

# Project Management Processes Used during the Development of Software Projects in Home Office Format: A Field Research in Multinational It Companies

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Abstract: Due to the consequences of the pandemic caused by the new coronavirus, home office has been adopted by companies to enable the continuity of their activities in an emergency and preventive feature. A survey has been conducted through interviews with ten project managers from multinational IT companies, in order to analyse and understand how project management processes are performed during the development of software projects in home office format. Impacts were identified in different aspects, positively and negatively, in the project management processes. Concerning software development teams, it was possible to observe that the greatest impact is related to communication and start using online tools for daily activities. We have also learned that there are differences between the consequences of the home office and consequences of the pandemic. And there are permanent changes and lessons learned during the management in pandemic.

## 1 INTRODUCTION

Project management shows historical evidence of having started during the period of the Industrial Revolution. In the last few years, a new approach to the execution of projects presents a differentiated view, mostly in the execution of software projects: agile methodologies, where the iterative approach is ideal when the final product is not well defined and evolves over time, agile project management focuses on active collaboration of customers and staff and allows flexibility and better adaptation to changes during project execution. For all agile methods, effective communication is highly valued during the management process: the work team receives constant feedback from interested parties and is willing to change and ensure continuous improvement of the product, embracing the work performed in each iteration cycle (Larson & Gray, 2016).

In remote work, technology is essential, both in the activity definition to be performed at a distance and in the way the manager deals with his subordinates. Several organizations already operate in a home office arrangement; the technology sector is one of the pioneers in this adaptation, while other sectors are still in the learning process. This year 2020, an emergency situation forced the population to

carry out social distance and in this context many companies had to quickly adapt into a home office implementation for all their employees.

The pandemic caused by the new Coronavirus COVID-19 compelled governments to make individuals to adhere to social distance, which includes closing schools, business centers and event cancellation with people crowding (Wilder-smith & Freedman, 2020). From this temporary change in social life, several changes in the organizations' work methodology were required in order to adapt to the context. One of the alternatives found by the companies is to enable their employees to perform their work routine remotely, through the home office format.

It is important for managers to recognize which processes could be impacted by and which alternatives can be used to improve the effectiveness of results. This work aims to identify and analyse the project management processes used during the development of software projects in home office format, through field research in multinational IT companies in a social distance context.

This work is structured in the following way: in section 1, the theoretical basis used for the research development. In section 2, the methodology used for the field research phase is presented. The results found

are commented and analysed in section 3. Finally, in section 4, the conclusions of this study are presented.

## 2 THEORETICAL BACKGROUND

### 2.1 Project Management

Project management comprehends a set of functions to ensure the final objective is achieved. It comprises management, organization and planning activities, and it is essential to have techniques and use tools to guarantee the control of all aspects involved in the planning, execution and delivery of a project, in other words, which are present in all its cycles. In the area of software development, the project manager has the responsibility to negotiate several changes during the execution of the project. In order to apply the processes that must be executed during a project, it is recommended to use reference standards and present their best practices for the project management success. When implementing management methods, it is possible to increase the project's level of success (Sanchez et al, 2017). There are several standards available, as PMBOK® Guide (PMI, 2018).

### 2.2 Agile Methodologies

Software development presents complex business processes, and it is constantly updating. In 2001, the Agile Manifesto was created, which states that the ideal balance must be sought between the importance given to documentation and processes and deliveries of value and quick response to changes. This manifesto is the basis for the implementation of agile methodologies, which are widely applied and have been showing good results in the project development process (Prikladnicki et al, 2014).

Scrum is one of the most well-known and used methodologies in the industry; one of its main characteristics is to be iterative-incremental, aiming at delivering value in the shortest possible time. As specified in the Scrum Guide, Scrum is not a process or a technique for building products, but a framework in which it is possible to employ different processes and techniques (Schwaber & Sutherland, 2013).

### 2.3 Home Office

Teleworking can be characterized by a set of professional activities, without direct contact with other people, who through the use of communication

tools are able to relate in work groups (Rafalski & Andrade, 2015). For organizations, teleworking reflects a continuous adaptation of work routines and behaviors. In the current scenario, these changes in the work format reflect a greater business sustainability and with technological advances, it is possible to offer the worker new skills to do his or her work effectively and productively (Aderaldo et al, 2020).

