Uncovering Requirements of SaaS Project Management Tools in ICT Startups using Virtual Teams

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Abstract. Software startups are facing the problem of choosing the right tool to support their project management efforts. Such tools are important to software startups, because group dynamics, knowledge sharing and the traceability of decisions are important and complex dilemmas. To tackle this problem, a case study consisting of multiple possible software solutions that support project management is carried out at a software startup in the Netherlands. Based on this case study, Podio is suggested as a suitable project management tool for software startups. Important requirements are the amount and combination of functionality and the usability of a project management tool.

Keywords: Project Management, Collaboration software, Software development, Startup Company.

1 Introduction

Project Management (PM) has become an essential aspect for many organizations [1]. This is both valid for large, established enterprises, as well as small companies that recently started business [2]. The challenges of PM are to enable organizations to better cope with a number of phenomena. In a small group, one person may perform a multiplicity of roles that in a larger group would be assigned to different individuals. This affects the way in which the organization is decomposed, thus the distribution of tasks in a smaller group will differ from that in the larger organization [3]. A key challenge of any successful organization is effectively creating relevant business knowledge and the timely dissemination of that knowledge to those members of the organization who need it [4]. For startups, the traceability of decisions especially is an important aspect, because many decisions are made on unstable ground [5]. Required information may be missing when a decision is made. Hence, decisions may change over time and a form of traceability is needed to grasp the motivation behind a decision at the time it was made.

To benefit from the potential that is offered by PM in an organization, a software solution that supports PM is often used throughout the organization. However, many startups in the ICT domain are facing difficulties in the process of choosing the right software solution that provides support for PM in their organizations. There are two main reasons for this problem. First, the market for PM solutions is large and has a dynamic nature: the sheer volume of possible software solutions is overwhelming and on top of that, new entrants often enter the market and existing providers almost continually upgrade the functionality that is offered. However, it may also occur that a competitor leaves the market. Second, the exact functionality that is offered by each software solution varies significantly. Some software solutions may offer only limited functionality, while others may be very feature rich. There are also many software
solutions in between both extremes, with different combinations and different amounts of functionality. Out of the our personal experience, it can be stated that selecting a software solution that does not provide the right combination of functionality may introduce new issues, including but not limited to: lack of commitment from project members, decreased coordination and collaboration among team members, general misunderstandings and duplication of efforts. Selecting the right software solution is especially important in the case of virtual teams. Virtual teams are teams where team members do not operate from the same location, so meeting face-to-face is not an option [6]. Hence, virtual teams have to rely on other means to communicate and collaborate, such as PM tools.

This paper aims at tackling the problem of selecting a PM tool for small software companies that are in the birth phase of the organizational life cycle. We will refer to such companies as software startups. The main research question is therefore stated as follows:

“How can a software startup select a suitable collaborative project management tool?”

The following sub questions are formulated to support answering the main research question.

- What are the requirements for a collaborative project management tool for virtual teams within software startups?
- Which collaborative project management tools meet these requirements?

By carrying out a case study of possible software solutions at a small startup company in the Netherlands an answer to these questions is presented. At the company, large proportions of work by the team members are done from different locations. Thus, we can speak of a virtual team. Parallel to that, software development is taking place in a distributed manner; it can therefore be characterized as distributed development [7]. The use of CT is expected to minimize the disadvantages of virtual teams and distributed development.

The remainder of this paper is organized as follows. In section two the theoretical background is presented. Section three contains a description of the research approach that is used in this research. Section four describes the current situation of the company where the case study takes place. Section five provides an explanation of the tools that are to be examined further. In section six the results of the survey are presented. Finally, section seven consists of a discussion of the results and limitations.

2 Theoretical background

A project is defined as “an endeavor in which human, material and financial resources are organized in a novel way, to undertake a unique scope of work, of given specification, with constraints of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objectives” [8].

Essentially, PM involves the process of successfully carrying out a project. More specifically, PM is defined as the process of controlling the achievement of the project objectives [2]. PM involves management of financial issues, resources, schedules,
risks, quality and processes. For a project to be successful, each of these areas must be managed well [6].

The fundamentals of PM have changed due to the business globalization and advances of computing environments. The evolution of project teams to more diverse, global, geographically dispersed environments presents new obstacles to traditional PM approaches [9][10]. The challenge is supporting collaboration among the people working at different sites, different times or in different organizations [4]. Another major change of PM in the last 25 years is the use of computerized project planning and control methods [11].

