

FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO

# Managing portfolio and project information in research organizations

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DISSERTATION

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**FEUP** FACULDADE DE ENGENHARIA  
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Mestrado em Engenharia Informática e Computação

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# Resumo

Nas últimas décadas, a gestão de portfólio de projetos ganhou proeminência em vários setores. Embora tenha sido inicialmente explorada nos setores empresarial e industrial, o seu âmbito expandiu-se para abranger praticamente todas as áreas. Apesar da sua reconhecida importância, existe uma lacuna notória, tanto de estudos como de aplicação, nos centros de investigação. Esta dissertação pretendeu mitigar esta lacuna, promovendo a implementação de práticas de gestão de portfólio de projetos através da adaptação e otimização de uma plataforma, aumentando assim a eficiência organizacional. O trabalho foi desenvolvido no Centro de Investigação de Sistemas e Tecnologias (SYSTEC) sediado na Faculdade de Engenharia da Universidade do Porto. O trabalho desenvolvido centrou-se na adaptação de uma plataforma existente e no aperfeiçoamento de processos de apoio ao SYSTEC em quatro níveis de gestão: portfólio, projeto, tarefa e conhecimento. A metodologia consistiu na realização de três tarefas: i) Identificação de requisitos; ii) Seleção da plataforma de gestão; iii) Desenvolvimento da plataforma, processos e *templates*.

O trabalho desenvolvido iniciou-se com uma pesquisa bibliográfica com o objetivo de identificar as boas práticas de gestão de projetos, as ferramentas e processos disponíveis e as necessidades gerais da gestão da inovação. A pesquisa bibliográfica foi também um passo fundamental para reforçar a importância dos processos simplificados e da gestão eficaz da informação na otimização da comunicação, acessibilidade da informação e documentação do conhecimento nas organizações de investigação. Posteriormente, foram recolhidos os requisitos específicos do laboratório para orientar o desenvolvimento da solução. Foi então realizada uma avaliação de várias plataformas de gestão de projetos para identificar a plataforma mais adequada às necessidades do SYSTEC. Através de uma comparação sistemática, o Microsoft Teams surgiu como a escolha ideal, oferecendo uma vasta gama de funcionalidades e integrações que se alinhavam com os requisitos de gestão de projetos do SYSTEC. Após a seleção da plataforma, foi implementada a customização para adaptar o Microsoft Teams aos requisitos específicos do SYSTEC. Isto envolveu o desenvolvimento de *templates*, incluindo a Atualização de Estado, as Atas de Reunião e o Repositório de Conhecimento, para facilitar a documentação eficiente e a partilha de informações relacionadas com o projeto. O processo de customização foi uma colaboração iterativa e interativa com os investigadores do SYSTEC, permitindo um feedback contínuo e o aperfeiçoamento da solução.

A implementação da plataforma Microsoft Teams customizada apresentou resultados altamente promissores. Nos inquéritos, os investigadores manifestaram um elevado nível de satisfação com a utilidade, a facilidade de utilização e a probabilidade de utilização da plataforma. Além disso, foi recomendado que a implementação da solução em projectos futuros permitindo ao SYSTEC recolher feedback adicional, validando a eficácia e a satisfação dos utilizadores da plataforma personalizada. Esta abordagem apoia uma mentalidade de melhoria contínua, permitindo ao SYSTEC otimizar ainda mais as suas práticas de gestão da informação do portfólio e dos projetos.



# Abstract

In recent decades, project portfolio management has gained prominence in several sectors. While initially explored within the business and industrial sectors, its scope has expanded to encompass virtually every field. Despite its recognized importance, there is a noticeable gap, of both studies and application, in research centers. This dissertation aimed to mitigate this gap by promoting the implementation of project portfolio management practices through the adaptation and optimization of a platform, thus enhancing organizational efficiency. The work was developed in the Research Center for Systems and Technologies (SYSTEC) hosted in the Faculty of Engineering of University of Porto. The work undertaken focused on customizing an existing platform and refining processes to support SYSTEC across four key management levels: portfolio, project, task, and knowledge. The methodology comprised the performance of three major tasks: i) Identification of requirements; ii) Selection of management platform; iii) Development of the platform, processes and templates.

The developed work began with a literature search in order to identify good project management practices, available tools and processes, and overall needs of innovation management. The literature search was also a key step to strengthen the importance of streamlined processes and effective information management in optimizing communication, information accessibility, and knowledge documentation within research organizations. Subsequently, the specific requirements of the laboratory were gathered to guide the development of the solution. An evaluation of various project management platforms was then conducted to identify the most suitable platform for SYSTEC's needs. Through a systematic comparison, Microsoft Teams emerged as the optimal choice, offering a wide range of features and integrations that aligned with SYSTEC's project management requirements. Following the platform selection, customization was implemented to tailor Microsoft Teams to SYSTEC's specific requirements. This involved the development of templates, including the Status Update, Meeting Minutes, and Knowledge Repository, to facilitate efficient documentation and sharing of project-related information. The customization process was an iterative and interactive collaboration with SYSTEC's researchers, allowing for continuous feedback and refinement of the solution.

The implementation of the customized Microsoft Teams platform yielded highly promising results. In surveys, researchers expressed a high level of satisfaction with the platform's usefulness, user-friendliness and likelihood of use. Furthermore, it was recommended that implementing the solution on future projects would enable SYSTEC to gather additional feedback, validating the effectiveness and user satisfaction of the customized platform. This approach supports a continuous improvement mindset, allowing SYSTEC to further optimize their portfolio and project information management practices.

**Keywords:** Portfolio. Project Management. Research Organizations.

**ACM Classification:** Social and professional topics → Professional topics → Management of computing and information systems → Project and people management → Project management techniques





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# Abbreviations

PM	Project Management
PPM	Project Portfolio Management
RTOs	Research and Technology Organisations
R&D	Research and Development
C2SR	Cyber-physical Control Systems and Robotics Laboratory
LMER	Laboratory for Electric Mobility and Renewables
LSCOE	Laboratory for Systems Control Optimization and Estimation
DIGI2	Laboratory for Digital and Intelligent Industry
SYSTEC	Research Center for Systems and Technologies
FEUP	Faculty of Engineering of University of Porto
IT	Information Technology
CSI	Cloud System Information
EDGE	Edge Devices and Computing
RIC	Robotic Information Collaboration
OPPM	One Page Project Manager
PMI	Project Manager Institute
NPD	New Product Development
PMO	Project Management Office
PMBoK	Project Management Book of Knowledge
MS Teams	Microsoft Teams
EARTO	European Association of Research and Technology Organizations
IPQ	Instituto Português de Qualidade / Portuguese Quality Institute
RD&I	Research, Development and Innovation
IMS	Innovation Management System
PDCA	Plan-Do-Check-Act
JIT	Just In Time
TQM	Total Quality Management
WP	Work Package
KPI	Key Performance Indicator
SME	Small-Medium Enterprises
HEI	High Education Institutions



# Chapter 1

## Introduction

In this chapter, it is presented the introduction to this work. In the Section 1.1 it is possible to understand the context of this dissertation, in the Section 1.2 is explained the motivation to undertake this work, in the Section 1.3 the goals of the work are presented and in the Section 1.4 the whole document structure is presented.

### 1.1 Context

The study of project management (PM) has garnered significant attention in recent decades, finding application in diverse domains. Initially explored within the business and industrial sectors, its scope has expanded to encompass virtually every field today [61]. Presently, the notion of managing projects without leveraging digital tools, whether through intricate platforms or straightforward Excel spreadsheets, is inconceivable. Consequently, there arises a necessity to employ information technology expertise and specialized proficiencies in the development of novel platforms or the enhancement of existing ones. Notably, the sole prerequisite for project management is the presence of a project itself.

Furthermore, like the concept of project portfolio encompasses a collection of projects, programs and processes that are managed together with the intent of financial and strategic optimization of the organization, the concept of project management extends beyond individual projects and encompasses project portfolio management. Project portfolio management involves the strategic management of an organization's project portfolio to align it with overall business objectives and priorities. It encompasses the selection, prioritization, and resource allocation to various projects within the portfolio [14]; [45]. In addition to project portfolio management, effective project management encompasses the principles of task and knowledge management. Task management involves organizing and tracking individual project activities to ensure timely completion and effective collaboration among team members. Knowledge management, on the other hand, focuses on capturing, organizing, and disseminating project-related information and expertise to enhance decision-making and promote continuous learning within the organization. By integrating

task and knowledge management practices into project management processes, researchers can optimize project execution and harness valuable insights for future endeavors [28]; [23]. Moreover, project management and portfolio management techniques find valuable application in the realm of research and development (R&D). By implementing these systematic processes and leveraging automation, researchers can effectively streamline project management activities. This enables them to allocate more time and attention to other critical tasks and research endeavors, while still ensuring efficient coordination, resource allocation, and milestone tracking [61].

Taking that into account, the work presented in this dissertation was developed in the Research Center for Systems & Technologies (SYSTEC). SYSTEC is a prominent research unit for systems and technologies that is based in the Faculty of Engineering of the University of Porto (FEUP). The primary mission of SYSTEC is to push the boundaries of systems and computer engineering through pioneering research, fostering collaboration, and nurturing talent, ultimately making significant contributions to scientific knowledge, technological advancements, and societal progress. The research unit is committed to addressing complex real-world challenges and providing valuable insights and solutions to industry and society. SYSTEC's research efforts encompass a broad spectrum of areas, including but not limited to software engineering, artificial intelligence, computer networks, embedded systems, robotics and data science [54].

Figure 1.1 shows a visual representation of the organizational structure of SYSTEC, including its labs and the various kingdoms within the organization [55]. For the purposes of this thesis, the focus was on **DIGI2** lab and more specifically in the **EIT** kingdom and its seven distinct projects.

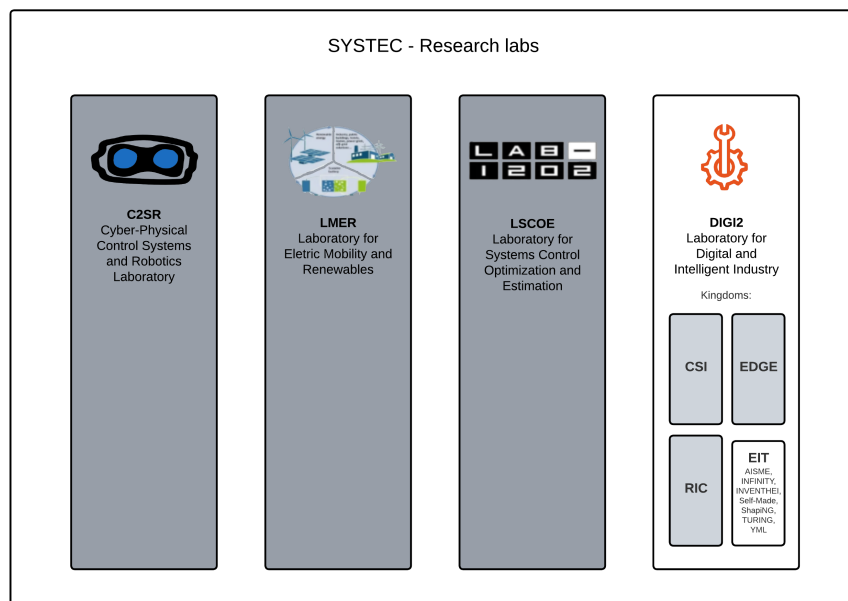


Figure 1.1: SYSTEC Research Labs

It features four distinct laboratories: the Cyber-physical Control Systems and Robotics Laboratory (C2SR), the Laboratory for Electric Mobility and Renewables (LMER), the Laboratory

for Systems Control Optimization and Estimation (LSCOE), and the Laboratory for Digital and Intelligent Industry (DIGI2). The center currently employs 87 researchers who are working on 51 diverse projects, 16 of which are being conducted on an international level [54].

DIGI2 laboratory is currently structured into four distinct kingdoms, each of which focuses on a specific type of project. The first kingdom, known as CSI (Cloud System Information), is dedicated to projects related to data. The second kingdom, EDGE (Edge Devices and Computing), is primarily focused on improving and innovating devices. The third kingdom, RIC (Robotic Information Collaboration), is dedicated to the development of robotic arms and other robotic systems. Finally, the fourth kingdom, EIT, collaborates on projects with EIT manufacturing<sup>1</sup>. Each of the kingdoms in the lab features an assortment of projects, with each project assigned to a single project manager. However, each researcher may be assigned to more than one project.

However, it is worth noting that the application of project management practices at SYSTEC was still an area that required further attention and improvement, and that is where this thesis had its focus. While the center boasts a rich research portfolio, there was room for enhancing its project management methodologies in order to optimize operations and maximize outcomes. By recognizing the significance of implementing efficient project management practices, SYSTEC could unlock immense potential, enabling researchers to allocate their time and expertise more effectively, foster collaboration, and ultimately achieve greater success in their R&D undertakings [11].

## 1.2 Motivation

The motivation for the development of this work arose from a personal interest in information technology, its multiple applications and, specially, how it can be used to optimize project portfolio management. The possibility to develop a project in this area was solidified during a meeting with the director of DIGI2, who is also the supervisor of this thesis. In this meeting, it was pointed out that there was no project management platform that would allow i) the adoption of standardized management procedures; ii) the access of properly organized information; and iii) a quick identification of relevant information of the status of projects and tasks (e.g., completed tasks, tasks to be completed, partners contacts). The primary issue identified as the source of these challenges was the fact that many projects were assigned to a single researcher who is responsible for all aspects of the project, including, but not limited to, research, documentation, and management. It is important to note that most researchers do not possess a background in project management and may not have the skills and knowledge required for implementing the best project management practices. Additionally, it should be noted that the COVID-19 pandemic has forced SYSTEC to adapt their processes and procedures to allow for remote work, ensuring the continuity of their projects.

It was recognized that leveraging computer knowledge and skills could prove to be a valuable asset in optimizing project management platforms. The versatility and potential of information

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<sup>1</sup><https://www.eitmanufacturing.eu/>

technology (IT) in project management are particularly noteworthy in the present era. The advent of digital platforms has revolutionized the way tasks are performed, eliminating the need for manual processes that were time-consuming and inefficient [11].

The identification of these challenges and the recognition of the potential of IT in project management served as significant motivations for undertaking this dissertation. By exploring and proposing innovative solutions that leverage IT in project management, this research aims to address the aforementioned issues and contribute to the advancement of project management practices within the research center.

### 1.3 Objectives

According to what was described above, some issues that require improvement could already be identified, such as, the lack of standardization of processes, the poor organization of information and the lack of overview of the projects' information.

It is also crucial to consider common problems associated with project management, which are unclear goals, scope creep, budget constraints, poor communication, team conflicts, mismatched skills, lack of accountability, and unrealistic deadlines [56]. These issues are substantiated by scholarly sources, with, for example, Martinsuo et al. (2014) [35] discussing the issue of ambiguous goals and Zschocke (2012) [61] addressing the constraints imposed by budgetary considerations. Further exploration of these challenges will be undertaken in subsequent chapters to provide a more comprehensive understanding.

Considering the already identified gaps and problems, this work aimed to answer the following questions:

- RQ1: Is it possible to optimize the project management processes of the research center?
- RQ2: Is it possible to customize a platform in order to meet the project management needs of the research center?
- RQ3: Does the fact that the platform is customized to the laboratory promote the adherence of researchers?

Taking this into consideration, the main goal of the work developed for this dissertation was to optimize the management processes at four distinct management levels – the portfolio, project, task, and knowledge – thus freeing up researchers' time and resources by enabling them to concentrate on research and development activities instead of time-consuming project management related tasks.

Additionally, this work sought to customize the management tool used in order to enhance its flexibility, adaptability, and user-friendliness. Tailoring it to meet the lab's specific requirements may increase the probability of adoption by researchers, allowing for the establishment of a common platform for all projects. This standardization would ensure the implementation of consistent and streamlined management procedures.

Furthermore, a key goal was also to develop a comprehensive user's manual about the project portfolio management optimized platform, in order to ensure not only that the users have access to the necessary information for its effective utilization but also, to serve as a guide for starting new projects.

## **1.4 Document Structure**

This dissertation is composed of six chapters, according to the following structure:

### **Chapter 1 | Introduction**

Overview of the developed work, including context, motivation, objectives, and document structure.

### **Chapter 2 | State of the Art**

Overview of the state of the art regarding PPM, integrating key concepts to the conceptualization of the work presented in this dissertation. This chapter comprehends all the theoretical foundation of the work presented in this dissertation.

### **Chapter 3 | Problem & Methodology**

Detailed description of the problems that led to this thesis. This chapter also presents the methodology used to address these issues.

### **Chapter 4 | Proposed Solution and Validation**

Presentation of the results obtained in the different steps of the applied methodology. This chapter includes the outcomes achieved throughout the applied methodology, encompassing the identification of needs, platform selection, proposed solution, validation, and subsequent solution enhancements.

### **Chapter 5 | Discussion**

Thorough discussion of the main results and findings.

### **Chapter 6 | Conclusion & Future Work**

Conclusions drawn based on the research and analysis conducted in the previous chapters, identifications of limitations and recommendations, and presentation of suggestions for future work.





## Chapter 2

# State of the Art

In this chapter, an overview of the State of the Art is presented. In the Section 2.1, an historic overview of the four management levels is presented, in the Section 2.2 the role of innovation and investigation in organizations is discussed, in the Section 2.3, there is an overview of the PMBoK and the PDCA cycle, in the Section 2.4 there is an analysis of traditional and agile project management models, in the Section 2.5, there is a study on the OPPM and Gantt chart. Finally, in Section 2.6 there is an overview of the main findings.

### 2.1 Portfolio, Project, Task and Knowledge Management

“In human affairs — political, social, economic, or business — it is pointless to try to predict the future, let alone attempt to look ahead 75 years. But it is possible — and fruitful — to identify major events that have already happened, irrevocably, and that will have predictable effects in the next decade or two. It is possible, in other words, to identify and prepare for the future that has already happened.” (Drucker et. al) [18]

This is also valid when it comes to project management. Indeed, over the past seven decades, there has been extensive discussion and research on project portfolio management (PPM) [61]. The field owes its origins to Markowitz in 1952 who created the portfolio theory, with the initial applications being in the financial investments field [34]. It allowed to determine which mix of projects would have the highest return for a certain level of risk. PPM is commonly defined as a process that aims to achieve four primary objectives: i) maximizing the value of a portfolio of projects, ii) establishing a balanced portfolio, iii) ensuring strategic alignment of projects, and iv) determining the appropriate number of projects based on available resources [14]. Distinctively, the Project Management Institute (PMI) presents a broader view of project management, highlighting that it is about using specific knowledge, skills, tools, and techniques to deliver something of value to people. Whether it is through the development of software, or through the construction of a building or even the expansion of sales into a new market segment [25].

The focus of PPM is to effectively execute and develop active projects while maintaining a well-balanced portfolio in line with the organization’s strategic direction, resource capacity, and

value optimization. Within the New Product Development (NPD) context, PPM has been extensively studied and applied, particularly in companies involved in developing radical or incremental products [15]. However, its application and research are relatively limited in the context of service development within companies [1], and there is currently no apparent research on the utilization of PPM by not-for-profit organizations [6]. To conclude this historical overview of PPM, it is important to highlight a study conducted by Patanakul (2022). The focus of this study was the exploration of the relationship between PPM effectiveness, the level of higher management involvement and the presence of a Project Management Office (PMO). The findings highlight several factors that contribute to enhancing PPM effectiveness, including the existence of a PMO and effective communication with higher management. It was observed that having a dedicated individual responsible for managing the PMO, who maintains regular contact with all projects, enables them to have a comprehensive overview and stay informed about project progress. This close connection and communication play a significant role in improving PPM effectiveness [42]. PMOs are responsible for establishing standard processes and methodologies, including project management information systems. According to the Project Management Body of Knowledge (PMBok), there are three types of PMO structures that vary in the level of control and influence they exert over projects: supportive, controlling and directive. Supportive PMOs play a consultative role, offering templates, best practices, training, access to information, and lessons learned from other projects. They serve as repositories of project-related knowledge with a low degree of control. Controlling PMOs provide support while enforcing compliance through various means, such as project management frameworks, methodologies, templates, and governance requirements. On the other hand, directive PMOs directly manage projects, taking complete control over them [26].

Now that a solid grasp on PPM and its past evolution was attained, it is imperative to acknowledge the criticality of task and knowledge management in completing successful projects. As a rule, projects entail numerous tasks or activities signifying that efficient task management lies at the core of project management. In addition, research projects often have the primary objective of generating and disseminating new knowledge, which underlines the importance of effective knowledge management. According to Das (2021), each project consists of a set of tasks that must be completed within a deadline. Good task management means managing a project from conception to completion. Some problems that may emerge from poor task management may include a lack of visibility on task progress, email dependency hampering work, a lack of structured performance reports, an absence of effortless automation, and dealing with scope creep. That way, to ensure the success of the project it is necessary to ensure good task management [17]. Fischer and Ostwald (2001) propose that problem-solving and learning are closely linked, as problems are unique and require solutions to be constructed in the moment. From this perspective, employees are the primary source of knowledge creation, rather than managers. Additionally, knowledge is considered a by-product of work. The main challenges in knowledge management include establishing shared understanding among employees, empowering communities to take ownership of knowledge, and managing information overload. These challenges are particularly relevant in the engineering field, where knowledge sharing, and collaboration are essential for successful project

outcomes [24].

In short, project management involves a lengthy process of approving and handling each project separately. In this area, the emphasis is on a single project and its scope, time frame, and budget. The project manager is responsible for assessing its performance. Whereas in PPM, the portfolio manager has to balance different projects with the same strategic goals and compete for the same resources. PPM is generally a dynamic decision-making process where new projects are evaluated, approved, and prioritized. Existing projects might be canceled or have their resources allocated to a new one. The main goal of portfolio management is to provide procedures and mechanisms that facilitate project prioritization at each review point in a timely, methodical, and effective manner [48].

### 2.1.1 Management Platforms

As mentioned in Section 1.1, it is inconceivable to manage projects without the use of a digital tool in the present times, and so it was crucial to analyze the most relevant and prevalent platforms currently in the market for that purpose. The ones chosen to be studied in more detail were: JIRA, Wrike, Monday.com, Asana, ClickUp, Zoho Project, Basecamp, Smartsheet, and Microsoft Teams.

#### JIRA

JIRA is owned by an Australian company called Atlassian and its only one in a group of products<sup>1</sup> made by the company. It is based on four key concepts: issue, project, board, and workflow. It started to be developed in 2002 and its original goal was to be a tool for software development, but it has been adopted by different types of companies.

According to (Filion et. al, 2017) [21], the biggest advantage of JIRA is the tight tracking of requirements with everything else related to it: sub-requirements, tasks, change requests, tests, bugs, project management items, and so on.

JIRA<sup>2</sup> is a project management tool, oriented to agile teams since it allows the creation of sprints and versions. It offers you Scrum and Kanban boards, Roadmaps and a variety of reports and insights. But it doesn't allow documentation collaboration. For that, if a company wants to use an Atlassian product, they need to use Confluence, or if not, use another tool, without the guarantee of integration of information.

The integration is made with products from less known sellers, so it might be a bit complicated to connect or use with some of the tools that are currently used.

In Table 2.1 it's possible to see some information about JIRA regarding pricing<sup>3</sup> and what they offer. They offer a 7-day free trial for the Standard or Premium plan if you wish to expand your team to more than 10 users, and when that comes to an end, you'll have to pay or go back to a smaller team with the Free subscription.

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<sup>1</sup><https://www.atlassian.com/software>

<sup>2</sup><https://www.productplan.com/glossary/jira/>

<sup>3</sup><https://www.atlassian.com/software/jira/pricing>

Table 2.1: JIRA information and features

~	Free	Standard	Premium	Enterprise
Price <sup>a</sup>	\$0	\$7,75	\$15,25	-
Max Users	10	35000	35000	35000
Storage	2 GB	250 GB	Unlimited	-

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<sup>a</sup>user/month

## Wrike

Wrike was founded in 2006 and acquired in 2021 by Citrix Systems. It's a cloud-based project management software that takes into consideration team collaboration and also external contributors.

They offer<sup>4</sup> a selection of templates to ease the transaction into the platform. Wrike offers a wide variety of views: table, boards, Gantt charts, analytics, etc. It allows integration with multiple well-known tools, such as Google Drive, Microsoft Teams and Github.

When it comes to support<sup>5</sup>, Wrike not only offers contact forms and help forums, with plenty of video tutorials and guides, it also has a phone support line.

In Table 2.2 it's possible to see some information about Wrike regarding pricing<sup>6</sup> and what they offer. They offer a 14-day free trial for the Business plan, and when that comes to an end, you'll be downgraded to the Free plan.

Table 2.2: Wrike information and features

~	Free	Team	Business	Enterprise	Pinnacle
Price <sup>a</sup>	\$0	\$9,80	\$24,80	-	-
Max Users	Unlimited	2-25	5-200	5-Unlimited	5-Unlimited
Storage	2 GB/account	2 GB/user	5 GB/user	10 GB/user	15 GB/user

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<sup>a</sup>user/month

## Monday.com

Founded in 2012, Monday.com<sup>7</sup> is an open platform that allows the creation of tools that can help in every aspect of the work. It combines build-blocks, like different apps and integrations.

It gives you the possibility to view the information in a variety of views, like table, Gantt, cards, kanban, calendar, etc. It has the ability to integrate with other tools, like Gmail, Outlook, Slack, MS Teams, Github.

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<sup>4</sup><https://www.techrepublic.com/article/wrike-review/>

<sup>5</sup><https://www.fool.com/the-ascent/small-business/project-management/wrike-vs-jira/>

<sup>6</sup><https://www.wrike.com/price/>

<sup>7</sup><https://www.g2.com/products/monday-com-monday-com/reviews>

In Table 2.3 it's possible to see some information about Monday.com regarding pricing<sup>8</sup> and what they offer. They offer a 14-day free trial for the Pro plan, and when that comes to an end, you'll be downgraded to the Individual plan.

Table 2.3: Monday.com information and features

~	Individual	Basic	Standard	Pro	Enterprise
Price <sup>a</sup>	\$0	\$10	\$12	\$20	-
Max Users	2	Unlimited	Unlimited	Unlimited	Unlimited
Storage	500 MB	5 GB	20 GB	100 GB	1000 GB

<sup>a</sup>user/month

### Asana

Asana<sup>9</sup> was founded by former Facebook executives, Dustin Moskovitz and Justin Rosenstein in 2008. The platform was created due to their own need for a platform to manage projects to replace the back and forward of emails so that they could focus on their work. It was released to the public in 2012 and it's currently one of the most popular project management tools.

This platform has the habitual project management views, such as list, board, kanban, Gantt charts and calendars but it also offers a mobile application both in iOS and Android to allow you to continue your work from wherever you are. One big difference from the platforms seen so far, is the ability to create workflows that could greatly impact the research center for processes like onboarding or weekly status updates. They also have a place to communicate inside the team, which makes this the first platform both for project management and communication that we have seen so far. It also has integration with a lot of other tools and platforms, such as Slack, MS Teams, Power BI, etc.

In Table 2.4 it's possible to see some information about Asana regarding pricing<sup>10</sup> and what they offer. They offer a 30-day free trial for the Business plan, and when that comes to an end, you'll be downgraded to the Basic plan.

Table 2.4: Asana information and features

~	Basic	Premium	Business	Enterprise
Price <sup>a</sup>	\$0	\$12	\$27	-
Max Users	15	Unlimited	Unlimited	Unlimited
Storage <sup>b</sup>	Unlimited	Unlimited	Unlimited	Unlimited

<sup>a</sup>user/month

<sup>b</sup>100MB p/ file

<sup>8</sup><https://monday.com/pricing>

<sup>9</sup><https://asana.com/company>

<sup>10</sup><https://asana.com/pricing>

### ClickUp

Founded in 2017, ClickUp<sup>11</sup> is a cloud-based project management and productivity tool. The idea to create the tool came from Zeb Evans' frustration of having to use multiple tools to manage his personal and professional tasks.

This platform has the expected views for a project management tool, and it also has a communication section. The bigger selling point of this platform is the integration of a documentation panel in each project and other tools, like a whiteboard that can be used for brainstorming for example and also embedded pages for YouTube, Google Docs, Figma and others. There are also other views that can only be accessed with the paid subscription, like forms and team view. The free trial gives you access to the Unlimited plan for 15 days.

