Joana Maria Pereira Teixeira

Building Continuous Improvement Practices in a
Project Management Team through the application of
Lean Office and Design Thinking concepts
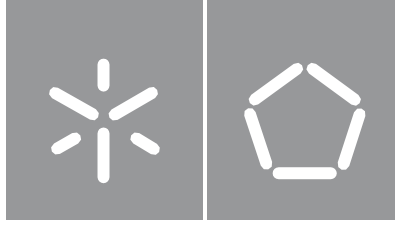
October 2023

Building Continuous Improvement Practices in a Project Management Team through the
application of *Lean Office* and Design Thinking concepts

Joana Maria Teixeira

UMinho | 2023

Universidade do Minho
Escola de Engenharia

Joana Maria Pereira Teixeira

Building Continuous Improvement Practices in a Project
Management Team through the application of *Lean Office*
and Design Thinking concepts

Master Dissertation
Master in Industrial Engineering
and Management

Work done under the guidance of:
Professor Rui Manuel de Sá Pereira de Lima
Professor José Pedro Teixeira Domingues

October 2023

DECLARAÇÃO DE INTEGRIDADE

Declaro ter atuado com integridade na elaboração do presente trabalho académico e confirmo que não recorri à prática de plágio nem a qualquer forma de utilização indevida ou falsificação de informações ou resultados em nenhuma das etapas conducente à sua elaboração.

Mais declaro que conheço e que respeitei o Código de Conduta Ética da Universidade do Minho.

Construção de Práticas de Melhoria Contínua numa Equipa de Gestão de Projetos através da aplicação de conceitos de *Lean Office* e Design Thinking

Resumo

Conceitos como globalização e o próprio avanço da tecnologia trazem desafios para qualquer setor. Estes desafios requerem que as empresas abracem sistemas mais produtivos, quer em ambientes de fábrica ou em escritórios. O setor automóvel em específico tem vindo a sofrer enormes transformações nos últimos anos, tornando-se imprescindível que as equipas de trabalho possam ter fluxos de trabalho com a maior automatização possível e de valor acrescentado.

O objetivo deste projeto, desenvolvido em colaboração entre a Universidade do Minho e a Bosch Car Multimedia S.A., foi a implementação de conceitos *Lean Office* com abordagens de Design Thinking numa equipa de gestão de projetos de industrialização.

Recorrendo à metodologia de investigação-ação (*Action Research*), inicialmente elaborou-se um diagnóstico dos problemas e necessidades da equipa, seguido da implementação de algumas propostas de melhoria.

A primeira ação implementada foi a criação de um sistema de melhoria contínua, através da divisão da equipa em quatro grupos, cada um abordando um tópico diferente. Os quatro grupos seguiram um plano comum de pontos de controlo para o resto da equipa, plano este baseado nos moldes do ciclo PDCA, ferramenta de *Lean Office*. Criou-se ainda uma plataforma interativa onde se poderiam adicionar e registar oportunidades de melhoria e tópicos a trabalhar. Aliado a isso, foi proposto um plano ou ciclo anual de melhoria contínua, onde a equipa anualmente revia os tópicos a trabalhar, através do uso da plataforma mencionada, com pontos de controlo e apresentações do status atual de cada tópico.

Por último, mais numa vertente de gestão de informação e standardização de processos, criou-se uma página web partilhada por todos, com a centralização de instruções de trabalho, links e documentos.

Durante a implementação destas propostas de melhoria, pretendeu-se envolver ao máximo as pessoas, considerando as suas opiniões e necessidades. Através da avaliação de resultados conduzida no final do projeto, concluiu-se que esse objetivo foi cumprido, que o trabalho da equipa foi facilitado e a melhoria contínua foi dinamizada.

Palavras-Chave

Design Thinking, Continuous Improvement, *Lean* Office, Project Management, Process Standardization

Building Continuous Improvement Practices in a Project Management Team through the application of *Lean Office* and Design Thinking concepts

ABSTRACT

Concepts such as globalization and the very advance of technology bring challenges to any sector. These challenges require companies to embrace more productive systems, whether in factory or office environments. The automotive sector in particular has undergone enormous transformations in recent years, making it essential for work teams to have workflows with the greatest possible automation and added value.

The aim of this project, developed in collaboration between the University of Minho and Bosch Car Multimedia S.A., was to implement *Lean* Office concepts with Design Thinking approaches in an industrialization project management team.

Using action research methodology, a diagnosis of the team's problems and needs was initially drawn up, followed by the implementation of some proposals for improvement.

The first action implemented was the creation of a continuous improvement system by dividing the team into four groups, each addressing a different topic. The four groups followed a common plan of control points for the rest of the team, a plan based on the PDCA cycle, a *Lean* Office tool. An interactive platform was also created where opportunities for improvement and topics to work on could be added and recorded. Allied to this, an annual continuous improvement plan or cycle was proposed, where the team would review the topics to be worked on every year, using the platform mentioned, with checkpoints and presentations of the current status of each topic.

Lastly, with a view to managing information and standardizing processes, a web page was created that was shared by everyone, centralizing work instructions, links and documents.

During the implementation of these improvement proposals, the aim was to involve people as much as possible, taking their opinions and needs into account. Through the evaluation of results conducted at the end of the project, it was concluded that this objective had been met, that the team's work had been facilitated and that continuous improvement had been boosted.

KEYWORDS

Design Thinking, Information Management, *Lean* Office, Project Management, Process Standardization

TABLE OF CONTENTS

LIST OF FIGURES

LISTA OF ABBREVIATIONS AND ACRONYMS

AE – Automotive Electronics

COS – Sample Shop

FAQ – Frequently Asked Questions

GPD – Goal and Performance Dialogue

IPMA – International Project Management Association

KPI – Key Performance Indicator

PDCA – Plan, Do, Check, Act

PMBOK – Project Management Body of Knowledge

PMI – Project Management Institute

PMO – Project Management Office

SW – Software

TPS – Toyota Production System

1. INTRODUCTION

The current chapter is meant to give an overview of the motivation and context of this project, as well as its objectives. Furthermore, the dissertation's structure will be explained and the research method that was applied will be both theoretically developed and framed within the activities conducted by the author.

1.1 Background and Motivation

The automotive industry market has been undergoing a lot of changes, not only in terms of the inevitable technological advances, but also regarding customer needs. These changes, naturally implicate a higher level of competitiveness and a need to increase efficiency. Manufacturing industries are pushed to improve their productivity in order to survive in the competitive global market (Ikome, Laseinde, & Katumba, 2022). In this sense, good information management and communication in project teams are essential for their success. The PMBOK Guide defines Project Communications Management as an area of knowledge that includes the processes that are essential to guarantee timely and appropriate planning, creation, distribution, management, and disposition of project information (Project Management Institute, 2017). Today's organizations are dependent on knowledge and, therefore, information and systems for their management are crucial components for good performance (Hicks, 2007). One of the goals of Information management is to improve the sharing of knowledge and information (Edwards, 2022).

Since good information systems are important to gain competitive advantage, it's important that activities and documents that produce any kind of waste are eliminated, and the rest are organized in a visual and practical way. From this, perspective, applying *Lean* and *Lean Office* principles emerges as an important tool. The goal of this approach is to eliminate waste along the value stream, but *Lean Office* focuses on administrative functions (Jaqueline Melara et al., 2017).

This research or project was carried out in collaboration with the company Bosch Car Multimedia Portugal, SA. This is a company recognised for its wide range of electronic products related to automotive technology. Within this company, the dissertation was carried out in a project management team linked to the Radar product. The team in question is named MFE16 and it is a recent team. Despite its newness, the expansion of this product on the market has led to new challenges that need to be raised, recognised and worked on. To this end, the main motivation for this project was to, first recognise the core struggles that the team faced and address them by implement a lasting and effective continuous improvement system. However, in order for this system to be as appropriate as possible to the people collaborating in

it, the motivation of building it in a humanistic way emerged. This gave rise to the idea of combining some of the concepts of Design Thinking, since it is an ideology in which people are placed at the centre of any type of project or idea. The implementation of a continuous improvement system would go hand in hand with the elimination of wastes that was mentioned above, as well with the better information management that, naturally, emerges as a challenge for offices conducting the management of several projects and processes.

On a final note, it can be said that another motivation for this project was to contribute in innovative ways to a highly standardized organisation in terms of project management activities, practices and processes.

1.2 Objectives

The main objective of this dissertation project was to work on the necessities and improvement opportunities of a team and to propose and implement a system of continuous improvement that is long-lasting, effective and involves all parties, eliminating waste in the office environment through better information management and communication channels. This objective should be achieved with an approach that would at all phases involve people's opinions and needs and maintain them as the main focus. Considering the objective and this principle the following actions should developed:

1. Conduct in-depth research into the problems faced by the team where the project will take place.
2. Analyse the data that will emerge from objective 1 and draw concrete conclusions.
3. Implement and test a continuous improvement system on the team.
4. Involve the team in evaluating and deciding how the continuous improvement system should look like in the future.
5. Improve the information and communication management on the team, as well as the standardization of processes and work instructions.
6. Evaluate the results of this project and leave notes and clear visual records of the work conducted, to support future work.

At the end of the project it is expected that the team has a **continuous improvement system** set for the next years, as well as **clearer information channels**, which will lead them to conduct their work activities in an easier and lighter way.

1.3 Research Method

Saunders et al. (2016) proposed a research methodology construction based on the theoretical concept of the "*Research Onion*". The research onion provides a description of the main layers that need to be achieved when the goal is to formulate an effective methodology (Raithatha, 2017). In Figure 1 it's possible to see this concept and its several stages.
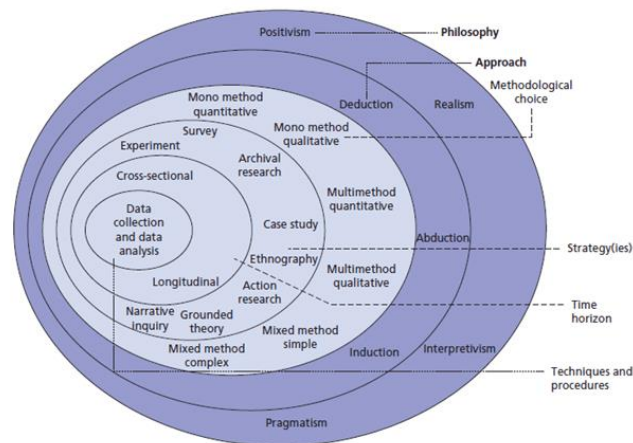
Figure 1 - Research Onion Model
(Saunders et al, 2007)

As a starting point, it is important to identify the philosophy which will help realise what is the most appropriate method to guide the research (Bilau, et al., 2018). Then, the approach is chosen, followed by the methodological choice. The layer after is the strategy or strategies. Finally, the author needs to consider the time horizon and the techniques and procedures.

The research strategy chosen was the **Action Research**, since it was the most adequate one for the objectives established. This method involves the author with the organization's employees in the process of implementing solutions (Saunders et al., 2019).

The main components of the Action Research are (Borgia & Schuler, 1996):

- **Commitment** – Action Research is a process that takes time.
- **Collaboration** – each idea should be heard, and each person contributes to the process.
- **Concern** – dedication and support.
- **Consideration** – reflection and critical assessment.
- **Change** – change is an important ongoing factor.
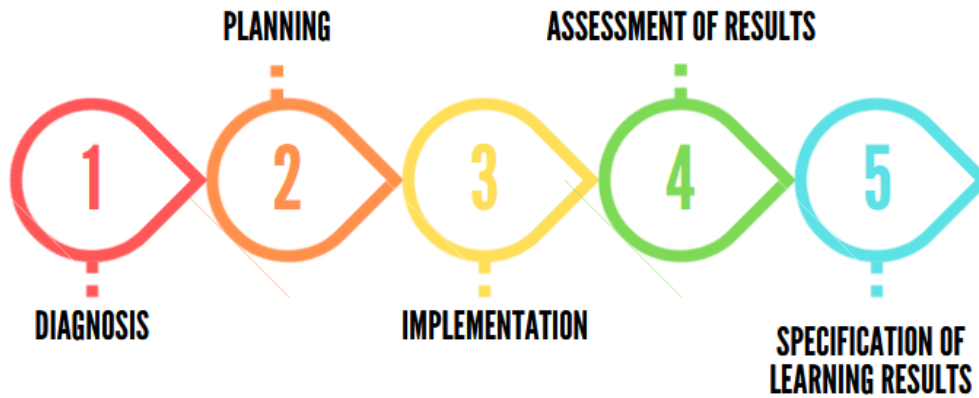
Figure 2 - Phases of Action Research
Adapted from Susman and Evered (1978)

In this dissertation, the phases were interpreted and developed in the following ways:

1. **Diagnosis:** conducted through an in-depth study on the team where this project occurred, focusing on their main struggles, strengths, wishes and requirements. For this purpose, workshops and interviews were carried out, followed by the analysis of the data that was generated.

2. **Planning:** after gathering, processing and studying the data that was retrieved from the *Diagnosis* stage, the conclusions were drawn and the ideas for improvement proposals were discussed and developed.

3. **Implementation:** this stage referred to the execution of the improvement proposals that were thought of in stage number two.

4. **Assessment of Results:** it included an assessment via survey on the improvement proposals that were implemented and an analysis of the results that were obtained.

5. **Specification of Learning Results:** finally, in this dissertation, the learning outcomes were drawn up in the form of conclusions, final considerations, obstacles that were faced and opportunities for future work.

1.4 Dissertation Structure

This dissertation is divided in seven main chapters: introduction, literature review, company presentation, current situation, improvement proposals, analysis and discussion of the results and, finally, conclusions. The first one, *Introduction*, is meant to give a general context on what the main motivations were to conduct this project, the objectives, the structure and the research method that was applied. By doing so, it's intended that the reader gets an overview on what the core of this dissertation is.

Secondly, the chapter for *Literature Review* gathers all the theoretical concepts and studies that were useful to carry out this project. It includes studies conducted on Project Management, gathering some basic concepts on this field and an overview of the PMBOK, 7th edition, by the Project Management Institute. Furthermore, the *Lean* philosophy was addressed, such as *Lean Thinking* and *Lean Office*, including its tools that were applied in this project. Finally, this chapter intends to explore some concepts on *Design Thinking*.