Traditional PM focuses on a single project located in a single location and emphasizes scheduling as a key issue, whereas distributed projects support multiple locations and therefore require more focus on coordination and collaboration instead [11][12]. Furthermore, whereas in traditional PM, progress tracking is often sufficient to manage the process, for distributed projects it is insufficient due to the dynamics and complexity of the project. Careful coordination of subtask allocation, interdependence and integration is needed on a daily basis. Ineffective collaboration may offset the benefits of virtual projects [13]. A disadvantage of distributed projects is the high demand for communicative, cooperative and collaborative initiatives among team members [12]. ICT can be used to support the cooperation within a team; this is called Collaboration Technology (CT). CT exists of tools that promote and improve cooperation. Doing so, CT enables a team to work together, even if team members work at different locations and at different times like in virtual teams. A virtual team is a team that is made up of organizationally or geographically dispersed members who are linked primarily through advanced information and communications technologies [14]. Members frequently use the Internet and CT to work together, rather than meeting face-to-face. Summing up, communication, coordination, cooperation and information exchange can be improved by using CT [15].

Information and communication flows must be frequent, or even continuous, in distributed contexts, in order to maintain commitment and build trust [16]. Reliance on electronic tools such as e-mail may increase conflicts due to limitations of such communication channels [17], and the lack of face-to-face contact could reduce individual team members’ identification, trust and commitment to the team, resulting in reduced performance [18][19]. Parallel to that, however, such tools could also potentially reduce diversity-related conflict [20]. Project team success relies on a variety of factors that interconnect in complex ways. These include the task, team processes, individual team member characteristics and contributions, resource constraints, organizational context factors, and, in the case of distributed or virtual teams, ICT availability and use [21].

From this point on, project management tools that inherit the principles of collaboration technology will be referred to as collaborative project management tools (CPMT).

There has been a shift towards what has been called “information age organizations”. These organizations have the following characteristics: they are networked, they employ team-based workers who are empowered with much decision-making authority, they have flat organizational structures with low direct supervision and levels of management and short cycle times to develop new products and bring them to market [22]. For such organizations effective management and knowledge sharing of organizational knowledge is becoming a significant determinant of whether an organization flourishes or fails [4]. Many software startups share the same
characteristics as “information age organizations”. Software startups are known to be networked and work with flat structures [23]. Many software startups also show high responsiveness, by utilizing short cycle times [24]. Thus, knowledge management and knowledge sharing are an important aspect for software startups as well.

3 Approach

To provide an answer to the research question a case study is carried out at a small startup company in the Netherlands. The case study exists of consecutively using four different CPMTs at the company. Because of time constraints in this research, the maximum number of CPMTs that can be used at the company during the case study is limited to four. The project members use each CPMT for the “duration” of ten issues.

Issues are points of discussion and can continually arise during the execution of a project. They may vary in size and complexity and can appear in any combination. An issue can be as small as repairing a single typing error on a website and as large as completely rewriting the codebase of an application. In this research, issues of any size contribute to the total number of ten issues per CPMT, with the exception of insignificant issues. An issue is categorized as insignificant in the following cases:

- if the issue only covers the execution of a single, atomic task;
- if the issue is an outcome of discussions that have taken place via other channels. In that case there essentially is nothing left to discuss in the CPMT and the issue only serves as a reminder for the programmer that has to carry out the task.

The “duration” of ten issues thus means that ten issues, which must not be insignificant, are dealt with. The option of using a fixed time frame, such as using a CPMT for two weeks is disqualified, because workloads of different weeks fluctuate heavily at the company. A limitation of this approach of working with a timeframe is that it is uncertain when a project member has fully mastered every aspect of a CPMT. However, because of time constraints a fixed limit of issues has to be set.

After using each CPMT, the project members are required to provide feedback on the corresponding CPMT, before using the next one. The next CPMT will then be used for the following timeframe, which is again the “duration” of ten issues. By using a short timeframe and directly giving feedback after using a CPMT, the chances of users forgetting details in their experiences or mixing their experiences with other CPMTs are minimized. This part of information gathering takes place in the form surveys. Each of the three project members participates in a survey for every CPMT that has been used over time.