The home office implementation requires changes in the management form, control and work routine, but with the pandemic advancing, the adoption of this work format contributed to isolation, requiring that companies change quickly. As an orientation directed especially to the management of teams in remote work, five points are presented as fundamental: having a leadership team in remote work; producing a reference manual and releasing it as the main source of confidence to answer the main doubts and keeping it always up to date; establishing communication plans, keeping communication channels open and honor transparency, more accessible leadership helps in better team adaptation; reducing the number of tools to a minimum, ensuring that everyone has easy access and the instructions for use are clear, in addition to guide communication and documentation; and finally, recognizing that the transition to remote work is a process and driving change at that moment is fundamental, considering that a company's success is based on trust, communication and support for shared goals (Gitlab, 2020).

### 2.4 Pandemic and Social Distancing

COVID-19 is classified by the World Health Organization as a transmissible and contagious disease, which can cause everything from mild symptoms to severe cases and death. In less than a month since the discovery of the disease, the World Health Organization determined that COVID-19 was a worldwide public health emergency, in other words, a pandemic: it is an epidemic that reaches worldwide proportions, when there are excessive cases of communicable and contagious diseases (CDC, 2020; WHO, 2020; Bonita, 2010).

To control the disease spreading and contagion reducing by the virus, the main measure of public health prevention is social distancing, avoiding crowding and quarantining those who show suspicious symptoms or have been exposed to the virus (WHO, 2020). Social distance means keeping a minimum distance of 1 meter from other people. In Brazil, the law No. 13,979, February 6th, 2020, institutes isolation and quarantine as some of the

measures to fight the Coronavirus (Brasil, 2020). The CDC (2020) recommends that people work and study from home and leave only when necessary. From these determinations, the home office was the way adopted by the companies to enable the continuity of their activities in an emergency and preventive character.

Papers related to this study have been searched. The authors have searched for articles and scientific papers that approach project management in a home office context, using search tools such as ScienceDirect. No materials that presented this subject have been found, but they have found researches that address these themes individually: agile project management, project management, home office practice and its relationship to the COVID-19 pandemic.

### 3 RESEARCH METHODOLOGY

This research has a basic, exploratory, qualitative and semi-structured nature. The procedure adopted was a field research, through bibliographic investigation and data collection by semi-structured interview. The field research is made through a bibliographic investigation and data collection procedure with people. Semi-structured interviews are applied based on a previously prepared script and usually contain open questions (Fonseca, 2002; Manzini, 2004).

The research subjects were professionals from multinational IT companies who work in the areas of project management and who are in a remote work situation. The sample was ten professionals from multinational IT companies who exercise the role of project manager. They were invited by the authors and the only criteria for the selection was to work on multinational IT companies as a project manager.

An interview script was developed with ten different questions about project management in the home office context, caused by the pandemic. The interview was guided and applied by the authors remotely, using the video tool called Zoom.

After all the interviews were accomplished, each of them was transcribed and the data collected were organized. The data underwent a qualitative analysis, in order to organize, analyse and interpret the data. Then, the data obtained through the interviews were categorized. Ten categories were defined with subcategories.

Ethical aspects were handled by obtaining informed consent and ensuring the privacy preservation of the interviewees', without discrimination in selection of those.

## 4 RESULTS

In this section, the field research results are presented, according to the objectives of this work. The interviewed managers' profile is shown in Table 1.

Table 1: Demographic information of the interviewed.

Respondents	
<b>Age</b>	
20 - 30	1
31 - 40	4
41 - 50	3
> 50	2
<b>Sex</b>	
Female	5
Male	5
<b>Current Position</b>	
Project Manager	7
Software Research and Development Manager	1
Software Development Manager	1
IT Development Manager	1
<b>Experience time in years</b>	
1 - 5	3
6 - 10	4
11 - 20	2
> 21	1

### 4.1 Obtained Results Analysis

This is a qualitative analysis, and it characterizes the content found in the interview phase. Ten categories were defined (with subcategories) following a categorization methodology. The topics specified below present the analysis from the raised categories.

### 4.2 Methods

The methods used by all the managers interviewed, during the home office context, are Scrum and Kanban, along with the use of a combination of both methods by one of the managers. These were not affected by the change from the face-to-face to the

remote context: the only change was the way to use and apply the techniques and methods, which became entirely online. Following Scrum, managers cited the performance of all ceremonies. The Kanban started to be used with an open scope and with continuous deliveries. Some techniques started to be applied completely online: Design Thinking for discoveries, war room for problem solving, Lean tools and methodologies for root cause analysis, such as fishbone diagram.