The chapter entitled *Company Presentation* is meant to give an overview of both the Bosch Group and its location in Braga, Bosch Car Multimedia S.A., where this dissertation took place.

The fourth chapter, *Current Situation*, is meant to analyse how the work was occurring in the office, as well as the factors that influenced it. A deep study was conducted on the team where this project was carried out: the struggles the team had to deal with currently, strengths, improvement goals, followed by the conclusions that were drawn from that study.

Improvement Proposals is the fifth chapter and it includes everything that was implemented as a result of the previous research that was conducted, namely the implementation of a continuous improvement system, the creation of a platform to register the work developed by the team on this matter, as well as improvement opportunities and topics for the future, the creation of a continuous improvement plan for the team's future and the creation of a shared platform page called *Docupedia*, to gather process mapping, work instructions and centralise important information for the daily work.

The chapter on *Analysis and Discussion of Results* included an evaluation of the improvement proposals mentioned above, through a survey that was conducted with all the people involved.

Finally, *Conclusions* includes final considerations, a reflection on the limitations and obstacles faced and opportunities for future work, based on the work carried out.

2. LITERATURE REVIEW

In this chapter some fundamental theoretical concepts of the developed project will be reviewed, to be consolidated in the practical part of implementation and review of the proposed solutions. In this sense, and considering the context of the work developed, this chapter is divided in three main parts: one for the theme Project Management, another to explore the theorical concepts of *Lean*, followed by *Lean Office* and, finally, a study was conducted on Design Thinking.

2.1 Project Management

In this section the area of Project Management will be theoretically developed and studied. This area is the fundamental basis of the project developed since the team where it was developed works in it and develops projects constantly. Some basic concepts on this subject will be presented, as well as an overview of the *The Standard for Project Management* and the *Project Management Body of Knowledge 7th edition* (PMBOK ®), a manual published by the Project Management Institute.

i. Basic Concepts

Over time and with the evolution of the companies' complexity, the need appeared to streamline the businesses practiced, i.e., make them able to introduce new products and solutions effectively, in a short time (Turner, 2008). Furthermore, given the constant changes that markets undergo, organizations have faced the need to adopt management processes with a transformation capacity that would allow them to keep up with technological developments (Popa & Tanasescu, 2010). From this perspective, the importance of the development of project management practices arises.

The Project Management Institute (2021a, p.4) defines project as "a temporary endeavour undertaken to create a unique product, service, or result". In parallel, the International Project Management Association, IPMA, (2015) defined project as an achievement, with cost and time constraints, of a defined set of deliverables (the scope to fulfil the project's objectives), based on standards and quality requirements. From these two definitions, it is inferred that it is essential to define a clear objective for the project and that there are requirements and factors that influence its development. The project management triangle covers four fundamental concepts that relate all these factors: time, cost, scope and quality, as shown in Figure 3. The iron triangle that describes a project is based on the ability to achieve certain objectives (scope), meeting the dates of deliverables (*time*), while considering the resources allocated to the project (*cost*) and the quality requirements (*quality*) (Atkinson, 1999).

Figure 3 - Project Management Triangle
(Watts, Rudder & Main, 2023)

ii.   PMBOK Overview

The Project Management Institute (PMI) published the seventh edition of the manual *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* in 2021. This manual considers global perspectives in the Project Management area and the changes occurring in it (PMI, 2021a&b). It is divided into two books, the first being *The Standard for Project Management*, which includes key and basic terms, a focus on systems for value delivery and the principles of good project management practice; and the second part, *A Guide to the Project Management Body of Knowledge*, which describes the domains of action of a project, contains a chapter on processes and tailoring domains and, finally, models, methods and artefacts in different areas of application.

The manual in question was chosen as support in this dissertation, not only because it serves as a basis for project management practices in the company where it was developed - Bosch Car Multimedia S.A. - but also because it is a worldwide reference guide.

In *The Standard for Project Management*, by the PMI (2021a, p. 4) defines Project Management as "the application of knowledge, skills, tools, and techniques to project activities to meet project requirements". The project manager plays a key role in the application of these concepts and has the role of acting in several roles to lead the team to the final goal and outcomes (PMI, 2021a). To the projects themselves are associated several functions, delegated to different parties. Depending on the type of project, these functions can be performed in different ways, by one person, by a group of people, or combined in different roles (PMI, 2021a). Some functions that are frequently found in projects are (PMI, 2021a):

- To provide oversight and coordination
- To present objectives and feedback
- To facilate and support
- To perform work and contribute insights

- To apply expertise

- To provide business direction and insight

- To provide resources and direction

- To maintain governance

In the analysis of this knowledge area, it is also important to study the internal and external environmental factors that influence a project and its eventual success. The internal environment of the project includes factors intrinsic to the organisation. Some examples of these factors are (PMI, 2021a):

- Process assets (tools, methodologies, approaches, templates, frameworks, patterns or PMO resources).

- Governance documentation.

- Data assets (data basis, document libraries, artifacts from previous projects and metrics and data in general).

- Knowledge assets.

- Security and safety.

- Organizational culture, structure and governance.

- Geographic distribution of facilities and resources.

- Infrastructure.

- Information technology software.

- Resource availability.

- Employee capability.

On the other hand, there are the external factors, which should also be analysed when creating and developing a project. Some examples of this type of factors include (PMI, 2021a):

- Marketplace conditions.

- Social and cultural influences and issues.

- Regulatory environment.

- Commercial databases.

- Academic research.

- Industry standards.

- Financial considerations.

- Physical environment.

To achieve success in a project and to carry out the work in a coherent and respectful manner it is, of course, necessary for teams and their leaders to follow a set of rules. The principles of a profession serve

as lines to be followed for the strategy, decision-making and problem solving and, specifically in project management, these are intended to guide the behaviour of the people involved in the project, not being imperative (PMI, 2021a). The PMI, through the collaboration of a global community of project practitioners, from different industries, cultures, practitioners of different roles and from different projects, identified and then theoretically developed twelve principles for project management, which are pointed out and summarized below (PMI, 2021a):

1. **"Be a diligent, respectful, and caring steward"** (p.24) – stewardship includes values of integrity, care, trustworthiness, and compliance with the internal and external guidelines, as well as an awareness regarding financial, social, technical and environmental impacts.

2. **"Create a collaborative project team environment"** (p.28) – this involves many factors, such as team agreements (working norms and parameters established by the team, created at the beginning of the project, and updated throughout the time), organizational structures, and processes. Even so when collaborative environments are fostered, knowledge-sharing will become more fluid and, consequently, better outcomes will be enabled. It is also important that team roles and responsibilities are clear.

3. **"Effectively engage with stakeholders"** (p.31) – identifying, analysing and the engaging with stakeholders proactively enables value delivery, since these groups of people directly influence all aspects of the project.

4. **"Focus on value"** (p.34) – project teams should constantly adjust the project's alignment with the business goals and intended benefits. Additionally, the business need, the project justification, and the business strategy should be aligned, along with the benefit and possible agreements, to allow the team to have solid information to make informed decisions and meet the intended business value.

5. **"Recognize, evaluate, and respond to system interactions"** (p.37) – a project can be seen as a system of interdependent and interacting domains of activity. Thinking about a project as a whole system and being responsive to system interactions, as well as recognizing, evaluating, and responding to them, allows the team to walk towards positive outcomes.

6. **"Demonstrate leadership behaviors"** (p.40) – this behaviour, when effective, enables success and contributes to positive outcomes.

7. **"Tailor based on context"** (p.44) – the success of a project relies on adapting to its unique context and realizing what is the best methodology.

8. **"Build quality into processes and deliverables"** (p. 47)

9. **"Navigate complexity"** (p.50) – analyse and evaluate the project's complexity so that the methodologies and approaches lead the team to successfully go through the project life cycle.

10. **"Optimize risk responses"** (p.53) – the project team should seek to maximise positive risks, opportunities, and minimize their exposure to threat, negative risks.

11. **"Embrace adaptability and resiliency"** (p.55) – responding to changing conditions, as well as recovering quickly from certain situations, is crucial for the project's success.

12. **"Enable change to achieve the envisioned future state"** (p.58)

The project's performance domains were also studied for this dissertation. The PMI (2021b, p.7) defines a project performance domain as "a group of related activities that are critical for the effective delivery of project outcomes".
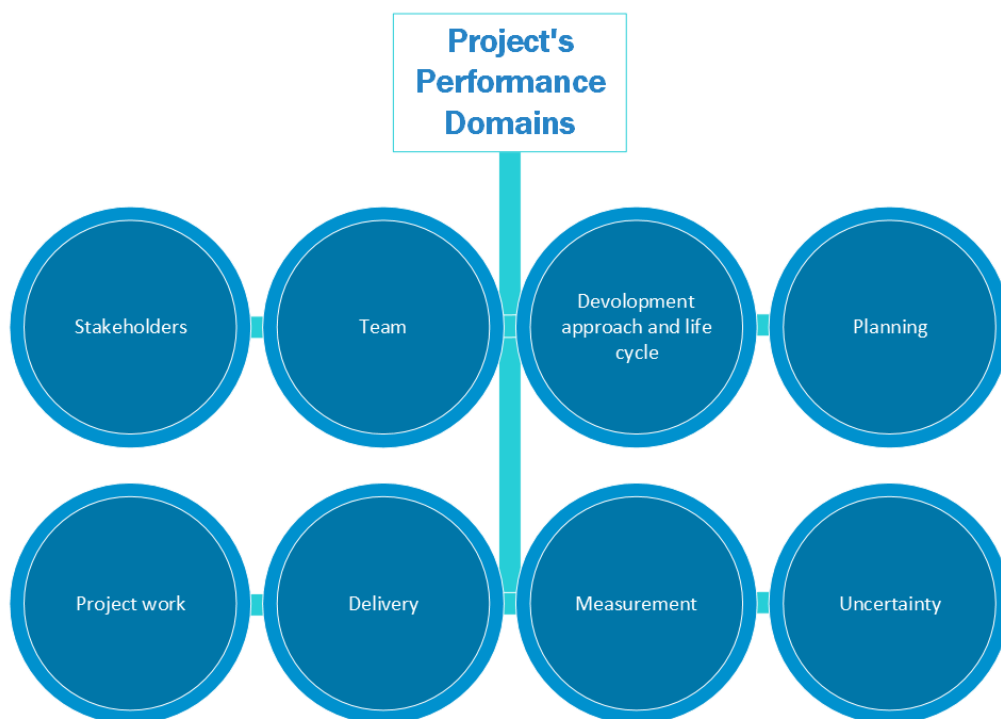
Figure 4 - Project Performance Domains according to PMI (2021b)

This institute distinguishes therefore eight project performance domains, which are (PMIb, 2021):

- **Stakeholder performance domain:** activities and functions associated with stakeholders (suppliers, customers, end users, governing bodies, PMOs, Steering committees, project manager, project management team, project team).

- **Team performance domain:** activities related with the people responsible for producing project deliverables. It involves the type of leadership and management, the team's vision, objectives, roles and responsibilities, operations, guidance, growth, culture, communication, and motivation.

- **Development approach and life cycle performance domain:** activities associated with the development approach and the series of phases the project goes through in its life cycle. It considers the type of project deliverables, as well as their frequency, and the type of approach to be used to create and evolve the product or service. This approach can be predictive, adaptive or hybrid.

- **Planning performance domain:** functions that relate to the organization and coordination necessary for delivering project deliverables and outcomes. These include the information involved in those activities and consider market conditions, legal and regulatory restrictions, and organizational requirements.

- **Project work performance domain:** everything that is related to the establishment of processes, management of physical resources and the enablement of a learning environment. Certain documents and knowledge are important in this matter, as well as communication with stakeholders, and information that can be collected recurring to different methods, such as meetings, conversations and through electronic repositories. The optimization of processes and the effectiveness in managing the resources are also very important points in this area.

- **Delivery performance domain:** this includes all the activities regarding the scope and quality related to the goals of the project. The project deliverables have requirements that must be accomplished and, as these requirements are identified, the project scope – sum of the results that are to be provided by the project – that will meet them is defined.

- **Measurement performance domain:** activities associated to understanding the status of the project and data that makes decision making easier. All the actions that are taken to assess and analyse the project are therefore included.

- **Uncertainty performance domain:** it is crucial to be aware of the environment of the project, and to explore, analyse and respond to uncertainty. Important topics in this domain are knowing the multiple variables of a project and how they connect to each other, in an interdependent way, the ability to predict threats and opportunities and cost and schedule reserves.

iii.   Project Management Office

In the PMBOK 7ᵗʰ edition ®, PMI (2021b, Appendix X3) states that "the Project Management Office (PMO) represents a management structure that standardizes project-related governance processes and facilitates the sharing of resources, tools, methodologies, and techniques".

Organizations can set up a PMO for various reasons, but the main benefit is to improve project management in terms of costs, quality, schedules and so on. In addition to this benefit, greater stakeholder involvement is boosted (PMI, 2021b).

Below is a list of some of the benefits that implementing a PMO can bring to an organization, as well as some of its capabilities, pointed out by the PMI (2021b):

- Providing guidance that feeds consistency in how projects are delivered, through guidelines, templates, training and coaching of good practices. With this, approaches are standardized and consequently decision-making regarding decisions that transcend individual project concerns is facilitated.
- Supporting services for planning activities, risk management, tracking of project performance, etc.
- Supporting the system of value delivery that covers de project.
- Fostering project management capabilities, by guaranteeing that everyone within and outside of the PMO understands, develops and applies several project management skills to their activities.
- Staying true to the goals of a project, as this is a crucial element of success.
- Continuous improvement, knowledge sharing and change management.

In sum, implementing a PMO in the organization can help standardize processes, create consistency, promote continuous improvement and knowledge sharing, being, therefore, beneficial.

2.2 *Lean* Production

After presenting some theoretical concepts of Project Management to better understand the work developed by the team where this dissertation was conducted, it became important to study and research how wastes could be eliminated in this team and how to improve productivity. Thus, the following section will serve to develop, theoretically, the concepts related to the *Lean* Production philosophy, its origin, the seven wastes that are associated to it, as well as its principles.