In Table 2.5 it's possible to see some information about ClickUp regarding pricing<sup>12</sup> and what they offer. In ClickUp the Free plan is forever.

Table 2.5: ClickUp information and features

~	Free	Unlimited	Business	Business Plus	Enterprise
Price <sup>a</sup>	\$0	\$5	\$12	\$19	-
Max Users	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Storage	100 MB	Unlimited	Unlimited	Unlimited	Unlimited

<sup>a</sup>user/month

### Zoho Project

Founded in 1996, Zoho Corporation<sup>13</sup> was founded by Ridhar Vembu and Tony Thomas and it is a set of cloud-based tools that were initially focused on software development and IT services. Zoho Projects, the company's project management tool, was launched in 2006.

This tool provides a very detailed view of everything related to the business, not only managing the different projects, but its human resources and customer relationships, the interface is understandable but a bit overwhelming. When it comes to features it has every feature that you can imagine but only in the most expensive plan. In the Free plan, there are a couple features that are simple but are behind a paywall, like subtasks or a Gantt view for example. Also, one of the disadvantages of this platform is the limited storage. When it comes to integration, Zoho Corporation has a separate service for that, that is called Zoho Connect, currently it has integration with a more limited number of apps, like Asana, Calendar and Github, but you can request integration with other tools. There is no integration with Microsoft 365 because Zoho Corporation has a service for each one of them.

In Table 2.6 it's possible to see some information about Zoho regarding pricing<sup>14</sup> and what they offer. They offer a 10-day free trial for any of the paid plans, and when that comes to an end, you'll be downgraded to the Individual plan.

<sup>11</sup><https://clickup.com/about>

<sup>12</sup><https://clickup.com/pricing>

<sup>13</sup><https://www.zoho.com/about-us.html>

<sup>14</sup><https://www.zoho.com/projects/pricing-comparison.html>

Table 2.6: Zoho information and features

~	Free	Premium	Enterprise
Price <sup>a</sup>	\$0	\$5	\$10
Max Users	3	Unlimited	Unlimited
Storage	10 MB	100 GB	120 GB

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<sup>a</sup>user/month

### Basecamp

Jason Fried, Carlos Segura, and Ernest Kim founded Basecamp<sup>15</sup> in 2004 with the initial focus being web design services.

This platform is fairly different from the ones analyzed so far, the views are not the typical project management ones, like a list view, but the information is separated into different cards that hold the information. The predefined cards are message board, where you can post announcements and keep feedback on-topic; to-dos, in here you can separated the to do items by each person or by topic; docs and files, where you would save all the important documentation but is not collaboration based; campfire, a place to chat casually and share and finally, schedule, that allows a shared schedule and can be integrated into Google Cal, iCal or Outlook.

In Table 2.7 it's possible to see some information about Basecamp regarding pricing<sup>16</sup> and what they offer. They offer a 30-day free trial for any of the paid plans, and when that comes to an end, your account and information will freeze and become inaccessible until you choose a plan and add a credit card.

Table 2.7: Basecamp information and features

~	Basecamp	Pro Unlimited
Price	\$15 user/month	\$299 month
Max Users	Unlimited	Unlimited
Storage	500 GB	5 TB

### Smartsheet

Founded in 2005 by Mark Mader and Brent Frei. The company was initially called Entitlenet<sup>17</sup> and the main focus was on developing a platform for web-based project management and collaboration.

When it comes to functionalities, this platform is very similar to Excel, the main page is a table where you can put all your tasks, assign them to someone, give them a deadline and check their status, the columns are fully customizable and you can add more depending on your needs. The main difference to Excel is that you can attach files to each task. It is also possible to create

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<sup>15</sup><https://basecamp.com/about>

<sup>16</sup><https://basecamp.com/pricing>

<sup>17</sup><https://www.smartsheet.com/about>

fully customizable reports and dashboards that allow you to have an overview of your project and its status.

In Table 2.8 it's possible to see some information about Smartsheet regarding pricing<sup>18</sup> and what they offer. They offer a 30-day free trial for any of the paid plans, and when that comes to an end, your account and information will freeze and become inaccessible until you choose a plan and add a credit card.

Table 2.8: Smartsheet information and features

~	Free	Pro	Business	Enterprise
Price <sup>a</sup>	\$0	\$7	\$25	-
Max Users	2	10	Unlimited	Unlimited
Storage	500 MB	20 GB	1 TB	Unlimited

<sup>a</sup>user/month

### Microsoft Teams

There is also a panoply of platforms that were not made for project management, but taking into account their adaptability and variety of features, allows them to be used for more than their initial purpose. An example of this is Microsoft Teams, since it is a Microsoft tool, it has integration with all the other company' products, such as SharePoint, OneDrive, Outlook, Planner, Word, Excel, etc. Microsoft Teams is a communication and collaboration platform launched in 2017. It offers chat, voice and video calling, collaboration and file sharing and is available for both desktop and mobile devices. With its integration not only with all Microsoft products, but also others like, for example, Jira, Wrike, and other management platforms studied previously. It can be considered a complete remote working and team collaboration solution.

In Table 2.9 it's possible to see some information about MS Teams regarding pricing<sup>19</sup> and what they offer. It's important to take into consideration that it can be used a Microsoft account existent and that this payment includes other Microsoft products.

Table 2.9: Microsoft Teams information and features

~	Free	Essentials	Business Basic	Business Standard	Business Premium
Price <sup>a</sup>	\$0	\$4	\$6	\$12,50	\$22
Max Users	2	10	Unlimited	Unlimited	Unlimited
Storage	5 GB	10 GB	1 TB	1 TB	1 TB

<sup>a</sup>user/month

<sup>18</sup><https://www.smartsheet.com/pricing>

<sup>19</sup><https://www.microsoft.com/en-ww/microsoft-teams/compare-microsoft-teams-options?market=af>



### Comparison

Table 2.10 presents the comparison between the platforms based on several parameters, in the last two rows there is the average score of each platform and the standard deviation. These metrics were calculated to understand which one was the best platform overall. The parameters chosen to evaluate the platform were availability, performance, its ability to do project management tasks, usability and the support they provided. The data available in the table was collected through a website, TrustRadius, that compares different platforms not only in the project management category ([57]; [58]; [59]) and taking into consideration the reviews left by users [13]. To calculate the mean and standard deviation values, all parameters had the same weight. The best platform will be determined by the highest mean value and the lowest standard deviation value. A low standard deviation value means that the score in the different parameters that were evaluated have closer values between them. One other thing that was considered when comparing the platforms was the ability to communicate within the platform. MS Teams is the only platform that has communication as a basic principle where Jira, Wrike, Monday.com and Smartsheet do not. These platforms allow communication, but it is through add-ons of other platforms (like MS Teams or Slack). And the other platforms that were analyzed have their own communication tool.

The information collected during this study was utilized to select the most suitable platform for the laboratory. For a more detailed analysis, please refer to Subsection 4.2, which takes into account the values presented in the Table 2.10, along with a personal experience with each platform.

Table 2.10: Comparison between the analyzed platforms.

$\sim^a$	Jira	Wrike	Monday.com	Asana	ClickUp	Zoho	Basecamp	Smartsheet	MS Teams
Availability	5,3	8,9	8,5	8,4	8,4	9,0	10	-	9,0
Performance	8,0	8,3	8,4	-	7,1	9,0	7,3	10	8,0
Project management	8,5	7,8	8,2	8,0	8,1	8,2	6,6	7,8	7,8
Usability	4,7	8,5	8,8	9,0	8,9	5,6	7,8	8,6	9,0
Support	8,8	8,9	8,3	5,1	9,0	6,8	8,6	8,1	8,1
Mean	7,1	8,5	8,4	7,6	8,3	7,7	8,1	8,6	8,4
Standard Deviation	1,91	0,46	0,23	1,73	0,76	1,49	1,31	0,97	0,58

<sup>a</sup>The values that have been highlighted denote higher magnitudes, except in the case of the standard deviation, where the highlighted values represent lower magnitudes. The values that have been highlighted with the lighter grey shade are also of considerable significance and will be duly taken into consideration.

## 2.2 Innovation and Investigation

When society speaks of innovation, it is natural to associate the term with any instrument, equipment, or software developed on the basis of the latest technological advances. All innovation leads to what Paiva et al. (2018) called “creative destruction”. In this destruction, the “new” stands alongside the “old” and is later superseded, leaving the ‘dead and wounded’ behind, but promoting progress. In this sense, innovation can result from new combinations of means of production, called technological innovation, including product (goods or services) innovation and process innovation [41].

Defining innovation is not an easy task, as there are numerous definitions by different authors [43]. According to Joseph Schumpeter (1930), one of the first to consider technological innovations as an economic lever. According to the author, innovation is the introduction of a new product or the modification of an existing one, a new process of innovation in an industry, the discovery of a new market, development of new sources of raw materials and other organizational changes. Later, another definition of innovation was presented by Kenneth Simmonds (1986) that defines it as new ideas consisting of new products and services, new uses of existing products, new markets for existing products or new methods market and beyond these definitions also suggests innovation as a basic creative process. Later on, in 1991, Evans explains innovation as the ability to discover new relationships, to see things from new perspectives and formulating new combinations of existing concepts. The European Commission Green (1999) highlights the importance of innovation and elucidates the successful production, assimilation and exploitation of novelties in not only the economic but also social environment.

Innovation plays a very important role in the development of organizations and innovation activities can vary greatly from company to company. Overall, innovation activities are scientific, technological, organizational, financial and commercial steps aimed at leading to the implementation of innovations. Many of these procedures are in themselves revolutionary, others cannot have the same characteristic but are necessary steps for the implementation of innovation [39]. Innovation can have four areas, these being product innovation, process innovation, organizational innovation organizational innovation and marketing innovation. Product innovation is related to considerable transformations in the potential of products or services, including generally new goods and services or major improvements in existing products. Process innovation is characterized by considerable changes in production and distribution methods. Organizational innovation refers to the introduction of new organizational methods, such as changes in business practices, in the management of the firm or in external relations. Finally, marketing innovation covers the implementation of new marketing methods, through changes in product design product design, product promotion, and the methods that determine the prices of goods and services [39].

Innovation involves the application of new or existing knowledge to create new value. According to Greg Satell (2017), there are four types of innovation: sustaining innovation, breakthrough innovation, disruptive innovation, and basic research [50]. One key aspect to distinguish between different types of innovation is dependent on the knowledge of the problem and the domain where

it occurs. In figure 2.1, it's possible to visualize a scheme on how the different types of innovation are organized.

Sustaining innovation is the most common form of innovation, which aims to improve existing capabilities in established markets. This type of innovation requires well-defined problems and is often approached through strategies such as roadmapping, design thinking, or traditional R&D labs. On the other hand, breakthrough innovation is required when the problem is well defined but in an unknown domain. This type of innovation involves exploring unconventional ideas and skills to find solutions, and open innovation strategies are often effective in these cases. Disruptive innovation occurs when a new product or service transforms the market, either because of changes in customer needs or advances in technology. This type of innovation often involves a shift in the industry landscape and requires a different set of strategies. Finally, basic research is the foundation of every great innovation, and it involves the discovery of new phenomena that enable new problem-solving techniques. This type of research is often carried out in research divisions and academic partnerships.

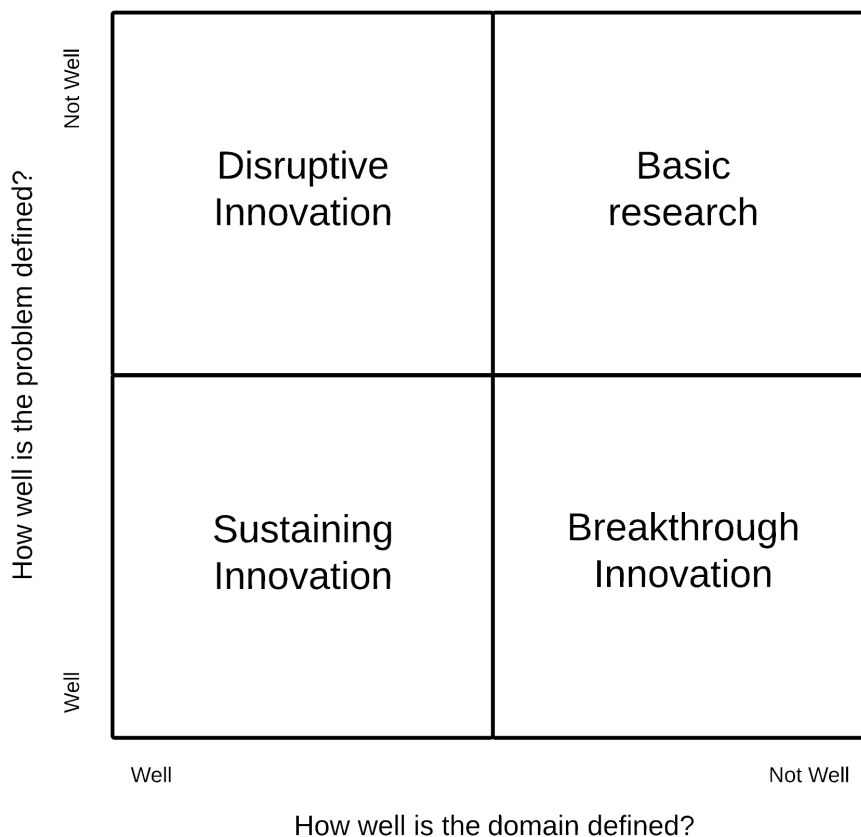


Figure 2.1: Different types of innovation. Adapted from: [50]

In turn, investigation is a systematic and rigorous exploration of a problem, topic, or phenomenon to generate new insights and develop a deeper understanding. According to research methodology [2], there are three types of investigation: descriptive, comparative, and experimental. In figure 2.2, it's possible to visualize a scheme on how to differentiate the different types of investigation.

Investigation Type	Purpose	Includes a Hypothesis?	Has variables (Independent and Dependent)?	Has a Control and Experimental Group?
Descriptive	Draw conclusions	No, but answers a question	No	No
Comparative	Determine relationships	Yes	Yes	No
Experimental	Determine causal relationship	Yes	Yes	Yes

Figure 2.2: Different types of investigation. Source: [2]

Descriptive investigation aims to draw conclusions without a clear hypothesis, but by answering a specific question. It does not require the use of independent and dependent variables, nor the presence of an experimental or control group. Comparative investigation, on the other hand, aims to determine relationships based on a hypothesis, which requires the identification of independent and dependent variables. However, it does not require the use of a control or experimental group. Finally, experimental investigation seeks to determine a causal relationship between variables. It requires the presence of a hypothesis, independent and dependent variables, and both control and experimental groups.

Innovation and investigation have become increasingly important in research and development activities, as they provide a way to develop new ideas, processes, and technologies that can lead to better products, services, and solutions. Portfolio, project, task, and knowledge management (Section 2.1) are essential components that connect innovation and investigation. These management practices provide frameworks, methodologies, and tools to nurture innovation, streamline project execution, optimize task performance, and leverage organizational knowledge, ultimately driving sustainable innovation and achieving strategic objectives.

Research Technology Organizations (RTOs) play a pivotal role in driving technological advancements and promoting innovation through their focus on research and development activities. These organizations are dedicated to conducting thorough investigations and explorations into cutting-edge technologies, scientific discoveries, and novel methodologies. According to the European Association of Research and Technology Organizations (EARTO), Research Technology Organizations (RTOs) are generally non-profit organizations aiming to produce knowledge in diverse research and development (R&D) areas, assuring social and technological innovation [19]. One example of an RTO is the Research Center for Systems & Technologies (SYSTEC) that was presented in the subsection 1.1.

By combining innovation and investigation, organizations can stay competitive in a constantly changing market, adapt to new challenges, and drive growth.

### 2.2.1 Innovation Management

Innovation management enables companies to focus on competitiveness and successful performance. Evidence at national and international levels demonstrates the importance of standardization as a body of knowledge to contribute to business innovation, enhance competitiveness and value creation [7]. Standardization strengthens the capabilities of an organization to align with national and international best practices and develop internal competencies, routines and processes that enable innovation journeys towards excellence.

From an academic and practical point of view, a company that has implemented an Innovation Management System (IMS) according to Portuguese standards will be able to improve knowledge management, creativity and idea management, communication and networking, new product development, engagement and participation, project management as well as reputation and internationalization [7]. The Portuguese Standard is defined in the NP 4457:2021 (Management of Research, Development and Innovation) norm, issued in december 2021 by the Portuguese Quality Institute (IPQ), aiming to establish an innovation model through the definition of requirements for the management system for research, development and innovation (RD&I). This model is supported by interfaces that manage technological and scientific knowledge, the knowledge of the organization itself and the knowledge of the market or society in general. The implementation of a Research, Development and Innovation Management System allows organizations to define an RD&I policy and achieve their innovation objectives [47].

## 2.3 Processes & Tools

### 2.3.1 PMBoK - Project Management Body of Knowledge

The PMBoK is a set of practices in project management that constitutes the basis of project management knowledge from the Project Management Institute (PMI). These practices are compiled as if they were a guide, called the PMBoK Guide [26]. The PMBoK Guide orientates project managers to follow a set of processes, throughout five phases as described below:

**Initiating Phase** Phase where officially the project starts. It includes processes that are performed to initiate new projects or new phases of existing projects. The goal is to get the necessary approvals to start the project or the phase;

**Planning Phase** Phase where all the processes necessary to define the scope of the project, narrow down the goals, and establish a clear course of action to achieve the desired outcome are comprised. This includes creating a comprehensive project management plan outlining the approach and strategy to be followed, including chronograms, interdependencies between activities, allocation of resources involved, cost analysis, etc. In this phase, the auxiliary plans for communication, quality, risks, supplies, and human resources are also developed;

**Executing Phase** Phase that includes the execution of activities defined in the project management plan to meet project specifications. The focus is on executing planned tasks, coordinating resources, and managing stakeholders to ensure that project deliverables are delivered as intended. Any mistakes made in previous phases become evident during this process;

**Monitoring and Controlling Phase** Phase that runs parallel to the execution phase. It includes processes necessary to monitor, review, and control project progress and performance like tracking project activities, comparing actual progress against planned goals, identifying deviations and taking corrective action when necessary;

**Closing Phase** Phase where the processes that are run to formally close a project or phase. The work done is evaluated, through an internal or external audit. The books and documents of the project are finished and all the faults that occurred during the project are discussed and analyzed so that similar errors do not occur in new projects.

Figure 2.3 illustrates the PMBoK methodology and how the different phases work together.

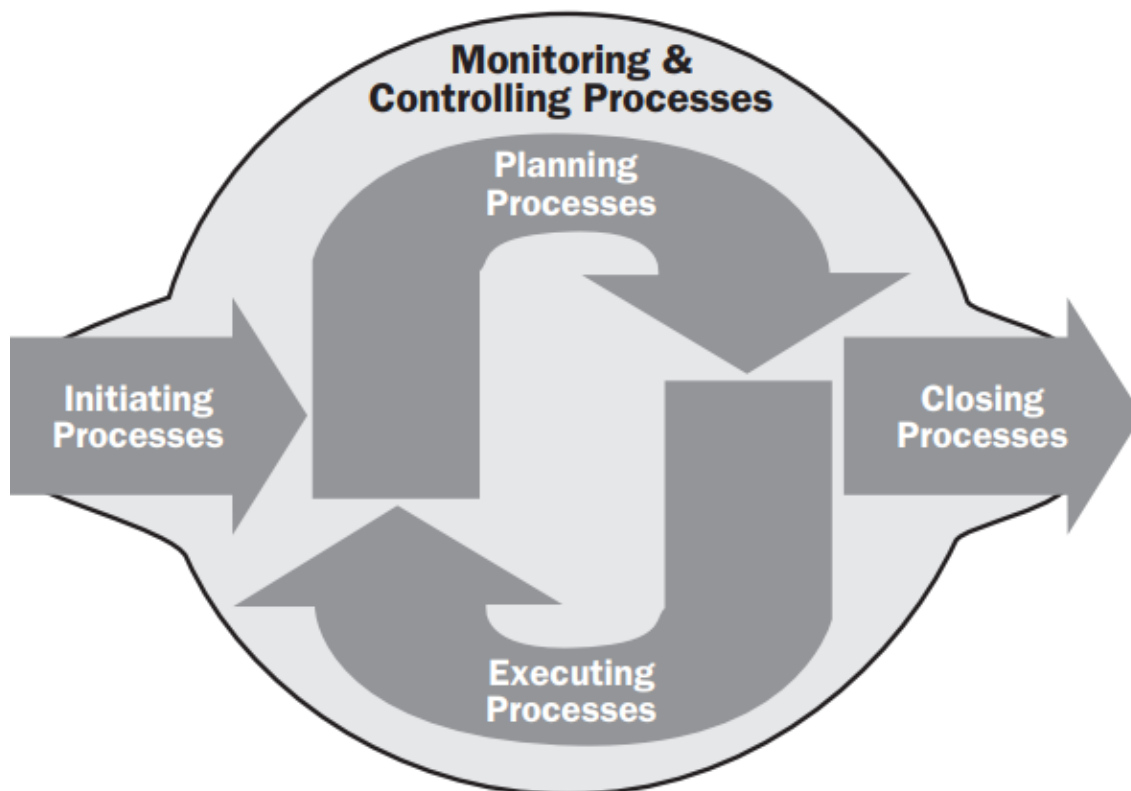


Figure 2.3: Project Management Process Groups. Source: [26]

### 2.3.2 PDCA - Plan, Do, Check and Act

PDCA is a circular process of change that eases the introduction of innovation in organizations that follow it [49]. It is not exactly a project management methodology but rather a development cycle that focuses on continuous improvement. This method is applied to achieve results within a management system and can be used in any company in order to guarantee business success, regardless of the company's area of activity. The cycle begins with planning, where goals are set, problems are identified, and a plan of action is drawn (Plan). Thereafter, the set of planned actions are executed (Do). Next, it is checked if what has been carried out is in accordance with what was planned periodically (Check), and action is taken to eliminate detected defects, improving quality, efficiency and effectiveness, improving execution and correcting possible failures (Act) [27]. Figure 2.4 illustrates the PDCA cycle.

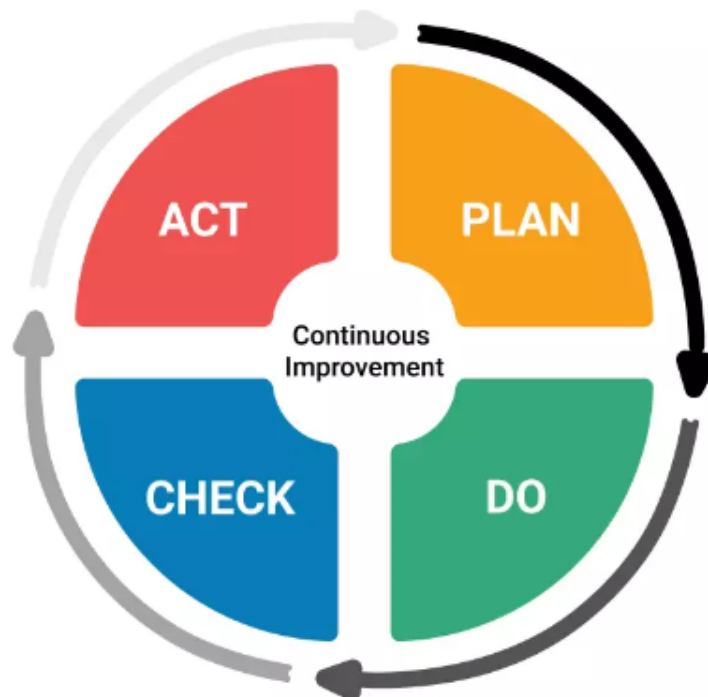


Figure 2.4: PDCA Cycle. Source: [29]

The implementation of the PDCA system can bring great benefits to organizations, such as: continuous improvements through a standardized method; reduction and barrier to resources spent on implementing inferior or ineffective solutions; promotion of group work and cost reduction. As for continuous improvement through a standardized method, the PDCA cycle is a standardized method that offers several advantages, such as the fact that it can be repeated many times on new or recurring problems, and it allows decisions to be made based on objective data and information [22].

## 2.4 Models

### 2.4.1 Waterfall

Well-planned projects, with defined content, which are delivered according to predetermined guidelines are commonly associated with traditional project management. The basic idea behind the traditional approach is that projects are relatively simple, predictable, and linear, with a well-defined content that allows for detailed planning and monitoring without too much change [4]. The principle of the (traditional) waterfall approach is based on the correct definition of each phase, with future steps feeding into the previous steps [38]. In figure 2.5 it is possible to visualize the waterfall methodology.

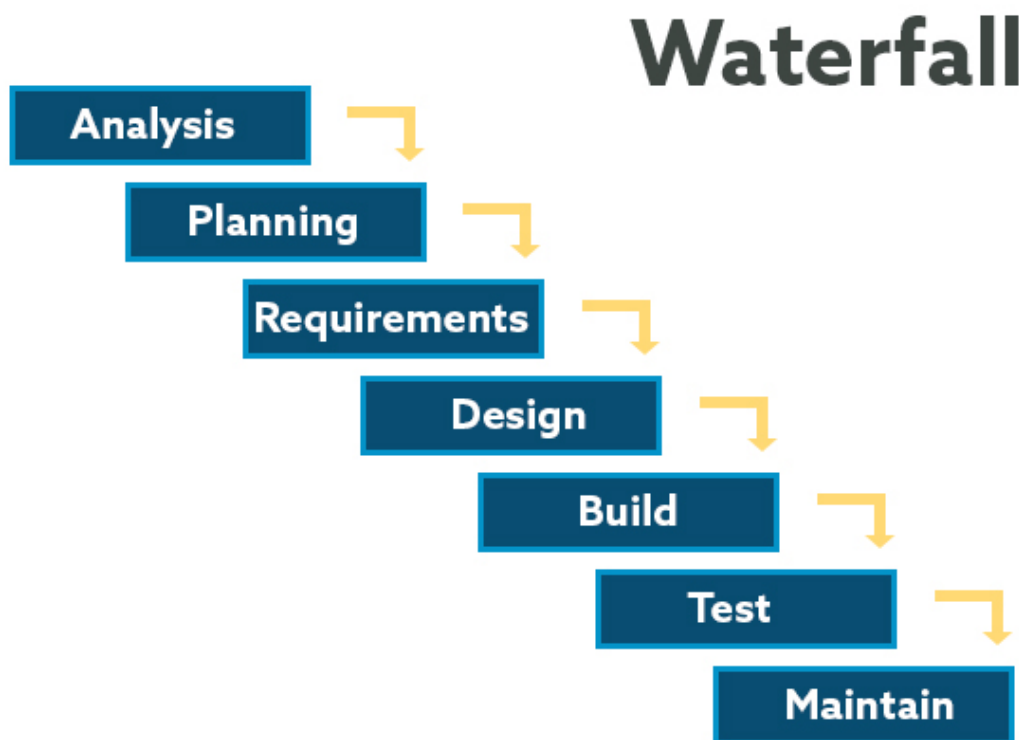


Figure 2.5: Waterfall Methodology. Source: [33]

This approach is presented as a robust one but the main drawback pointed out by the literature is that "one size does not fit all" when it comes to applying the same methods and practices to all projects [12]. It is also important to note that extensive documentation is required from projects that are using a traditional approach whether they are in the process of control or execution [36].

In the 70s, Dr. Royce wrote "Managing the Development of Large Software Systems" and claimed that the waterfall method itself was ineffective and that it would have to be repeated at least twice to be successful. He reiterated that doing everything in one sequence was not realistic.



## 2.4.2 Agile, Lean & Scrum

### Agile

For a long time now, the foundations of agile techniques have been present. In fact, the values, principles, and practices of agile are nothing more than a codification of common sense. The history of agile project management dates back to the 1930s, with Walter Sherwart's Plan-Do-Check-Act (PDCA) approach to project quality. (Section 2.3.2)

"Lean" and "Agile" are exclusive concepts. Lean software development should be used in a stable, predictable, and linear environment. In contrast, the agile approach would benefit from being used in a dynamic, unpredictable, uncertain, and non-linear environment. In short, in a repetitive environment, such as an organization's operations, the lean approach has greater potential [46].