### 4.3 Tools

The use of tools before and during the pandemic has changed, although both project teams and managers have used many of them previously. The main change mentioned was related to the intensity and frequency use of these. According to the interviewees, the most used tool in the face-to-face context that was lost in changing the work format is the whiteboard, used to perform group actions and monitor the development teamwork.

Table 3: Tools that had their use affected by the pandemic.

Use purpose	Tools
Dynamics and actions group	FunRetro, Mural, Miro
Communication	Zoom, Webex, Microsoft Teams, Microsoft Outlook
Organization and planning, team work	Jira, Rally, Microsoft Planner, Trello, Microsoft Project
Documentation	Confluence, Microsoft Word, Microsoft PowerPoint, OneNote
People Management	StandOut, Microsoft Excel
CRM	Siebel
Data and business analysis	Microsoft PowerBI
Document and file repository	Google Drive, Microsoft SharePoint

The white board was mentioned in 6 of the 10 interviews as the most affected tool by remote work. The meetings did not stop happening: in person, no specific tools were used, but after the beginning of the remote work, the use of videoconferencing applications was reported. The interviews mentioned the tools that were affected by the pandemic and are listed in Table 3.

Managers reported significant learnings for improving processes regarding the use of online tools. According to a report by one of the interviewees: “[...] things that were very difficult, perhaps one would be waiting to solved in person with the client and with the people on the team. Since we do not have this option, we learn and look for other alternatives to accomplish them remotely, both the way of talking, connecting, as well as searching for digital tools that before were always sought for an in-person alternative”. It has been identified learning with tools has been identified to improve the communication of the team and stakeholders, bringing transparency to the management. Managers also started learning about virtual tools, with presentation and conference protocols, security, types of tools best suited to each situation, online courses and training. Interviewed pointed the replacement of face-to-face tools with digital tools as a permanent adaptation to the companies' project management, especially for teams distributed in different locations.

### 4.4 Communication

The point which was most addressed by the interviewees was communication during the home office. It was necessary for a quick and effective manager's adaptation with the team and with the form of management, so that the communication could be maintained with quality and efficiency. Although in a smaller quantity, some points were reported in which the home office brought advantages in communication, with the convenience in communication that was necessary, since the agendas became busier and time needed to be optimized.

There was a communication restructuring in order to be more objective and more comprehensive. The concept of non-violent communication was fomented, which consists in a communication approach that aims to speak and listen with compassion (Rosenberg, 2006). According to one of the managers: “The effort to better communicate with others has generated a more careful behavior with communication, [...] to be clearer, to check if the other is understanding what is being said and agreed. This is one of the lessons learned from the pandemic

that I think will last forever". As a disadvantage, the lack of proximity to the managed was raised, as reported below: "It is more difficult to understand what the other person is going through. The relationship between people has been lost, there is no way of knowing if the person we are talking to is really well or not". This change in the relationship format reflected in the way the managers work. They felt the need to increase the frequency of private conversations with each member of the team. The formation of new teams made it difficult to get closer to the members of the newly formed team. Beyond that, there is a difficulty in guaranteeing the motivation and engagement of the team. One of the managers narrates: "I'm not sure if people are really engaged and dedicated to what they need right now, as I can't see the difficulties closely". Another disadvantage was the increased frequency of information transmission, resulting in a greater number of meetings, e-mails and messages. Because of this, the team members forget the aligned processes, and it became necessary to prepare meeting minutes and formalize decisions and agreements made.

## 4.5 Productivity

Productivity was related to factors such as the work environment, adaptability, focus and distractions. For most managers, teams were able to adapt quickly to the new reality in this regard, and in some cases, productivity increased. The performance of software developers has grown proportionately: many of them have reported to managers that they have started to focus more on their day-to-day activities when they are working from home. However, for some managers, productivity remained similar to the face-to-face format.