After the Second World War, Japan was facing financial challenges and lack of resources. In addition, domestic demand was lower than in other western countries due to the economic crisis caused by the war (Chiarini, 2013). One company in particular, called Toyota Motor Company, in facing certain problems in this prism, became the vanguard of a new production concept that revolutionised the methodologies and philosophies that were put in place until then (Monden, 1998). This concept concerns the **Toyota Production System (TPS)** and was developed by Eiji Toyota and Taiichi Ohno.

From the Toyota Production System emerged the *Lean Production* philosophy or methodology, which presents as its main objective "doing more with less" in organisations that practice mass production (Womack et al., 1990).

Through TPS, there's an intention to satisfy customer needs in the shortest possible time and with maximum quality (Sugimori, et al., 1977). Fujio Cho, former director of Toyota, developed, in schematic form, one of the most important representation models of this philosophy adopted for mass production, the **TPS House**. This is represented in Figure 5 and points out the base of this philosophy, its pillars - core activities - and the top - the objectives (Fritze, 2016).

Figure 5 - Toyota Production System House
Liker & Morgan (2006)

At the top of the house, the roof, the TPS objectives are presented, which relate to the quality delivered, cost reduction and shortening of delivery times. Besides those mentioned, it is important to mention that the motivation and safety of the workers are intended (Liker, 2004).

The pillars that constitute the house relate to *Jidoka* and Just in Time (JIT). The word *Jidoka* is Japanese and means automation with human intervention, something central to ensure the quality of products (Liker & Morgan, 2006). This principle consists in the automation of a system to develop, in the machines

themselves, the ability to detect problems so that the operator can solve them, having as the main vision that the defects are detected and prevented along the production line, protecting the customer and reducing scrap costs (Monden, 1998). It is intended then that there is autonomy, in the employees or in the machine, to intervene in the occurrence of an anomaly (Ohno, 1988) and areas of autonomy, automation, organization and method should be related (Pinto, 2006). The JIT concept, on the other hand, advocates that the right material should be supplied, in the right quantity, at the right place and at the right time (Khan, 2022). For processes to be aligned with this principle, the *pull* system should be used, which states that the flow of materials and information only occurs when there is a customer order (Ohno, 1988). In this way, only what is necessary is produced, excessive inventory is eliminated and, consequently, it becomes possible to better visualise the problems that the production system has and, therefore, their resolution is easier (Liker & Morgan, 2006).

At the base are the foundations of this system, namely the standardization of processes. The stability of processes is necessary for the implementation of a TPS system, and this occurs through the detailed clarification of procedures and work instructions of each one (Liker & Morgan, 2006). Next, it is based on *Heijunka*, which means the levelling of the production plan (Licker, 2004).

Finally, it is presented the concept of continuous improvement, in Japanese *Kaizen*, which is at the heart of the house and advocates constant search for optimization of processes by bringing together all parties involved and motivate them to go towards benefits for the company (Ohno, 1988).

ii.   The seven wastes

According to Ohno (1988), production activities can be classified as activities that add value to the product, which are those that the customer is willing to pay for, and activities that do not add value to the product, which correspond to those that the customer has no interest in paying for and may be necessary or not. It is possible to identify two strategies to increase the unit value of each sale: the reduction of internal waste and consequently of production costs as well, or through the addition of characteristics that add value for the customer, without increasing production costs, such as, for example, shorter delivery times (Hines et al. 2004). The concept of waste includes resources that are not used properly and require greater use of time, as well as costs that don't reflect added value for the customer (Rentes et al., 2009).

Lean breaks waste down into concrete aspects, thus allowing for improvement activities to be better targeted, and identifies the best tools for their realisation (Tapping & Shuker, 2010). Ohno (1988) characterised waste in three classes, also known as the 3M: *Muda*, *Mura* and *Muri*. The *Muda* class

concerns waste that does not employ value in the final product for the customer. *Mura* is associated with inconsistency and irregularity and, finally, *Muri* corresponds to the overloading of people or equipment, something that can induce quality and safety problems.
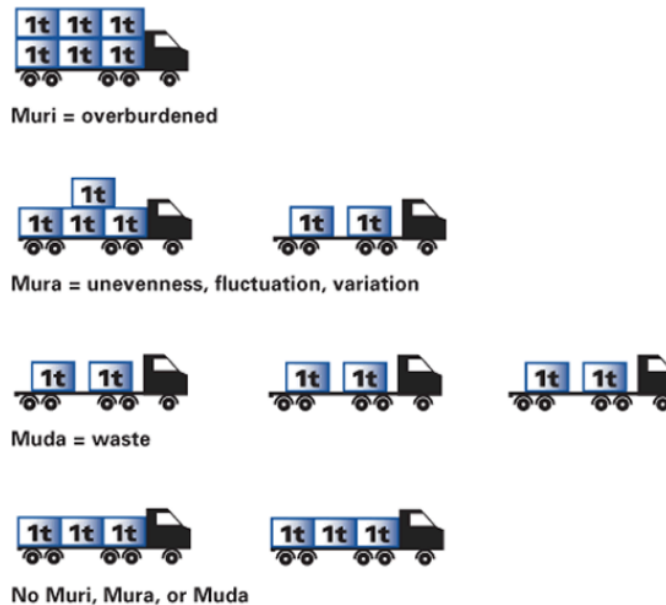
Figure 6 - Muda, Mura, Muri
(Do, 2017a)

Still regarding waste, Ohno (1988) and Shingo (1981) recognised seven types of wastes:

- **Overproduction:** corresponds to the production in excess before the necessary moment. This takes up resources unnecessarily and leads to increased inventory.

- **Defects:** related to defective production, not aligned with the client's requirements. Defective production naturally wastes resources and time, to no effect.

- **Unnecessary movements**: corresponds to any type of movement of the operators that is not necessary and leads to waste, such as time.

- **Transport**: unnecessary movements, that is, that do not add value to the work unit, product or service for the client, of raw materials, products in progress or final products.

- **Waiting**: refers to dead and unproductive times, whether of materials, equipment, products, people, among others. This waste causes a decrease in productivity and may lead to delays in deliveries.

- **Overprocessing**: it means performing more tasks than those that are really necessary or performing tasks inefficiently.

- **Inventory**: inventory is wasteful because it takes up unnecessary space. It can also have consequences for employee safety.

iii. *Lean* Thinking Principles

For an industry to become *Lean*, it is necessary to implement a way of thinking that frames a process flow that adds value and a system pulled by the customer, whereby only what the next operation (customer) will consume is replenished, at short intervals, and always keeping process improvement in mind (Liker, 2004).

In 1996, the book "*Lean Thinking - Banish Waste and Create Wealth in your Corporation*" was published, which introduced the *Lean* Thinking philosophy, including the fundamental principles to create value in an organization, regardless of the sector in which it operates. The authors (Womack & Jones, 1996) identified five principles:

Figure 7 - *Lean* Principles
(Do, 2017b)

1. **Define Value:** identify value from the customer's point of view and not from the company's. It is essential to understand what the customer wants, what their needs and requirements are, so that activities that do not contribute to them can be eliminated.

2. **Map Value Stream:** the organisation must understand and map the value chain, that is, what are the activities and processes inherent to the product that bring value, so that those that are associated with waste and do not add value can be eliminated.

3. **Create Flow:** it is necessary that the processes and activities of the identified value chain, be they of people, information, material or capital, flow continuously, without any stoppage, thus pursuing the elimination of waste and possible deviations.

4. **Establish Pull:** the customer, that is, the demand, is the one who triggers the entire production process. An activity should only be triggered when the next activity requests it. This avoids the accumulation of inventory and unnecessary overproduction. In addition, unnecessary costs are mitigated and a better return on resources and workload is achieved.

5. **Pursuit Perfection:** every opportunity arising from errors should be taken to reduce waste and effort. This principle is intrinsically related to continuous improvement, an indispensable factor in a *Lean* mentality, and endlessly seeks how to improve all aspects of processes and can be applied to any type of activity.

Later, these principles were complemented with those of ''knowing the stakeholders'' and ''continuously innovate'', to achieve success and excellence (Pinto, 2009). Innovation, in particular, is fundamental for the survival of companies in increasingly competitive markets and serves as an aid or basis for the implementation of tools aimed at continuous improvement and waste reduction. These new foundations also drive a more solid relationship with customers (Rentes et al., 2009).

2.3 *Lean* Office

Since this project was developed in an office environment, it was necessary to direct the *Lean* Production concepts towards office areas. This section will develop the concept and methodology of *Lean Office*, approaching its principles and making a relation between them and the *Lean Production* principles, as well as the seven wastes previously identified. Here, a theoretical study of the benefits and barriers of this methodology and the *Lean Office* tools that were applied in this project will also be made.

i. Concept and Principles

The need to eliminate waste in administrative areas has been growing as the competitiveness in the sectors has increased, this factor having forced the reduction of costs and fixed expenses (Lima et al., 2015). Waste in productive areas is easier to identify, due to its tangible nature (Hicks, 2007). However, there is also waste outside this environment, in areas indirect to the product, being crucial to identify the value of the activities that take place in the offices according to the final deliverable (Lago et al., 2008). Furthermore, according to Lareau (2002), companies that implement *Lean* principles only in the productive operations, ignoring the administrative aspects, cannot achieve competitive advantage.

In 1970, a more specific area of *Lean* emerged, directed to the improvement of this type of processes, called *Lean Office*. The overall objective of *Lean Office* is to work more efficiently and free up time by creating a better workflow, visualising the order of the work, shortening deadlines, reducing waste,

increasing flexibility, and implementing continuous improvement actions (Hines et al., 2004). Furthermore, this methodology intends to satisfy the customer's expectations through the standardization of administrative processes, which should be efficient, so that there is a reduction of costs and delivery times (Tapping & Shuker, 2003).

Lean Office, despite being based on the same principles as *Lean*, has some differences in this sense, since their area of application is different. Thus, it is possible to perform some comparisons in the approach to the five *Lean* principles, already mentioned in the previous chapter.

Table 1 - Comparison between *Lean* Manufacturing and *Lean* Office Principles (Nunes & Faccio, 2014)

Principles	*Lean Production*	*Lean Office*
Value	Visible in every step. The goals are well defined.	Hard to identify and the goals are variable.
Value Stream	Items, materials and components.	Information and kowledge.
Continuous Flow	Interactions are a waste.	Planned interactions should be efficient.
Pull Production	Guided by the takt time.	Guided by the company's needs.
Perfection	Enables error-free process repetition.	The process enables organizational improvement.

ii.   *Lean Office* wastes

In short, having an office based on the *Lean* philosophy means constantly minimising waste to maximise the value stream (Tapping & Shuker, 2010). In order to be able to eliminate the waste inherent in this environment, it is necessary that all parties involved have incorporated the *Lean* mindset and that they know that this form of improvement is quite beneficial for the organization and, consequently for everyone, since the organizational success is determined by the combination of all its resources (Piercy et al., 2009). Table 2 relates the *Lean Production* waste with the *Lean Office* environment.

Table 2 - *Lean Production* wastes vs. *Lean Office* wastes (Lareau (2002); Seraphim et al. (2010); Rubrich & Watson (2004); Suri (1998))

Principles	*Lean Production*	*Lean Office*
Overproduction	Excess production with too high volumes.	Generating more information than necessary and performing activites that aren't needed.
Transportation	Excessive transportation of products.	Excessive usage of computer systems in communication. It also includes the transportation of information in physical format.
Motion	Excessive movements due to inadequate layouts.	Excessive moving of information and/or people.
Defects	Flaws in the quality of the product or materials.	Errors in documentation, low performance and quality problems.
Over-processing	Wrong using of tools, procedures or systems.	Inadequate systems or wrong usage of procedures. Repeating tasks that weren't well-performed.
Inventory	Excess of materials, unfinished products or finished products.	Excess of information, duplication of documents. Unorganized offices and too much material.
Waiting	Waiting for machines, information, materials and people.	Inactive periods from people and waiting for information.

Other authors pointed out more waste besides the seven tabulated wastes, namely Liker, J. (2004) who mentioned the waste that occurs when employees do not have an active and inclusive participation, since this leads to loss of time, ideas, and opportunities for improvement. Moura (2016) reinforces this thought with the idea that not involving people is currently one of the most worrying wastes in organizations and may compromise their success.

iii.   Benefits and Barriers

When applied in the daily routine of a company, the *Lean* philosophy benefits all stakeholders of the organization (Allway & Corbett, 2002). However, many companies fail to apply the *Lean Office* methodology because they are not able to devote sufficient effort to adapt their tools to it (Pinto, 2014). A *Lean* system will value and encourage teamwork, while driving the enhancement of skills and knowledge. The sharing of information, as well as its easy access to any employee is also a very important

factor in this type of system (Womack et al., 1990). In these circumstances the work becomes simpler and more efficient. However, the process of implementing a *Lean* methodology is somewhat lengthy, since the tools must be implemented in the long term, and the support of all employees is necessary (Moura, 2016). Some studies point out that to initiate change in an organisation, it is important to have a facilitator who should monitor and coordinate the improvement actions, as well as have the necessary knowledge which, combined with the resources and support, will bring a positive impact to the implementation of *Lean* (Howell & Higgins, 1990; Melton, 2005; Smeds, 1994).

In this perspective, this methodology will naturally have both an advantageous side for companies and some inherent challenges and limitations. Figure 8 succinctly outlines the benefits that the *Lean Office* methodology brings as well as the barriers that serve as obstacles to its implementation, with both aspects being allied to the advantages and limitations of the *Lean* methodology itself.

Figure 8 - Advantages and Barriers of *Lean* Office
Adapted from Amaro & Pinto (2007); Melton (2005)

2.4 *Lean Office* tools applied

In this dissertation, some *Lean* tools were applied in the office context of Project Management, in order to support the improvement of processes and practices of industrialization project management, performed by the team. This section will explain in what these concepts consist theoretically. The project developed was enabled by the tools: PDCA Cycle, Standard Work and Visual Management.

As it was previously mentioned, continuous improvement or "pursuit perfection" is one of the five principles of *Lean Thinking*. This concept, *Kaizen* in Japanese, is a methodology that intends to improve processes continuously, counting on the participation of all the collaborators or employees, who should be motivated to find new solutions that will bring benefits to the organization (Pinto, 2014). This methodology allows for the implementation of various tools or techniques, turning continuous improvement into something long-lasting (Ortiz, 2006). Nonetheless, in order to maintain that culture, inertia and reluctance to change good or bad work routines need to be fought (Toussaint & Chandrasekaran, 2019).