### Lean

The Lean concept can best be characterized as an effective production process that can be traced back to the famous Toyota experience. It is a combination of concepts such as Just in Time (JIT), Total Quality Management (TQM), Supply Chain Management and others [40]; [31]. The Lean Thinking philosophy focuses on eliminating waste and creating value. It is based on five essential and successive principles, namely [60]:

1. Defining value: Lean manufacturing seeks to eliminate sources of waste and create value. Therefore, the starting point of Lean thinking is value. Value can only be defined by the customer, otherwise you run the risk of efficiently providing the customer with something they are effectively not looking for. The greater the value acquired in the customer's perception, the greater the customer satisfaction and therefore the loyalty to the product will increase [16];
2. Value stream: The second Lean principle is to identify and map the value chain. Using the definition of value addressed in the first principle as a reference point, it is necessary to analyze the activities that occur when creating this value from the perspective of the end customer. By reducing and eliminating unnecessary activities it is possible to ensure that the customer gets the product or service they want and, at the same time, that the cost of production is reduced;
3. Flow: Value stream analysis shows, almost always, that three types of actions occur along the value stream: i) activities that add value; ii) activities that do not add value, but are necessary and cannot be eliminated; iii) activities that do not have any associated value, being recognized as Muda, that is, waste that should be eliminated immediately;
4. Pull system: The fourth principle refers to the production of a product or service only when it is requested by the customer rather than creating value in advance (which would result in having to stockpile inventory and waiting for customer to order), which leads to saving significant amounts of time and resources;

5. Perfection: According to Emiliani [20], the successful completion of the previous 4 principles leads to all activities that constitute the value stream becoming transparent. Consequently, the identification of waste by all employees in an organization becomes easier, promoting the search for perfection through continuous improvement actions. The search for perfection should be seen as a continuous and permanent process, with constant involvement from top management to the less specialized workers.

**Lean Office**

Lean Office is the application of the principles of Lean thinking to non-manufacturing and physical activities, i.e. office environments and areas of company management. In this case, the value flow consists of flow information and knowledge [10].

In the Table 2.11 you can see the parallelisms between the traditional Lean that is commonly associated with manufacturing and Lean office.

Table 2.11: Differences between traditional Lean and Lean office

	Traditional Lean	Lean Office
Value	Visible in each step, being objective and well defined	Difficult to see and easy maintenance
Value Flow	Items, materials, components	Information and knowledge
Continuous Flow	Wastes disturb fluidity	The fluidity depends a lot on interactions
Pull Production	Defined by the takt time <sup>a</sup>	Defined by the company's need
Zero Defects	Process repetition without errors	It will generate organizational improvement

<sup>a</sup>Takt time is a calculation of the available production time divided by customer demand.

**3M's Waste**

One important concept when talking about Lean is waste, since one of the main goals of this methodology is to eliminate it. 3M's of Waste are terms often used together that collectively describe wasteful practices that should be eliminated. The terms have Japanese origins and are Muda, Mura, and Muri, that mean respectively, waste, overburden and unevenness. Figure 2.6 provides a visual representation of the 3M's.

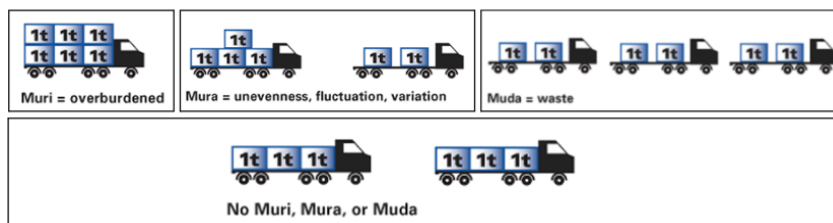


Figure 2.6: Muda, Mura and Muri concepts. Source: [9]

### Scrum

An agile methodology, Scrum is an iterative and incremental development process for project management. Although it has been developed for the management of software projects, it can also be used in software maintenance teams or as a general approach to program management. This methodology is known for having sprints that have the duration of 1-4 weeks. This method consists of breaking down a large process into small blocks (the product backlog) and then working on it. At the end of the sprint, the review and retrospective meeting is held to check that the work has been completed and to move on to the next block of work. It should also be noted that a short meeting (about 15 minutes) is held every day to check how the work went that day, to see if any element needs support or to review the objectives for that sprint. This cycle continues until all the small blocks have been completed and new work steps are defined. The people involved in this management method are the Product Owner, who is responsible for defining deadlines and task priorities, managing the team's profitability and accepting or rejecting the results obtained, the Scrum Master, that helps the team to understand its ideas and, whenever possible, he should be present at the team meetings to act as a helper, because he can remove some obstacles to the progress of the team's work and the Team, that normally consists of 5 to 9 elements, forming a multidisciplinary team [37]. In figure 2.7 there is the process of Scrum that was described.

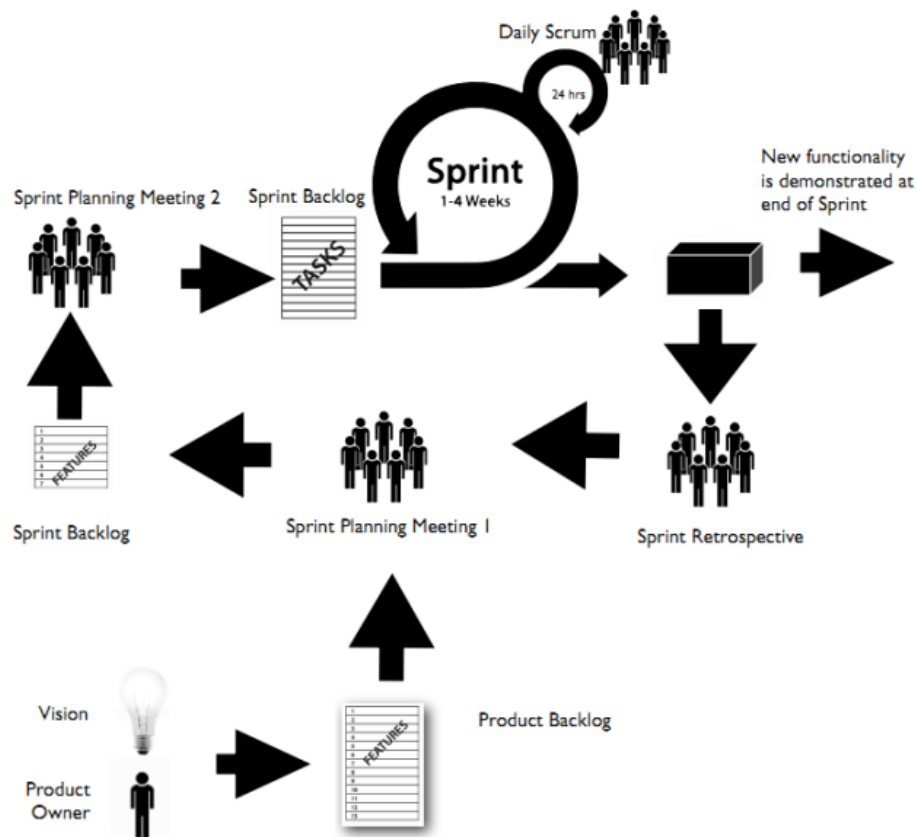


Figure 2.7: Scrum process. Source: [53]

## 2.5 Approach

### 2.5.1 OPPM - One Page Project Manager

The One Page Project Manager (OPPM) is a visualization tool that allows a quickly and in an easily understandable manner communication of all the key information a project's stakeholders need to know. Its primary purpose is to communicate aspects of a project to people not involved in the project, both within and beyond the organization. The OPPM uses icons and colors to provide a visual representation of where a project is at any given time.

This tool is characterized by the fact that all the information on the project under analysis is presented on a single page, making it easier for stakeholders to obtain a brief and objective view of the project. However, the OPPM has some limitations, namely in the way information is perceived, as it is not presented in a very detailed way, but only in a macro view of each concept of the project.

The possible information to be presented on the project page are stakeholders, missions, tasks, deadlines, milestones, prerequisites, costs and more [8]. An example of an OPPM is present in figure 2.8.

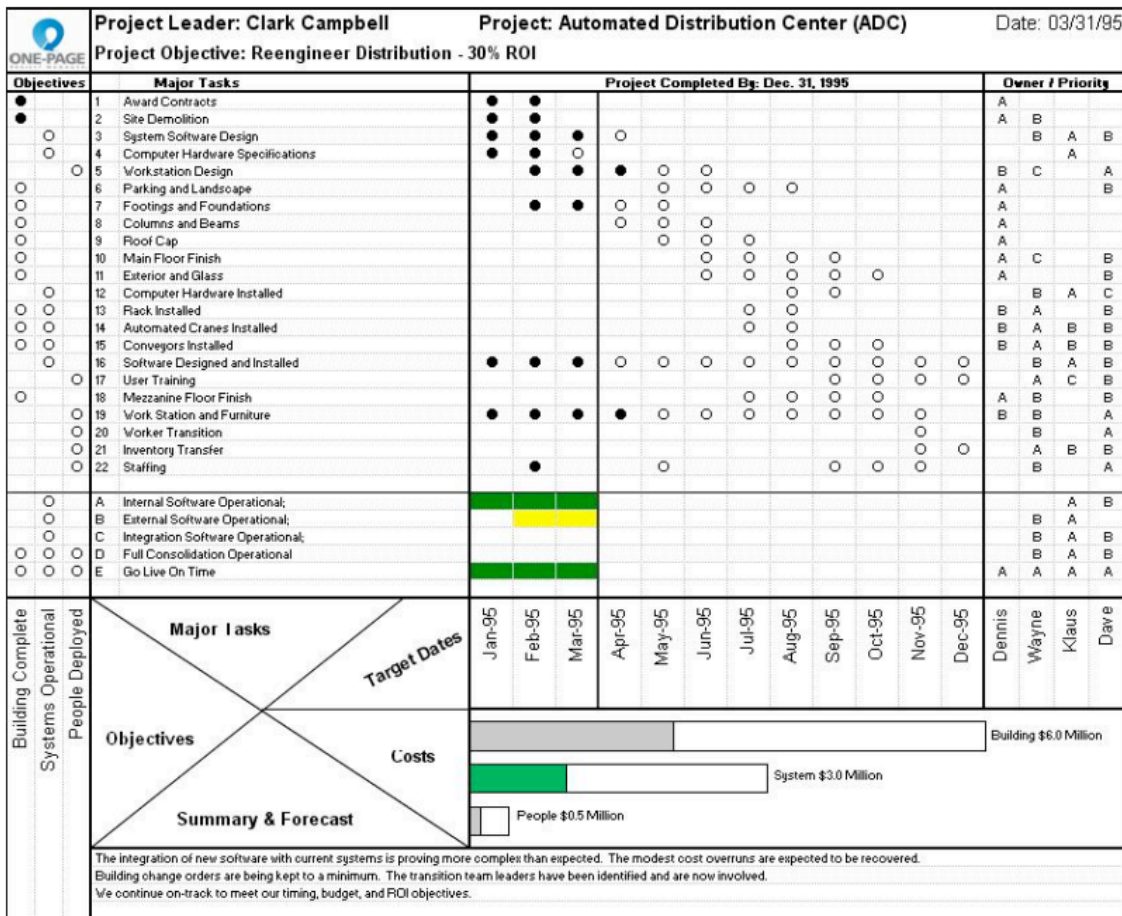


Figure 2.8: OPPM example. Source: [52]

### 2.5.2 Gantt

The Gantt chart is not a methodology but rather a visual representation of project plans. It employs a system of coordinate axes, with activities depicted on the vertical axis and time on the horizontal axis (typically measured in days, weeks, or months). Each activity is associated with a specific duration. Typically, separate activities are aligned vertically, while time-dependent activities can be represented horizontally in sequence. Plan control is achieved by drawing a vertical line at the date of analysis, which can be adjusted to any desired position. Activity tolerances are visually indicated by extending the respective activity bar, often with additional padding. Critical activities may be highlighted using a distinct color or pattern [30]. An example of a Gantt chart is present in figure 2.9.

The Gantt chart offers several advantages. First, it provides an easy, simple, and clear planning approach, enabling project managers to visualize and communicate project timelines effectively. Second, it allows for the straightforward addition of new activities as the project progresses, accommodating changes and updates. Third, the Gantt chart facilitates the deletion of activities if they are no longer necessary, ensuring the plan remains up to date. In addition, the model facilitates simple, direct and immediate analysis of project progress, making it a valuable tool for monitoring and decision making. Finally, the Gantt chart is time-oriented, with a strong emphasis on tracking project schedules and milestones. However, Gantt charts also have some limitations. One challenge is the difficulty in detecting interrelationships or dependencies between activities, which can affect the sequencing and coordination of project tasks. Identifying redundant or unnecessary activities can be problematic, potentially leading to inefficiencies in resource allocation. Estimating accurate activity durations can be challenging, as unforeseen factors or changes in project circumstances can impact time estimates. Furthermore, Gantt chart primarily provide a high-level overview, limiting the ability to perform detailed scheduling or analyze alternative scenarios. Finally, significant modifications to the project plan may require a redesign of the entire Gantt chart, making it less flexible in handling complex project changes [3].

Task Name	Q1 2019			Q2 2019		Q3 2019
	Jan 19	Feb 19	Mar 19	Apr 19	Jun 19	Jul 19
Planning	■					
Research		■				
Design			■			
Implementation				■		
Follow up					■	

Figure 2.9: Gantt chart example. Source: [44]

## 2.6 Summary

After conducting an analysis of management across the four levels under investigation — portfolio, project, task, and knowledge — and delving into the exploration of innovation, investigation, and theoretical concepts in project management, including processes, tools, models, and approaches, numerous valuable insights and discoveries have been derived. These findings have significantly influenced and shaped the research conducted for this work. The key findings and insights obtained are as follows:

- The platforms studied shared a common foundation, with most of them offering similar features, views, and organizational structures. The points of differentiation primarily stemmed from design aspects and the level of detail and formalization within each platform.
- The 3M's concept, encompassing Muda (waste), Mura (overburden), and Muri (unevenness), played a pivotal role throughout the development of the solution, ensuring that waste was minimized, workloads were balanced, and processes were streamlined.
- Despite being a visual approach of older origins, the One Page Project Manager (OPPM) proved valuable in providing an overview of projects, tasks, deadlines, and other critical project-related information. Its utilization can effectively support project monitoring activities.

These findings from the State of the Art serve as essential learnings, informing the subsequent stages of the research and contributing to the overall understanding of project management in the context of this thesis.

## Chapter 3

# Problem & Methodology

In this chapter, the problem and the methodology chosen are specified and detailed. In the Subsection 3.1 is presented the problem and in Subsection 3.2 the methodology is explained in detail as well as the work that was developed in each task.

### 3.1 Problem

As described in the subsection 1.3, some issues were identified, such as the lack of standardization of processes, the poor organization of information and the lack of overview of the projects' information. It was also referred that the main objective of the work developed for this thesis was to ensure the integration of information in four management levels — portfolio, project, task, and knowledge — thus freeing up researchers' time and resources by enabling them to concentrate on research and development activities instead of time-consuming project management related tasks. But, in order to ensure the best solution to those problems, it was necessary to first understand what those tasks entail, that way it's ensured that the researchers at SYSTEC have access to all the information they need to manage their projects effectively and efficiently.

### 3.2 Methodology

According to Lederman (2015), a theoretical framework, like a theory, is a collection of related concepts, but not necessarily well developed or elaborated. It is used to guide research by providing a lens through which we can see and understand phenomena. It usually consists of concepts and statements derived from existing theories that can be used to explain and predict the behavior of a particular phenomenon. A theoretical framework can be used to guide research question development, data selection and interpretation, and hypothesis formulation. In essence, theoretical frameworks are tools researchers use to organize their thoughts and research in order to make sense of their world [32]. The methodology chosen to develop this work can be considered a framework by itself, but not necessarily a theoretical one.

For this dissertation, the methodology chosen was a mix of techniques that consisted in both quantitative but mostly qualitative data. The retrieved data was primary, since it's going to be collected specially for this work and it was experimental rather than descriptive [51]; [5].

The methodology will be separated in three major tasks:

- **Task1:** Identification of requirements.
- **Task2:** Selection of management platform.
- **Task3:** Development of the platform, processes and templates.

Task 1 comprised the identification of lab needs and practices regarding project management. It aimed to provide a comprehensive understanding of management practices, fragilities and needs. This information was in order to obtain this information, participation in projects activities and meetings with the researchers was organized. This allowed to better understand the projects' structure, examine how each researcher operates and documents the steps involved in some of the processes that could benefit from standardization. Necessities were identified through a semi-structured interview performed in a presential meeting with the DIGI2 lab director and researchers. The primary objective of this meeting was to collect an extensive range of information, particularly focusing on the existing processes, in order to gain a deeper understanding of the projects and identify impactful measures that could be implemented.

Task 2 involved a deeper study of the platforms available in the market in order to better understand if it was necessary to implement a new one or adapt the platform already used in the lab (platform mainly used for communication but optimizable for project management).

Task 3 encompassed five steps, representing the most extensive part of the work. Firstly, it was essential to examine the utilization of MS Teams by researchers, including their team structures and identifying areas that can be improved for enhanced outcomes. Secondly, a comprehensive analysis of MS Teams was conducted to gain a deeper understanding of its capabilities, if it was possible to take any existing challenges, and explore how this platform could effectively address them. Third, creation and implementation of the customized framework, which includes the customization of the chosen platform and the development of templates and processes, which resulted in the pilot version. Fourth, as a validation to the solution developed, the platform was shared with the researchers for validation, prompting them to provide feedback, suggestions, and observations through a detailed form. Lastly, the development of the enhanced platform' final version, taking into account the researchers' feedback from the validation test of the pilot version.

To finish the dissertation process, everything was documented. Additionally, it was written an user's manual (DIGI2 Project Portfolio Management Platform — A User Manual) to ensure the effective utilization of the enhanced management platform and to serve as a guide for starting new projects. The manual is present in the Appendix D to consultation.

All the documents, and their contents, can be found in later chapters and appendixes.



## Chapter 4

# Proposed Solution and Validation

In this chapter, the solution and validation will be presented, for that it will be followed a similar structured as defined in the previous chapter. In the Section 4.1, a necessities study is presented, in the Section 4.2 it is chosen the management platform and the criteria for its selection and in the Section 4.3 presents the several steps followed to obtain the solution.

### 4.1 Requirements Identification

Task 1 of the methodology encompassed the identification of needs by first understanding the existing operational and project management practices employed by the researchers. This involved delving into the current methods and approaches utilized to manage projects effectively. The answers received in the meeting allowed a better understanding of the projects themselves, what areas could and should be improved, and also the current state of project management practices in the lab. It is important to note that one of the biggest goals of this thesis was not only to improve the project management of the lab but also guarantee that the changes made have impact and facilitate the researchers' quality of life when it comes to the management tasks.

The following are the questions that were asked and a summary of the answers given by the interviewees. All the information gathered has been taken into consideration for the work that has proceeded.

1. Give a brief description of the project(s) that you are currently working on.
2. How do you organize your work? Do you use any tool or platform to assist in the management of your tasks?
3. What do you consider to be the biggest weakness of the current processes of project management in the lab?
4. Is there anything in particular that you would like to be improved?
5. Is there anything in particular that you think is currently working that should not be changed?

For the first question, it was gathered that each researcher is involved in a minimum of two projects, and a summarized overview of each project is presented in Table 4.1. The information incorporated into the table was derived from the meeting and the project proposals<sup>1</sup>. All projects, with the exception of INVENTHEI, adhere to a standardized proposal structure. The focal theme of these projects revolves around education, targeting students, teachers, or staff members of Small-Medium Enterprises (SMEs). The duration of each project ranges from 1 to 2 years, with the possibility of renewal for subsequent editions. International partners are involved in all projects, while select projects also include national collaborators. Notably, SYSTEC assumes leadership in 57% of the active projects within the EIT kingdom.

Table 4.1: EIT kingdom projects information

~	AISME	INFINITY	INVENTHEI	Self-Made	ShapiNG	TURING	YML
Area	Education; Skill-driven learning	Education	Education	Education	EIT Regional Innovation Scheme	Education	Education
Target	SMEs	SMEs	HEI <sup>a</sup> students and academic staff	SMEs	6-18 years-old students and professors	SMEs	18-30 years-old students and young professionals
Duration <sup>b</sup>	2	2	2	2	1	1	1
Partners	FEUP + 6 international	FEUP + 4 international	FEUP + 1 national 4 international	FEUP + 1 national + 4 international	FEUP + 5 international	FEUP + 2 national + 4 international	FEUP + 9 international
Leader	No	No	Yes	Yes	Yes	Yes	No

<sup>a</sup>HEI = Higher Education Institutions

<sup>b</sup>Duration in years

In question two, the researchers' approaches to self-organization varied, not existing standardized methods followed by all individuals. Researchers had the freedom to select their preferred management practices. Noteworthy practices mentioned by the researchers include maintaining written to-do lists or bullet points, utilizing Post-it notes, and setting reminders in their calendars.

In the third question, several noteworthy weaknesses came to light. Firstly, the absence of a comprehensive overview detailing the current status of all projects posed a significant challenge. Consequently, when the lab director sought to identify areas of concern, direct communication with the researchers became necessary, albeit sometimes proving ineffective. Secondly, the lack of a shared calendar posed challenges in coordinating meetings and requesting assistance from fellow researchers, leading to protracted exchanges of messages and emails. Another substantial weakness revolved around the absence of regular kingdom meetings, and even when such meetings occurred, the failure to generate documentation hindered the ability to review the discussions that transpired. Furthermore, the project management platform utilized, Microsoft Teams, lacked a standardized structure, this makes it cumbersome for researchers to seamlessly integrate into multiple projects, as each project's structure was at the discretion of the responsible researcher. Lastly, the lab's knowledge management practices exhibited fragmentation, with information dispersed across multiple platforms such as Google Drive for file storage, MS Teams for communication with partners, and Slack for communication within the kingdom, impeding the establishment of a centralized and cohesive repository.

<sup>1</sup>The project proposal is a structured document filled by the project leader upon the proposition of the project, where all information about the project is presented. That includes duration, workplan, partners information, key performance indicators (KPIs), milestones, outputs, deliverables, budget, etc.

When asked which areas needed improvement, in question four, a recurring theme that emerged from the responses was the desire for enhanced project status visibility, as well as the imperative for standardized project structure and centralized information.

Finally, when addressing the last question, the researchers did not specifically identify any aspects that they believe should remain unchanged. They expressed a willingness to explore new solutions and adapt to improvements. However, it should be noted that they appreciated the flexibility and autonomy in their self-organization practices, where a less formal approach was favored.

During the meeting, additional information was provided that was not specifically addressed in the predefined questions, which includes the following points:

- Regarding portfolio management, it was mentioned that project selection and prioritization are conducted annually by an external entity, relieving the lab of that responsibility.
- Difficulties were encountered in retrieving specific information, such as partner contacts, which seemed to be scattered across various emails and communication channels.
- Key project-related terms, such as KPIs<sup>2</sup>, milestones<sup>3</sup>, deliverables<sup>4</sup> and outputs<sup>5</sup>, were identified as crucial for a comprehensive understanding of the projects.
- Concerns were raised about issues with the notification system of MS Teams - the platform used by the lab - , indicating challenges in receiving timely notifications or updates, which led them to use Slack to communicate.

To summarize the findings of the necessity study and the information gathered in the initial phase, the data can be categorized into four management levels as it was discussed in Section 1.3, namely portfolio, project, task, and knowledge management. An overview of the results is presented in Table 4.2.

In the context of this case study, portfolio management deviates from its conventional meaning of project selection and prioritization. Instead, the focus lies on establishing an improved communication framework among researchers and facilitating a comprehensive view of project statuses. This encompasses portfolio monitoring and implementing a structured approach to meetings, addressing the identified needs for enhanced collaboration and effective project oversight within the laboratory.

In terms of project management within the laboratory, the primary challenge lies in the absence of a standardized approach to organizing documentation and communication channels. This can create obstacles for researchers who are involved in multiple projects or need to collaborate on others' projects. Additionally, scheduling meetings proved to be challenging due to the geographical distribution of project partners across various regions in Europe.

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<sup>2</sup>Key Performance Indicators are a quantifiable measure of performance over time for a specific objective. Provides targets for teams to shoot for, milestones to gauge progress, and insights that help people across the organization make better decisions.

<sup>3</sup>Milestones are a significant stage or event in the development of something. In the context of the projects, milestones are assigned specific target dates by which they should be completed.

<sup>4</sup>Deliverables are tangible or intangible documents that are submitted within the scope of a project.

<sup>5</sup>Outputs are the direct immediate term results associated with a project. In other words, they are the delivered scope.

Regarding task management within the lab, there was a lack of standardization in researchers' methods for organizing their work. Currently, researchers employ individualized approaches such as manual to-do lists, physical Post-it notes, and bullet point lists. While providing researchers with the flexibility to choose their preferred task management methods can be beneficial, it can also result in information gaps and increased communication efforts to ensure everyone is aware of each other's tasks.

Furthermore, concerning knowledge management in this case study, a primary challenge was the lack of organization in the documentation. Enhancing the organizational structure of the documentation will alleviate the necessity for excessive communication and extensive information retrieval.

Table 4.2: Identified DIGI2 requirements.

Requirement ID	Requirement Statement	Management Level
Req1	The platform shall allow an overview of all project's status	Portfolio
Req2	The platform shall allow documentation of meetings	
Req3	The platform shall allow the schedule of regular meetings	
Req4	The platform shall have a standard structure of information	Project
Req5	The platform shall have a digital tool to delegate tasks	Task
Req6	The platform shall have a centralized location for knowledge documentation	Knowledge

## 4.2 Management Platform Selection

Task 2 of the methodology entailed the meticulous selection of a management platform. This process involved gathering pertinent information from Subsection 2.1.1, which aimed to provide a comprehensive assessment of the features, functionality, and efficacy of various platforms in facilitating project management processes. This data served as the foundation for conducting a comparative analysis to ascertain the platform that offered the optimal balance between features and cost, aligning with the specific requirements of the laboratory.

Additionally, accounts were established for each platform, enabling practical tests to be conducted in order to gain profound insights into their capabilities and limitations. These tests encompassed the completion of provided tutorials and the population of the platforms with relevant project information, including tasks. Furthermore, an exploration of each platform was undertaken to ensure a comprehensive understanding of all major functionalities. Upon conducting these tests, it was concluded that several platforms exhibited an unnecessary level of detail and formality that exceeded the laboratory's needs and the operational practices of the researchers.

With those factors in mind, three important aspects had to be taken into consideration.

Firstly, the results presented in the Table 2.10, which indicates that the platform with higher mean value is Smartsheet (8.6), followed very closely by Wrike (8.5), MS Teams (8.4) and Monday.com (8.4). These values signify their superior performance across the five selected parameters. To ensure the robustness and proximity of these values, the standard deviation was utilized, with a lower value indicating closer values. In this regard, Monday.com (0.23) exhibited the lowest standard deviation, followed by Wrike (0.46) and MS Teams (0.58). Based on both these metrics, the top platforms are Wrike, Monday.com, MS Teams, and Smartsheet. However, it is important to note that the mean value was calculated by assigning equal weight to all parameters (availability, performance, project management, usability, and support) to facilitate calculations. In order to make a more informed platform selection, different weights should be assigned to these parameters. For the laboratory's specific case, project management and usability should carry higher importance, where Jira achieved the highest score (8.5) in the first one, and MS Teams obtained the highest score (9.0) in the second. It is noteworthy that Jira's lower score in usability (4.7) may be attributed to its high level of detail, that is difficult for a first time user to fully understand, while MS Teams' impressive project management score (7.8) can be attributed to its integration capabilities with various add-ons that seamlessly facilitate project management, specially when taking into consideration that MS Teams is the only platform being studied that was not designed with project management in mind.

Secondly, the cost implications associated with each platform must be duly considered. The free versions of most platforms are deemed impractical due to essential features being restricted behind paywalls or limitations on the maximum number of users, which often falls short of the number of researchers. Notably, MS Teams incurs no additional costs as the University of Porto provides licenses to all students and staff.

Thirdly, it is essential to acknowledge that MS Teams is the current platform being utilized by the researchers. This pre-existing familiarity would significantly mitigate the learning curve and streamline the integration of the platform into the existing processes.