Below the characteristics are presented that the participants have to answer, together with the corresponding sub-questions. Participants are given two types of question per characteristic: the first question require the participant to rate a number on a 1 to 5 Likert scale, the second question asks participants to textually motivate the scores that they provided at the first question.

- Added value (efficiency): How do you rate the added value of this tool to project management: Does it do what it’s supposed to do? Does it make collaboration and communication between you and your colleagues easier? To what extent?
- **Ease of use**: Is the tool easy to understand and easy to use? Is it clear what buttons do? Is it clear what functionality can be found in which section? Are menus and options logically structured?
- **Technical perspective**: Did the tool work well from a technical perspective? For example, think about loading times, browser compatibility, downtime and/or errors that may occur.
- **Functionality**: Does the tool meet your expectations about functionality? Does it have all functionality on board that you need? If no: what is missing? Does the tool contain functionality that you don’t need? If yes: what functionality and why don't you need it? What functionality did you like in particular? What functionality did you dislike in particular?
- **Recommendation**: Would you recommend this CPMT to another software startup?
- **Final verdict**: What is your final verdict about this CPMT?

After having used all four CPMTs, the project members are interviewed to develop a set of requirements for a suitable CPMT, followed by their personal choice(s) for which CPMT to be used in the project. This takes place in the form of interviews.

The primary author fulfills the role of project manager at the company at hand. Therefore, this research can also be typified as action research, which combines theory and researches with practice and practitioners through change and reflection in an immediate problematic situation within a mutually acceptable ethical framework. Furthermore, action research is an iterative process involving researchers and practitioners acting together on a particular cycle of activities, including problem diagnosis, action intervention, and reflective learning [25]. To avoid any influence on the results, the authors of this paper do not participate in the surveys.

### 4 Current situation at the company

The case study takes place at a small startup company in the area of Utrecht in the Netherlands. The company was founded in 2010 and has had four employees ever since. Currently, the company is both developing a digital learning platform and an application for mobile telephones (smartphones). The company does not yet have an office at its disposal. Thus, work is done at different times and at different locations, resulting in a virtual team.

The current situation of the company is as follows. Prior to this research effort, a rigorous CPMT has not been in use. A substantial part of the communication takes place in the form of email. For collaboration purposes, three separate tools are used on a regular basis. First, Google Docs is used to share textual documents among team members. The most important reason for using Google Docs is that it enables multiple users to work on a single document at a single moment in time. Second, Dropbox is used to synchronize all types of documents among the team members. The advantage of using Dropbox is that it is very easy to use and it almost seamlessly blends in with any major operating system. Finally, Vermis is solely used as a technical issue tracking system for the development of the main product of the company. Besides providing the possibility to discuss technical issues, no further means of communication or collaboration is provided by Vermis.

The way each CPMT is introduced to the team members is as follows. First, the project manager registers the company in the CPMT and registers the other team
members. Second, the CPMT automatically sends out emails to the other team members with an invitation, accompanied by an introduction about how to get started with the CPMT. The project manager takes no part in this. No forms of documentation or assistance are provided by the project manager in this process; the team members are required become acquainted with the CPMT on their own by using their own resources. For example, the documentation that is provided by the CPMT may be of service. This ensures that any possible bias or personal experiences that the project manager may have is not passed on to the other team members. However, the team members are allowed to assist each other if needed, as they could do in a real world situation.

As explained earlier, at this moment the company uses a combination of tools to support collaboration and communication. This may result in a personal bias of the individual team members towards or against certain CPMTs. To avoid such bias, participants are asked beforehand if they have ever had any experience with the CPMT, or any product of the same supplier in the past. This was never the case, so working with each CPMT was a completely new experience for every participant during the case study. This approach therefore matches a real world situation, where a new CPMT is introduced to a project team where no team member has any experience with the particular CPMT.

5 Participating CPMTs

All CPMTs are so-called Software-as-a-service (SaaS) solutions. SaaS entails that the software package can be accessed from any recent Internet browser, from any location in the world, as long as an Internet connection is available. The users of SaaS products are not required to manually install any software on a local computer themselves. All data is stored by the software vendor, who is also responsible the integrity of the data in the form of backups and security. This is a good match with virtual teams, because a virtual team never operates from one location. The virtual team can simply use a SaaS CPMT, so there is no need to worry about the location and capacity of the computer that is running the CPMT.

