of expertise. Additionally, the case of gamification, if applied, could become an important source of motivation in virtual projects.

6.3 Final concluding remarks

This study has been a personal journey that offered both expected and unexpected results.

The expected results came in the shape of a lack of motivational features in the currently available projectware. Personal experience in previous virtual projects gave place to those expected results.

However, a complete set of unexpected results came with the notion of intrinsic and extrinsic motivators, and the notion of progress that derives from the motivation theories and literature, and the way that translates into actual working settings.

The conclusions that can be drawn from this study are many. The importance of motivation regardless of the project management context. The enhanced complexity of fostering motivation in virtual settings. That intrinsic motivators and fostering inner work life in the current modern working life are much more effective than extrinsic motivators. That progress and the notion of improvement is an extremely powerful motivator that drives us. And that, even if project managers do not like this approach, sometimes extrinsic motivators need to be applied to overcome the shortcomings of virtual projects. It is a work in process, an industry in progress, and as such, the software dedicated to it is in the same situation as the project managers: they aim for improving the inner work life of virtual team members by making the work easier, faster, and more productive.

It is a good start, and hopefully, with time, the extra step that aiming for specific motivating features (such as gamification techniques) will be spreading. As it has been pointed out, gamification can generate the stimuli to amplify small wins generating engagement, user habit, and finally feeding a progress loop that leads to enhanced motivation. Furthermore, it has the potential of partially lifting the responsibilities of motivation off the shoulders of the leader, and redistributing them among other team members and the software in use.

6.4 Academic contribution

This study reflects upon various noteworthy theories about motivation. In a way, they have been approached in an almost chronological way. Each theory has been adopted in its own way and defined with the model that it was created for.

The theoretical contribution of this study is the application of the concept of progress as a common denominator of these motivation theories. Progress, not within the notion of time, but within the idea of accomplishment, of improvement, of moving forward. This proposition levels the field for the application of gamification into the realms of motivation in working environments.

While only exploratory, the connection of traditional motivation theories and the game design techniques of gamification can be used as a starting point in future endeavors.

6.5 Practical contribution

The present study has provided a clearer view of the dynamics of motivation in virtual settings. These results give an increased understanding of the way project managers interact with team members in virtual environments and their views and approaches towards motivation.

Given the importance of the industry, a new perspective in motivation within the framework of virtuality can help organizations to plan the virtualization of projects, with a better understanding of how individuals react to the new environments, and the challenges that they entail. By knowing that progress is a

concept that can be strongly connected to motivation, practitioners can aim to expose and make more evident that particular trait.

Furthermore, project and program managers, as well as organizations' executives, can now reflect, in a different way, on what they should expect from virtual project management systems. By applying the benchmarking process used in this study, practitioners and stakeholders can look for the software that better suits their needs, by looking at the stress applied to the different components and features.

Finally, an exploratory approach on gamification within project management is made and could serve for inquisitive organizations as a starting point for possible implementations of techniques and systems that both engage and motivate team members.

6.6 Future research

During the process of this study, several questions and riddles appeared that escaped the scope of the domain of this research. Taking that into consideration, two new lines of future research are encouraged.

The first one, is the application of gamification techniques within the framework of virtual project management software. The rich and varied examples of applications of gamification techniques in various industries ask for further research on a field where motivation is more challenging. As it has been pointed out, the introduction of gamification in this study was merely exploratory, however, the idiosyncrasies of applying game design in non-gaming environments are particularly complex. Deep and extensive research must be done before serious applications of these techniques can be applied successfully and with limited risk in real-life virtual projects, especially at a corporate level.

The second suggestion for future research revolves around studying the team members' acceptance or resistance to adopt the new projectware envisioned for virtual projects. By using the Technology Acceptance Model (TAM) developed by Davis in 1986 (as cited by Majchrzak, et al. 2000), studying the implementation of VPMS systems in large corporations could lead to a better understanding of why some individuals are particularly resistant to using new technology, and how that problem can be addressed both in a real-life setting, or even at the design stages for these software packages. Research on this field could lead to the adoption of measures in order to decrease the level of resistance to the new project software, thus reducing the friction between employees and the organization, and increasing productivity.