In this dissertation, the continuous improvement tool that was analysed and implemented was the PDCA Cycle, formed by four different stages: Plan, Do, Check and Act. PDCA is a systematic series of these four steps and aims to gain valuable learning and knowledge for the continuous improvement (Patel & Deshpande, 2017).
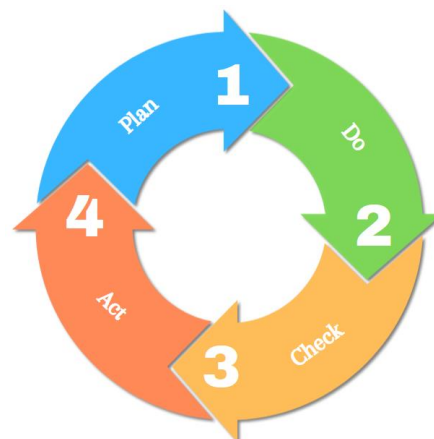
Figure 9 - PDCA Cycle

The four stages of the PDCA cycle consist in (Deming, 2006):

- **Plan:** the first stage is about identifying the problem, establishing the goals, analysing the process and establish a plan of action.
- **Do:** in this phase the action plan is executed, and people are trained when necessary.
- **Check:** now, the actions performed are measured and observed to check, as the name implies, if the established goals are being accomplished.
- **Act:** finally, the results are evaluated, the successful tasks are standardized, and the team is trained. Corrective measurements are applied for the tasks that didn't work out as planned.

At the end of the cycle, if the results were positive, the tasks are standardized. Otherwise, the cycle is reinitiated as many times as necessary until the established goals are fulfilled (Deming, 2006).

How to Sustain a Continuous Improvement environment?

The *Lean* philosophy states that to make possible the reduction of wastes, excessive costs and activities without value for the final product or service, it is necessary that all employees involved have a sense of commitment to this end (Lareau, 2002). Despite the advantages inherent in the implementation of this philosophy, embracing this mentality is a complex task, requiring, in addition to knowledge, dedication, meticulous planning and strong leadership (Pavnaskar et al., 2003). Only in this way is it possible to increase productivity, improve material, people and information flows, while satisfying the customer (Maia et al., 2014).

When implementing a continuous improvement system, it is imperative that, as the name implies, these practices are maintained on an ongoing and sustained basis. To this end, a literature search was conducted to gather important tips and real-life examples for this purpose.

According to Ashkenas (2012), it is important to rethink the way continuous improvement is conducted, in particular by assessing the impact it has on everyday behaviours. Furthermore, the author emphasises that continuous improvement does not have to be incompatible with innovation if it is thought of in a creative way.

Holweg, Staats and Upton (2018) emphasise that improvement processes tend to work well in the early stages, but the gains diminish as the process continues. In their article "*Making Process Improvements Stick*", they point out some things to consider when trying to make an improvement system stick:

1. Visible support from the leaders – without it, team members assume their leader has lost interest and that the work being conducted is not relevant.
2. Consistent control and monitoring.
3. The leadership communicates the plan in a clear way and aligned with the team's purpose.
4. Creating motivation by celebrating small wins.
5. Direct efforts for points that will clearly benefit employees.

ii.   Standard Work

Standardized work is the establishment of specific procedures to be executed by each worker to perform tasks and operations successfully, including the description of the workstation, the tools, equipment,

quality norms, time, skills, and the sequence of actions necessary to finish the task successfully (Tapping & Shuker, 2003; Mironiuk, 2012).

Some benefits of standard work are, according to Emiliani (2008):

- The creation of reference points from which it's possible to continuously improve.
- Reduction of variability.
- Improvement of quality and flexibility.
- Stability and predictable outcomes.
- The ability to predict anomalies.
- Better control of processes.
- The creation of an individual and organizational learning platform.

Mironiuk (2012) also points that using standard work diminishes variability in the process, avoids mistakes and makes it easier to train new employees, serving as well as a base for continuous improvement.

iii.   Visual Management

Visual Management is an approach that relies on several communication techniques that intend to make information available in a visual format. This information can be about tools, production activities, operations, etc., and it's put in a place of easy visualization so that anyone involved can quickly understand (Womack & Jones, 1996).

The main objective of the application of Visual Management is to improve and remove obstacles in the flow of information (Singh & Kumar, 2021; Meiling et al., 2012; Aziz & Hafez, 2013). From this, it's possible to avoid mistakes and other wastes (Oliveira et al., 2017).

iv.   5S's

According to Tapping & Shuker (2010), the 5S's tool is used with the purpose of creating a work environment aligned with the *Lean* and visual control criteria and it's formed by 5 different concepts or steps: *Seiri, Seiton, Seisou, Seiketsu* and *Shitsuke*.

- *Seiri*: consists of classifying and identifying the essential materials and separating them from the unnecessary ones.
- *Seiton*: this step is about setting in order the necessary elements that were identified in the previous stage. They should be left in places where the worker can easily find them when necessary.

- *Seisou*: relates to a sense of cleaning and making sure the workplace is organized at all times.

- *Seiketsu*: it's important to standardize the way the organization of the workplace was performed, by using visual patterns or maps.

- *Shitsuke*: sustaining is the final stage. Iit's about having a commitment towards maintaining self-discipline that will sustain the 5S concepts. It's important that there's good communication and education.

Figure 10 - 5S's (6sigma, 2017)

According to Imai (1997), this tool brings many benefits such as creating a clean, safe and pleasant work environment and the increasement of the workers' motivation. Carvalho, Alvez & Lopes (2011) also pointed out that the application of the 5S's technique maintains the warehouses organized, reduces the time spent in moving materials, as well as the time spent looking for tools. Finally, a safe workplace avoids work accidents.

Applying the 5S principles to folders and electronic files can help companies create an organised digital environment and it reduces the probability of making mistakes and creating stress in the workers. Nowadays, it's important to understand that no company is safe from clustering data in the wrong places, having several versions of the same file or even losing important documents (Bencheva, 2020).

The first step, *Seiri*, in this context, relates to identifying which documents aren't necessary and if some documents have several versions. *Seiton* will organize the folders and necessary documents in a way that will be easy to find. *Shine* is about cleaning and inspecting the file's storage regularly. Standardizing is establishing a process to maintain the first 3 S's. Finally, sustaining is ensuring that this tool will be followed (The University of Tennessee – Health Science Center, 2022).

1. Sort	Sort data files: check folders and remove unnecessary files.
2. Set in order	Set remaining files in order: create folder structure and file naming conventions that suit your needs.
3. Shine	
4. Standardize	Shine and standardize: develop a method that will support the new practices and make it part of the daily routine.
5. Sustain	Sustain your new system and teach it to your colleagues so that good practices spread.

Figure 11 - 5S's for data files (Helsingin Yliopisto, 2019)

2.5 Design Thinking

Finally, in this literature review chapter, after conducting research on how to eliminate office wastes and establish tools to improve productivity in the workplace, it became necessary to review articles that would allow for the implementation of said tools while maintaining the people involved in the project as its main focus throughout the entire project. For that, a study was conducted on the principles of Design Thinking.

One of the essential principles of management pointed out by Peter Drucker (2007) is that management is about humans and its purpose is to maximise the strengths of the team and minimise their weaknesses. In this sense, and as the main purpose of this dissertation was to improve the practices related to the processes and internal communication of a team of project managers, it was necessary to resort to literature review and methodologies that had as their focus people and their interpersonal relationships. The organizations that stand out in terms of profitability are those that invest more efficiently in innovation, and it is in this sense that Design Thinking emerges as an innovation model capable of generating differentiated results, since it frames research and development methods with solutions focused on users (Bonini & Sbragia, 2011). The main pillar of Design Thinking is the human being, encouraging organisations to focus on the people for whom they are creating and on the human need that lies behind the necessities that arise, gathering insights by practicing empathy, observation and interviewing, getting to the bottom of problems by turning them into questions, building prototypes that allow learning about people's needs and using research to understand the past, present and future (IDEO.org, 2023). This approach to problem solving can be applied regardless of the role or industry in question (IDEO.org, 2023).

By putting people at the centre of any idea or business, human-centred design can be grouped into three major phases (IDEO.org, 2015):

1. *Inspiration*: it's about listening to people's stories, observing, and understanding in detail the needs, barriers and constraints that are being addressed. This involves identifying what is the strategic challenge that will guide the questions that will be asked during the research and subsequent solutions, assessing pre-existing knowledge, identifying the people to talk to and work with, creating a plan and selecting the research methods.

2. *Ideation*: this phase is about creating, i.e., it aims at understanding the data collected before, identifying patterns, defining opportunities, and creating solutions. From this phase opportunities, prototypes and solutions are obtained and can be materialised through synthesis activities, brainstorming, prototyping and subsequent feedback.

3. *Implementation*: in this phase the solutions are put into practice, with the assurance that people have been involved in the process from the beginning. Prototypes are temporarily evaluated in the real world, a map for the action plan is built, resources are assessed, partnerships are built, the impact of the solution on the people for whom it was made is taken into account, the team and the pilot are dealt with, among others. In addition, it is important to monitor and evaluate, continuing the iterative process and receiving feedback.

This approach is iterative, so that ideas are validated throughout the process, receiving feedback and opportunities for improvement (IDEO, 2015). Following this model, teams can get to the root of problems and find solutions that satisfy those facing them.

3. COMPANY PRESENTATION

The aim of this section is to describe the company, Bosch, where the research and work were developed. The company will therefore be presented in both global and national terms, i.e., a brief description of the Bosch Group and then Bosch Car Multimedia, S.A. will be carried out.

3.1 Bosch Group

The Bosch Group is a leading global supplier of technology and services, that offers solutions in many different sectors.

The history of the company started in 1886 when Robert Bosch set up the "*Precision Mechanics and Electric Engineering*" shop, located in Stuttgart, Germany. This workshop performed precision mechanical and electrical engineering work, such as installing telephone systems and electric bells (Bosch, 2023a). The organization has been evolving ever since and, by 1910, it was represented in all continents (Bosch, 2023b). Currently, Bosch Group is set worldwide with 468 subsidiaries and regional companies in over 60 countries and regions (Bosch, 2023c). Its headquarters is set in Stuttgart, Germany. The company employs around 420,300 associates around the world and had a sales revenue of 88,201 million euros in 2022. Besides this, the Bosch Group has been carbon neutral since 2020 (Bosch, 2023d).

Bosch's operations are divided into four business sectors: Mobility, Industrial Technology, Consumer Goods, and Energy and Building Technology (Bosch, 2023e).
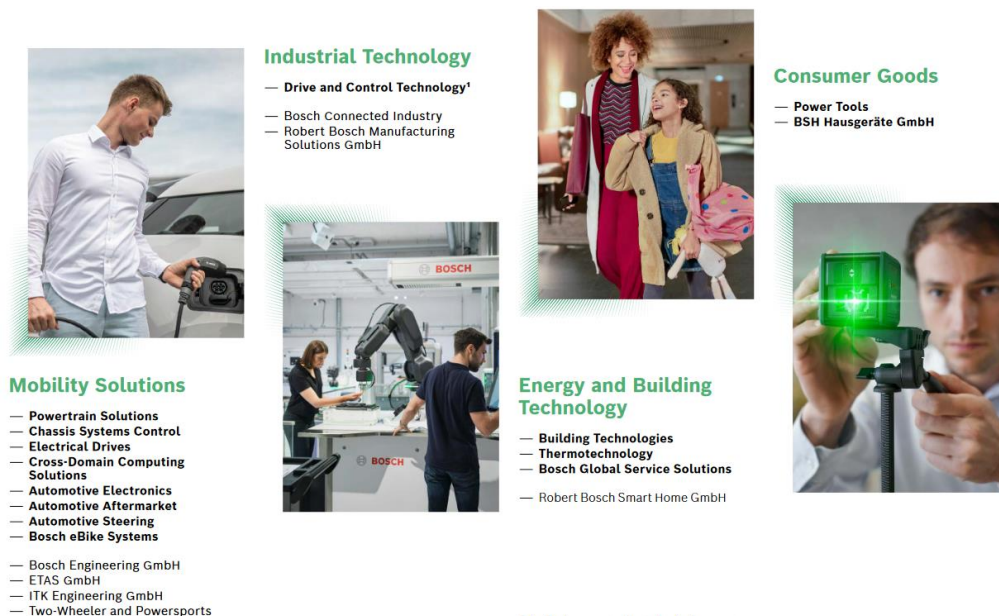
Figure 12 - Bosch Group's Business Sectors (Bosch, 2023e)

Regarding the performance of the group in 2022, the company achieved 88,2 billion euros in sales revenue (Bosch, 2023e) and the sector with the highest figure was the Mobility Solutions one which is shown in Figure 13, along with the other sector's values (Bosch, 2023d).

Bosch Group sales by business sector

45.3 | **52.6**
2021 | 2022
Mobility Solutions

6.1 | **6.9**
2021 | 2022
Industrial Technology

21.4 | **21.7**
2021 | 2022
Consumer Goods[3]

5.9 | **7.0**
2021 | 2022
Energy and Building Technology

[3] Including other activities

Figure 13 - Bosch Group's Sales by Business Sector in billions of Euros – 2021 and 2022 (Bosch, 2023d)

3.2 Bosch Portugal

Bosch emerged in Portugal in 1911 and is one of the most important and recognized companies in the country. It's represented in four different locations: Braga, Ovar, Aveiro and Lisbon.

In Braga, Bosch Car Multimedia S.A. is set currently in three parishes (Lomar, Lamaçães and Sequeira) and it includes different types of installations, such as plants, offices and development and test buildings. The Bosch site in Braga belongs to the Automotive Electronics division and is largest one of the Bosch's Portuguese sites. This site is mainly focused on the development and production of multimedia solutions and car sensors. The company exports almost all its production and is also one of the biggest employers in the Braga region (Bosch, 2023f).

Bosch Security Systems, in Ovar, focuses on the production of solutions in the area of security and communication systems, electronic displays, fire-alarms and other products for different business units of the Group. Even though production is the main activity in the Ovar unit, there is also an area of research and development (Bosch, 2023f).