Given these considerations, presented in Table 4.3, and the study of each platform, it was concluded that MS Teams is the most suitable choice for the laboratory. It demonstrated excellent performance in the overall analysis, imposes no financial burden, and offers ease of integration with the existing workflow. Additionally, since it was already in use by the team, it would be the most seamless option to integrate into their daily operations. Although other platforms may provide more advanced project management features, the associated costs may not justify the added benefits in this specific case. From all the platforms studied, MS Teams gave the idea that, with the addition of templates, it could fulfill all the requirements outlined in Table 4.2.

Therefore, it was recommended that the EIT projects of the DIGI2 lab continued utilizing Microsoft Teams, complemented by customized templates and processes to enhance the organization of project documentation and tasks. This approach ensured a cohesive and efficient project management environment while capitalizing on the familiarity and advantages offered by MS Teams.

Table 4.3: Platform selection considerations.

<sup>a</sup>		Jira	Wrike	Monday.com	Smartsheet	MS Teams
Platform Comparison <sup>b</sup>	Mean Value	9°	2°	3°	1°	3°
	Standard Deviation	9°	2°	1°	5°	3°
Cost <sup>c</sup>		\$139,5	\$176,4	\$180	\$450	\$0
Familiarity		No	No	No	No	Is the main platform used

<sup>a</sup>In this table are only presented the platforms that have the most relevant results.

<sup>b</sup>Rank between 1° and 9° of the platforms studied.

<sup>c</sup>The pricing analysis considered the entire DIGI2 lab, although the proposed solution was tailored specifically to the EIT kingdom and its projects. Individual value calculations were performed for 18 researchers, taking into account their unique requirements and platform needs. The chosen pricing tiers for each platform were determined based on factors such as the desired functionalities and the number of users. It is important to note that the presented values represent the monthly costs associated with utilizing the platforms.

### 4.3 Solution: Platform, Processes & Templates

Task 3 of the methodology encompassed the customization of the platform, streamlining processes through standardization, and the development of templates to support various operations. To accomplish this, several key steps were taken into consideration. Firstly, a thorough observation and understanding of the existing operational practices were conducted, ranging from how researchers organized MS Teams in their projects to identifying areas for potential improvements in meeting the required needs (see Subsection 4.3.1). Secondly, since MS Teams was chosen as the platform, an examination of different add-ons was undertaken to address identified challenges and ensure the customization of the platform to align with the laboratory's specific requirements (see Subsection 4.3.2). The third step involved most part of the practical work, including the structuring of new teams, such as the PMO team, and the creation of the project team template to be replicated for each new project. Furthermore, various documents were developed, including project monitoring tools, meeting documentation templates, and a knowledge base (see Subsection 4.3.3). To ensure that all needs were addressed and the solution resonated with the researchers, a feedback session was conducted, providing an opportunity for them to engage with the platform and provide valuable input through a dedicated feedback form (see Subsection 4.3.4). Lastly, the fifth step entailed implementing the received feedback to refine and finalize the solution, creating the ultimate version that best serves the laboratory's requirements (see Subsection 4.3.5).

#### 4.3.1 Original Organization

To gain familiarity with the lab's processes, a comprehensive understanding of the original workflow was necessary. This was achieved by joining three teams in MS Teams, namely the PMO team and two project teams (TURING and ShapiNG).

The PMO team was structured into three channels: *General*, *Projects*, and *Team*, as it can be observed in figure 4.1. However, it was observed that the information within the team was outdated and not actively utilized. The available information included a *Wiki* page with basic details about ongoing projects, submitted proposals, and completed projects, as well as another *Wiki* page listing the current team members. In addition, there was a *Calendar* page with no scheduled meetings and *Files* pages that lacked documents.

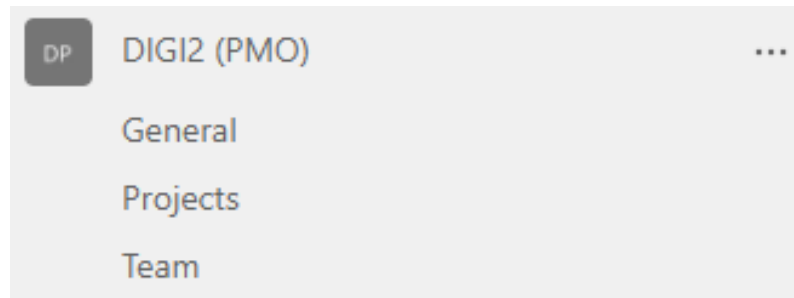


Figure 4.1: Original PMO Team Structure.

As previously mentioned, two project teams were joined (TURING II<sup>6</sup> and ShapiNG IV<sup>7</sup>), and it was observed that these teams exhibited distinct structural characteristics, as it can be observed in figure 4.2.

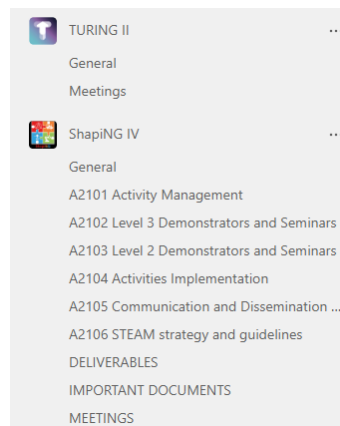


Figure 4.2: Original Projects Teams Structure.

On one hand, both projects share two common channels, *General*, which is a mandatory channel in MS Teams and is utilized differently by each project manager and *Meetings*, which is dedicated to scheduling meetings and storing related documentation, particularly PowerPoint presentations. On the other, ShapiNG features additional channels that were categorized according to some parts of the project proposal.

<sup>6</sup>The project's name is TURING II, signifying its position as the second iteration of the TURING project. However, for simplicity, it will be referred to as TURING moving forward.

<sup>7</sup>The project's name is ShapiNG IV, signifying its position as the fourth iteration of the ShapiNG project. However, for simplicity, it will be referred to as ShapiNG moving forward.

Within the TURING team, the *General* channel comprises two tabs: *Posts* and *Files*. The *Posts* tab served as a communication hub for exchanging information among the team and its seven partners, facilitating discussions on tasks, specific assignments, and announcements. On the other hand, the *Files* tab was utilized to store and organize all relevant project documents. Figure 4.3 depicts the file storage structure employed, wherein the various folders are named after the work packages outlined in the project’s proposal under the Workplan section.

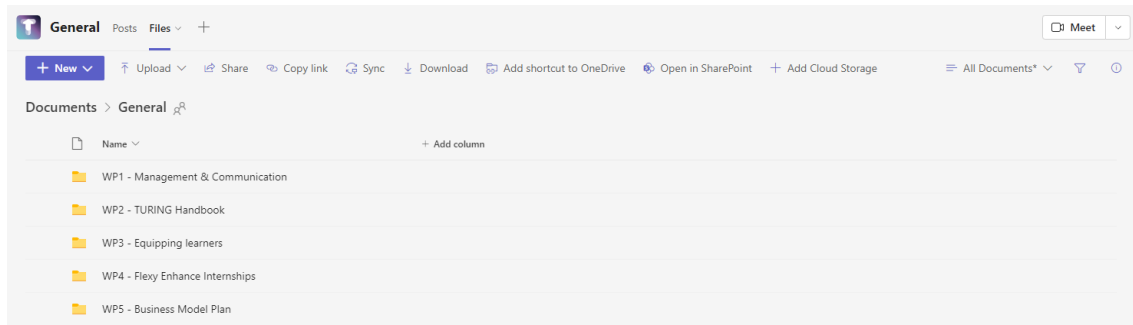


Figure 4.3: TURING file system.

In the ShapiNG team, the utilization of the *General* channel is notably different. It remains inactive and does not serve any communication purposes. Instead, the channels prefixed with *A210* correspond to the respective work packages outlined in the project proposal. The *Deliverables* channel is designated for storing documentation associated with the project’s deliverables, while the *Important Documents* channel remains unused. Similarly to the TURING team, the *Meetings* channel serves as a platform for scheduling and documenting meetings. Communication within the ShapiNG team is primarily established within specific channels dedicated to each work package. For instance, discussions related to Activity Management would take place exclusively in the *A2101 Activity Management* channel, without dispersing the conversation across other channels. Unlike the TURING team, documents in the ShapiNG team are not centralized within a single channel but are distributed among their corresponding work packages. This approach has its benefits and drawbacks. On one hand, for active project members familiar with the project’s structure, locating specific documents or tasks is relatively straightforward, and the volume of information remains manageable. On the other hand, for individuals less acquainted with the project, finding a particular document may prove challenging. Each channel in the ShapiNG team features a *Posts* tab for communication and announcements, along with a *Files* tab for organizing documents within folders. The file system structure specific to this project will not be provided, as it holds limited relevance beyond this context.

Following the examination of each team’s original setup, valuable insights were obtained regarding areas lacking standardization and potential areas for improvement. The following key observations were made:



- The PMO team, despite its existence, was not utilized effectively and would benefit from structural modifications to enhance its functionality.
- The two projects teams exhibited noticeable differences in their structures, highlighting the need for standardization to promote consistency and streamline operations.
- Certain channels within the teams were found to be underutilized, indicating untapped potential for improved collaboration and information sharing.
- The analysis revealed a recurring need for project managers to constantly remind partners of their assigned tasks, suggesting an opportunity for task automation to alleviate this burden.

These findings underscore the importance of optimizing the team structures, promoting standardized practices, maximizing channel utilization, and leveraging automation to enhance overall efficiency and effectiveness in project management.

### 4.3.2 MS Teams Possibilities

With the selection of the management platform and having gained a full understanding of the laboratory's requirements, the next step was to explore and get acquainted with the various add-ons and customization options available within MS Teams. To begin, it was important to understand some key concepts related to MS Teams (Figure 4.4):

- **Team** (red): It consists of groups of individuals who have come together for work, projects, or common interests. A team is made up of channels that serve as communication hubs for teammates. Every team was a *General* channel by default;
- **Channel** (green): A channel is dedicated to a specific topic, department or project within a team. There are two types of channels: public, which are available and visible to everyone, and private, which are focused and allow communication with a specific audience. Each channel offers the possibility of including multiple tabs. Every channel has the *Posts* and *Files* tabs by default;
- **Tabs**: Channel tabs (blue) are located at the top of each channel and provide access to files, applications and services, allowing for seamless integration and enhanced functionality. Personal tabs (yellow), on the other hand, are located in the left vertical menu and provide quick access to different applications. There is a wide range of possible applications that can be added to either personal or channel tabs from the App Store within MS Teams.

In order to tailor the platform to specific requirements, a thorough evaluation and testing of various add-ons was conducted. Within MS Teams, the app store conveniently categorizes applications into categories, such as the featured section that is divided into apps that are Popular on Teams, Top Picks, What's New, Best Selling, and Sharpen Your Skills. Moreover, the app store also classifies applications based on the industries they cater to, including but not limited to education, finance, and retail. Additionally, applications are categorized based on their functionalities, encompassing areas such as education, project management, productivity, and more.

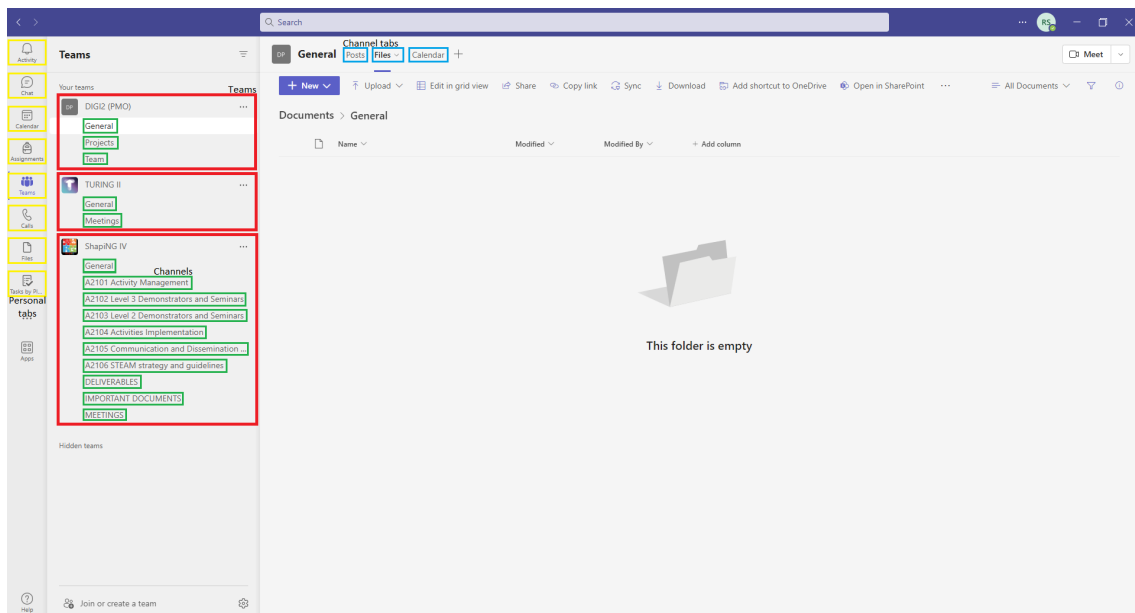


Figure 4.4: Microsoft Teams key concepts. (red: teams; green: channels; blue: channel tabs; yellow: personal tabs)

Based on the capabilities offered by MS Teams and the identified requirements outlined in Table 4.2, the following structure was adopted to address each requirement:

- PMO team with:
  - A dedicated channel for each project, facilitating a centralized location for project updates, status tracking, and storage of files and documentation, effectively addressing the need for an overview of projects' statuses and centralized file management (Req1).
  - A scheduling feature enabling efficient meeting organization and provided quick access to meeting information and related documentation, fulfilling the requirement for streamlined meeting management (Req2 and Req3).
  - A knowledge repository, enabling easy access and sharing of valuable insights among team members, thus satisfying the need for effective knowledge management (Req6).
- A team for each Project with:
  - A standardized channel and folder structure that ensuring consistency and ease of navigation for project-specific discussions and documentation (Req4).
  - The adoption of a digital task management tool within MS Teams allowing for seamless task delegation and tracking, enhancing the project teams' ability to manage and monitor their tasks effectively (Req5).

Detailed information on the selected add-ons, the architectural framework chosen, and the templates created to support the fulfillment of these requirements will be provided in the subsequent subsections.

### 4.3.3 Pilot Version

In the draft of the customized platform, it was determined that the foundational structure would remain unchanged. A dedicated team was established to serve as the PMO for the kingdom, that would take the supportive role as discussed in Section 2.1, providing support and enabling portfolio monitoring for all active projects at a kingdom level. This team also serves as a repository for managing the knowledge generated across different projects. Additionally, individual teams were created for each project, facilitating document storage, effective communication among project stakeholders, and streamlined project and task management processes.

Figure 4.5 shows the new PMO (a) and Project (b) teams structure. On the left, there are eight channels, the first being the *General* channel, followed by seven channels dedicated to each active project. On the right, there are also eight channels, illustrating the recommended structure for a project team. Similarly, the first channel is the *General* channel, which is mandatory in MS Teams. The next five channels represent each *Work Package* (WP) outlined in the project proposal. In addition, there is a channel dedicated to *Deliverables* and another one for *Meetings*. The following sections provide further details about each team.

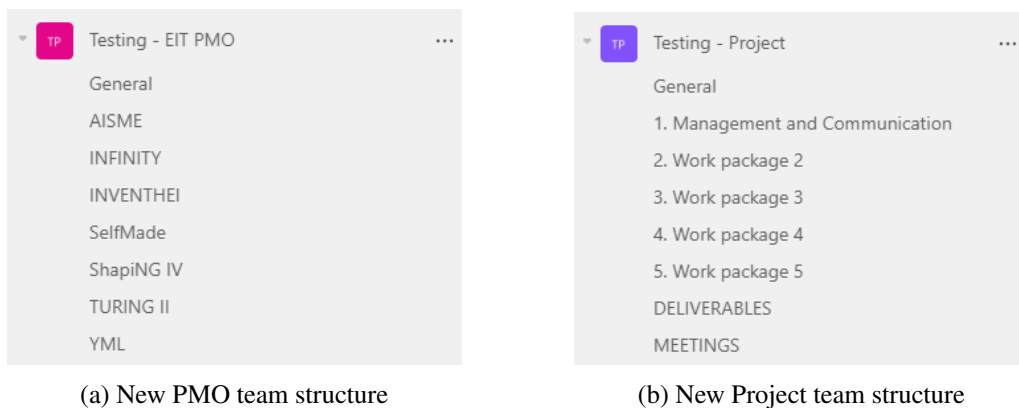


Figure 4.5: New teams structure

#### 4.3.3.1 PMO Team

The PMO team was customized to fulfill its purpose of monitoring the project portfolio and serving as a knowledge base for the kingdom. This subsection provides a detailed overview of this team's configuration. The individuals who should be added to the PMO team are the project leaders of all currently active projects. As previously stated, the PMO team consists of eight channels, namely *General* and one dedicated to each active project. The channel names are indicative of the ongoing projects within the EIT kingdom.

The *General* channel within the PMO team consists of four tabs: *Posts*, *Files*, *Calendar*, and *Notes*. The *Posts* tab facilitates communication among researchers, allowing them to request assistance or schedule meetings, amongst other topics. The *Files* tab enables the storage of documents, which are saved in SharePoint for easy access by all team members. To enhance accessibility, a *Proposals* folder was created to house project-related information (see Figure 4.6).

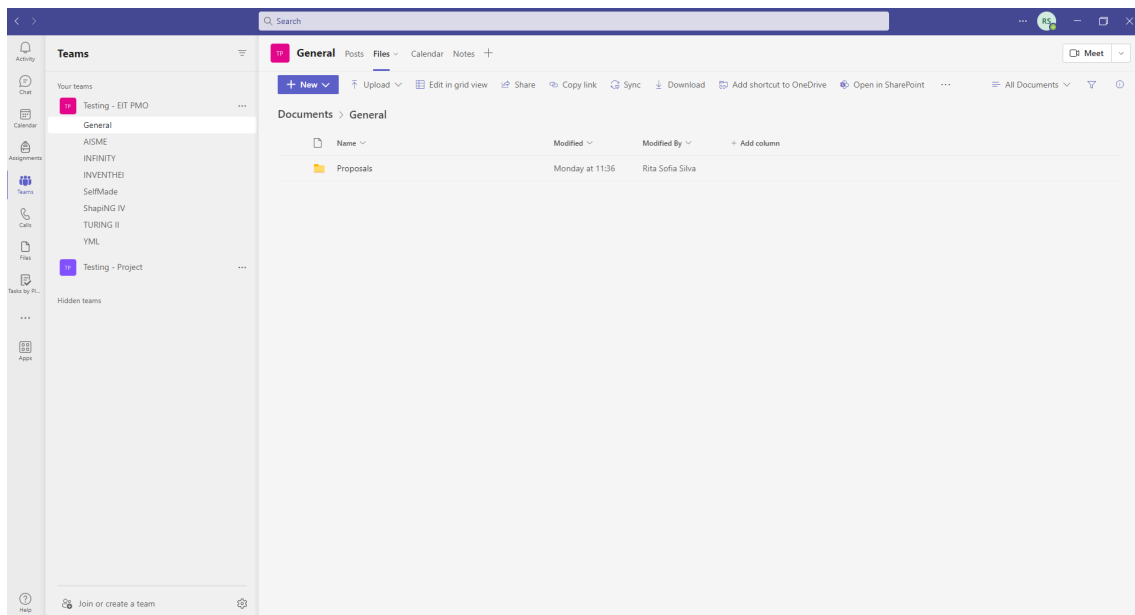


Figure 4.6: PMO Team's General channel: Files tab

The *Calendar* tab serves two purposes: displaying scheduled meetings and enabling the scheduling of new meetings. This tab is provided by the Calendar add-on on MS Teams, that integrates the Outlook calendar to the management platform. The Outlook calendar provides a Scheduling Assistant feature that allows team members to view each other's availability and statuses. A tutorial on utilizing the Scheduling Assistant can be found in Annex A .

The most significant tab within the *General* channel is the *Notes* tab, which serves as the repository for all knowledge. It contains an OneNote notebook with two sections: *Meeting Minutes* and *Knowledge*.

The *Meeting Minutes* section features a template page titled "EIT dd/mm" for recording meeting minutes before and during each monthly kingdom meeting (see Figure 4.7). The template is divided into four parts: General information (including location, time, and participants), Agenda items (for each project manager to provide information and notes), Action items (similar structure as the previous part), and Next meeting information to ensure the upcoming meeting is scheduled and easily accessible.

The *Knowledge* section contains five pages. The first page serves as a guide on how to utilize this section and document knowledge blocks effectively. The remaining four pages provide examples of relevant topics based on the laboratory's research and projects (see Figure 4.9). A guide on maximizing the usage of these pages is presented in Figure 4.11. Each knowledge block should follow the structure depicted in Figure 4.10 to ensure standardization of information. Notably, the Tags feature in OneNote proved advantageous during the development of the Guide. Custom tags can be created and searched, although this feature is only available in the OneNote app and not the MS Teams plug-in. If there is a need to attach files to a knowledge block, researchers can either make a copy of the document within OneNote (depending on the file size) or store it in the *Files* tab while annotating the file's path in the knowledge block.

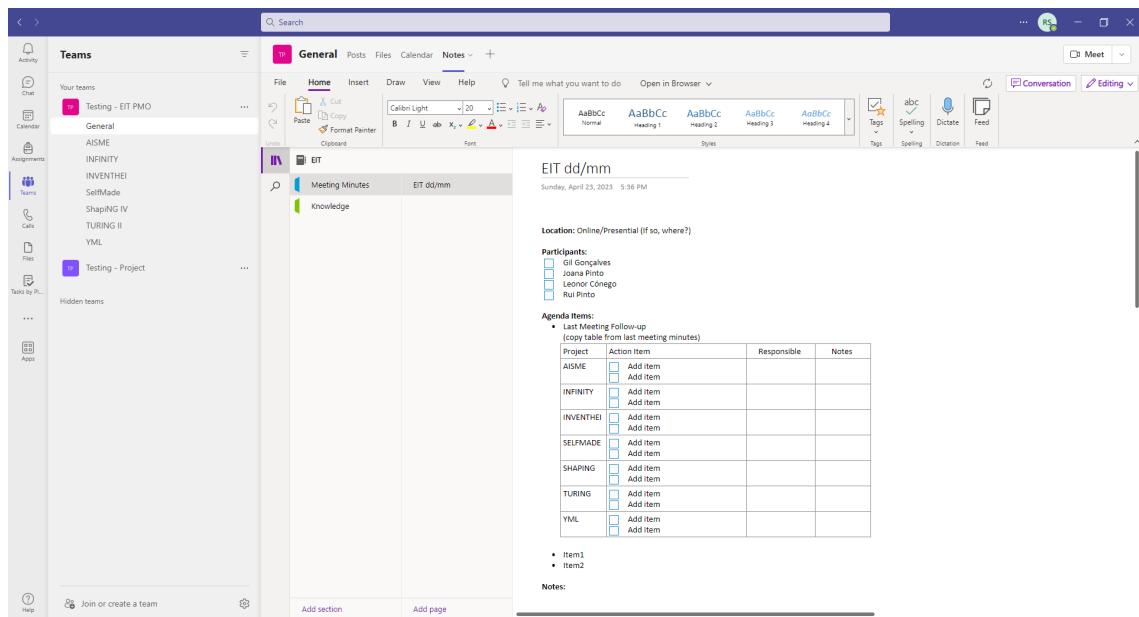
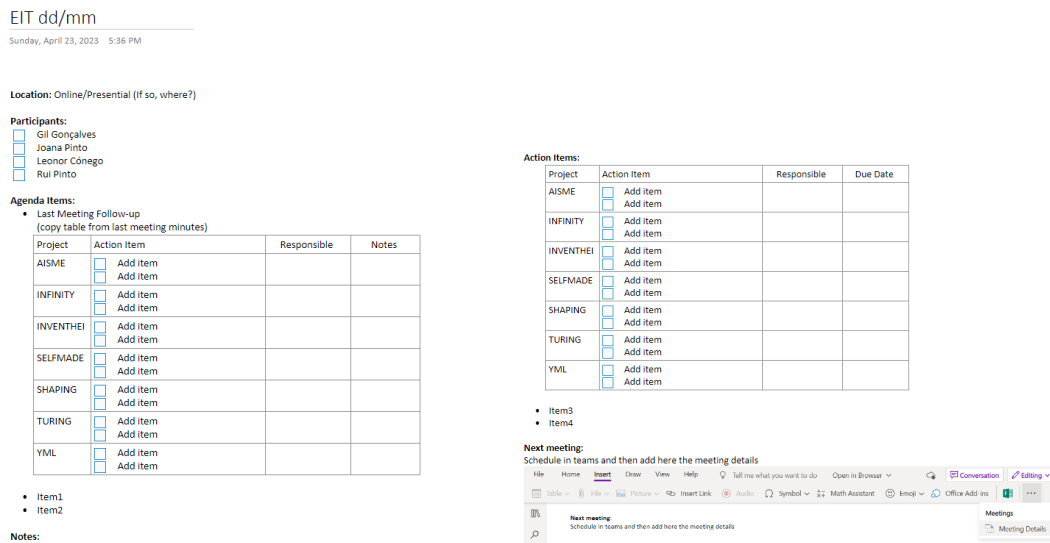


Figure 4.7: PMO Team’s General channel: Notes tab; Meeting Minutes section



(a) Part 1

(b) Part 2

Figure 4.8: Meeting Minutes template

The decision to categorize knowledge based on its field/topic rather than by project was made to facilitate the search and retrieval process. Researchers who encountered similar issues would find it easier to locate relevant knowledge blocks. Conversely, researchers who were unaware of specific issues or solutions would benefit from this approach, eliminating the need for extensive communication and time wasted. OneNote was chosen due to its similarity to Word and Whiteboard, its seamless integration with MS Teams, and its user-friendly interface for researchers. One advantage of this platform is that it allows real-time collaboration, with automatic cloud-saving of any changes made.

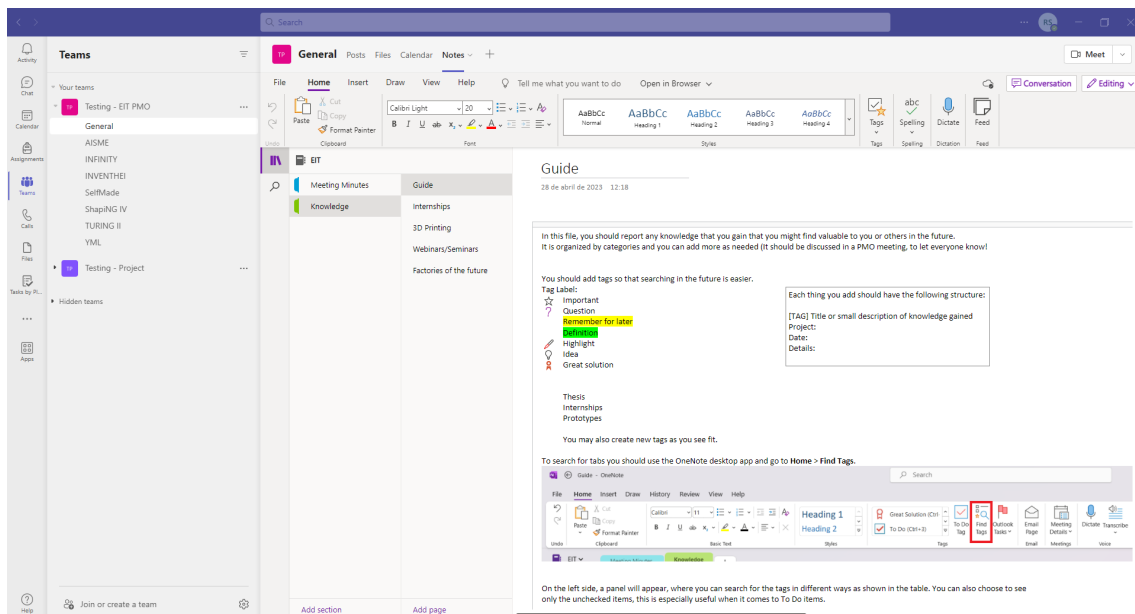


Figure 4.9: PMO Team's General channel: Notes tab; Knowledge section

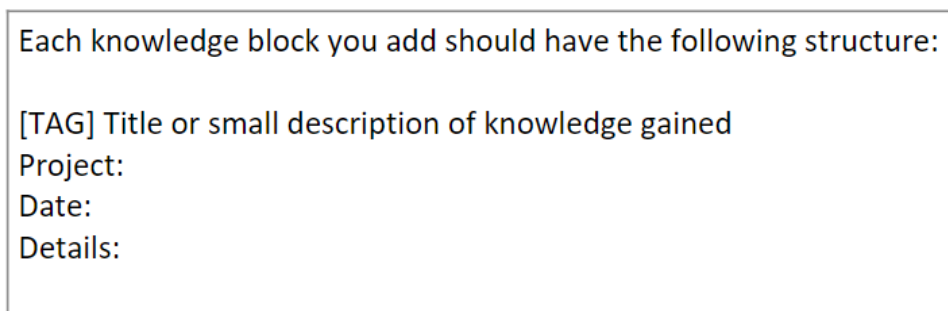


Figure 4.10: Knowledge block structure

Guide

28 de abril de 2023 12:18

In this file, you should report any knowledge that you gain that you might find valuable to you or others in the future. It is organized by categories and you can add more as needed (It should be discussed in a PMO meeting, to let everyone know!)