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Appendix 1 - Interview Framework

Overarching themes	Questions	Possible Probes (follow up questions)
Current working characteristics of the interviewee	Could you do a brief presentation of yourself? In which industry do you currently work?	How many years have you been working within projects? How many in virtual projects? Do you usually combine both?
	Do you work for various organizations? Do you work in multiple projects at the moment?	Do you currently supervise any projects? How many?
	Have you ever managed a virtual project? Are you a certified Project Manager?	How many virtual projects have you managed?
	Where do you work most of the time?	Do you ever combine office with telecommute? In your opinion what are the advantages and disadvantages of working from home?
Characteristics of the teams and the organizations	Are the organizations you deal with international or are they centered in one country?	Are the members of the teams international or are they geographically dispersed within your national borders?
	Are the teams created with workers from different organizations?	How are the teams created? Who is responsible for creating the teams?
	Is it frequent to have different team members working in different time zones?	Would you consider this an issue?
Personal views on virtual projects	Why did you chose to work in virtual projects?	Is it a company policy, personal choice or industry standard?
	Would you say you enjoy working this particular way?	Why? Why not?
	In your opinion what are the advantages of working in a virtual project?	If you had to name the best three perks of virtual projects, which ones would they be?
	What are the disadvantages of working in a virtual project?	Which would be the worst three characteristics of virtual projects?
	From your perspective, apart from having a dispersed team, what are the main differences between traditional projects and	What are the biggest challenges that a team needs to overcome to have a successful virtual project?

	virtual ones?	
Virtual Project Interactions	How do you usually communicate between members?	How often? Do the other members communicate with each other, or only to the leader?
	Are there any kind of physical meetings?	How often? If not, do you have any strategy to bridge the lack of face-to-face interaction? Are they with the whole team or individually?
	In your experience what are the best strategies to create a tight and well functioning team?	How do you know if everyone is engaged? What do you do if you have conflicting team members?
Virtual Project Software & Tools	How are the tasks and processes organized and delivered to the team members?	How do you follow-up the progress? Is everyone aware of everyone else's progress?
	What type of software do you use to run the projects?	Is it an integrated system or do you use different tools? Do you have a favorite software for project management?
	Does this software replace the Project Management Office?	Does this software help solve the disadvantages of VPM? In which way? How important is this software?
	Is there anything missing in your current software that you would like to see implemented?	What is that? Does it have any tool for motivation?
Motivation in Virtual Projects	Is it easy or difficult to see if a team is motivated or unmotivated?	How do you see that?
	In a scale from 0 to 10, being 0 "not important at all" and 10 "critically important", how important is it to have a positively motivated team?	Is it particularly important in a Virtual Project, or is it similarly important in a traditional project?
	What do you usually do in order to motivate your teams?	How do you try to create a motivational environment/How would you like to be motivated?

	Can you think of factors that would contribute to an unmotivated team?	How do you overcome them?
	How do you deal with teams that are performing but that have one or more unmotivated members?	Do you aim for team harmony, or you prefer a more individual approach?
	Is it different to motivate a Virtual Team than a traditional team?	How so? Is it more challenging or easier?
	As a manager what motivates you?	How do you motivate yourself?
E-Leadership	Do you think that, in general, a leader needs to change his/her leadership style to suit the needs of a virtual team?	Do you actively chose a particular style or adapt yourself to the team at hand?
	Are there specific areas of VPM where you think that requires extra efforts from the leader's perspective?	Which so? How is it different from the traditional project management?
	In your perspective what are the main strategies that a leader must carry out in order to get high performance from the team?	
Gamification in VPM tools	Do you think it is important that motivation in a team comes not only from the leader, but also from the members themselves?	What about the importance of the tools and software? Do you think they could help in motivate the team?
	Do you know what Gamification is?	Do you think that gamification could have a positive or negative effect in VPM?
	Do you recognize any gamification strategies in your current VPM software?	Is there any gamification strategy that you could think that could be help in engaging and motivation the team members?