Bosch Thermotechnology in Aveiro manages the Bosch Group's residential hot water business unit, supplying hot water solutions through heaters, boilers, and heat pumps, worldwide (Bosch, 2023e).

Finally, Robert Bosch S.A., in Lisbon, was established in 1960 to turn into the commercial headquarters for the Portuguese market. In the present day, this location is focused both in central accounting services,

purchases, communication, marketing and training and in Human Resources and Communication services for the whole world (Bosch, 2023f).

3.3 Bosch Car Multimedia S. A.

The location of Bosch in Braga was where the current dissertation was developed. The Braga location appeared in 1990, under the name *Blaupunkt Auto-Radio Portugal Lda*, with the opening of the Blaupunkt factory and, at that time, the unit was dedicated to the production of car radios and aftermarket accessories. With the evolution of the market in which the firm was inserted, in 2009 the company was sold, becoming Bosch Car Multimedia S. A. – dedicated to the development and production of infotainment systems, instrumentation and security sensors for the automotive industry (Bosch, 2023g). In 2012, along with University of Minho, the company signed the biggest innovation partnership in Portugal and one of the biggest partnerships between a company and a university in Europe (Bosch, 2023g).

As it was previously mentioned, Bosch Car Multimedia S. A. belongs to the *Automotive Electronics* (AE) unit and it's responsible for the development and production of multimedia solutions and sensor for automobiles, gathering other areas of Mobility (Bosch, 2023g). This unit employs around 3700 people and is one of the biggest contributors for the results of Bosch in Portugal (Bosch, 2023g).

As for the organizational structure of the company, it's divided into two main areas: Commercial and Technical. The commercial area includes all the departments that don't contribute directly to the product, such as accounting, human resources, communication, logistics of the components and management of the information. The technical area consists in all the areas that affect the product directly, focusing on production, project management, industrialization of new products and quality departments. This dissertation was developed in the section MFE16, which is part of MFE1 - inserted in the technical area and responsible for project management and sample build (Figure 14).
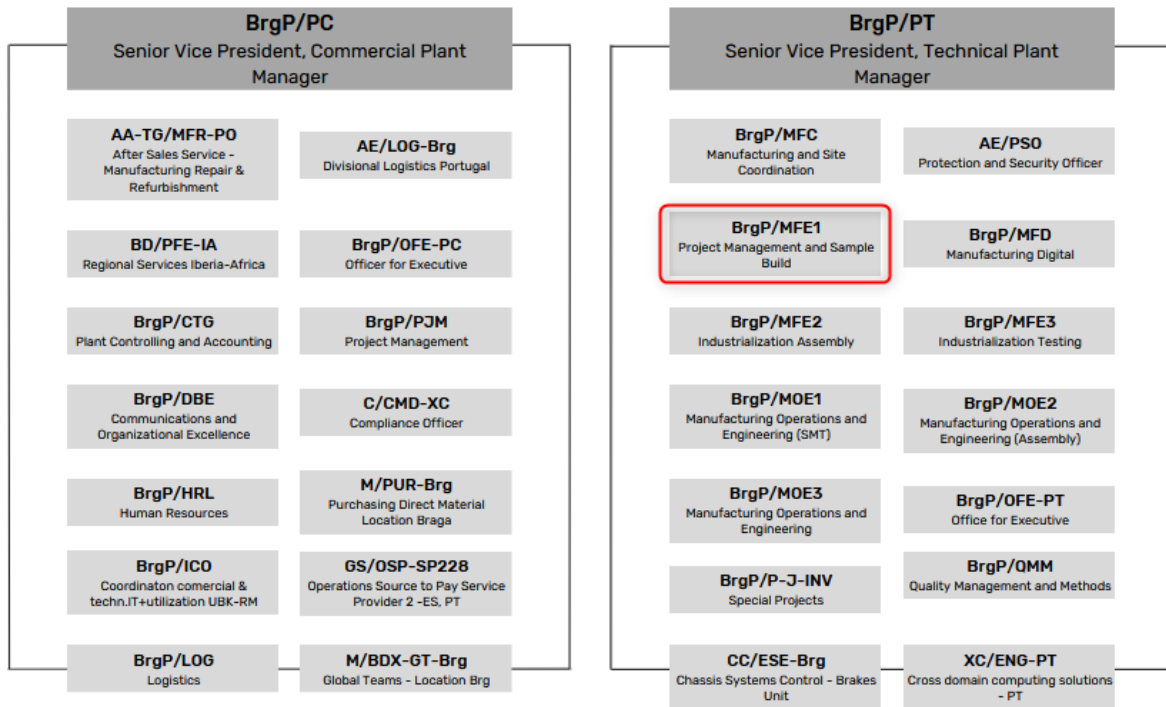
Figure 14 - Bosch Organization Chart

4. CURRENT SITUATION

This next chapter is meant to give an overview of the context in which this project occurred, focusing on the identification of problems and struggles that MFE16 faces, through the conduction of workshops and individual interviews with the team members. By identifying improvement opportunities, it was also possible to connect these issues with the concept of *Lean Office* wastes.

4.1 Product presentation - Radar

The team, MFE16, where this dissertation was developed is responsible for the project management of all projects regarding the product Radar. This product is considered a *Smart Sensor* and it's integrated in the projects related to the *Automated Mobility* solutions, which intend to develop and improve vehicles and mobility services, making the experience simpler and safer.

This sensor acts as a technological solution developed by Bosch with the purpose of preventing accidents and allowing the driver to be connected to their surroundings, which also guarantees safety for other people.

For confidentiality reasons regarding the design of this product and its different specifications, the different variations for this product will not be provided.

4.2 Identification of Problems, Wastes and Team Goals

The main strategy adopted during this project was to use the MFE16 team meetings, not only to present the progress and development status of the work, but also, and mainly, to use the time when the team was all present to develop activities whose objective was to collect the problems faced by the team and feedback on the work developed. First, a workshop was made to gather information on the team's strengths, struggles and goals. On a different stage of this initial process, individual interviews were conducted, with the purpose of understanding individual activities where people were having difficulties and where they felt they were wasting time. After this, the data collected was processed to understand the team's priorities and the biggest problems that were being faced and to figure out the best strategy to apply in the future. Finally, it was possible to relate the issues with the *Lean Office* wastes.

In Figure 15 it's possible to see the different stages followed to identify the team's struggles and goals, finishing in the main purpose: to build a strategy that would encounter people's needs.
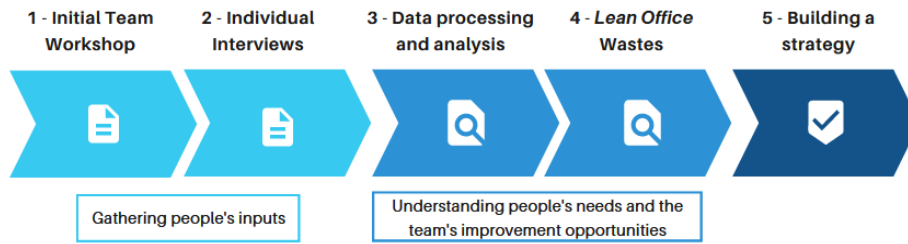
Figure 15 - Stages Conducted for Problem Identification

i.   Team Workshop and Individual Interviews

The first stage of identifying the problem was to gather as much information as possible, always keeping one focal point: the people. This first step was inspired by some advice and values provided by the first stage established in the Design Thinking approach – *Inspiration* –, which meant focusing on people's stories, observing, and keeping in mind the needs the team was facing. For this, in a first instance, a workshop was developed with 12 team members, with the goal of identifying the main problems, objectives and needs in general, in order to better define the focus of the project. In this workshop the team first filled out a form with five questions:

1. *How are you feeling right now?*

The initial question served as an icebreaker. It was multiple choice, and the answers were pictures of cats representing different moods, with the purpose of making people comfortable and relaxed.

2. *Briefly, describe your team's biggest strengths.*

This question aimed to raise the positive aspects and strengths of the team, with the purpose to understand better how the members saw the team itself. The intention was also to bring positivity to the team and not focus only on their struggles.

3. *Define the three biggest struggles/challenges you face currently.*

The third question aimed to collect which are the biggest challenges or problems faced by the team members on a daily basis.

4. *If you were granted three wishes, what would you change/implement in your daily work?*
5. *Based on your last replies, make your own user stories.*

    As a (role)___, *I want* (something)____ *so that* (benefits) _____.

Finally, the fourth and fifth questions aimed to understand the requirements and needs faced by each member. For this purpose, in the latter, the concept of *user stories* was used to extract the team's wishes

in a simple and objective way, also understanding the benefits the individual previewed with said wish. In Appendix 1 it's possible to see the form that was filled by the team.

In the second part of this workshop, the team was divided in two groups, and they were provided by the author with blank cards. They had to discuss between them where they saw the team in the future, their biggest aspirations, even if they sounded unreachable at the time. The purpose of this activity was to understand how people felt in their daily work, what they were missing, how they saw their team and what were their goals, not only as individuals, but also as team members.

As a second step of this initial data recollection, individual interviews were conducted, in person, to, in a more specific way, realise which were the processes or daily work activities in which the team members felt they were wasting more time.

The interviews were short conversations conducted in a private room, only with the author of this dissertation and a team member present. Two questions were asked:

1. *In which activities/processes do you feel like you lose more time?*
2. *Why do you think that happens?*

By listening to the people directly, it was possible to get detailed information on where the team was standing then, where they intended to be in the future, as well as what were the main obstacles and the processes that needed to be standardized.

In the next section, the data collected will be analysed. For confidentiality motives, people's answers will not be fully shown, only the results that were drawn from them.

ii.   Processing and Analysis of Collected Data

By performing the initial workshop and individual interviews, a high quantity of information was collected, and it was necessary to find a strategy to establish the main priorities and focal points, as well as to make the data more visual and succinct.

Starting with the question of the survey regarding the team's strengths, it was possible to group and divide them into four main ones, shown in Figure 16.
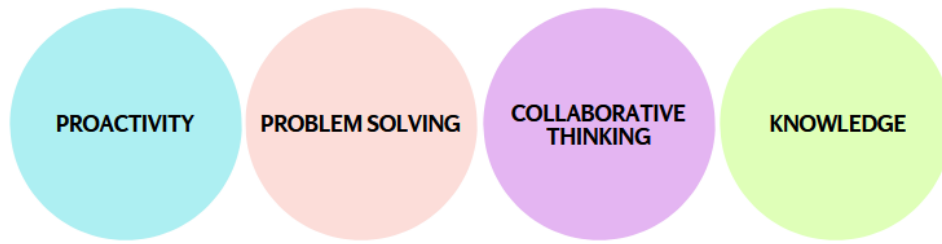
Figure 16 - Team's identified Strengths

On the other hand, the struggles, goals and wishes were divided in six big categories:

- Processes

- Platforms and documents

- Continuous improvement

- Communication

- Time

- Roles, Responsibilities, and other Teams.

Gathering both the struggles faced by the team and the wishes that were expressed, it was possible to draw conclusions regarding all of these six categories.

Regarding the category of **processes**, it was assessed that there was a need to define some processes and describe work instructions related to some of the team's activities.

With regard to **platforms and documents**, the team showed dissatisfaction with some of the existing documentation, as it could be better adapted to the processes connected to the Radar product. Furthermore, the lack of standardization and centralisation of information was highlighted, since several platforms were used for the same purpose, and the information was dispersed in several files.

In the category of **continuous improvement**, the idea of reserving a time slot to work on improvement opportunities was expressed and to improve the sharing of improvements and follow-up of their implementation.

Regarding the theme **communication**, the team showed the need to have clearer and simplified communication channels and to eliminate some meetings and emails that weren't productive or added valuable information.

In the category related to **time**, people expressed the wish of, in some processes, being able to perform the tasks with more time and reducing time wasted searching for information.

Finally, moving on to the class of <u>roles, responsibilities and other teams</u>, it was mainly pointed out the need of having clearly defined responsibilities within some of the processes, that weren't clear at all times and allowed for the existence of grey areas.

The way the results were grouped can be seen in Appendix 2, with the example of the struggles topic.

All the wishes, goals and desires stated in the user stories were aggregated, along with workshops that had previously been held in the team. That said, a whiteboard was developed and shared online with all members, with the aim of holding a vote to establish the team's priorities. Team members were asked to vote with three stickers of each colour (red, yellow and green), with red corresponding to topics that are having an immediate impact and are urgent/critical, yellow to topics that are having an immediate impact but are not urgent and green to those that can be solved in the medium-long term. Figure 17 gives an overview of how the online whiteboard looked, with the objectives clustered in the six initial groups mentioned above and the stickers assigned by employees.

Figure 17 - Assessment of Priorities (Online Whiteboard)

It was stipulated that red stickers were worth three points, yellow ones two and green ones one. In this way, an *Excel* sheet was created with each of the objectives and their respective scores. Thus, it was possible to order them in descending order, so that the team's priorities would be more perceptible.