You should add tags so that searching in the future is easier.

Tag Label:

- ☆ Important
- ? Question
- Remember for later
- Definition
- Highlight
- Idea
- Great solution

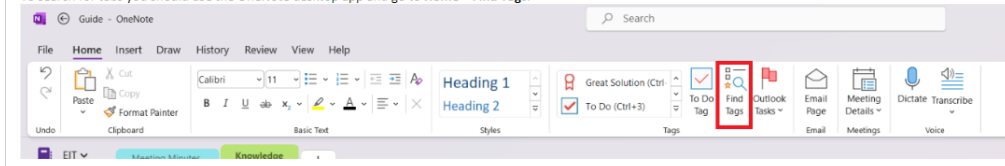
Each thing you add should have the following structure:

[TAG] Title or small description of knowledge gained  
 Project:  
 Date:  
 Details:

- Thesis
- Internships
- Prototypes

You may also create new tags as you see fit.

To search for tabs you should use the OneNote desktop app and go to Home > Find Tags.



(a) Part 1

On the left side, a panel will appear, where you can search for the tags in different ways as shown in the table. You can also choose to see only the unchecked items, this is especially useful when it comes to To Do items.

tag name/type	Section (Colored tabs on top)	Title (Page inside the sections)	Date	Text (in alphabetical order)
<p>Tags Summary</p> <p>Search completed</p> <p>Group tags by:</p> <p>Tag name</p> <p><input type="checkbox"/> Show only unchecked items</p> <p><b>Definition</b></p> <p>Definition</p> <p><b>Great Solution</b></p> <p>Great solution</p> <p><b>Highlight</b></p> <p>Highlight</p> <p><b>Idea</b></p> <p>Idea</p> <p><b>Important</b></p> <p>Important</p> <p><b>Question</b></p> <p>Question</p> <p><b>Remember for later</b></p> <p>Remember for later</p> <p><b>To Do</b></p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Search:</p> <p>This notebook</p> <p>Refresh Results</p> <p>Create Summary Page</p> <p><b>See also</b></p> <p>Customize tags</p>	<p>Tags Summary</p> <p>Search completed</p> <p>Group tags by:</p> <p>Section</p> <p><input type="checkbox"/> Show only unchecked items</p> <p><b>Knowledge</b></p> <p>Definition</p> <p>Great solution</p> <p>Highlight</p> <p>Idea</p> <p>Important</p> <p>Question</p> <p>Remember for later</p> <p><b>Meeting Minutes</b></p> <p>Search:</p> <p>This notebook</p> <p>Refresh Results</p> <p>Create Summary Page</p> <p><b>See also</b></p> <p>Customize tags</p>	<p>Tags Summary</p> <p>Search completed</p> <p>Group tags by:</p> <p>Title</p> <p><input type="checkbox"/> Show only unchecked items</p> <p><b>EIT dd/mm</b></p> <p>Guide</p> <p>Definition</p> <p>Great solution</p> <p>Highlight</p> <p>Idea</p> <p>Important</p> <p>Question</p> <p>Remember for later</p> <p>Search:</p> <p>This notebook</p> <p>Refresh Results</p> <p>Create Summary Page</p> <p><b>See also</b></p> <p>Customize tags</p>	<p>Tags Summary</p> <p>Search completed</p> <p>Group tags by:</p> <p>Date</p> <p><input type="checkbox"/> Show only unchecked items</p> <p><b>Today's notes</b></p> <p>Important</p> <p>Question</p> <p>Remember for later</p> <p>Definition</p> <p>Highlight</p> <p>Idea</p> <p>Great solution</p> <p><b>This week's notes</b></p> <p>Search:</p> <p>This notebook</p> <p>Refresh Results</p> <p>Create Summary Page</p> <p><b>See also</b></p> <p>Customize tags</p>	<p>Tags Summary</p> <p>Search completed</p> <p>Group tags by:</p> <p>Note text</p> <p><input type="checkbox"/> Show only unchecked items</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Add item</p> <p>Definition</p> <p>Gil Gonçalves</p> <p>Great solution</p> <p>Highlight</p> <p>Idea</p> <p>Important</p> <p>Joana Pinto</p> <p>Leonor Cónego</p> <p>Question</p> <p>Remember for later</p> <p>Rui Pinto</p> <p>Search:</p> <p>This notebook</p> <p>Refresh Results</p> <p>Create Summary Page</p> <p><b>See also</b></p> <p>Customize tags</p>

To take the most advantage of this feature, you should add things to this section as soon as you find something new or at least when you do the quarterly reports.

(b) Part 2

Figure 4.11: Knowledge section Guide page information

Each project channel within the PMO team follows a consistent structure, comprising a *Posts* tab and a *Files* tab. The *Posts* tab serves as a means of communication between the researchers and the laboratory director, as well as a platform for requesting assistance from others. On the other hand, the *Files* tab is designated for storing all project-related documents. Researchers are advised to refer to the tutorial provided in Annex B for guidance on effectively organizing and managing files in SharePoint. This tutorial will explain how to copy the entire repository from the Project team to the respective Project channel in the PMO team, the technique should be adapted to copy only certain files. This approach ensures the establishment of a centralized repository for project information, facilitating access for all researchers within the PMO.

#### 4.3.3.2 Project Team

The Project team was customized to effectively manage and monitor the project and its tasks. This subsection provides a comprehensive overview of this team's configuration. The members who should be added to the Project team include the project leader, the laboratory director, and all partners associated with the project, whether at a national or international level.

The Project team comprises eight channels: the *General* channel, five channels representing each *Work Package* (WP) outlined in the project proposal, a channel dedicated to *Deliverables*, and another for *Meetings*.

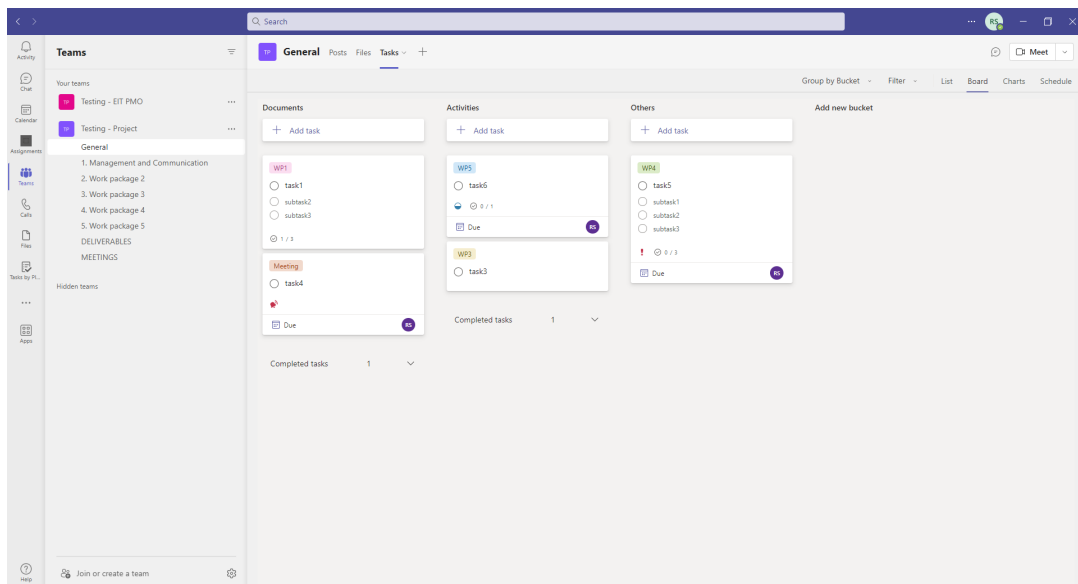
The *General* channel within the Project team consists of three tabs: *Posts*, *Files*, and *Tasks*. The *Posts* tab facilitates communication among researchers, allowing them to request assistance or discuss relevant topics. The *Files* tab serves as a storage location for documents, which are saved in SharePoint for easy access by all team members. It is important to note that most documents are stored in separate channels corresponding to each Work Package, as well as the channels for deliverables and meetings. Therefore, a specific structure for storing documents within the *General* channel was not proposed.

The most significant tab within the *General* channel is the *Tasks* tab, which utilizes Microsoft Planner for seamless integration within MS Teams. Figure 4.12 provides an example of how this tab should be used. In the board view of the *Tasks* tab is divided into three buckets: "Documents", "Activities", and "Others" as shown in Figure 4.12a. These buckets represent the categories in which tasks should be classified. Additionally, Figure 4.12b displays the chart view, offering an overview of task status, bucket assignments, priority, and assigned personnel. This view allows for identifying workload imbalances, overlooked tasks, and other valuable insights. The *Tasks* tab also offers two other views: list, where tasks are presented in list format, and schedule, where tasks are distributed based on their start and due dates, facilitating task prioritization. Figure 4.13 illustrates a task card and its various components, such as name, subtasks, assignee, tags<sup>8</sup>, due date, priority, and more. Each card represents a task, and this tab allows for customization according to the project's requirements. Additional buckets can be added, and tags can be edited.

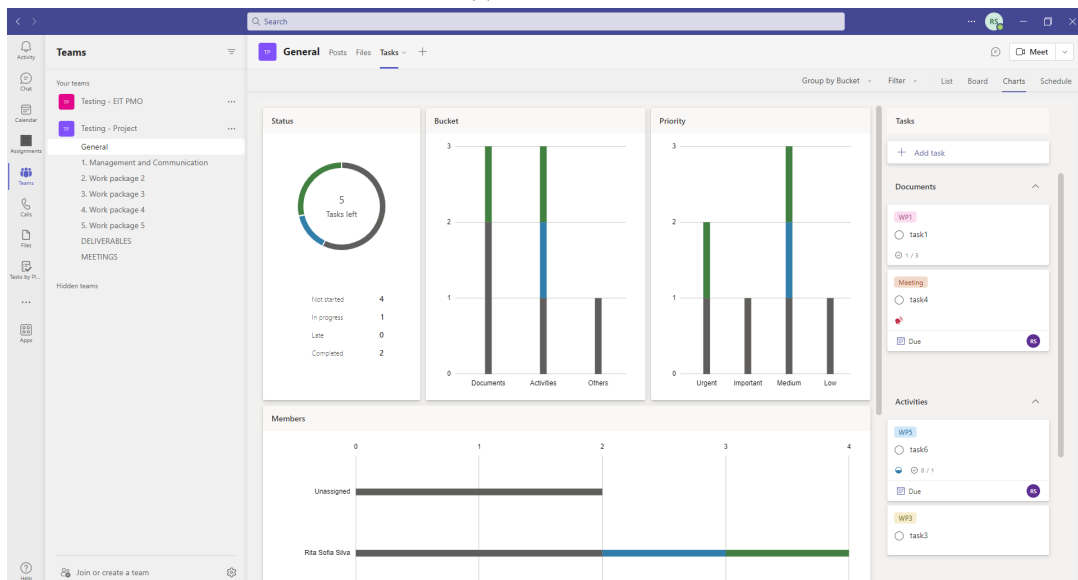
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<sup>8</sup>The tags shown in Figure 4.13 were the ones chosen as a base for all projects (one for each WP, one for deliverables, and one for meetings). Tags can be fully customized to meet the specific needs of each project. In a card, one to two tags should be chosen.





(a) Board view



(b) Chart view

Figure 4.12: Project Team's General channel: Tasks tab

One notable advantage of this add-on is its integration with "Tasks by Planner," another Microsoft application that sends daily task reminders. This integration eliminates the need for constant task reminders, minimizing time wasted on communication. Moreover, this personal tab allows users to view multiple Planners from different projects and presents information in various ways. Users can filter tasks assigned to them or prioritize tasks based on urgency. Figure 4.14 demonstrates this feature.

The subsequent five channels in the Project team are designated for each specific Work Package (WP) outlined in the project proposal. Therefore, the channel names should be modified accordingly to reflect the names of the respective WPs. All these channels follow the same tab

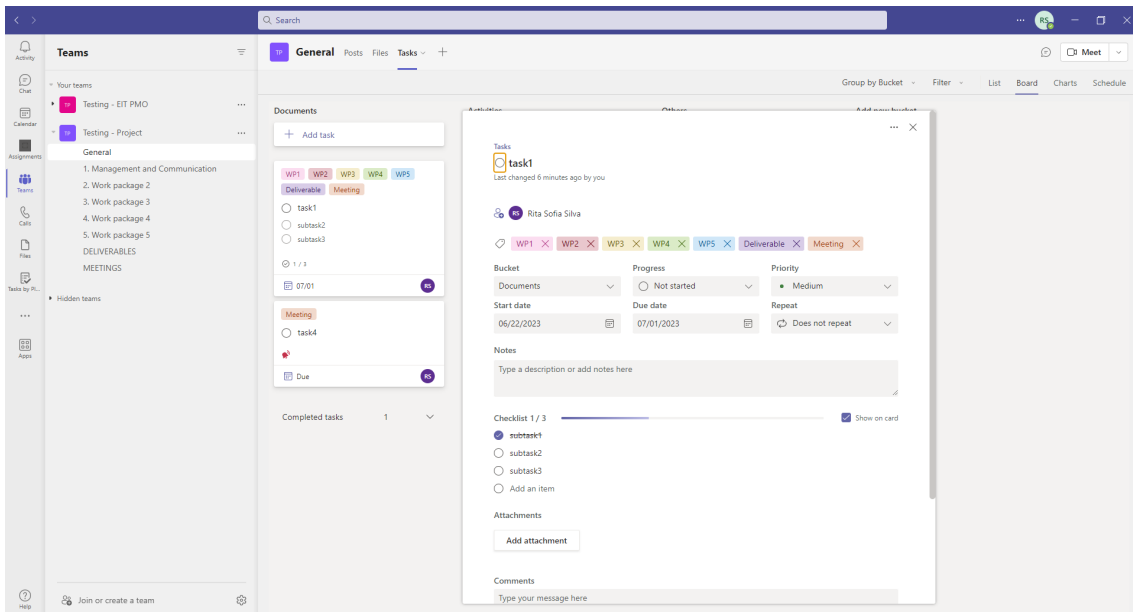


Figure 4.13: Project Team’s General channel: Tasks tab; Card example

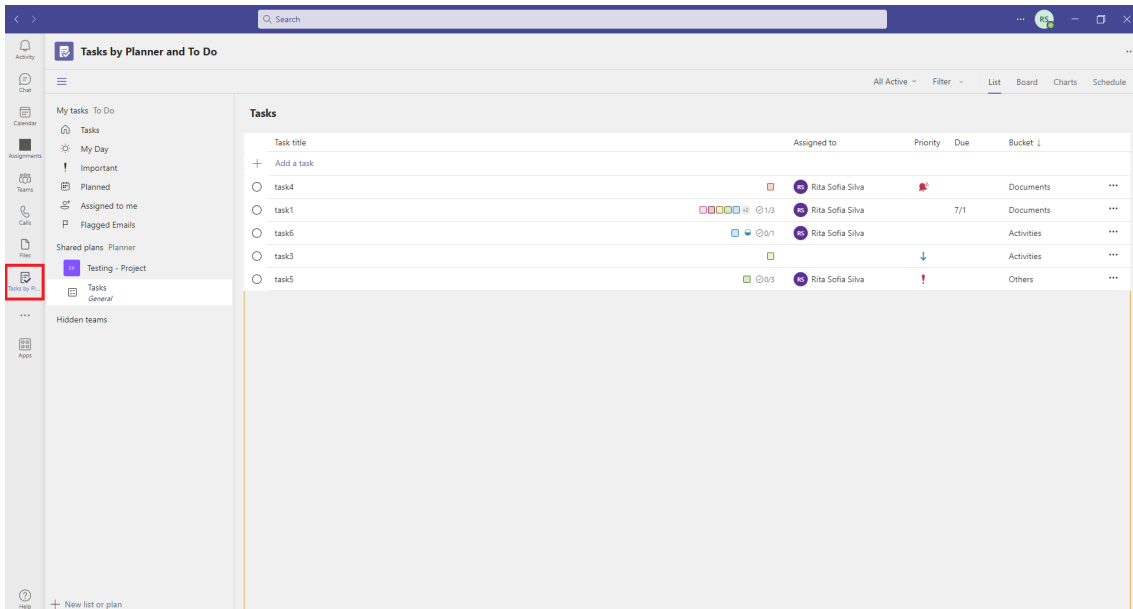


Figure 4.14: Tasks by Planner (personal tab)

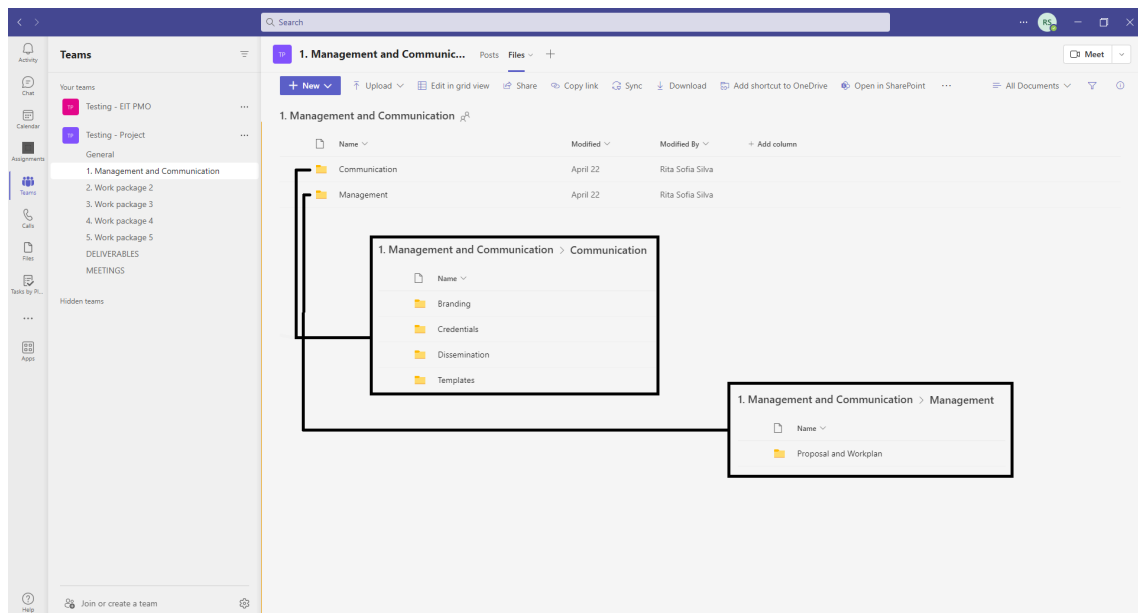


Figure 4.15: Project Team's Work Package channel: Files tab

structure, consisting of the *Posts* and *Files* tabs. These tabs serve the same functionalities as in other channels, with the *Posts* tab facilitating communication and the *Files* tab providing storage for relevant documents. Given the varying documentation requirements between WPs and projects, a predefined file structure was not established, leaving it up to the researchers to organize the files within each channel. However, it is worth noting that all projects generally include a WP related to Communication, encompassing topics such as branding, credentials, dissemination, and templates. Additionally, there is typically a WP related to Management, housing the project proposal and work plan. In some cases where the project has smaller dimensions, these two WPs may be combined. Figure 4.15 provides an illustration of the file structure for the described WP. However, if the project has these two WPs separated, the file structure should be adjusted accordingly, while maintaining the folder names consistent.

Finally, there are two additional channels included in the Project team: *Deliverables* and *Meetings*. The purpose of the *Deliverables* channel is to serve as a centralized repository for all project deliverables' files, while the *Meetings* channel facilitates the scheduling of meetings and provides storage for all meeting-related documents such as PowerPoint presentations and Status Updates. In the *Deliverables* channel, two tabs are present: *Posts* which enables communication regarding any issues related to the deliverables, and *Files*. Figure 4.16 illustrates the recommended file structure that should be followed within the channel. The folder names should be modified to reflect the specific deliverables mentioned in the project proposal. Other than the root folders of this tab, the organization of files is at the discretion of the researchers, taking into consideration the unique requirements of each project.

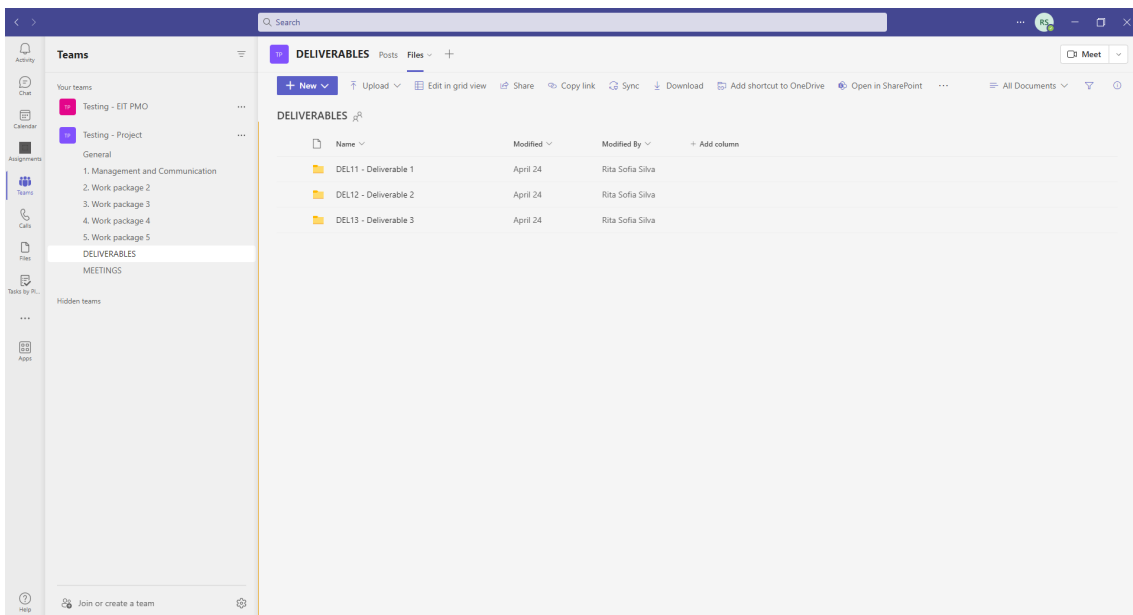


Figure 4.16: Project Team's Deliverables channel: Files tab

And finally, within the *Meetings* channel, there are three tabs: *Posts*, *Files* and *Calendar*. The first serves as a communication hub regarding meetings. The second, represented by figure 4.17, has two main folders, one for Presentations, where all material related to meetings should be stored and Status Updates, that contains an Excel template that should be completed to facilitate the monitoring of the overall project's progress. And finally, the third tab, allows the scheduling of meetings, like the Calendar tab presented before in the General channel of the PMO Team, this also has the Schedule Assistant (see Annex A).

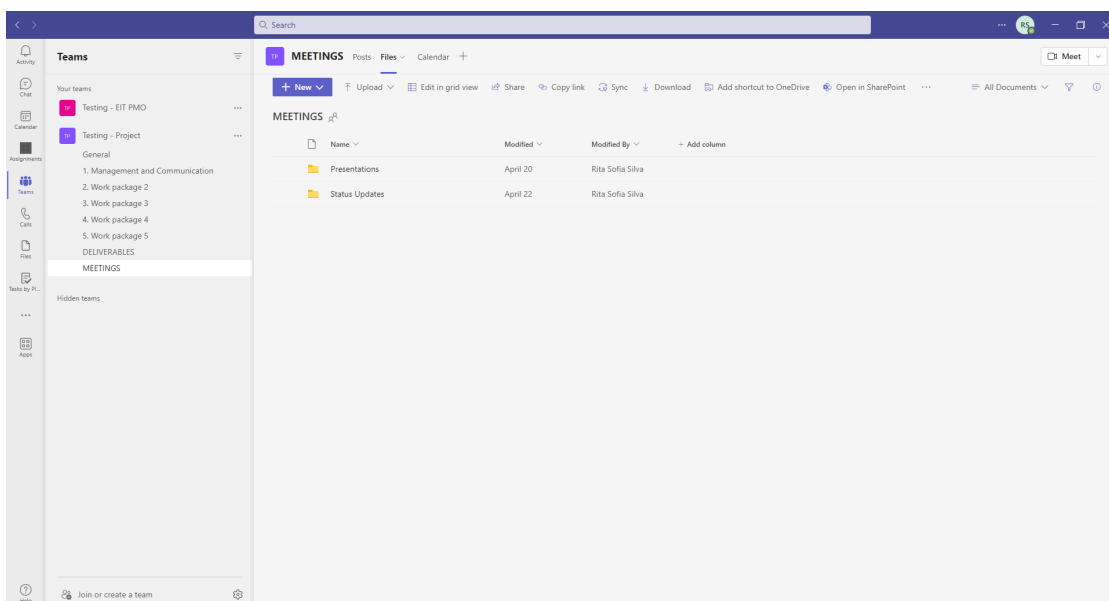


Figure 4.17: Project Team's Meetings channel: Files tab

Figures 4.18 to 4.21 depict the various sheets of the Status Update file, which serves as a crucial component of the new project management process. The primary objective of this process is to facilitate the maintenance of a holistic view of projects by the project manager, while also keeping all partners informed about their progress, and additionally enabling the laboratory director to gain comprehensive insights into the project portfolio. It also allows identification of areas that demand attention, and determine resource requirements. The template presented is a customized adaptation of the OPPM (refer to Section 2.5.1) to specifically address the needs of EIT projects. It is important to note that the figures provided are for illustrative purposes only, as the template necessitates project-specific data. The creation of the Status Update file is an initial step when commencing a new project, utilizing the information outlined in the project proposal. Subsequently, it should be updated on a monthly basis.

The Status Update template consists of seven sheets: Overview (see figure 4.18), Details (see figure 4.19), one sheet for each quarterly report (see figure 4.20, that serves as an example for the first quarter), and Settings (see figure 4.21).

The Overview sheet of the template consists of six tables, which are organized from left to right and top to bottom. These tables represent six main areas:

**Table 1 (Project Information):** This table contains essential project details that remain static throughout the project's duration. It includes information such as the project leader's name, as well as the project's start and end dates.

**Table 2 (Budget):** The Budget table provides an overview of the project's financial resources. The budget value displayed is figurative. By entering values in the "Already Spent" row, the corresponding amount will be deducted from the initial budget. The "Remaining" cell will turn red if the remaining budget becomes negative, indicating budgetary concerns.

**Table 3 (Key Performance Indicators - KPIs):** This table presents information about the project's KPIs. It includes columns for the "Target Values" of the KPIs upon project completion, the "Current" values representing the current progress towards meeting the targets, and the "Status" column, which is color-coordinated to facilitate easy visualization of the information.

**Table 4 (Milestones/Deliverables/Outputs):** This table is associated with the milestones, deliverables, and outputs expected from the project. Each entry includes an "Expected Date" for completion. If the "Date" field at the top right corner of the sheet is filled, it calculates the number of days remaining (represented by cells with a white background) or elapsed (with a grey background) since the expected date. The "Status" column, also color-coordinated, provides an instant overview of progress.

**Table 5 (Project Components):** This table comprises four project components such as Budget, Resources, Timeline, and Scope. Each component has a "Status" column, color-coded to indicate its progress or state. Additionally, a "Notes" column allows researchers to add text describing any problems or issues to be discussed in subsequent meetings. The table aims to provide a centralized location for note-taking accessible to all team members.

**Table 6 (Risk Management):** This table contains information related to Risk Management, as specified in the project proposal. It serves as a constant reminder of potential risks and can be expanded to include additional risks, if necessary.