SaaS is viewed as an ideal setup for small startup companies, because many startup companies do not have sufficient resources at their disposal to locally install a CPMT. Vendors of CPMTs that utilize SaaS take care of keeping the software up and running. The vendors charge a fee to the users, usually based on the number of features and/or the number of project members that will have access to the CPMT. In some cases, the CPMT is offered fully free of charge to a limited number of users.

An extensive overview of the existing CPMT packages is provided in Table 1. Of these candidates, four CPMT packages are chosen as candidates in this research. To select these four candidates, several criteria will have to be met. These criteria are from a functional perspective. This implies that every contending CPMT must adhere to the functionality that is mentioned by the criteria. These functional criteria are the following:

- **File / document sharing:** It is crucial for a software startup to be able to share documents and other files with each other. Three CPMTs do not support this feature.
- **Milestones:** Especially during the early stages of development, it is important for software startups to be able to explicitly determine which milestones have to
be met and, more importantly, when such milestones are exactly met. Six CPMTs offer no support for such a feature.

- **Time tracking**: Time tracking is important because governments usually require companies to have a form of time administration. Time tracking tools are abundantly available. However, it is desirable to have such functionality integrated in the CPMT, reducing the number of separate tools that is needed to run a software startup. One CPMT lacks this functionality.

- **Contacts**: Project members in virtual teams are often part of different professional networks. It can be very valuable to the project members if a CPMT has a shared repository of important contact information of people that are important to the project, but are outside the project team. Fifteen CPMTs have no support for similar functionality.

- **Zero downloads required**: This may sound redundant at first; because SaaS already implies that nothing extra is needed to run the software besides a recent browser. Despite that, there are two CPMTs in the long list that require users to download an extra piece of software to run properly. This is not desirable, because software startups are often working without an office, on different computers and from different locations. Being able to run the CPMT without having to install extra software is therefore viewed as a necessity.

After applying the criteria eighteen CPMTs are ruled out and eight CPMTs remain. Because software startups are likely to have restricted resources available, it was decided to use the four CPMTs with the lowest costs for a typical software startup. These CPMTs are marked gray in Table 1. The price is based on a typical situation of software startup, with five project members. For each CPMT, the most appropriate price level was sought out. If a CPMT does not offer a corresponding price level, the cheapest package without losing functionality is chosen.
Table 1. Overview of available CPMTs.

<table>
<thead>
<tr>
<th>CPMT</th>
<th>Task creation</th>
<th>Description</th>
<th>Resourcing tasks</th>
<th>Reporting/track</th>
<th>Expense tracking</th>
<th>Cost tasks on email</th>
<th>Task dependencies</th>
<th>CRM features</th>
<th>SM/Collaboration</th>
<th>Average monthly cost</th>
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6 Survey results

In this section the results of the survey are discussed. The results of the survey are presented in Table 2. The number in each box represents the average Likert score, on a 1 to 5 scale, that the three participants rated each aspect for each CPMT. The column “Recommendations” represents how many times a CPMT is recommended by a participant. For example, Basecamp has received one recommendation, out of a maximum number of three. Three is the maximum number because there are three participants. In retrospective, the “duration” of ten issues resulted in an average usage of approximately three weeks per CPMT.

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1 Inspired by http://alturl.com/g3d3b
Table 2. Results per CPMT.

<table>
<thead>
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<th></th>
<th>Efficiency</th>
<th>Functionality</th>
<th>Usability</th>
<th>Technical perspective</th>
<th>Final verdict</th>
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6.1 Basecamp – www.basecamphq.com

Basecamp does very well in the technical area. One participant responded “Very quick responses, which is a great deal to me.” However, in other areas Basecamp received mediocre scores. One participant supplied the following response: “It is a decent project management tool concerning messaging and assigning tasks. It is however not well equipped for software development projects.” Basecamp receives one recommendation.