Through these classifications, it was possible to conclude that the team's needs were related to each other and that there were two main groups of objectives: the more general ones, that represented the team's aspirations and that could include specific measures to be taken or simply the way the team wanted the work to be carried out in the future, and the specific ones, that related to specific processes or activities. The team's general and specific objectives are as shown in Figures 18 and 19, respectively.
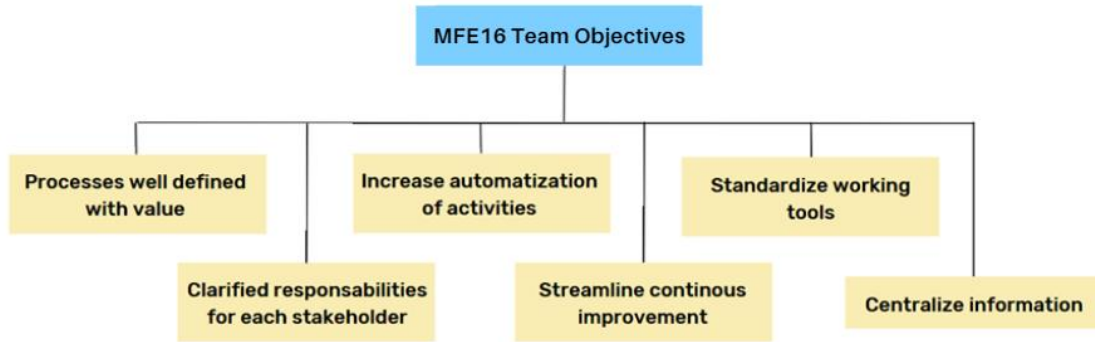
Figure 18 - MFE16 Team General Goals
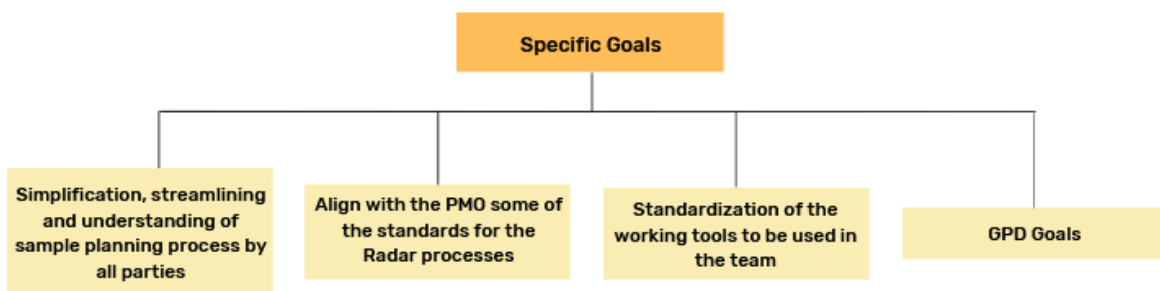
Figure 19 - MFE16 Team Specific Objectives

Finally, after this in-depth analysis of the team's problems and requirements, four major topics were identified that needed to be worked on and that, in their work, would address other topics that were indirectly related. These four topics were: the planning of a type of product samples, the alignment of the Radar team with the PMO, the team's communication strategy and the Goal and Performance Dialogue (GPD) Goals (Figure 20).
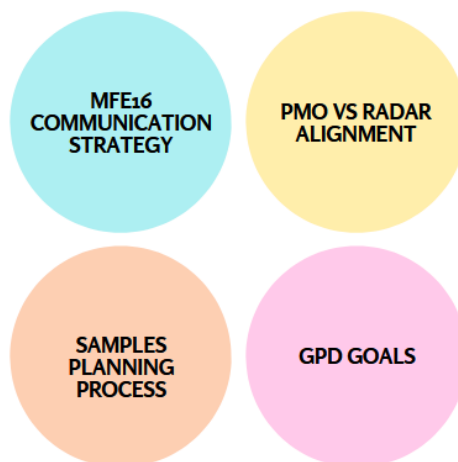
Figure 20 – Final 4 topics chosen to be worked on

1. **MFE16 Communication Strategy**

The topic regarding the team's communication strategy involves all means of communication, as well as the platforms used, the documents, the project folders and the way the team meetings were being carried out. Besides this, the centralization of information, knowledge sharing and standardization of processes are also considered by this topic.

2. **PMO vs. Radar Alignment**

The Project Management Office (PMO) at Bosch provides, among other things, standards and support to industrialisation projects, such as document templates. It was mentioned by the MFE16 team that some documents were not completely fitted to the processes and characteristics regarding the product Radar. It was, therefore, important to align the PMO with the activities performed by the team members.

3. **Samples Planning Process**

When it comes to an industrialization project, there are several types of samples that are built. Throughout the workshops and individual interviews, the team demonstrated discontent with the way the process of planning the production of a certain type of samples was being carried out, both in terms of the appearance of grey areas regarding responsibilities as well as with communication and execution of unnecessary steps in the process. For reasons of confidentiality, the type of sample in question will not be described and, for the purposes of reading and understanding this dissertation, the samples belonging to this category will be referred to as X Samples.

4. **GPD Goals**

The GPD Goals consist in goals that are presented to each individual by managers, that intend to implement objectives to be achieved and assessed if they were accomplished or not. This topic emerged to be worked as a team because, although the goals consider people individually, there are enablers to achieve those goals that can be worked in group.

iii. *Lean* Office Wastes

Since several of the problems and objectives identified by the members of section MFE16 were related to document and information or communication disorganisation, it became possible to conclude that the

office environment could be improved. Thus, *Lean Office* concepts, previously studied in detail, were used and some *Lean Office* wastes were identified (Figure 21).

Regarding the type of waste related to **overproduction**, excessive work was identified due to the practice of duplicated activities which, in turn, occurred because of the existence of scattered or excessive files, i.e., decentralized information.

It was also possible to identify the waste regarding **defects**, as much of the documentation was not adequate and the fact that files were scattered, disorganised or out of date could increase the likelihood of errors. In addition, with some of the processes not being standardized or with some grey areas in terms of responsibilities, some errors or process delays were not prevented from occurring.

Also from the same perspective, the waste of **over-processing** was identified, justified in the execution of unnecessary tasks as a consequence of disorganised information and lack of process definition.

At the **inventory** level, this type of waste was also observed due to an excess of information, documents, tools and platforms.

Finally, regarding the **waiting** waste, the team faced loss of time waiting in the search for files or information and in the steps of some processes that were unclear or undefined.

IDENTIFIED LEAN OFFICE WASTES

- ✓ Overproduction
- ✓ Defects
- ✓ Over-processing
- ✓ Inventory
- ✓ Waiting
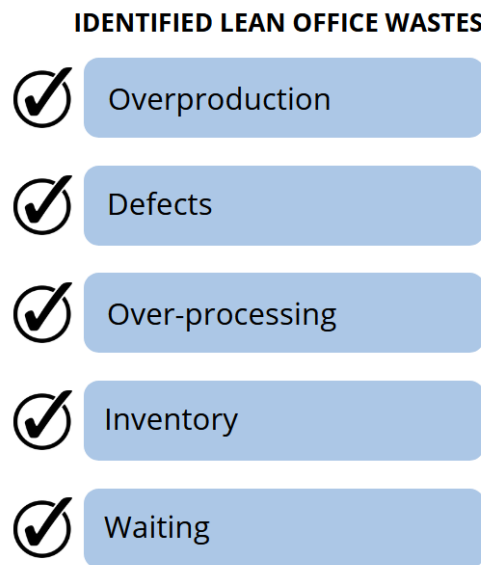
Figure 21 - Identified *Lean* Office Wastes

5. IMPROVEMENT PROPOSALS

This chapter aims to explain the proposals for improvement that have been presented and developed in the team, based on the study explained in the previous chapter regarding the current situation and the problems faced. It is divided into three sub-chapters: the first is related to a continuous improvement system that was applied in the team; the second concerns the proposal of a continuous improvement plan for the future of the team and the creation of a platform for registering opportunities for improvement and, finally, there is the third sub-chapter where a tool was developed and presented with the purpose of centralizing information and standardization of processes and work instructions.

5.1 Continuous Improvement System Application to various topics (PDCA Cycle)

One of the main objectives of this dissertation, as it was previously mentioned, was to establish a continuous improvement system in the team. Through the data analysed in the previous chapter, it was mainly shown that the team faced many problems of organisation, communication and standardization and that these problems existed for a long time and weren't being worked on. Due to the team not moving towards a path to solve these issues and lack of time to work on the topics pointed out, it became necessary to have someone pushing and organizing the team to perform activities that would align with the continuous improvement of their daily work.

Therefore, and based on the study carried out on *Lean* theories and *Lean Office* tools, a continuous improvement system similar to the PDCA cycle was implemented to work on four of the topics that were raised: *Communication Strategy*, *PMO vs Radar alignment*, *X-samples process* and *GPD Goals*.

In order to do so, the team was divided in four groups and each group would work in one topic. But, since these topics involved all of the team members, it was important that everyone was aware of the work that would be conducted in each one of these topics. To this end, a planning calendar was established for these activities which marked points at which each group would have to present the current work to date to the rest of the team. This way, everyone could contribute with inputs and make the work collective and responsive to everyone's needs and make them feel they were involved in all the topics. In addition, the calendar served to create deadlines, to go around the possibility of the work being forgotten due to lack of time and/or motivation and also so that all groups would practice these activities in a standardized way in relation to the others. Figure 24 shows the calendar that was established with the team.

Finally, it's important to add that a workspace for the whole team was created on *Microsoft Teams*, with all the information that would serve as a support for the groups. This included the planning calendar,

information for each group, templates, inputs given by the team on each theme and a shared *Excel* file with a page for each group to work on, thus allowing for the centralization of information and for each group to be aware of what the other groups were doing.

During this process, the author of this dissertation was heading most of the group meetings, as well as the team meetings for presentations and feedback, and supporting the tasks of the groups and their ideas.

The PDCA cycle applied was structured, for all the groups, as follows:

- Plan

The author established an initial meeting with each group to present the plan for the continuous improvement system, the objectives expected and to respond to any questions or doubts they could have regarding it. As a first step, it was asked to the groups to identify all the problems or factors related to each topic and, if necessary, to schematize a visual description of the current situation. For that purpose, the template on Figure 22 was provided, so the groups would have an orientation and could know which questions needed to be answered. Each group could organize themselves in whichever way they thought was best and, with the support of the author, they had follow-up meetings to work on the topic.

Problem Definition

Filled in by:

Topic:	
What are the problems/improvement opportunities involved?	**Visual description of current situation (block-diagram, scheme…)**

Figure 22 - Problem Definition Template

After defining the problems, and describing what the current situation looked like, the various groups made presentations to each other, using one of the MFE16 team meetings. They then collected inputs and changed or added suggestions, when necessary.

Starting the week after these presentations, the groups had to work on developing an action plan for each topic, taking into consideration the problems they identified before. A template was also provided for this matter (Figure 23). Only five fields were required to be filled out: the action itself, the person or group responsible for it, the establishment of a deadline for the action, the status, which would be updated throughout the time and, finally, additional comments or information necessary for the action.

Figure 23 - Action Plan Template

All of this information, the problem identification and action plan were placed in the shared *Excel* file, and all the team members were able to check the work that was being carried out.

Finally, the planning phase ended with a set of team presentations. Inputs and opinions were gathered and taken into consideration, and the action plan could now be put into practice.

- Do

This stage was dedicated to the development of the action plan. Each group could freely organize themselves and conduct meetings and activities to put in practice the plan that was stablished in the previous phase.

- Check

The *Check* stage corresponded to a meeting with all the team present, in which each group presented the status of the actions they were implementing and gathered feedback on both the actions that were already finished and the ones that were unfinished, so they could adjust how they were working and further plan the next steps.

- Act

Once the feedback from the rest of the team was collected, each group implemented the necessary changes and improvements in their actions and moved forward with their work, while standardizing the improvements that were made.

After acting on the previous conducted activities, implementing changes or improvements in them, the *Plan* phase starts again, since it's necessary to carry out a certain planning for these improvements, which end up being new actions themselves that will again be checked by the team in a meeting, therefore forming the PDCA cycle. In Figure 24 it's possible to see how the different phases of the PDCA cycle align with the stablished calendar.

When? calendar week	What?	Who?
17	Establishment of the 4 groups	Joana T.
18	Meeting with each group – topic development and clarification of existing doubts regarding the plan	Joana T.
19	Topic development – identification of problems in each topic/how's the current situation?	Groups
20	**Presentation to all the groups – pointing out the problems within each topic and gathering inputs from the rest of the team**	Groups+Team MFE16
21	Definition of an action plan	Groups
22	Definition of an action plan. **Presentation to all the groups and discussion.**	Groups+Team MFE16
23	Action plan: initiated	Groups
24	Action plan: initiated	Groups
25	Action plan	Groups
26	Action plan	Groups
27	**Presentation: Checking the work developed with the rest of the team, gathering inputs and improvement opportunities**	Groups+Team MFE16
28	Action Plan – continuation	Groups
29	Action Plan – continuation	Groups
30	**Final presentation – planning the next steps for each group considering the work that was done. Discussion in team of how to maintain this cycle in the future.**	Groups+Team MFE16

Figure 24 - Plan for the 4 groups vs. PDCA Cycle

In the next subchapters, this continuous improvement cycle for each topic will be developed in detail, showing how each group organized themselves and the actions that were implemented.

i. Communication Strategy

As it was mentioned before, this topic was mainly focused on all the means of communication that were practised by the team, as well as the standardization of processes and work activities. During the dissertation project, the group was able to perform various improvement actions regarding this theme, which will be described in this chapter.

Plan

The planning phase first involved the presentation of the common timetable for all the other topics previously mentioned. Through it, the communication group scheduled regular meetings among themselves that aligned with the proposed objectives and deadlines.

In the first meeting following the presentation of the plan, the group was able to identify the problems or improvement opportunities related to this topic, which were:

- Lack of process standardization

- Poor use of the *Microsoft Teams* team channel

- Repeating the same information in different meetings

- Several storage locations for information

- The structure of the team's shared folders was too confusing

The template filled out by this group with the improvement opportunities can be seen in Appendix 3.

After showing this analysis to the other groups, they gathered some inputs by the rest of the team and had another meeting to work on an action plan (Figure 25).

No	Action	Responsible	Deadline	Status	Comments
	Action Plan				
1	Identify the processes that aren't standard				
2	Mapp the processes mentioned in topic 1				
3	Improve the project meetings: identify important topics that should be regularly presented in these meetings, by other teams				
4	Create a Docupedia page				
5	Define the requirements and structure for the docupedia				
6	Apply the 5S's tool to the team's shared folders				

Figure 25 - Communication Group - Action Plan

The plan was then shown to the rest of the team, before putting it in practice, so that everyone would approve and be involved.

Do

During the time in which the project of this dissertation occurred, the actions that were worked on by this group were mainly focused on improving the organization of the team shared folders applying the 5S's *Lean* tool, improving the project team meetings with other departments and developing the teams *Docupedia* page, which would include the standardization of processes and activities and would serve as

a platform for centralizing the important information for the team. This specific tool will be explained in chapter 5.3. of this dissertation.