Project					Date
Project Information					01/07/23
Project ID	Project Leader	Project Status	Start Date	Target Completion Date	
1	Researcher	Active	01/01/2023	31/12/2023	
Budget					
Planned					100 000,00 €
Already Spent					
Remaining					100 000,00 €
KPI	Code	Title	Target Value	Current	Status
	KPI 1	Key Performance Indicator 1	10	10	Achieved
	KPI 2	Key Performance Indicator 2	10	10	Achieved
	KPI 3	Key Performance Indicator 3	10	8	Almost There
	KPI 4	Key Performance Indicator 4	10	7	Almost There
	KPI 5	Key Performance Indicator 5	10	9	Almost There
	KPI 6	Key Performance Indicator 6	10	2	Far
	KPI 7	Key Performance Indicator 7	10	3	Far
	KPI 8	Key Performance Indicator 8	10	7	Almost There
Milestones	Code	Name	Expected Date	Days Missing	Status
	MS11	Milestone 1	31/03/23	-92	Delayed
	MS12	Milestone 2	31/08/23	61	In Progress
Deliverables	DEL11	Deliverable 1	28/02/23	-123	Done
	DEL12	Deliverable 2	31/03/23	-92	Done
	DEL13	Deliverable 3	30/06/23	-1	Delayed
	DEL14	Deliverable 4	31/08/23	61	In Progress
	DEL15	Deliverable 5	31/10/23	122	In Progress
	DEL16	Deliverable 6	31/12/23	183	In Progress
	DEL17	Deliverable 7	31/12/23	183	In Progress
	DEL18	Deliverable 8	31/12/23	183	In Progress
Outputs	OUT11	Output 1	28/02/23	-123	Done
	OUT12	Output 2	31/12/23	183	In Progress
Project Components					
Component	Status	Notes			
Budget	Under				
Resources	Need Help				
Timeline	Potential Delays				
Scope	On Track				
Risk Management					
Category	Title	Likelihood	Impact		
EXTERNAL	Risk 1	2	3		
STRATEGIC	Risk 2	2	5		
OPERATIONAL	Risk 3	1	4		

Figure 4.18: Status Update: Overview Sheet

The Detail sheet within the template was developed based on an analysis of various task management platforms mentioned in Section 2.1.1. Its purpose is to provide an alternative to the Tasks tab in the General channel of the Project Team and to gather feedback in order to decide between the two task management solutions. Figure 4.19 illustrates this sheet, which is divided into three sections: Last Iteration, Accomplishments/Difficulties, and Next Iteration.

The first section adopts a structured format similar to the third (Next Iteration). Each task is represented in a row, allowing for the inclusion of priority, assigned personnel, due dates, automatically calculated days remaining based on the current date, percentage of completion, notes, and status. The status column is color-coordinated for easy identification. The tasks listed in this section pertain to the iteration that is finishing upon the meeting realization. On the other hand, section 3 refers to tasks that are being planned for the next iteration. The second section provides a designated space for all project partners to reflect on their significant accomplishments and challenges encountered during the iteration currently under discussion. This allows for insights and improvements to be implemented in subsequent iterations.

Project							Date
							01/07/23
Last Iteration							
Task Name	Priority	Assigned To	Due Date	Days Missing	% Complete	Notes	Status
Task 1	🔴	1 Researcher 1	31/08/23	61	20		In Progress
Task 2	🟡	2 Researcher 2	31/10/23	122	5		Delayed
Task 3	🟡	3 Researcher 3	31/12/23	183	40		In Progress
Task 4	🟢	4 Researcher 4	01/07/23	0	100		Done
Task 5	🟡	5 Researcher 5	31/10/23	122	10		In Progress
Biggest Accomplishments				Biggest Difficulties			
Next Iteration							Next Meeting:
Task Name	Priority	Assigned To	Due Date	Days Missing	% Complete	Notes	Status
Task 1							
Task 2							
Task 3							
Task 4							
Overview							Details
Q1 Report							Q2 Report
Q3 Report							Q4 Report
Settings							

Figure 4.19: Status Update: Details Sheet

The Quarterly Reports are essential documents that need to be completed four times a year, corresponding to each quarter. This process is mandatory for projects conducted in collaboration with EIT Manufacturing, and the reports are submitted through Plaza, the designated platform. The Quarterly Reports consist of six questions that require written responses. The questions are as follows:

- Performance Report for M1 to M3 (Where M1 is equal to the first month and M3 is equal to the last month of the respective quarter in analysis).
- Explain and justify foreseen deviations from the Original Workplan (if any) and Mitigation Plan concerning those foreseen deviations.
- Overall KPI Analysis: Please provide a brief overview of the overall KPIs achievements and deviations (if any)
- Budget consumption: briefly describe the status of budget consumption and inform of any relevant under spending.
- Outlook for next quarter.

Taking this information into consideration, the Qx Reports sheets, where x represents the respective quarter number (1, 2, 3, or 4), have been designed to facilitate the completion of Quarterly Reports. These sheets are depicted in Figure 4.20, where it is presented the sheet for the first quarter. Each report consists of five tables, corresponding to the five questions mentioned earlier. The information in these tables should be updated on a monthly basis, ensuring that all necessary data is readily available when it is time to submit the reports on Plaza. The only variation between the reports is the inclusion of specific months in the Performance Report table, reflecting the relevant quarter under analysis.





#### 4.3.4 Validation

Subsequent to the full development of the solution, the validation phase involved obtaining feedback from the end users. The initial step encompassed presenting the platform and its features to the researchers and laboratory director. This was achieved through two distinct meetings: an in-person session involving two researchers, followed by an online session with another researcher and the director. During these meetings, a thorough discussion took place to familiarize the participants with the platform's functionalities and elucidate their optimal utilization.

Following the meetings and subsequent verbal feedback, the researchers were granted access to the platform for a period of four weeks. They were encouraged to incorporate the platform into their daily tasks, utilizing it to input authentic information and assess its suitability for meeting their specific requirements. At the conclusion of this trial period, they were requested to complete a one of two Google Forms questionnaires that were made, providing feedback on all aspects of the platform's performance. The questionnaires differed in terms of length and level of detail. This approach was implemented to accommodate participants with limited time availability, as the longer version of the questionnaire took an average of 45 minutes to complete whereas the shorter version only took 10 minutes. Both questionnaires solicited suggestions and observations for further improvement. All the questions were discussed during a subsequent meeting held to gather final thoughts before presenting the participants with the final version of the platform. The forms are fully available on Annex C.1 (detailed form) and Annex C.2 (general form). Both forms were divided into three sections: General Questions, that aimed to obtain an overview of the feedback, Project Team Questions, directed to the Project team, and PMO Team Questions, directed to the PMO team.

The results obtained from the questionnaires revealed valuable insights regarding participants' feedback on the platform's performance. In response to the first question, that was the same in both forms, approximately 67% (2) of respondents rated the usefulness of the platform as a whole with a score of four out of five, while the remaining respondents gave it the highest rating of five out of five. In terms of user-friendliness, 100% (3) of the responses had a score of four out of five. And finally, when considering the likelihood of use, one respondent gave it a score of three out of five, while the other two gave it a score of four out of five (see Figure 4.22).

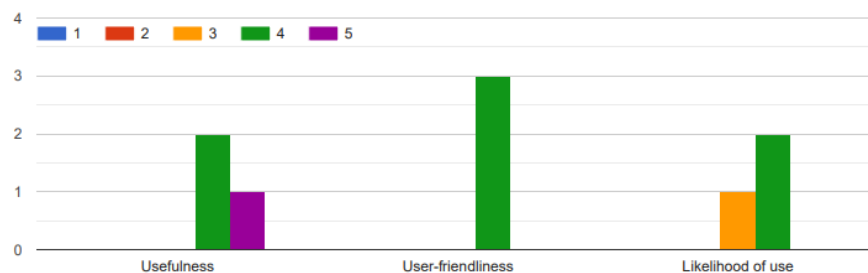


Figure 4.22: Graph with all responses obtained in question 1 of both forms. (Question 1: Regarding the platform as a whole, how would you classify its Usefulness; User-friendliness; Likelihood of Use?)

The key points gathered from the questionnaires are as follows:

#### A | GENERAL QUESTIONS:

- Participants expressed that the platform facilitated fast communication, easy collaboration, and offered simple and accessible organization and planning capabilities.
- Good compatibility with other tools, particularly Microsoft products commonly used in the laboratory such as Word, Excel, and PowerPoint.
- Reliability issues were identified with Microsoft Teams, especially on machines operating with Linux.
- Participants pointed out limitations with the Outlook calendar as a negative aspect.

#### B | PROJECT:

- The *Task* tab in the *General* channel received the highest rate of five out of five for likelihood of use from all respondents.
- Participants appreciated the platform's customization options, allowing for adaptation to project-specific needs, such as adding new buckets, tags, and folder structures.
- All respondents agreed that having a channel for each Work Package (WP) made sense, and the file structure within those channels should align with the project's requirements.
- It was recommended the addition of a tab for *Forms* within the relevant *Work Package* channel. This suggestion was driven by the observation that many EIT projects involve activities that require the use of online forms, such as workshop registrations or feedback collection, that previously was stored in Google Drive.
- Regarding the Status Update file:
  - The evaluation revealed that participants found it highly understandable and useful for gaining an overview of their projects. The participants consistently provided scores of four or five out of five for the parameters of interface, usability, and user-friendliness when evaluating the platform. (see Figure 4.23).
  - The Details sheet of this document was deemed unnecessary, with participants preferring the *Tasks* tab in the *General* channel.
  - Participants suggested incorporating a feature that would allow each project partner to update the Key Performance Indicators (KPIs) values, automatically updating the total value in the Overview sheet, thereby eliminating the need for manual input.
  - Another suggestion was to include a sheet containing contact information for project partners.
  - It was also requested the addition of a sheet for Risk Register.

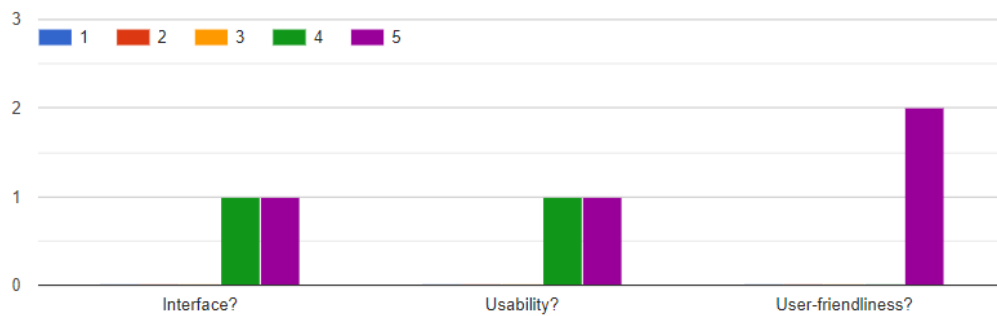


Figure 4.23: Graph with responses obtained in question 17 of the detailed form. (Question 17: Regarding the Status Update file, how would you classify its Interface; Usability; User-friendliness?)

#### C | PMO:

- Participants viewed the consolidation of all projects in one place as a valuable feature.
- Participants suggested adding some folders to the *Files* tab of the *General* channel, for example to add materials provided by EIT, like branding and templates.
- Regarding the *Notes* tab of the *General* channel:
  - The customization options were appreciated.
  - A suggestion was made to remove the Action Items table in the Meeting Minutes section, as it did not align with their meeting structure.
  - The concept of organizing knowledge by category rather than by project was positively received, although participants expressed the need for more time to adapt.
- Question 29 of the detailed form, which pertained to copying files from the Project team to the *Project* channel of the PMO team, elicited varied responses (see Figure 4.24).

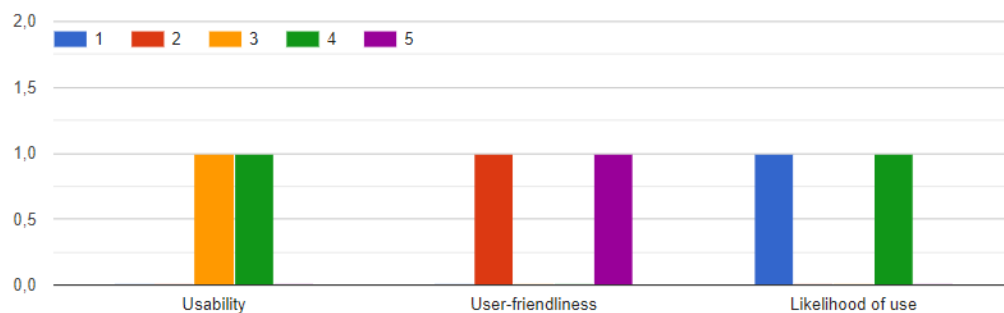


Figure 4.24: Graph with responses obtained in question 29 of the detailed form. (Question 29: Taking into consideration the tutorial included in the Google Docs file to copy the documents from the Project team to the PMO team, please rate its Usefulness; User-friendliness; Likelihood of Use?)

These outcomes play a vital role in evaluating the effectiveness of the platform and contribute to the overall findings of the thesis. The analysis and interpretation of the feedback guided the development process, leading to the creation of the final version, as is described in Section 4.3.5.

### 4.3.5 Final Version

By incorporating all the insights and suggestions gathered from the researchers, the final version aims to address their needs more effectively and provide an improved user experience.

In response to their feedback, some changes were implemented within the PMO team:

1. Introduction of EIT Materials Folder: A new folder was added in the *Files* tab of the *General* channel to accommodate files related to EIT materials, such as branding and templates. This addition allows for easier access and management of these resources, providing a centralized location for the team to retrieve the necessary materials (see Figure 4.25).

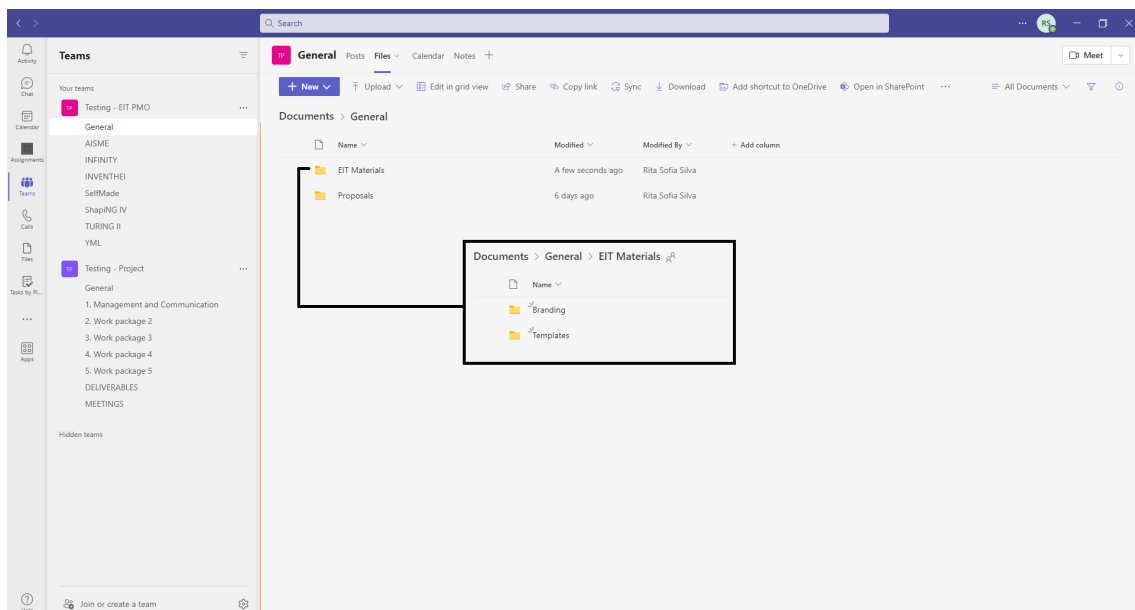


Figure 4.25: PMO Team's General channel: Files tab' final version of the file structure.

2. Updated Meeting Minutes Template: The meeting minutes template was revised based on the researchers' suggestion to ensure it follows the structure of their meetings. This update enables a more consistent and organized approach to documenting meeting discussions and action items (see Figure 4.26).

There were also modifications made to the Project team:

1. In the *Work Package 2* channel, an additional *Form* tab was added. This tab serves as an example for creating forms that may be required for various activities within the WP. It is important to adapt this tab to the corresponding WP channel where it is needed and customize the form according to specific requirements (in Figure 4.27 there is an example of a Registration Form).

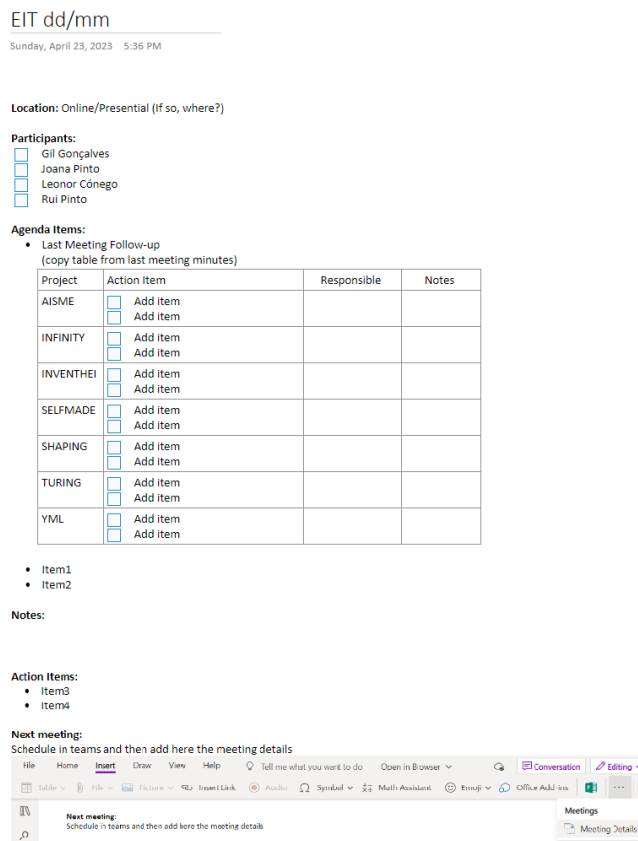


Figure 4.26: PMO Team’s General channel: Notes tab’ final version of the Meeting Minutes template.

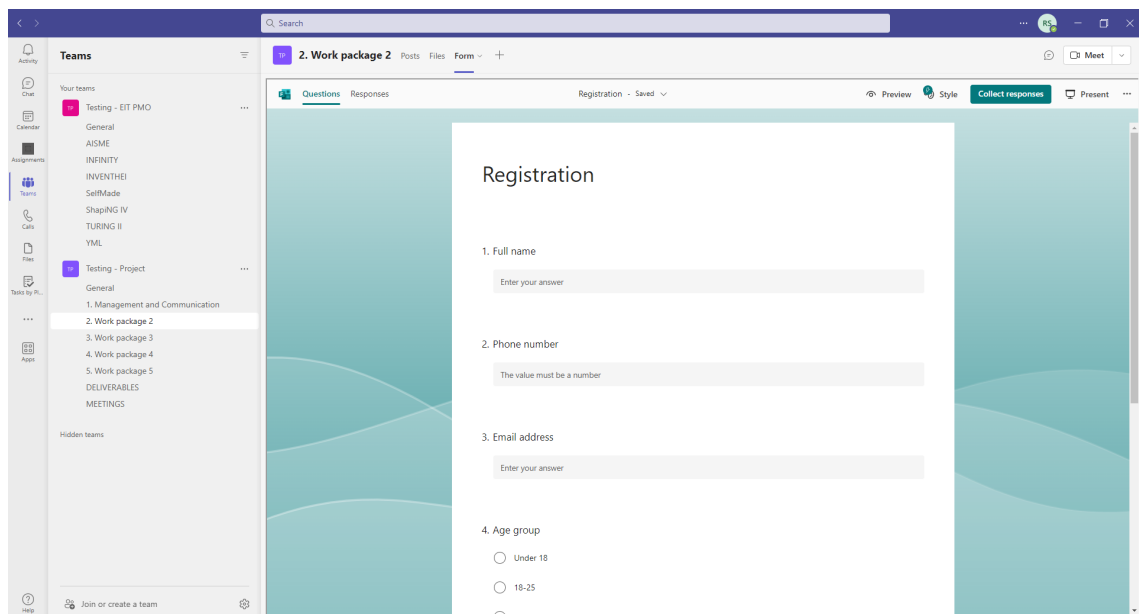


Figure 4.27: Project Team’s Work Package 2 channel: Form tab’ final version.

- The Status Update file was moved to a tab, named *Status Update*, in the *General* channel, since it is a document that should be easily accessed and used frequently (see Figure 4.28).

Project Information				
Project ID	Project Leader	Project Status	Start Date	Target Completion Date
1	Bobster	Active	01/01/2023	31/12/2023

Budget	
Planned	100,000.00 €
Already Spent	
Remaining	100,000.00 €

Code	Title	Target Value	Current	Status
KPI 1	Key Performance Indicator 1	10	5	Achieved
KPI 2	Key Performance Indicator 2	10	6	Achieved
KPI 3	Key Performance Indicator 3	10	0	Almost There
KPI 4	Key Performance Indicator 4	10	2	Almost There
KPI 5	Key Performance Indicator 5	10	3	Almost There
KPI 6	Key Performance Indicator 6	10	4	Far
KPI 7	Key Performance Indicator 7	10	4	Far
KPI 8	Key Performance Indicator 8	10	3	Almost There

Code	Name	Expected Date	Days Missing	Status
M511	Milestone 1	31/03/23	-92	Delayed
M512	Milestone 2	31/08/23	61	In Progress
M513	Milestone 3	31/12/23	183	In Progress

Code	Name	Expected Date	Days Missing	Status
DEL11	Deliverable 1	28/02/23	-123	Done
DEL12	Deliverable 2	31/03/23	-92	Done
DEL13	Deliverable 3	30/06/23	-1	Delayed
DEL14	Deliverable 4	31/08/23	61	In Progress
DEL15	Deliverable 5	31/10/23	122	In Progress
DEL16	Deliverable 6	31/12/23	183	In Progress
DEL17	Deliverable 7	31/12/23	183	In Progress
DEL18	Deliverable 8	31/12/23	183	Done

Code	Name	Email
Partner 1	Person A	personA@partner1.com
Partner 2	Person B	personB@partner2.com
Partner 3	Person C	personC@partner3.com
Partner 4	Person D	personD@partner4.com
Partner 5	Person E	personE@partner5.com
Functional Director		

Figure 4.28: Project Team's General channel: Status Update tab' final version.

- Within the Status Update file, three significant changes were made:
  - The Overview sheet was updated to automatically reflect the current values of Key Performance Indicators (KPIs) based on the new KPIs sheet. A new table was introduced to display information from all project partners, namely their name and e-mail, as well as the Functional Director, that is the EIT contact person. The layout of the sheet was also adjusted to accommodate these changes (see Figure 4.29).
  - The KPIs sheet was added, featuring a table that outlines the KPI objectives for each partner. Partners can update their respective KPI current values, and these values are then summarized in the "Currently" column, which feeds into the Overview sheet. The specific values for each partner's objectives should be discussed and agreed upon in advance (see Figure 4.30).
  - The Details sheet was deemed unnecessary and, consequently, deleted. As a result, the Settings sheet was modified accordingly to reflect this change as well as the addition of the needed configurations to customize the new Risk sheet (see Figure 4.31).

Project										Date		
Project Information										01/07/23		
Project ID	Project Leader	Project Status	Start Date	Target Completion	Budget							
1	Leader Researcher	Active	01/01/2023	31/12/2023	Planned	100,000,001						
					Already Spent							
					Remaining	100,000,001						
KPI	Code	Title	Target Value	Current	Status	Milestones	Code	Name	Expected Day	Days Missing	Status	
	KPI1	Key Performance Indicator 1	10	5	Achieved		MS11	Milestone 1	31/03/23	-92	Delayed	
	KPI2	Key Performance Indicator 2	10	6	Achieved		MS12	Milestone 2	31/08/23	61	In Progress	
	KPI3	Key Performance Indicator 3	10	0	Almost There		MS13	Milestone 3	31/12/23	193	In Progress	
	KPI4	Key Performance Indicator 4	10	2	Almost There							
	KPI5	Key Performance Indicator 5	10	3	Almost There		Deliverables	DEL11	Deliverable-1	28/02/23	-123	Done
	KPI6	Key Performance Indicator 6	10	4	Far			DEL12	Deliverable-2	31/03/23	-32	Done
	KPI7	Key Performance Indicator 7	10	4	Far			DEL13	Deliverable 3	30/06/23	-1	Delayed
	KPI8	Key Performance Indicator 8	10	3	Almost There			DEL14	Deliverable 4	31/08/23	61	In Progress
						DEL15		Deliverable 5	31/10/23	122	In Progress	
						DEL16		Deliverable 6	31/12/23	193	In Progress	
						DEL17		Deliverable 7	31/12/23	193	In Progress	
						DEL18		Deliverable-8	31/12/23	193	Done	
Partners	Code	Name	E-mail									
	Partner 1	Person A	personA@partner1.com									
	Partner 2	Person B	personB@partner2.com									
	Partner 3	Person C	personC@partner3.com									
	Partner 4	Person D	personD@partner4.com									
Partner 5	Person E	personE@partner5.com										
Functional Director												
Project Components					Risk Management							
Component	Status	Notes										
Budget	Under											
Resources	Need Help											
Timeline	Potential Delays											
Scope	On Track											
Category	Title	Likelihood	Impact									
EXTERNAL	Risk 1	2	3									
STRATEGIC	Risk 2	2	5									
OPERATIONAL	Risk 3	1	4									

Figure 4.29: Status Update: Overview Sheet' final version.

KPIs / Partner		Objective	Currently	Partner 1		Partner 2		Partner 3		Partner 4		Partner 5	
Code	Title			Objective	Current	Objective	Current	Objective	Current	Objective	Current	Objective	Current
KPI 1	Key Performance Indicator 1	10	5	1	1	3	1	3	2	2	1	1	
KPI 2	Key Performance Indicator 2	10	6	1	1	1	1	1	1	6	5	1	
KPI 3	Key Performance Indicator 3	10	0	2		3		3		1		1	
KPI 4	Key Performance Indicator 4	10	2	3		5	2	1		0		1	
KPI 5	Key Performance Indicator 5	10	3	5	1	2	1	1		0		2	
KPI 6	Key Performance Indicator 6	10	4	1	1	1		2	2	4	1	2	
KPI 7	Key Performance Indicator 7	10	4	2	1	3	2	3		1		1	
KPI 8	Key Performance Indicator 8	10	3	0		1		5	1	2	2	2	

Figure 4.30: Status Update: KPIs Sheet' final version.

Overview										
Project Status	KPI Status	Project Components				Milestone Status	Deliverables Status	Outputs Status		
Active	Far	Budget	Resources	Timeline	Scope	In Progress	In Progress	In Progress		
On Hold	Almost There	Under	On Track	On Time	On Track	Delayed	Delayed	Delayed		
Done	Achieved	On	Need Help	Need More Time	Need Change	Done	Done	Done		
Cancelled		Over	Lacking	Potential Delays						
Risk										
Category	Likelihood	Impact	Risk Level		Proceed?	Responsible	Status			
STRATEGIC	1	1	Lower Value	Higher Value	YES	Person 1	OPEN			
OPERATIONAL	2	2	1	4	NO	Person 2	CLOSED			
EXTERNAL	3	3	5	8		Person 3				
INTERNAL	4	4	9	14		Person 4				
BUDGET	5	5	15	25		Person 5				

Figure 4.31: Status Update: Settings Sheet' final version.





# Chapter 5

## Discussion

In this chapter, its presented the discussion. In the Section 5.1, its presented a summary of the work developed, in the Section 5.2 the answers to the research questions made in the beginning that led to the development of this work, in Section 5.3 the benefits of the solution are presented and in Section 5.4 is presented more validation made to further evaluate the possibility of adherence and scalability of the solution.

### 5.1 Summary of Work Done

The present dissertation emphasizes the significance of project management across diverse domains and underscores the indispensability of digital tools for its effective implementation. The study highlights the crucial role of portfolio, project, task, and knowledge management in optimizing project execution, monitoring, and achieving successful outcomes. The specific focus of this study was on SYSTEC, where opportunities existed to further enhance project management practices and thereby maximize R&D endeavors. The primary objectives of this work encompassed the optimization of management processes at various levels, the customization of a project management tool to cater to the unique requirements of the laboratory, and the promotion of researchers' adherence to the implemented platform.