6.2 5pm - www.5pmweb.com

As is visible in table 1, from a functional point of view 5pm is arguably one of the most well-equipped CPMTs in this research. The participants noticed that as well, hence the score of 3.67 in that area. However, the participants experienced problems with navigating their way to find the appropriate functionality. Subsequently, 5pm receives its lowest score in the area of usability. It therefore seems that this abundant amount of functionality is hard to find and/or hard to use. This is explicitly supported by one participant, who stated the following: “The tool provides a lot of functionality, however the user interface is complicated. Therefore, using the tool also takes extra time and effort and is therefore not very attractive.” Summing up, 5pm receives average scores across the whole spectrum. 5pm also receives one recommendation.

6.3 Podio- www.podio.com

Podio, like 5pm, also offers a great deal of functionality. But what makes Podio stand out is the fact that it is offered free of charge for up to ten users, which will be enough for a lot of software startups. The “Facebook-like” feel in particular was regarded as very useful. One participant stated: “The tool has a Facebook-feel, which enables fast response and clear activity overviews.” The modularity of Podio is also regarded as very useful. Another participant commented: “The tool offers the possibility to add different types of ‘apps’ which enables the functionality that is desired for one project, while hiding unnecessary functionalities in another.” On top of that, Podio by far receives the best scores across the whole spectrum, including the final verdict. Podio is also the only CPMT to receive the maximum of three recommendations.


6.4 Feng Office

Feng Office is the CPMT with the lowest average score. All scores are consistently mediocre, without any major outliers. A certain participant commented that “The tool does do what it has to do, but it feels very ‘1.0’ and not up-to-date.” Parallel to 5pm, Feng Office also receives its lowest score in the area of usability. Feng Office is the only CPMT that is not recommended by any participant.

6.5 Overall

Although Table 1 shows that 5pm and Podio both offer similar amounts of functionality, their respected scores in this area differ significantly. 5pm receives a score of 3.67, whereas Podio receives the highest possible score of 5.00. A possible explanation for that is the scores in the area of usability. In that area, 5pm scores 2.33 and Podio 4.67; this points to a relationship between these areas. Furthermore, it is crucial that users are able to properly benefit of the functionality that is offered by the CPMT. This is not the case for 5pm.

Globally speaking, Podio positively stands out. It receives the highest scores in each area and receives the most recommendations. The other three CPMTs receive very similar scores.

7 Discussion and conclusions

In this section, the main conclusion is presented, followed by a discussion. Based on the results, several conclusions can be drawn.

First, Podio consistently and convincingly received the best scores and received the most recommendations. Podio not only has the highest average scores, but is also unparalleled in its single areas. The only area where Podio does not have the single highest score is technical performance, where only Basecamp rivals Podio. Basecamp receives the exact same average score in that area. As an icing on the cake, Podio is completely free of charge for a typical software startup. Second, the other three CPMTs receive very similar overall scores, apart from one key difference. As stated, Basecamp offers the smoothest experience from a technical perspective. The downside of Basecamp is the lack of extended functionality. 5pm and Feng Office show similar scores with little or no outliers. It is therefore hard to recommend a single CPMT out of these three. Third, based on the results, when selecting a CPMT for a software startup, no single CPMT can be ruled out beforehand. This is supported by observation that no CPMT has an area where it receives a lower score than 2.33 and that the lowest overall score is 2.93. Fourth, the combination and amount of functionality that a CPMT offers are considered important, but it is perhaps even more important that the functionality is usable, meaning that it should be easy to learn and easy to use.

Summing up, it is advised for software startups to first consider Podio. If Podio is not selected, the remaining three CPMTs are all still viable options. However, each of them may show different shortcomings in different areas. On the bright side, none of the contenders cost more than $30.00 per month for five users.
There are a number of limitations to this research. Only four out of the possible eight CPMTs that match the minimally required functionality are tested. It is possible that any number of the four candidates that have been ruled would change the outcome of this research. Although these candidates were in fact more expensive than the CPMTs that were tested, it is possible that the extra cost of these CPMTs could weigh up to the added benefit. This limitation can be extended to every CPMT that exists, because it is impossible to truly make a sound choice without trying all CPMTs that exist. Nevertheless, trying all CPMTs is hardly a feasible scenario for a researcher – or a software startup for that matter – to do. As stated, the number if CPMTs is not only very high, but CPMTs are also subject to many changes. Another limitation is that this research was performed at only one company. Therefore it is difficult to generalize the results to any kind of startup besides a software startup, which is also a suggestion for further research. This direction includes performing a study that involves a bigger sample. For example, have multiple companies test multiple CPMTs.

8 References