Starting off with the application of the 5S's technique to the shared team folders, a meeting between the author and this group was conducted to get support on changing the structure of the folders that were shared with the whole team. These folders contained documents with information on the several projects, as well as templates for support, presentations for the meetings and visits, among others. It was expressed by everyone several times that it was hard to find information and documents because the current structure was not user-friendly. In this sense, the author of this dissertation conducted a benchmarking and theoretical study on the *Lean Office* 5S's technique and, with the support this group, proposed a new structure for these folders to the rest of the team.

For confidentiality motives, the results of this proposal will not be fully shown in this document, but the idea for the structure of the team folders will be explained and presented.

Firstly, as the 5S's technique points out, it was necessary to identify which documents could be deleted, either because they were repeated in other places, or because they were no longer necessary. Afterwards, all the necessary items that remained after the first stage needed to be organized. In order to do so, several main folders were stablished for the new structure. Each **product** worked on by the team would have its own folder, with folders inside related to that product, as, for example, to the projects conducted about that product, quality management, capacity management, product information, production lines, among others. Then, a folder was created for topics related to **Change Management** and another for **Data Analysis**. Regarding the presentations that were made, necessary templates for meeting alignments and documents for visits, a folder named **Communication Management** was created. For **Costs and Resources Management**, there was a main folder with this topic, including inside a folder for Cost Management, another one for Resources Management and a third one for old documents on this topic. Regarding **Processes** that were already mapped and stored by the team, a folder was created to hold them. There was also a need to create a folder for general **Team Topics**, in order to keep documents on internships that were conducted on the team, shared notes from the team members, photos of the team and the annual holiday plan. Finally, there was a folder for **Archive**, for documents that were no longer in use but needed to be stored.

In figure 26 it's possible to see the structure elaborated by the group.
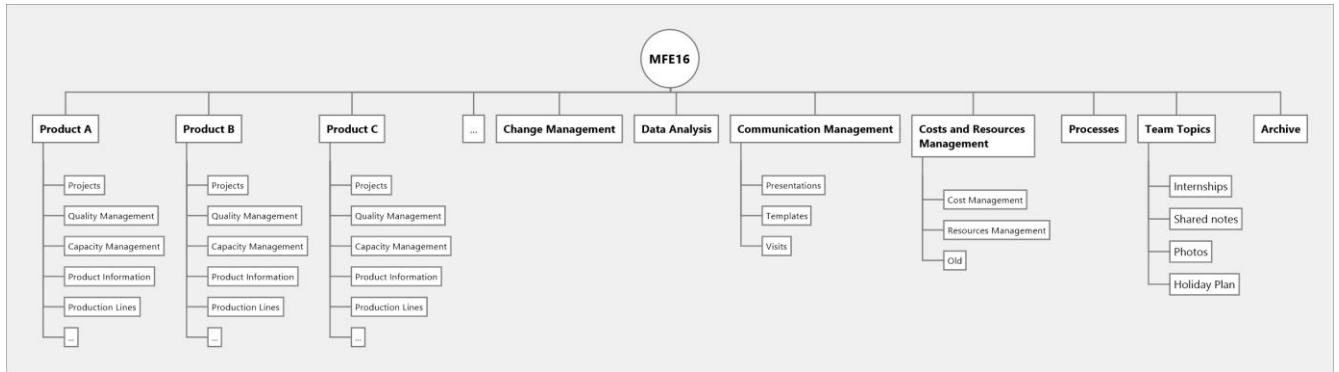
Figure 26 - 5S's Application Proposal for the Team's Shared Folders

It's important to mention that the previous structure had most of the concepts mixed up. Some topics that were similar to each other were not being held in the same folder and there wasn't a clean structure for these documents, making people waste time when searching for files.

Regarding the action of improving one of the regular project meetings that involved al of the MFE16 members and other departments, as a first step, to consider everyone's opinion, a survey was conducted – *How do you evaluate these Meetings?* – with all the departments involved in these meetings. Both the questions and results of this survey, out of 24 responses, are shown in Table 3. The objective of these meetings was: project status and team communication, so it was important that this communication was sharp and effective.

Table 3 - Survey conducted on the Radar project meetings

Questions	Results
Return of time investment (Evaluate from 1 to 5)	4.08
Usefulness (Evaluate from 1 to 5)	4.25
Presentation Method (Evaluate from 1 to 5)	4.17
Free text suggestions (not mandatory to respond)	- Sharing a useful topic every week for the whole team - Everyone who presents in this meeting should present in a standard way/template - Request this kind of feedback more often

The results show that, in general, the meetings were useful to all parties involved and it was productive to attend them. As it was aligned in the action, some people pointed out that it would be important to

include other topics in the meeting, developed by other departments. In these meetings, what happened was that the various MFE16 project managers gave updates on their projects. However, there was a lack of interaction with the other departments and meeting time for topics related to their activities.

In order to include this time, and to take into account the suggestions given by people in the survey, the communication group developed a proposal to fit the other departments and their topics into this weekly meeting. In this new meeting structure, another department outside MFE16 would present a status of its work, the following week another department would present, and so on. The group identified the following sections of work to present:

- *Sample build* – orders, forecast and KPIs.
- *Production* – KPIs and eventual issues of production.
- *Quality* – Issues and customer complaints.
- *Logistics* – Planning, levelling, critical materials, and lead times.
- *Status of production lines and maintenances*
- *Topics related to testing*

One of these topics would be presented one week, in the next week another topic, and so on. Naturally, the teams responsible for these subjects would be the ones presenting. Since there are six sections, each section would only have to present every six weeks. In short, the meeting would be divided into two parts: a larger part for the project managers to give the current status of the projects to the whole team involved, and a remaining part where one of these departments presented the requested topics.

Finally, regarding the processes that should be mapped, this subject will be approached separately, as it's connected to the creation of the *Docupedia* page.

Check

In the verification phase, the proposed new structure of the shared folders was presented. The rest of the team was happy with this proposal. However, the issue arose that these shared folders were not easy to share with people outside of the team. Therefore, it was agreed that it was necessary to create a folder in *Microsoft Sharepoint* - a document and application sharing point that integrates *Microsoft* applications, used by Bosch.

The objective of placing documents in this *Sharepoint* was, as mentioned above, to make it easier to share documents with people outside the team, when necessary. The documents to be maintained in the

shared folders were simply the ones regarding information that was either only useful for the team members or not meant to be shared outside the team.

Regarding the proposal to improve the project team meetings, the inputs collected were the people from each section who should be approached for this purpose. In addition, inputs were collected regarding the possibility of sporadically holding these meetings in person, since they were currently mostly held online.

Act

As mentioned earlier, it was decided as a team that some files should remain in the initial shared folders but others should go to the *Sharepoint*. This distinction was based on topics that were relevant to be shared with people from other departments and sections and topics that were only useful for the MFE16 team. The others would then move to *Sharepoint*. In Figure 27 it is possible to see the distinction that was made between files to remain in the Shared Folders.

Sharepoint	MFE16 Shared Folders
Information regarding products, projects and ongoing acquisitions, etc. To be shared with other departments.	Information only useful for MFE16 members, such as communication, costs and resources, data analysis, mapped processes, etc.
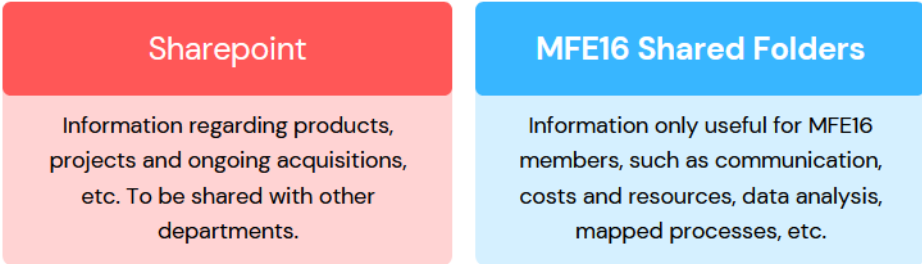
Figure 27 - Documents for Sharepoint vs. MFE16 Shared Folders

Sharing documents that weren't previously being shared in these terms with other departments would allow for the reduction of the time wasted on sending files by email, therefore making communication easier. Finally, this tool allows for the management of permissions regarding who can view or edit each document or folder, which brings the benefit of a long term and easy control of these settings that can be changed at any time.

The entire final structure, based on the first proposal can be fully seen in Figure 28.
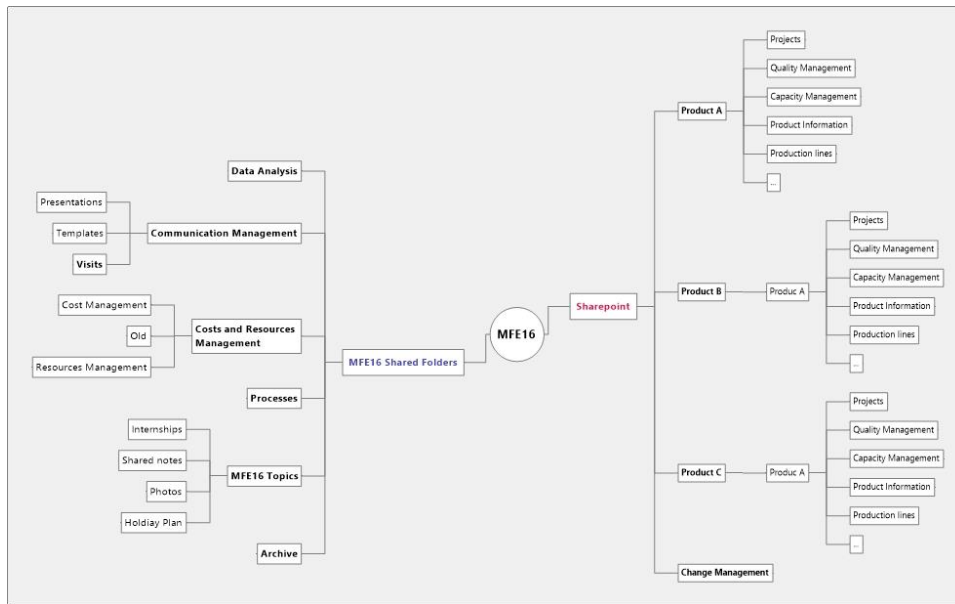
Figure 28 - Team Shared Folders (Sharepoint vs. Shared Folders)

Regarding the proposal for other departments to present in the project meetings, a presentation was made with a calendar of the weeks in which each department would have to present, so that these dates would be easy to verify. Then, a specific person from each department was appointed for this purpose and it was stipulated to speak to each of them individually in order to gather as much feedback as possible and understand whether the proposal would be feasible or not. For confidentiality motives, this calendar with the names of the people from each department and the dates in which they had to present will not be shown.

ii.   PMO vs Radar Alignment

This topic had as its major purpose the alignment of the PMO standards with the project management activities carried out in the MFE16 team, mainly regarding the Radar product. The main focus turned out to be the fact that the standard documentation provided by the PMO was not yet fully adapted to some of the processes carried out by the team. In order to bring the difficulties of the team to the attention of the PMO, it became necessary to agree among everyone what the main struggles in this matter were and then communicate them clearly to the PMO.

Plan

The first phase, *Plan*, as previously mentioned, had as a first step the presentation by the author of the plan and milestones common to all groups. Afterwards, this group held a meeting as well to identify the more specific problems related to this topic. The results obtained in that meeting were mostly related to the fact that the documentation or standard templates provided by the PMO were not yet adequate to some of the processes of the product inherent to the team's projects, the Radar. This group identified the documents that they felt needed to be reviewed. These results are shown in Appendix 4. For confidentiality reasons, the identified documents are not shown.

After showing it to the rest of the team and gathering their validation on the identified issues, this group then had another meeting to develop an action plan. In that plan, the main action was to approach the PMO in a meeting or workshop and present to them what were the main struggles and documents that weren't in line with the projects the team had to carry. The topics to be presented to the PMO were pointed out in the table on the lines bellow and they were aimed to be presented to them in this meeting, along with suggestions on how to improve them. The action plan can be fully seen in Figure 29.

Figure 29 - PMO/Radar Alignment - Action Plan

Do

On the phase *Do*, the intention was to put in practice the action plan developed. In this sense, as planned, a meeting was arranged with the PMO where the points were presented and discussed. Several inputs were gathered and registered on the section *Comments* of the table of the Action Plan previously shown. For confidentiality motives, these inputs will not be shown.

Check

At this stage, the results of the meeting carried out with the PMO were communicated with the rest of the team. After this check, it became clear that it would be necessary to build a new table with follow up actions, so that responsible persons could be defined. For this, a new meeting with the PMO would be

necessary, this time more specific and focused on concrete actions and naming the respective responsible, since the previous one had only served to review the problems faced and have a preliminary discussion of draft ideas.

Act

After checking with the team the connection made with the PMO, it was necessary to act on the ideas and topics raised in that meeting. For this, and already mixing the *Plan* phase of the next cycle, a new table was structured with follow-up actions, registering all the points that arose in the meeting with the PMO, making the main focus to fill the column of those responsible for the actions. For this purpose, it was stipulated that a new meeting would be held with the PMO, so that this could be decided together, thus dividing the activities in the best way and taking into account the capacity of everyone involved. This follow-up actions table is presented in Figure 30.

Follow-up Actions	
Action	**Responsible**
Set up a follow-up meeting with the PMO to define clear follow-up actions and responsibles for each action	

Figure 30 - PMO/Radar Alignment - Follow-up Action Plan

iii. X Samples Planning Process

This topic was chosen to be worked on because it was one of the main struggles pointed out by of all team members. It concerns the process of planning the production of one type of product samples. This process turned out to be very dense and had inefficient steps. It was relevant to name the main problems inherent to this process and to elaborate an action plan that could improve it in the future.

Plan

The planning phase of this group began in a similar way to the others, that is, with the presentation of the plan by the author to the group and a subsequent meeting to identify the problems related to this theme, which can be found in Appendix 5, integrated in the template that was provided.

In summary, the group came to the following conclusions regarding the improvement opportunities:

- Planning was being carried out on different platforms and files.
- There was a lack of information regarding the process flow.
- Lack of a dashboard or platform with aggregated data that would provide a real-time view of the planning.
- The meeting prior to the insertion of the product into the production line (*startmeeting checklist*), which gathers all parties involved to verify that all checkpoints are met in order to proceed with the insertion of the product in the line, has a document with these same checkpoints and many of them are non-applicable to the Radar products. Besides this, most of the parties that should be involved in this meeting weren't participating in it, which lead to the necessity of having to reach out to people to check the points which they were responsible, instead of having clear inputs on time.
- The dates, deadlines, lead times or quantities should be more transparent.
- Some meetings were not fully efficient.