### 5.2 Answer to the Research Questions

To fulfill these objectives, this dissertation addressed identified challenges and explored innovative solutions in order to enhance project management practices within SYSTEC. In pursuit of this aim, three core research questions were formulated.

Firstly, the question of whether it is feasible to optimize the project management processes of the research center is addressed. The response to this question is affirmative, as through comprehensive understanding and gathering of the center's specific needs, optimization efforts were

successfully undertaken. These included structural improvements in project organization, knowledge creation and documentation, and updates to the project status. The validation of these optimizations was derived from positive feedback obtained through post-implementation surveys distributed among the end users of the platform.

Secondly, the question of whether it is possible to customize a platform to meet the project management needs of the research center is explored. The answer to this question is also affirmative, as specific requirements unique to this study case were identified. Notably, the creation of the Project Status template and the OneNote notebook emerged as crucial components of the solution, ensuring effective visualization and documentation of essential information by all stakeholders. These customizations were pivotal in aligning the platform with the laboratory's specific needs, that would not have been answered by the platform as it was, confirming the necessity of customization.

Lastly, the question of whether the platform's customization to the laboratory needs promotes researchers' adherence is examined. Although a definitive answer to this question is currently pending due to the ongoing implementation of the platform on a new project that commenced on June 22<sup>nd</sup>, several measures were undertaken to maximize researchers' acceptance and engagement. These measures included extensive interactions with end users throughout the development process, the integration of their feedback, the utilization of a platform they were already familiar with, the creation of a concise manual and the absence of additional costs to the laboratory. While conclusive evidence regarding adherence is yet to be determined, the aforementioned steps strongly suggest a high likelihood of positive acceptance among researchers. Time and continued observation will ultimately unveil the full extent of researchers' adherence to the implemented platform. Nonetheless, the current indications are promising, suggesting a favorable outlook in terms of researcher engagement and adoption.

Referring back to the identified target necessities in Table 4.2, the solution successfully addressed the following aspects: i) on a portfolio level, it provided an overview of project statuses through the utilization of the Status Update file. To ensure that it was established a supportive PMO in the lab for the EIT kingdom, according to what was studied from the PMBoK. This also facilitated regular meetings by recommending monthly PMO meetings, documenting them in the Meeting Minutes of the Notes tab in the General channel of the PMO team, and improved scheduling, utilizing the Schedule Assistant functionality; ii) from a project perspective, the solution established a standardized structure for information organization, achieved through the channel and folder naming patterns within each Project team; iii) task management was enhanced through the use of the Tasks tab in the General channel of the Project team, which reduced the need for additional communication to remind partners of their assigned tasks, and iv) additionally, the implementation of a central knowledge base facilitated knowledge sharing among researchers based on specific categories rather than by projects.

### **5.3 Benefits of the Solution**

The implementation of processes, standards, and a fully digital and centralized project management platform also brings out an important advantage in terms of preparedness for unforeseen circumstances such as a pandemic. With the availability of these tools and systems, the laboratory is better equipped to handle situations that require a shift to remote work and online collaboration. In the event of a situation that forces research activities to be conducted remotely, like a pandemic, the established processes and templates provide a framework for efficient and effective project management in a virtual environment. Overall, the presence of these processes, standards, and the digital platform enhances the laboratory's ability to adapt and respond to challenging circumstances, ensuring that research endeavors can continue even in the face of unexpected disruptions, minimizing the impact of external factors on the progress and success of projects.

The inclusion of standardized processes and structures within the laboratory and its diverse teams was necessitated by several reasons, primarily addressing resource management. By implementing such standardization, the transfer of projects from one researcher to another becomes more seamless and comprehensible. In the event of a researcher leaving SYSTEC, the documentation and established processes facilitate a smooth transition for the incoming researcher, enabling them to quickly integrate into the ongoing projects. Similarly, when a new researcher joins the lab, the standardized procedures provide a solid foundation for their comprehensive understanding and involvement in the projects. The structured documentation plays a crucial role in this regard, allowing for in-depth analysis and comprehension of project details. Furthermore, an essential advantage of this solution lies in its ability to facilitate knowledge and information sharing. By establishing a common platform and implementing standardized processes, researchers within the lab are interconnected and have access to the same information. This promotes collaboration and effective communication, ensuring that knowledge and insights are readily shared among team members. The accessibility of shared information enhances coordination, minimizes duplication of effort, and enables a more cohesive and efficient work environment within the laboratory.

### **5.4 More Validation**

However, while the current projects in the EIT kingdom are relatively small, with a duration of one to two years and involving only one researcher per project, it is important to consider the adaptability of this solution to larger projects with more participants. In a broader context, the solution offers a centralized platform for efficient information and knowledge sharing. Let us consider its potential applicability to a company managing multiple interdependent IT projects, each involving larger teams of approximately ten members per project. Adopting a similar team structure, the proposed solution could bring substantial benefits. The Project Management Office (PMO) functionality could greatly enhance communication among projects, while individual Project teams could effectively coordinate their activities. The integration of a Tasks tab in the General channel could effectively manage tasks across different projects. Additionally, the knowledge management

aspect could benefit from the categorization of knowledge based on topics rather than individual projects. This approach would enable development teams to address shared challenges such as security or the need for centralized documentation on coding structures. The Notes tab in the PMO channel could serve as a suitable location for storing such information. When considering project management, the proposed solution can be implemented effectively. The use of distinct channels within the platform ensures clearer communication among project team members. Creating separate channels for deliverables and meetings can significantly enhance the company's ability to locate and access relevant information. However, in the context of larger projects, additional considerations may need to be taken into account. For instance, specific solutions within Teams could be explored to assist with code organization or prototyping, although these aspects were not within the scope of the target group addressed in this thesis. To maximize the benefits of the solution for project management in larger-scale projects, further analysis and customization may be necessary to cater to the specific needs and requirements of those projects.

To validate the adaptability of the solution, an in-person meeting was conducted with researchers from other kingdoms within SYSTEC who work on larger projects with extended durations. These projects differ from the ones studied in this thesis as they focus on development rather than education and are not in partnership with EIT. During the meeting, the full potential of the platform and its various features were presented to the researchers.

Following the meeting, the researchers were given access to the platform and requested to test its functionality. They were also asked to provide feedback through a form, which was based on the one outlined in Appendix C.2, with the addition of two Yes/No questions:

1. Do you think this platform is useful?
2. Do you think it adds value to larger projects?

All participants responded affirmatively to both questions, highlighting the platform's benefits in terms of organization, access to materials, and effective team coordination. However, it was acknowledged that transitioning fully to MS Teams posed an initial effort since it was not their primary platform of choice, unlike the researchers from the EIT kingdom.

In summary, the solution developed in this work successfully meets the unique requirements of the laboratory and its projects. The centralized platform with its standardized structure, improved communication, efficient task management, and knowledge sharing capabilities demonstrates the versatility and applicability of the solution. Nevertheless, it is important to recognize that no solution is without limitations. During the implementation and evaluation process, certain limitations were identified that provide valuable insight for future improvements. In addition, there are recommendations to further enhance the effectiveness of the solution and address potential areas for refinement. By considering these limitations and recommendations, future iterations of the solution can be more tailored and effective in meeting the diverse needs of research centers.

## Chapter 6

# Conclusions & Future Work

In this chapter it's presented the conclusions. In the Section 6.1 the main conclusions, in the Section 6.2 the limitations and recommendations and in the Section 6.3 some recommendations for future work.

### 6.1 Conclusions

To conclude this thesis, the work developed has addressed the challenges and opportunities in project portfolio management within SYSTEC. The study recognized the importance of project management practices and the role of digital tools in optimizing project execution and monitoring. By implementing efficient project management processes, standardizing procedures, and developing a customized management platform, this research aimed to enhance operations, maximize outcomes, with a special focus on promoting researchers' adherence to the solution.

The optimization of project management processes at different levels, including portfolio, project, task, and knowledge management, has been successfully achieved through the proposed solution. The customized management platform, tailored to meet the specific needs of the EIT kingdom within SYSTEC, provides standardized procedures, organized information, and a comprehensive overview of projects. The positive responses obtained from end users and the implementation of the platform on a new project indicate the potential for increased researcher adherence and acceptance.

Furthermore, this dissertation highlights the vital role of an informatics engineers in the customization of management platforms. With their multidisciplinary competences in information technology, informatics engineers have the ability to bridge the gap between project management principles and digital solutions. The significance of informatics engineering extends beyond traditional domains, and their involvement in project management customization showcases their versatility and potential. Their broad spectrum of knowledge and skills enables them to analyze the requirements, design, and develop customized platforms that cater to the specific needs of different organizations.

In conclusion, this work has demonstrated the benefits of implementing efficient project management practices, customizing a management platform, and creating tailored templates. By optimizing project management processes and utilizing digital tools, research organizations like SYSTEC can enhance their operations, maximize outcomes, and promote collaboration among researchers.

## 6.2 Limitations & Recommendations

Despite the successful development and implementation of the solution, it is important to acknowledge that no solution is perfect, and certain limitations were identified during the course of this dissertation. The following list outlines the identified limitations (L) along with corresponding recommendations (R):

- L: The calendar feature is limited to Outlook, which may not align with the researchers' preferred calendar system.
- R: Consider either transitioning to Outlook as the main calendar or explore options to automate the process of synchronizing tasks with researchers' preferred calendars (e.g., Google or Apple calendars).
  
- L: The solution could not be fully implemented on an ongoing project, resulting in feedback gathered from an experimental perspective.
- R: Implement the solution on future projects to gather feedback and insights in a real-world setting<sup>1</sup>.
  
- L: Due to time limitations and the author's unfamiliarity with this type of project, there may have been challenges in comprehending the tasks involved in the projects and their implications.
- R: Enhance understanding of the tasks involved in these projects by engaging in further research and collaboration with relevant stakeholders. Promoting further optimizations of the solution. This will ensure a more effective implementation and successful project outcomes.
  
- L: Initial budgetary constraints might have influenced the choice of project management platform. However, Microsoft Teams proved to be a valuable tool with several advantages. Nevertheless, concerns were reported by the researchers such as reliability issues and compatibility with Linux machines.
- R: Explore alternative project management platforms or address the reported issues with Microsoft Teams to ensure a more seamless and reliable experience for all users, regardless of their operating system.

---

<sup>1</sup>The solution was fully implemented on an EIT project that started on the 22<sup>nd</sup> of June, showcasing the benefits of customizing a platform to enhance adherence. However, due to time constraints, feedback and results from the usage of the solution on this project could not be collected.

By acknowledging these limitations and providing corresponding recommendations, it becomes evident that there is room for further improvement and refinement of the solution to overcome these challenges and enhance its overall effectiveness in addressing the needs of research projects.

## 6.3 Future Work

While this thesis has made significant progress in optimizing project management practices within SYSTEC and customizing a management platform to meet the specific needs of the research unit, there are several areas that could be further explored in future work.

Firstly, a comprehensive evaluation of the implemented solution's effectiveness and impact on project outcomes and efficiency would provide valuable insights. Conducting a longitudinal study that assesses the long-term adherence and acceptance of the platform among researchers would contribute to understanding its sustainability and potential for scalability. Additionally, gathering feedback from end users and incorporating their suggestions for further enhancements and improvements would ensure continuous development and adaptation of the platform to meet evolving requirements.

Another important aspect is the transition process from the current project management system to the new platform. It is essential to plan and execute a smooth transition, ensuring minimal disruption to the projects and providing comprehensive training and support to researchers during the migration.

As mentioned before, scalability is a crucial consideration for the solution. Conducting a feasibility study and developing a roadmap for scaling the platform to other kingdoms of SYSTEC and eventually other research centers would ensure its widespread adoption and consistent implementation across the organizations. This would involve adapting the platform to accommodate the unique requirements and workflows of different kingdoms while maintaining the core functionalities that have proven effective in the initial implementation.

To respond to one of the identified limitations, the integration with other calendars is another area worth exploring. Automating the synchronization of project schedules and tasks with researchers' existing calendars, instead of only supporting the Outlook calendar, would enhance the usability and convenience of the platform. This could involve developing plugins or integrating with existing calendar applications to provide a seamless experience for researchers and ensure that project-related activities are properly scheduled and tracked.

Furthermore, investigating the compatibility of the platform, particularly the MS Teams integration, with Linux operating systems is important. Understanding the limitations and challenges of using MS Teams on Linux and exploring alternative solutions or workarounds would ensure that the platform can be effectively utilized by researchers regardless of their operating system, thereby maximizing its reach and impact.

Overall, future work should aim to continually evaluate and enhance the implemented solution and provide comprehensive training and support to researchers. By addressing these areas, the research center can further optimize its project management practices and leverage the full potential of the customized management platform to drive successful outcomes and promote collaboration among its researchers.



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# Appendixes

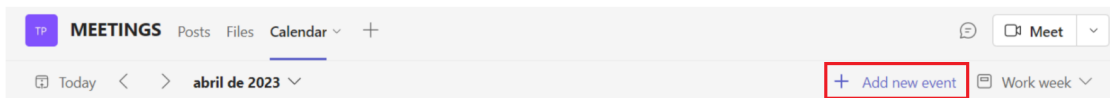




# Appendix A

## Schedule Assistant Tutorial

**Step 1:** Click in *+Add new event* button.



**Step 2:** Fill in all the details.

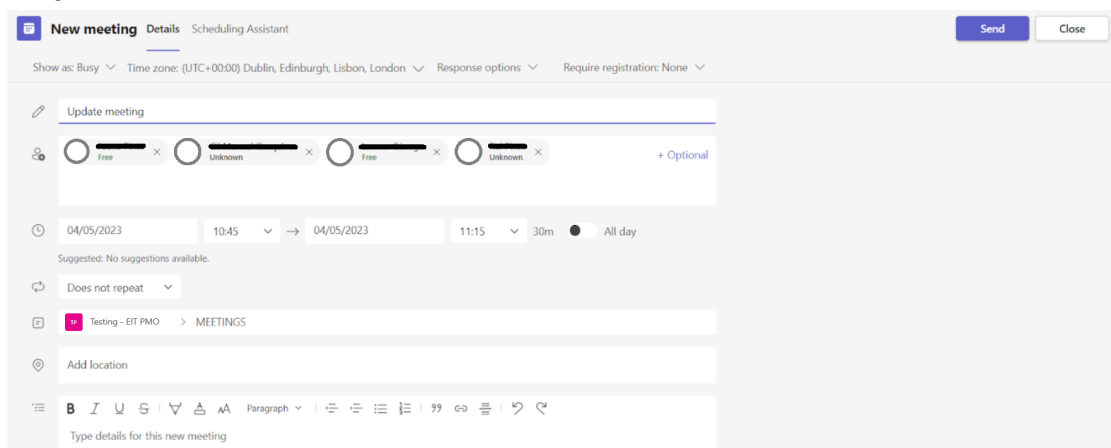
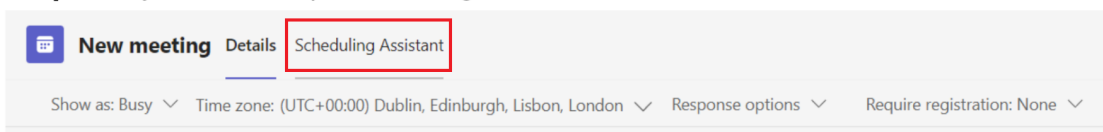
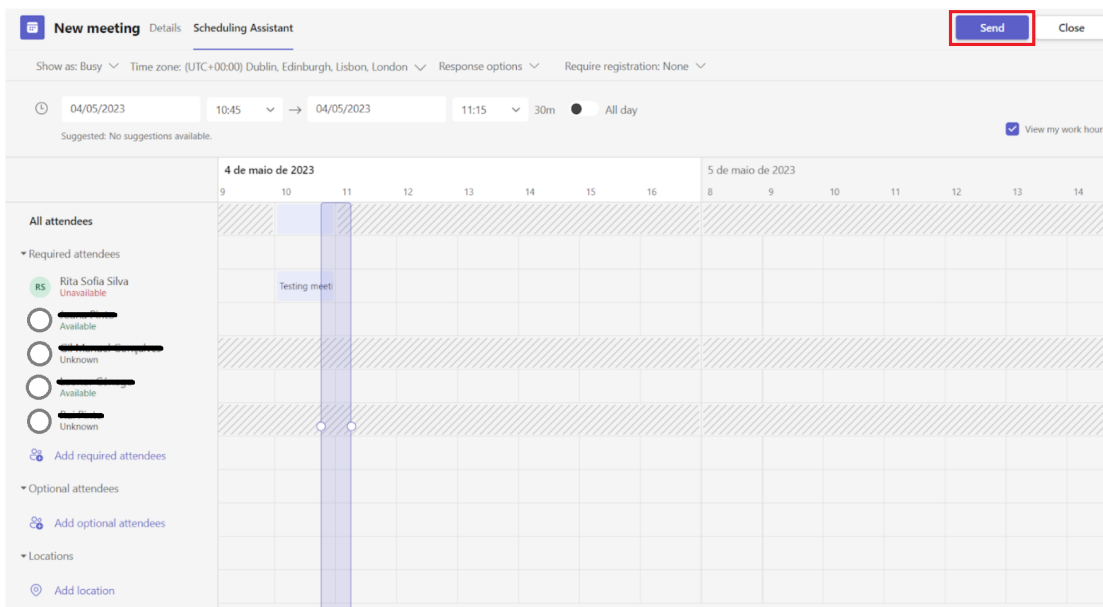


Figure A.1: Schedule Assistant Tutorial: Step 1 & 2

**Step 3:** If you need help scheduling click in the *Schedule Assistant* button.



**Step 4:** If someone is unavailable at that time it will appear in **red**.



Find a slot where most/all participants can attend and click in the *Send* button.

Figure A.2: Schedule Assistant Tutorial: Step 3 & 4

## Appendix B

# Copying Entire Project Repository in SharePoint Tutorial

**Step 1:** Go to your project and in the Files tab of the General channel click in the *Open in SharePoint* button.

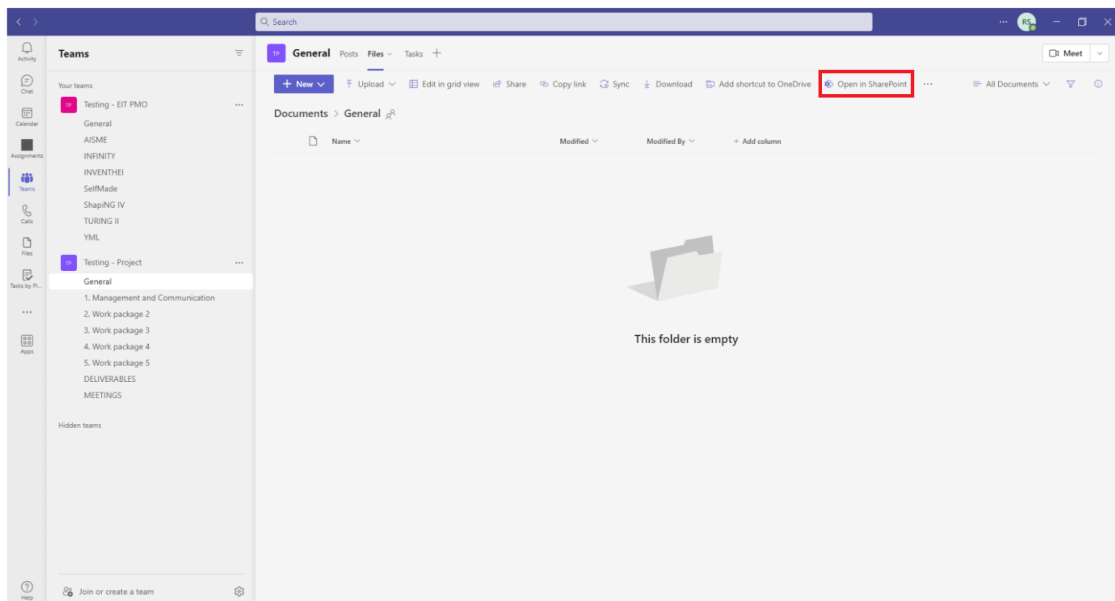


Figure B.1: Copying Documents in SharePoint Tutorial: Step 1

This will open on your browser.

**Step 2:** Click in *Documents*.

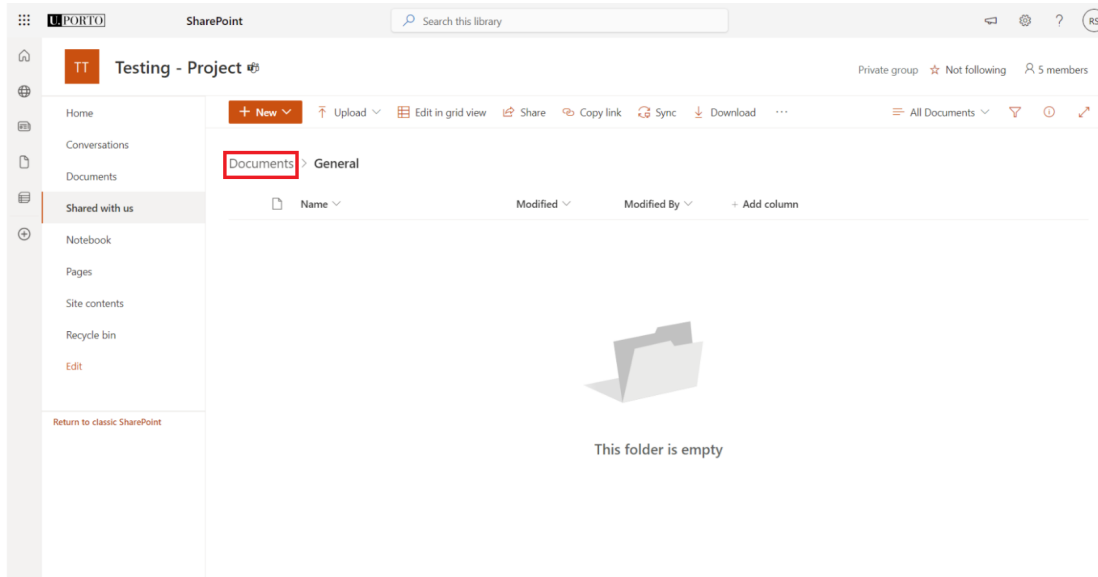


Figure B.2: Copying Documents in SharePoint Tutorial: Step 2

**Step 3:** Select all folders.

**Step 4:** Click on the *Copy to* button.

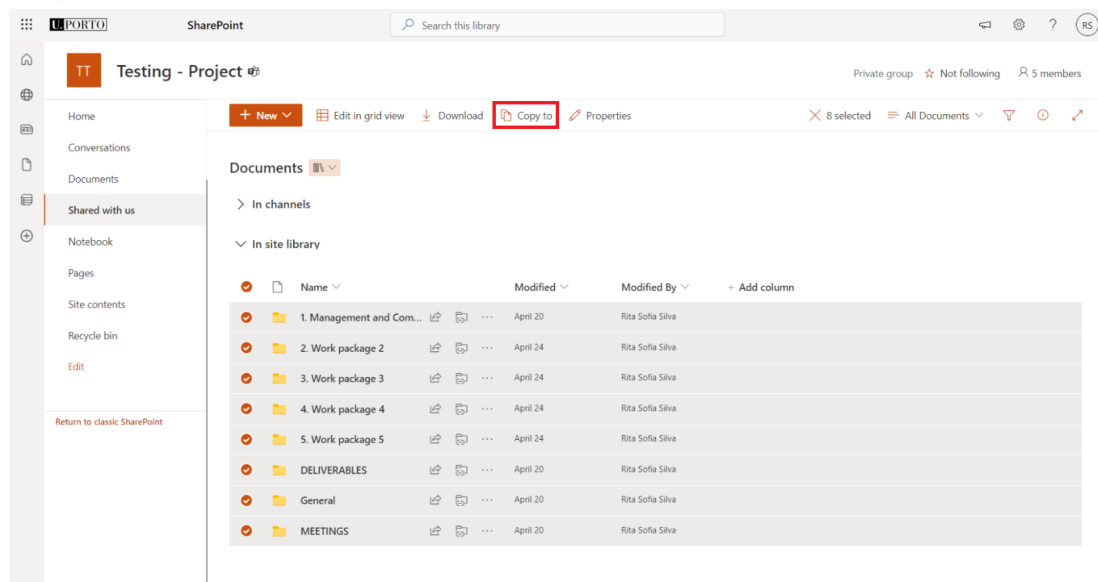


Figure B.3: Copying Documents in SharePoint Tutorial: Step 3 & 4

**Step 5:** On the left side choose the PMO team and 'In channels' dropdown choose your project.

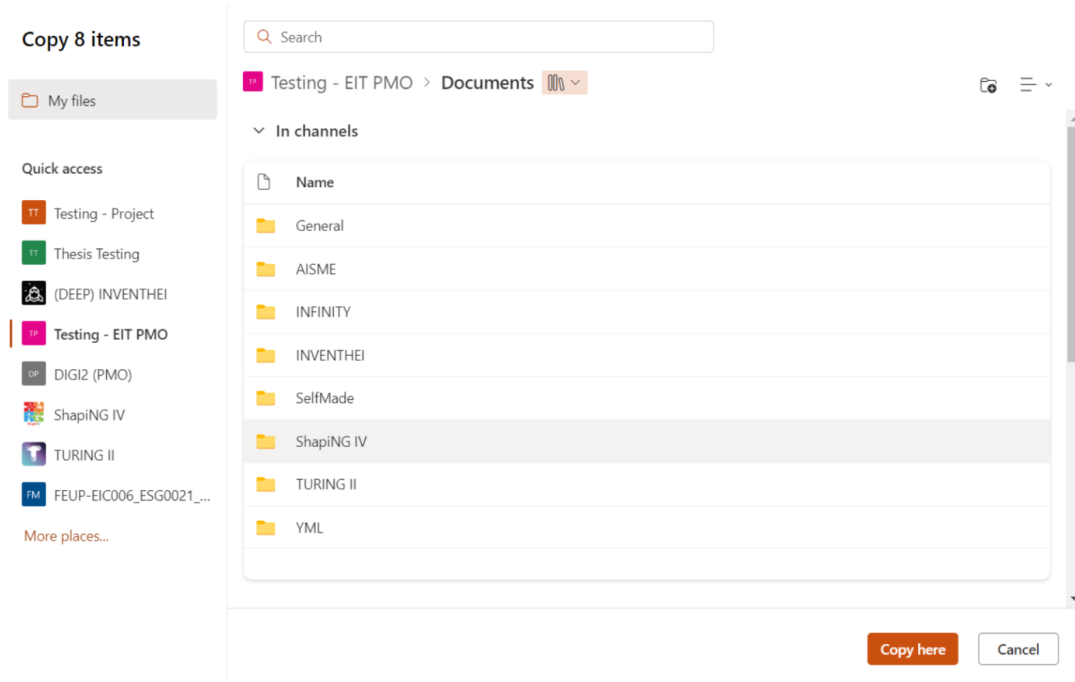


Figure B.4: Copying Documents in SharePoint Tutorial: Step 5

**Step 6:** Click on the *Copy here* button.

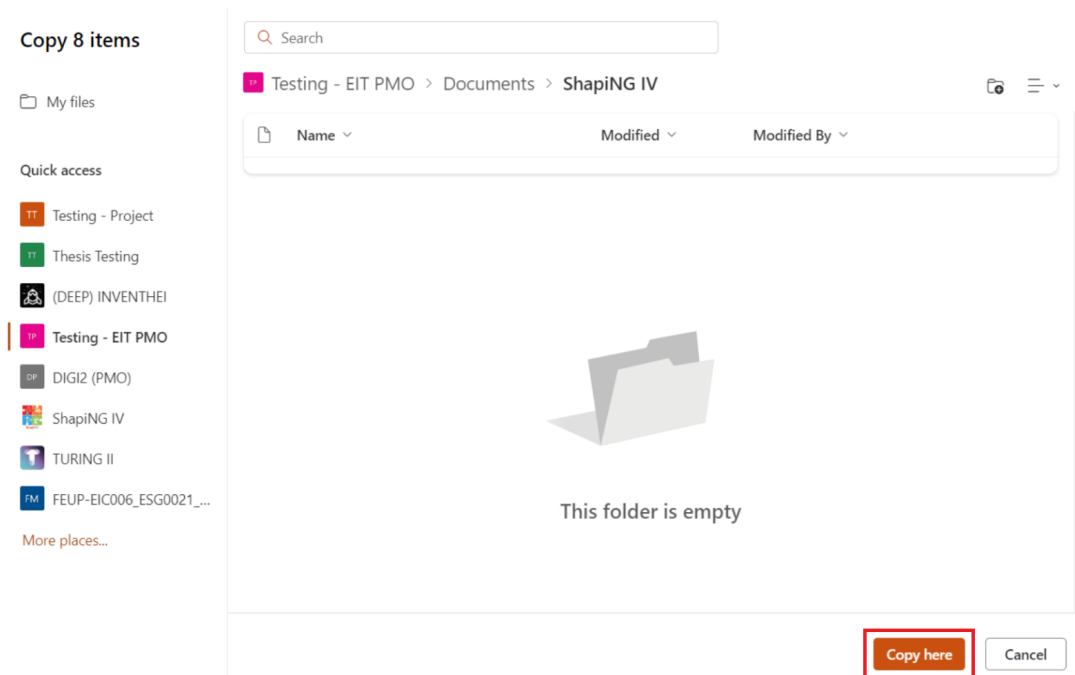


Figure B.5: Copying Documents in SharePoint Tutorial: Step 6



## **Appendix C**

# **Validation Forms**

### **C.1 Detailed Form**

**General Questions**

1. Regarding the platform as a whole, how would you classify its

	1	2	3	4	5
Usefulness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User-friendliness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Likelihood of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. What do you consider to be the strengths of the platform?