### 4.5.1 Focus

The focus was responsible for increasing the productivity of some employees. This is because virtual meetings decrease the scope for interruptions, delays, informal conversations and other situations that cause distractions; people spend more time on the same task in virtual mode than in person. According to the managers, the distractions experienced in the company office decreased significantly with remote work, giving people greater concentration on their tasks. This reduction was pointed out as one of the advantages in the home office context: "[...] in the office I was frequently interrupted, I started doing an activity and someone called me, that often happened

and in remote work, you can actually work on what is in your schedule. "The following points were indicated as responsible for increasing the focus: reduction of informal conversations; meetings are virtual; option to use "do not disturb" features in communication tools; less travel time to devote to other tasks.

### 4.5.2 Work Environment

Work environment was also addressed as a decisive factor for home office productivity: many employees do not have an appropriate workstation, which directly affects the employee's productivity, since they lack the comfort offered by the company in the office. The report translates this reality: "At home, in an emergency situation like the one we have been through, not everyone was able to prepare properly.

As far as the pandemic period was being extended, things became less improvised, but not necessarily everyone on the team has an ideal home office structure. "Plus, there is the environment itself: children and family members close to the work environment, making it difficult to focus on activities.

However, despite the presence of that reality in the daily lives of many employees today, this scenario does not originate from teleworking, but from the pandemic, which forces distance and, consequently, distances children from schools and family members from their respective workspaces.

## 4.6 Personal Organization

Personal organization has been mentioned numerous times. In remote work, personal organization was necessary so that the management activities (and other employees) were properly fulfilled, regardless of the operating environment. Thanks to the need for greater agendas and schedules control, it was possible for some managers to follow a previously defined task plan in order to fulfil the expected day-to-day activities. This context favored the managers and employees' personal organization. According to one of the managers: "Self-organization has become much more demanded, and not everyone is able to be self-organized and self-managed". Some of the managers interviewed report that, at the beginning of the pandemic, discipline in the home office was less; over time, this self-organization has increased, in some cases, including in personal activities. A work routine started to be established as in the face-to-face context, with meeting and work schedules and rest, lunch and leisure times.

## 4.7 Working Day Tracking

Managers are responsible for managing not only projects, but people who make them happen. Monitoring the development of the team members of the managers interviewed was affected by the home office in different aspects, from communication to direct people management. Relaxation moments were excluded from work routine and this reality directly interfered in the relationship between managers and their respective teams. It was necessary to increase the frequency of private meetings with the employees, since there are no more casual meetings for the natural development of conversations.

Managers began to monitor people's feelings, tone of voice, and non-verbal language more closely, as there is no visual and face-to-face contact to capture key points for personnel management. Some of the interviewees started managing new teams in a completely remote way, relating only through virtual communication tools. "[...] I lost feeling of how the day-to-day life is, how the team's energy is, the progress of the work. I spend many moments without talking to them and without feeling how things are going". There is no one-off help from collaborator to collaborator, when they are blocked or having trouble. The relationship of trust and proximity between managers and employees has become more challenging, since there are no gaps for building bonds and empathies in the same way as in the face-to-face context. "[...] it is much more natural to focus more on what has to be done and not on the people who are working with us".

## 4.8 Flexibilization

Work flexibility was mentioned, on several occasions in the interviews, as an advantage and a learning experience for the home office, and is considered a permanent change in companies, even after the end of the pandemic context.

### 4.8.1 Schedule Flexibilization

An advantage mentioned was the schedule's flexibility: as examples, one can mention the possibility of scheduling online meetings, which eliminate travel time and can avoid delays. In addition, by viewing online calendars, it is easier to find compatible schedules for everyone involved. The option of not responding instantly to messages received by chat also contributes to the focus on the execution of activities and the flexibility of work shifts.

### 4.8.2 Place Flexibilization

The workplace flexibility is directly related to the possibility found by the managers and their team to perform their activities in places other than the physical office. This was a learning experience presented by a manager who, before the pandemic, worked in person with his team and, even with the possibility of opting for working days in the home office model, he believed that being present in the office brought more benefits for the execution of his tasks. Currently, he identified that the activities developed in a virtual way have the same expected result. The client and stakeholders' relationship also had a positive impact. As access to people became more flexible, there is no longer a need to travel and the communication channels (e-mails, chat, videoconferences) become more accessible, besides the permanent flexibility of hours worked in the home office: before the pandemic, some companies limited the hours that employees could join the home office.

After the forced change of context, some companies started to allow people to work entirely in home office format, even after returning to the office.

### 4.8.3 Hiring Flexibilization

Hiring has become more flexible for companies, since the pandemic has allowed people from different locations and offices to be included in the same team. Previously, managers reported that, when joining a team together, they were limited to professionals located in the same region, which would be an advantage to expand the possibilities of finding people with the best profile to form work teams and was considered as a possible permanent change in the company.

## 4.9 Infrastructure

Different situations related to infrastructure were mentioned.

### 4.9.1 Digital Infrastructure

The change in the way of working has increased the use of online tools. Access to these tools must be guaranteed for all team members, but at the beginning of teleworking, there was a need to adapt to the new format, which is currently stabilized. This situation allowed a greater perception of the manager in the process of starting a new team: "[...] we have to ensure that everyone has access and that everyone has a license to access the standard tools". The possible lack of connection was considered a new risk,

because in the space provided by the company, people have a standardized structure, designed for performance and usage time. With little time to adapt to remote work in their homes, some employees have connection problems as they do not have the same connection conditions as in the office and, for these reasons, the quality of work or communication may be compromised.

#### 4.9.2 Physical Infrastructure

Despite the initial period of adaptation to the new work format, currently the teams are already adjusted to the new structure and routine. Project managers recognized the greatest need to ensure that all people have the necessary equipment to do the job, such as a suitable computer, camera and microphone, as well as an ergonomic and comfortable environment.

However, the physical structure presents a greater challenge when it needs adjustments, especially in an emergency. In an effort to reduce the difficulty of adaptation, managers needed to provide accessories, table and chair for employees. This new process is even being included in the stage of forming new teams and hiring new employees. In response to this new scenario, the gradual reopening of some offices is being considered by some companies soon, and it will bring new processes and rules to ensure the health of all employees.

#### 4.10 Delivering

Managers answered questions about the influences of the work situation on delivering value and measuring results.

##### 4.10.1 Delivering Value

Part of the interviewees noticed small improvements in the teams' value delivery, but almost insignificant when compared to the face-to-face work model: "The fear of remote work having too much impact on deliveries was demystified by the pandemic, which forced a movement that was slowing down". The following is an account of the improvements identified in the delivery of teams' value: "Most managed to adapt well and had increased productivity, mainly the developers, who reported being able to focus much more when they are at home". Managers who saw no improvement noticed that their team's delivery speed dropped at the start of the pandemic, during the adaptation period. Other managers reported not noticing differences in their teams' value delivery. One report cited the balance between people who adapted better to the remote

work situation and others who did not, balancing the result of delivering value. The following quote presents a reflection on the adaptation of the work: "We had an organizational climate survey that ran in June of this year and the result this year was even better than last year. In other words, if the pandemic had generated a very bad feeling in relation to the business execution, in which the processes had not been working, the deliveries would not been happening, or if the quality had fallen, certainly this research would have shown".

##### 4.10.2 Results Measurement

When questioning the managers about the way of measuring and precision of the results, all of them replied that there were no differences caused by the change in the way of working. The metrics and tools used have remained the same. Report sending on the project changed during the pandemic: before, it was sent only to the client, but it started to be sent to everyone on the team, so that everyone remains informed about the results of the metrics and progress of the project.

## 5 CONCLUSION

It was possible to raise considerations about the project management processes used during the development of software projects in the context of the home office. Other points related to software development teams were also affected by the context of social distance. The manager's communication with employees and customers has undergone significant changes. The tools were divided between new tools adopted and tools that were already used in the face-to-face context, but which had their use intensified. Some scenarios are consequences of different origins, between consequences of the pandemic and consequences caused by the home office. Many learnings and new working ways will be applied in project management after the pandemic and in general, companies continue to discuss permanent changes to be applied. Results delivery as well as how to obtain team metrics have not changed significantly.

This work presented limitations, such as the researchers' bias and the pandemic context, which brought some adversities: difficulty in contacting the interviewees for an invitation to participate and delay in their return. This reduced the numbers of interviewed and the time foreseen for the analysis of results, since the realization of private individuals

depended on the availability of managers. In addition, the interviews were conducted via the Zoom video conferencing tool, and unforeseen circumstances such as a lack of connection delayed the progress of some of the scheduled interviews.

There has been difficulty in identifying in the scientific literature works similar to this one.

Authors believe that new research can be developed considering the changing work context during pandemic. It is possible to accomplish comparative research after the pandemic, studies dedicated to the consequence of the pandemic in communication and its effects and research dedicated to the use of new tools for project management in the home office.

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