A sua resposta

3. What do you consider to be the weaknesses of the platform?

A sua resposta

Figure C.1: Detailed Form: General Questions (1)



4. Is there any need that you feel has not yet been met within the platform? If yes, please specify.

A sua resposta

5. Is there any functionality/feature that you would need a more detailed explanation or a tutorial? If yes, please specify.

A sua resposta

6. Observations/suggestions:

A sua resposta

Figure C.2: Detailed Form: General Questions (2)

## Project

### Project Team New Structure

TP Testing - Project

General

1. Management and Communication
2. Work package 2
3. Work package 3
4. Work package 4
5. Work package 5

DELIVERABLES

MEETINGS

7. What is your opinion regarding the following parameters?

	Poor	Fair	Good	Very Good	Excellent
Channels' names	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure C.3: Detailed Form: Project Questions (1)

**Task Management**  
In order to improve the projects' task management, a Tasks tab was included in the General channel of the Project Team.

8. In the *General* channel, what is the likelihood of using the *Tasks* tab?

1      2      3      4      5

Not likely                                    Very likely

9. What is your opinion about the buckets organization in the Tasks tab of the General channel?

1      2      3      4      5

The buckets don't make sense                                    I really like the organization

10. Do you have any suggestion regarding the buckets' names?

A sua resposta

Figure C.4: Detailed Form: Project Questions (2)

11. Do you consider the automatic addition to the Tasks app of the information added to the Tasks tab to be important?

1      2      3      4      5

Not useful                                    Very useful

**Documents Structure**  
Since every project has a different workplan, it can be complicated to standardize the way information is stored. In order to assure the resolution of this issue, the files were structured as presented in the Google Docs file (available for consultation).

12. Regarding each Work Package channel, do you consider it appropriate for each channel to have its own structure?  
Taking into consideration that the packages related to Management, Communication and Dissemination will have the same structure in every project.

Yes  
 No

13. Do you have any suggestions for the structure of the documentation?

A sua resposta

Figure C.5: Detailed Form: Project Questions (3)

**Meetings**  
In this section of the platform, please consider that:

- Meetings scheduling -> this will work better and more efficiently if you commit to use Outlook calendar
- Status updates -> should be updated at least once per month (ideally, before each EIT PMO meeting)

14. How likely are you to use the Outlook calendar?

1            2            3            4            5

Not likely                        Very likely

15. Are you familiar with the Schedule Assistant functionality?

Yes

No

16. How does it compare to how you used to schedule meetings?  
If you choose 'I prefer the old way' please select also 'Other option' and briefly describe the old way  
In any other case, please select only one option

I prefer the old way

I already use it

Indifferent

I still have to get used to it

I prefer this way

Other:

Figure C.6: Detailed Form: Project Questions (4)

17. Regarding the Status Update file, how would you classify its

The Status Update file is the Excel document available for each project. In MS Teams is in the Project Team, in the Meeting channel, in the Files tab inside the Status Update folder.

	1	2	3	4	5
Interface?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usability?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User-friendliness?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. Do you find the overview of the project status presented in this document useful?

	1	2	3	4	5	
Not useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very useful

19. Were there any difficulties in using this document? If so, please specify.  
Please give feedback to any of the Excel pages

A sua resposta

20. Do you have any improvement suggestions for this document?  
Please give feedback to any of the Excel pages

A sua resposta

Figure C.7: Detailed Form: Project Questions (5)

21. What do you consider are the key advantages of this document?  
Please give feedback to any of the Excel pages

A sua resposta

**Overall**  
Please give feedback  
regarding the Project Team,  
as suggestions for improvement or other ideas that you consider relevant.

22. Feedback, suggestions, improvement ideas for Project Team

A sua resposta

Figure C.8: Detailed Form: Project Questions (6)

## PMO

There are two parts in this new Team:

General channel - provides a Calendar tab and a Notes tab.

Channel for each project - files should be updated frequently.

### PMO Team's New Structure

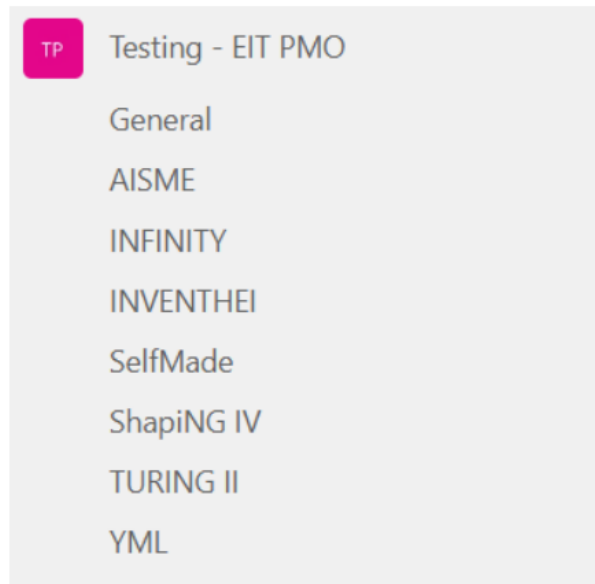


Figure C.9: Detailed Form: PMO Questions (1)



**General**

23. How likely are you to use the Calendar functionality?  
Please take into consideration the Scheduling Assistant feature.

1      2      3      4      5

Not likely                                    Very likely

**Notes tab**  
This tab includes a OneNote notebook, organized in two sections (Meeting Minutes and Knowledge).  
In the first, there is a template of the document that should be edited before and after each meeting of the EIT PMO; in the second, there is a structure of how the information can be saved within the lab, in each knowledge area instead of each project.

24. Do you have any suggestion regarding the Meeting Minutes template?

A sua resposta

Figure C.10: Detailed Form: PMO Questions (2)

25. In the Knowledge section, is there any tag that you would like to be created?  
Please, read the guide to understand the tag functionality, and how it is used.

A sua resposta

26. Were there any difficulties in using this document? If so, please specify.  
Please give feedback to any of the sections

A sua resposta

27. Do you have any improvement suggestions for this document? (For example more sections that would be useful?)  
Please give feedback to any of the sections

A sua resposta

28. What do you consider are the key advantages of this document?  
Please give feedback to any of the sections

A sua resposta

Figure C.11: Detailed Form: PMO Questions (3)

**Project channels**

29. Taking into consideration the tutorial included in the Google Docs file to copy the documents from the Project team to the PMO team, please rate its:

	1	2	3	4	5
Usability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User-friendliness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Likelihood of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Overall**  
Please give feedback regarding the PMO Team, as suggestions of improvement or other ideas that you consider relevant.

30. Feedback, suggestions, improvement ideas for PMO Team

A sua resposta

Figure C.12: Detailed Form: PMO Questions (4)

## C.2 General Form

### General Questions

1. Regarding the platform as a whole, how would you classify its

	1	2	3	4	5
Usefulness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User-friendliness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Likelihood of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. What do you consider to be the strengths of the platform?

A sua resposta

3. What do you consider to be the weaknesses of the platform?

A sua resposta

Figure C.13: General Form: General Questions (1)

4. Is there any need that you feel has not yet been met within the platform? If yes, please specify.

A sua resposta

5. Observations/suggestions:

A sua resposta

Figure C.14: General Form: General Questions (2)

**Project**

6. Regarding the teams for each Project, how would you classify its

	1	2	3	4	5
Usefulness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User-friendliness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Likelihood of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. What do you consider to be the strengths of the Project team?

A sua resposta

8. What do you consider to be the weaknesses of the Project team?

A sua resposta

9. Observations/suggestions:

A sua resposta

Figure C.15: General Form: Project Questions (1)

**PMO**

10. Regarding the team for the PMO, how would you classify its

	1	2	3	4	5
Usefulness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User-friendliness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Likelihood of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. What do you consider to be the strengths of the PMO team?

A sua resposta

12. What do you consider to be the weaknesses of the PMO team?

A sua resposta

13. Observations/suggestions:

A sua resposta

Figure C.16: General Form: PMO Questions (1)





## **Appendix D**

# **DIGI2 Project Portfolio Management Platform – A User Manual**



# DIGI2 Project Portfolio Management Platform – A User Manual

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## Document Goal

This user manual provides a comprehensive set of instructions for configuring and utilizing the project management platform used in the DIGI2 lab - Microsoft Teams. It is intended to guide researchers in effectively documenting and setting up projects and their information within the lab. Please note that the platform distinguishes between two main types of teams: PMO (Project Management Office) teams and Project teams. The PMO teams serve as a knowledge base for the knowledge created in each DIGI2 kingdom as well as the central location for documenting meetings, allowing portfolio monitoring. On the other hand, each Project team handles both task management and project management of the respective project.

Please keep in mind that this document is only intended to assist you in the setup of the management platform of DIGI2 lab, and if you need any assistance please contact any collaborator from the lab.

## PMO Team

### **Setting Up PMO Teams**

In Microsoft Teams, the EIT PMO team has been established as the initial team. To replicate this setup for the other three kingdoms, please follow the steps below:

1. Request Access to the EIT PMO team:
  - Contact the administrator or designated person responsible for the EIT PMO team to request access.
  - Once access is granted, proceed to the next step.
  
2. Creating new teams:
  - Using the EIT PMO team as a template, create new teams for the other three kingdoms.
  - Make sure to include all DIGI2 researchers who belong to the respective kingdom in each PMO team.
  - Follow the instructions provided in the [Create a New Team](#) section to set up each team accordingly.



## PMO Team Configuration

- Each PMO team consists of several channels, including the General channel and a channel for each project.
- Ensure that when a project is completed, it is hidden rather than deleted to preserve project history and documentation.

In the General channel there are four tabs: Posts, Files, Calendar and Notes.

- The Posts tab allows for general discussions and announcements relevant to the kingdom.
- The Files tab should have a well-organized file structure that aligns with the specific needs of each kingdom.
- The Calendar tab is utilized for scheduling meetings and accessing meeting-related information.
- The Notes tab is an OneNote notebook serving as a knowledge base for the kingdom. Within the Notes tab, there are the following sections:
  - Meeting Minutes: All kingdom meetings should be documented in this section.
  - Knowledge: This section is categorized into separate pages, each representing a knowledge category with distinct knowledge blocks.

- This page includes the tag feature that allows for easy search of the different knowledge blocks. It is possible to create new tags in the OneNote app. The ones recommended to use are presented in figure 1, but more can be created.

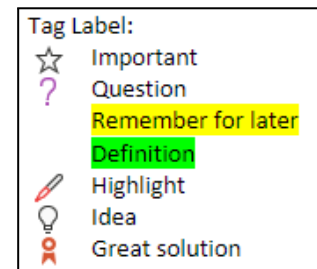


Figure 1: Recommended tags in the Knowledge section of the Notes tab of the General channel in the PMO team.

- Each knowledge block should follow the structure presented in figure 2, but it can also be further customize to embrace other needs:

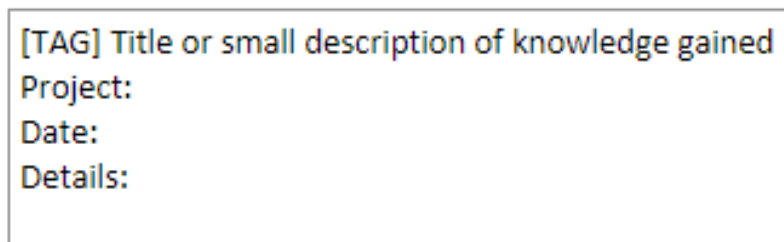


Figure 2: Recommended structure for knowledge blocks in the Knowledge section of the Notes tab of the General channel in the PMO team.



- Ideas: This section is dedicated to storing new ideas, whether they pertain to prototypes, thesis, internships, or other areas.
- Team: In this section, an overview of the kingdom's team and their ongoing projects should be provided.

## Project Team

### **Setting Up Project Teams**

In Microsoft Teams, it has established a template for the project team. To replicate this setup for other projects, please follow the steps below:

1. Request Access to the Project template team:
  - Contact the administrator or designated person responsible for the Project template team to request access.
  - Once access is granted, proceed to the next step.
2. Creating New Teams:
  - Using the template, create a new team for the project. Follow the instructions provided in the [Create a New Team](#) section to set up each team accordingly.
  - Team members include the kingdom director, the project manager and all partners involved in the project - national and international.

### **Project Team Configuration**

- Each Project team consists of several channels, including the General channel, a channel for each work package defined in the project proposal, the Deliverables channel and the Meetings channel.

In the General channel there are four tabs: Posts, Files, Tasks and Status Update.

- The Posts tab allows for general discussions and announcements relevant to the project in general.
- The Files tab should be empty, but it can have files if needed.
- The Tasks tab is utilized for tasks management, where you have 3 buckets (Documents, Activities, Others - can be customized) where you can add a task and



its due date, its assignees, its priority, some tags (that are customizable), its progress, etc. This tab also allows to visualize this information in a list view, a calendar view and some automatically generated reports. You might also want to add an app to your MS Teams called Tasks by Planner that allows you to have an overview of multiple projects' Tasks at once, as well as filter tasks assigned to you, or with high priority.

- The recommended tags for the Tasks tab of the General channel of the Project team are as shown in figure 3, where WPx is representative of each Work Package. In this figure it is also possible to see the structure of each Task card and its components.

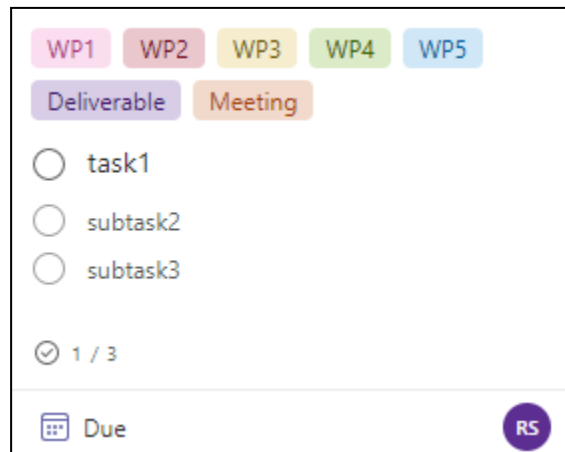


Figure 3: Card structure of each task in the Tasks tab of the General channel in the Project team.

- The Status Update tab is an Excel document serving as an overview of all relevant information about the project and its status. Within this document, there are the following sheets:
  - Overview: Allows you to have an overview of the status of completion of KPIs, milestones, deliverables, outputs. As well as an easy view of the budget, partners contacts and risk management.
  - KPIs: This section is where each partner should keep updated the values of completion of their assigned KPIs, this information will update the Overview sheet KPIs information.
  - Quarterly Reports: This sheet has the structure of the quarterly reports to be filled monthly.
  - Risk: This sheet allows you to have a broader view on the risk register and control the eventual mitigations.
  - Settings: In this sheet you can easily customize the appearance and text of the status columns all throughout the document.



This arrangement will facilitate effective communication, collaboration, and overview of project information. The Status Update should be created upon creation of the Project team, according to the project proposal, and its values should be updated at least once a month.

In each Work Package channel there are only two tabs: Posts and Files.

- The Posts tab allows for discussions and announcements relevant to the specific work package.
- The Files tab should have a file structure that aligns with the files needed for the work package in question.

More tabs can be added according to the needs of the WP activities, like for example a Form tab, where it is possible to create forms and have all partners edit it and access responses. (Example in WP 2 channel of the Project team template)

In the Deliverables channel there are two tabs: Posts and Files.

- The Posts tab allows for discussions and announcements relevant to the deliverables.
- The Files tab should have a folder for each deliverable present in the proposal, following the name DELxx - Deliverable name, where xx is the code of the deliverable as it is defined in the proposal and Deliverable name should be changed to accommodate the name of the deliverable.

In the Meetings channel there are three tabs: Posts, Files and Calendar.

- The Posts tab allows for discussions and announcements relevant to the meetings.
- The Files tab has a folder for the presentations created for the meetings.
- The Calendar tab is utilized for scheduling meetings and accessing meeting-related information.



## Create a New Team

First verify if you are part of the team template you want to create. You might want to take a look into [Setting Up PMO Teams](#) or [Setting Up Project Teams](#) according to the team you are looking to create.

**Step 1:** Click on the *Join or create a team* button.

**Step 2:** Click on the *Create team* button.

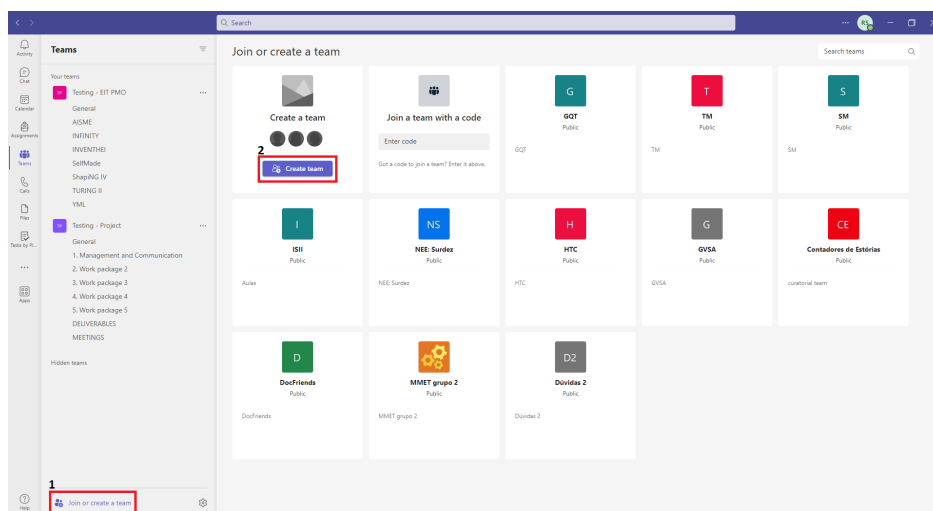


Figure 4: Step 1 and 2 on how to create a new team

**Step 3:** Click on *Create a team using an existing team as a template*.

**Step 4:** Select the team template to be used. Click on the *Choose team* button.

**Create your team**

Collaborate closely with a group of people inside your organization based on project, initiative, or common interest. [Learn more about teams and channels](#)

Team name  
New Project

Description  
Let people know what this team is all about

Privacy  
Private - Only team owners can add members

[Create a team using an existing team as a template](#)

Cancel Next

**Which team do you want to use as a template?**

- TP Project Template
- FE FEUP-M.EIC002-2021-15-486243
- FC FEUP-LEIC021-2021-15-484431
- (DEEP) INVENTHEI
- TT Thesis Testing
- FFIP-I FIC024-2021-15-484434

Cancel Back Choose team

Figure 5: Step 3 and 4 on how to create a new team





**Step 5:** Fill the information and click on *Create*.

You are using "Project Template" as a template for a new team

Team name

**New Project** ✓

Description

Let people know what this team is all about

**Choose what you'd like to include from the original team**

Messages, files and content won't be copied. You'll need to set up tabs and connectors again.

- Channels
- Tabs
- Team settings
- Apps
- Members (8 people, including 1 guest)

Privacy

Private - Only team owners can add members ▼

Cancel Create

Figure 6: Step 5 on how to create a new team

After a few moments, it will ask for you to add new members, you can do it now or later. Don't forget to add everyone that is necessary to make the PMO or the project work!

The file structure and some of the tabs are not automatically created/configured. You should add them manually, according to the template.

**Step 6:** Go through all channels and its tabs and make sure everything is configured.

Some key points to be alert on the teams created with the EIT PMO team as a template are:

- You have to create a new OneNote notebook that should follow the structure defined above (see Section [PMO team configuration](#)). You may request access to the EIT notebook to help you structure yours.
- In the General channel, the calendar tab is not automatically created. You should add it as shown in figure 4.

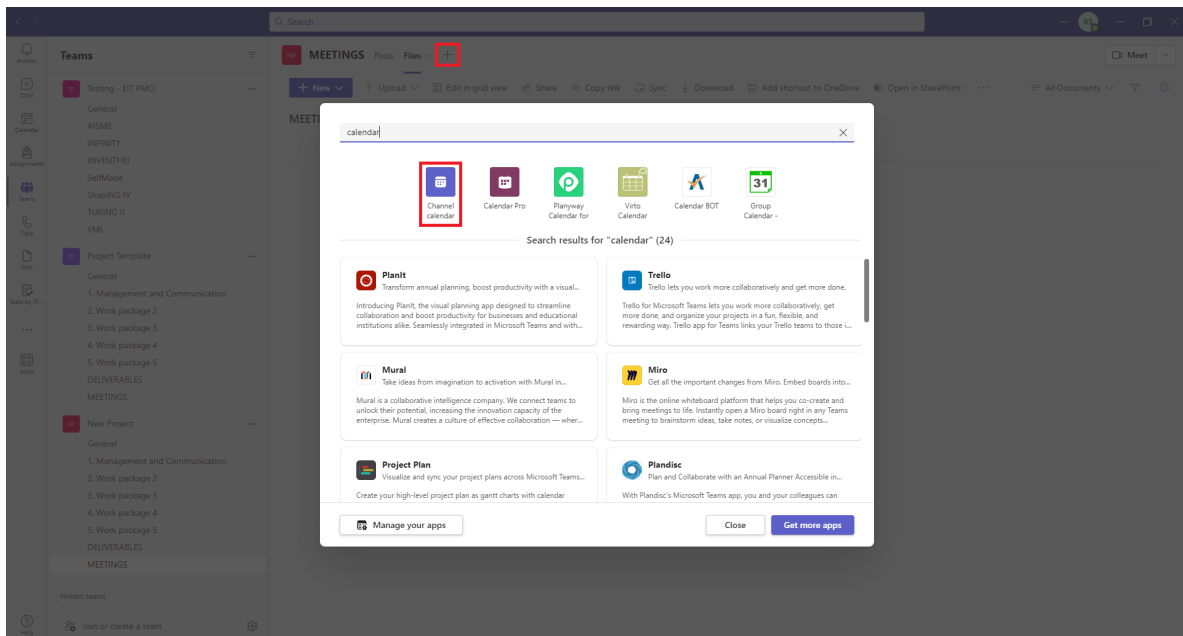


Figure 7: Add calendar when creating a new team

- You should delete all the project channels and create all the ones that are active in your kingdom.

If you prefer, you can manually create the PMO team and add the channels and their tabs, according to what was described previously.

Some key points to be alert on the teams created with the Project team template are:

- The Management and Communication work package should have the folder structure as shown in figure 5.
- The Task tab will require that you create a new Planner for your team, you should add the buckets (Documents, Activities and Others are the suggested ones). And you should also customize the tags. (For that you have to create a task and post it, then click on the card and select the tags).
- The Status Update file should already be created and saved in your Microsoft account. It is suggested to save the file from the Project team template.
- In the Meetings channel, the calendar tab is not automatically created. You should add it as shown in figure 4.

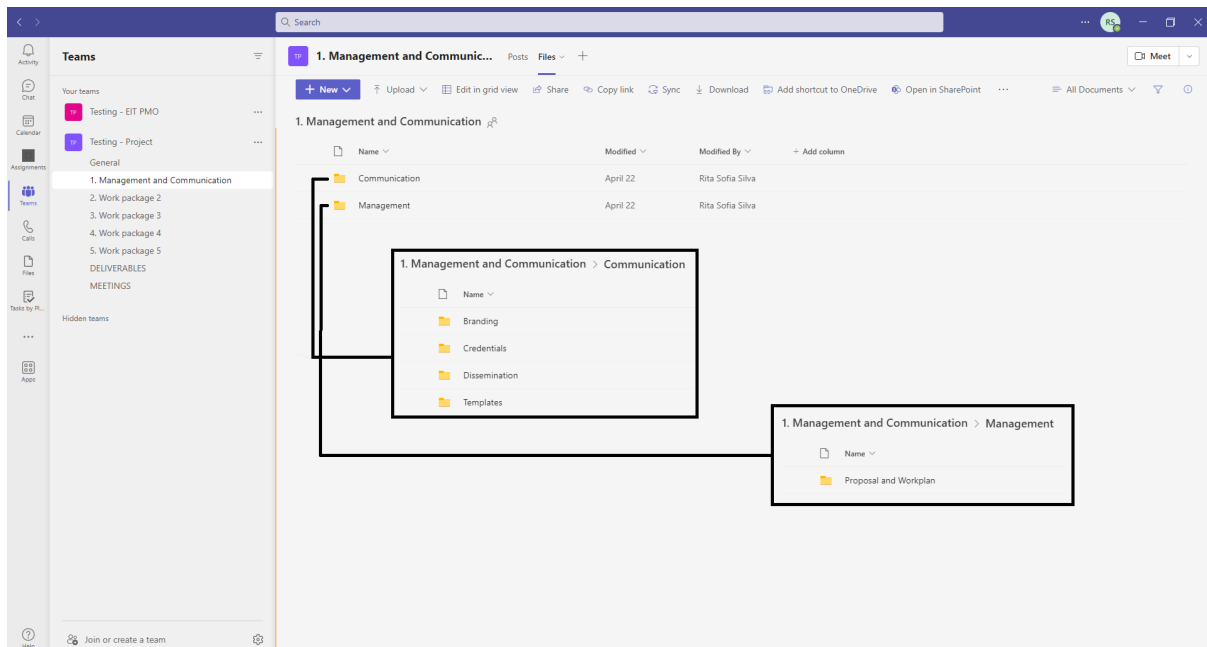


Figure 8: File structure suggested for the work package related to Management and Communication



## Update Information

There are important information that should be updated frequently namely:

Team	What?	Where?	By who?	How often?
PMO	PMO Meetings	MS Teams in the PMO team' General channel or in person	All members of PMO team	Monthly
	Meeting Minutes for PMO meetings	MS Teams in the PMO team' General channel in the Notes tab' Meeting Minutes section	Researcher	Whenever a meeting occurs
	Knowledge blocks	MS Teams in the PMO team' General channel in the Notes tab' Knowledge section.	Researcher	Whenever knowledge is created
	Idea blocks	MS Teams in the PMO team' General channel in the Notes tab' Ideas section.	Researcher	Whenever an idea occurs
	Update of team's constitution	MS Teams in the PMO team' General channel in the Notes tab' Team section.	PMO director	Whenever a researcher enter or leaves the kingdom
Project	Project Meetings	MS Teams in the Project team' Meetings channel or in person	All members of Project team	Monthly
	Update 'Status Update' file	MS Teams in the Project team' General channel in the Status Update tab	Project manager	Monthly
	Task update	MS Teams in the Project team' General channel in the Tasks tab	Project manager	Weekly



## Notes

The Project team structure can only be applied in projects where DIGI2 is the leader of the project, but the PMO structure should be utilized in the four kingdoms.

You might find that some file structures are not applicable to your projects, they can be changed to accommodate your project' needs.

In the knowledge section of the OneNote notebook, the pages can be changed to accommodate the categories of knowledge created in your kingdom.