Through these main conclusions, it was possible for this group to elaborate an idea-solution that would bring together many of the topics pointed out. This idea consisted in the creation of a web-based checklist platform on which all checkpoints or questions regarding the planning and delivery process of X-samples would be placed. All parties involved and responsible for each topic in the process would post the information necessary and relative to their roles, giving an overview of the state of the process and avoiding the need to go after information, also cutting out time-consuming calls and meetings.

Having said this, the action plan of this group consisted in the elaboration and better development of this proposal and in aligning this process with other departments, namely the Sample Shop (COS), the department in charge for building samples, including the necessary materials, planning, production, etc. This action plan can be found in Figure 31.

No	Action	Responsible	Deadline	Status	Comments
1	Prepare a proposal for COS				
2	Schedule a meeting with COS to present the proposal developed				
3	Define the process flow with the team				

Figure 31 - X-Samples - Action Plan

Do

The implementation phase consisted in further developing the proposal and building a presentation, not only for the rest of the team, but also for COS to approve and give feedback, since the development of this application would require technical support from other departments.

It was necessary to describe the current state of the process and develop the justifications and advantages associated with the proposal in question.

Firstly, in one of the MFE16 team meetings, the process was mapped. For confidentiality motives, this process will not be shown in this dissertation. By mapping the steps of the process and agreeing on it, it was possible to standardize the work that was being conducted and conclude/reinforce that the process was too dense, as it included many steps and files that could be optimized. The team realised that all the steps of this process had one goal: to establish and gather the necessary conditions to insert and assemble a sample in the production line. As it was previously mentioned, this goal was culminated in the meeting (*startmeeting checklist*) that was held to verify if all the steps were taken care of, before taking the product to the line. This meeting was supported by a document consisting of a checklist containing all the topics that needed to be completed in order to trigger the start of that insertion in the line. The standard of this document contained many topics that were not applicable to the radar product and there was lack of attendance in that meeting, making it necessary to go after the information and wasting time in extra calls or emails. Furthermore, there was a lack of visibility in the opening and/or closing of the various points to be fulfilled and a lot of time was lost throughout the process.

Facing these obstacles, the idea of creating a web-based checklist would incorporate all these points to be completed, with the proper responsibilities assigned. The necessary questions would be put to this whole process and the parties involved would fill in with their input, deadlines, lead times, etc. For example, regarding the material, the department of the company responsible for this function could answer in their point whether or not there was stock and when the necessary materials would arrive. This proposal aimed mainly at creating a more digital and automated process and less file-intensive, that is, with centralized information. Through this application, when a new product needed to be produced, all the parties involved could receive email alerts, knowing that they would have to start their tasks. Besides, in this way, the checklist could be better adapted to the Radar product, the responsibilities could be better defined, and people could participate in a more direct way, making the process more transparent and less pushed, while avoiding wasting time in searching for information, as well as cutting down on the number of inefficient meetings. Figure 32 shows a comparison between the situation and the proposal developed by the group.

Current	Proposal
• Non-applicable topics in the checklist • Low attendance at the meeting • "Pushed" Process • Lack of visibility of opening/closing checkpoints • Little alignment between the teams involved • Manual and slow process • Time lost in planning	• Web-based checklist with questions and responsibilities assigned • Email alerts/work-on and checkpoints tracking • The process becomes more digital and automated • Less time spent in planning and unnecessary meetings/calls performed to chase information

Figure 32 - X-Samples Current Situation vs. Web-based Checklist Proposal

Finally, for the presentation of this proposal, the advantages of its implementation were numbered Figure 33.

Proposal Advantages
• Centralized information
• Linking with other planning plattforms/web tools
• Process becomes more digital and automated
• Responsabilities well-defined
• More transparent lead times and deadlines
• Less inefficient meetings and time wasted
• Quality: transparency of the process flow and details regarding each activity allows for better understanding of the cause of errors, when they occur

Figure 33 - Web-based Checklist Proposal - Advantages

Check

In the check phase of this group, the improvement proposal was shown to the MFE16 team, as well as the final mapped process, and positive feedback was received regarding the proposal itself, in addition to aligning the meeting that should be scheduled with COS: type of approach and people to be included.

Act

The *Act* phase of this sub-project was focused on the action of presenting the developed proposal, bridging with COS to align the ideas and collect the necessary inputs to be taken into account for the development of this proposal.

As such, two meetings were conducted with COS to first present the proposal and then to collect opinions and key points to be taken into account in case the proposal is accepted and developed in the future. From this process, the conclusions set out in Figure 34 were drawn.
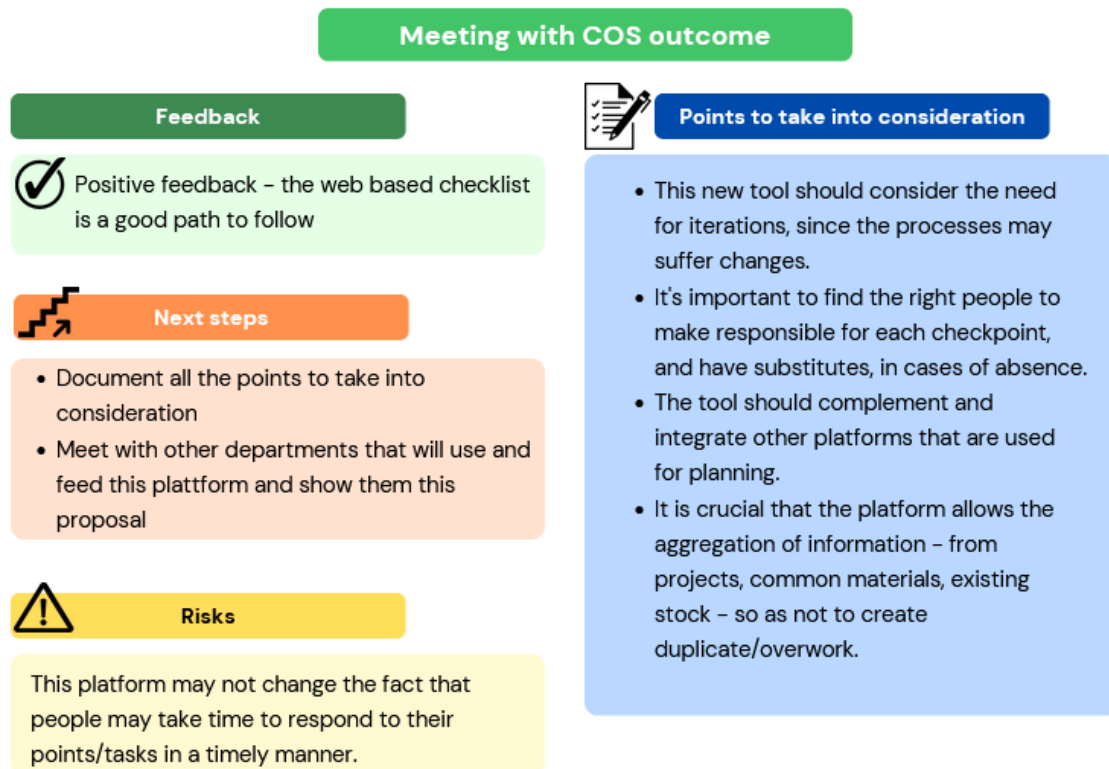
Figure 34 - Web-based Checklist proposal - Conclusions

After gathering these inputs and discussing the points to be taken into account in the development of the platform, the group gathered and documented all the information related to this topic, i.e., the current process flow, the developed proposal and the minutes of the meetings. In the f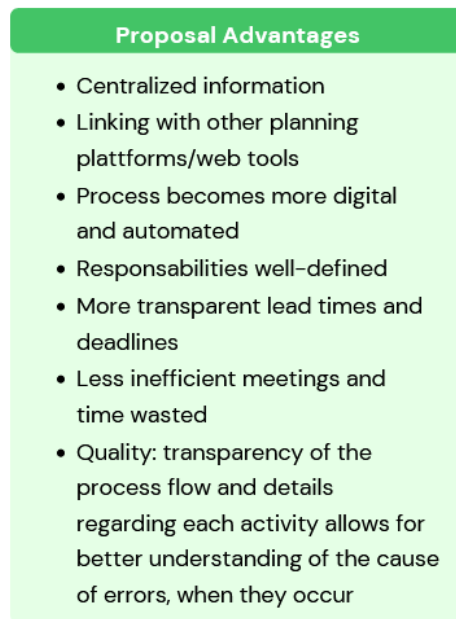uture, if this proposal is developed, these records and the team would support in its development, so that the purpose and focus would not be lost.

iv.   GPD Goals

The GPD goals, as mentioned above, represent objectives tailored to each person's work, which are based on goals to be achieved. These goals are then evaluated and can be related to many areas, such as KPI's, documentation, costs, general standards of the company, etc. For confidentiality reasons, the GPD goals

presented to the team members will not be provided in this dissertation. This topic was selected to belong to the continuous improvement cycle as the follow-up of topics that are evaluated could be optimised and worked on as a team.

Plan

The planning phase again consisted, in common with all the other groups, of presenting the continuous improvement plan to the group concerned. This was followed by the identification of struggles or opportunities for improvement in the current way of working. The identification of these possible points for improvement was recorded in the same template used also in the other groups and is recorded in the Appendix 6.

In summary, the main improvement opportunities that were identified were:

- The need to clarify strategies and define templates to fulfil the objectives proposed.
- The need to make the achievement of certain objectives less complex to the team.

After gathering the improvement opportunities and showing to the rest of the team, this group developed an action plan to support the team in meeting these objectives (Figure 35).

No	Action	Responsible	Deadline	Status	Comments
1	Create a proposal for an internal procedure in MFE16				
2	Define milestones for filling the objectives				
3	Costs: Clarify details on what each objective intends to evaluate and what needs to be monitored				
4	Create templates to track objectives				

Figure 35 - GPD Goals - Action Plan

Do

During the first iteration of the PDCA cycle, the *Do* phase of this topic was focused on creating a proposal for an internal procedure for filling the objectives and studying in detail what each objective intended, as well as the struggles and doubts faced by the team on them.

For one of the objectives, this group came up with the idea of creating a *Buddy System* where the team would be divided in pairs and each pear would push and help each other, annually, to fill all the required points of said objective. With the development and implementation of this proposal, the points listed in Figure 36 were intended.
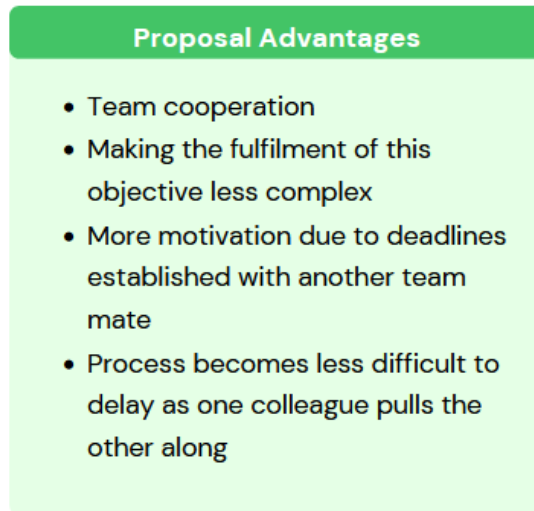
Figure 36 - GPD Goals - *Buddy System*

In addition, this group conducted studies, consulting other people too, on some struggles that the team faced regarding the best procedures to take in order to fulfil the proposed objectives. Then, they registered everything down so that everyone would have access to it.

Check

In the verification phase, this group showed the rest of the team the pair proposal for filling for the *Buddy System* in pairs. The feedback was positive, the team accepted the proposal, and there was clarification on how to proceed. It was established that this partner system could never be with one person mentoring the other, but rather both helping each other. At this stage, the people who would work together as a pair were also agreed almost randomly and without criteria. No criteria were used in choosing this pair, since, as mentioned earlier, the aim was mutual help and not mentoring.

Regarding other objectives and the clarification of some questions, this group encountered some struggles that needed to be clarified with the PMO. That said, it was agreed that the continuous improvement groups *GPD Goals* and *Radar vs PMO Alignment* should, as a first step, meet with each other to align the topics and subsequently work together on this bridge with the PMO. This would also help the team standardize some of the practices conducted to fulfil these goals.

Act

Concerning the topic *Buddy System*, the *Act* phase corresponded to the implementation of the fulfilment work system in pairs.

Next, and mixing here the beginning of the planning phase of the next cycle, a table of follow up actions that remained to be done was drawn up (Figure 37).

Follow-up Actions	
Action	**Responsible**
Align with the group responsible for the topic PMO/Radar Alignment what tasks can be worked on jointly and presented to the PMO. Include the following topics:	
Create a shared folder for the team with support documents for GPD Goals	
Create an anual chronogram for team about the GPD Goals	

Figure 37 - GPD Goals - Follow-up Actions

These actions, as can be seen in the table above, correspond both to those that were left undone from the first plan and to those that appeared as a consequence of the first ones carried out. They relate to creating a link between this group and the group responsible for the topic PMO/Radar alignment, consulting the PMO on several standards, and to creating a shared folder for support documents to help the team with the achievement of these goals, as well as elaborating an annual chronogram for the team to talk about this topic and create a spirit mutual support.

5.2 Development of a Continuous Improvement Plan for the Future and Creation of a Platform for Improvement Topics

i.   Continuous Improvement Plan for the Future

As researched and concluded in the literature review phase of this dissertation, the implementation of a continuous improvement system that is durable in a team is something that must be accomplished with attention to certain points.

One of the major goals of this dissertation project was not only to install a culture of continuous improvement in the team during the project time, but also to set up a continuous improvement plan and methodology for the future of the team. However, to establish this plan, it was necessary to involve the whole team in its creation, without imposing something predefined.

Embracing the concepts of Design Thinking, an attempt was made to involve all parties from the very beginning of thinking about this future plan. To this end, in a first phase, a meeting was scheduled with the entire MFE16 team. Since the creation of this plan started already at an advanced stage of the groups work (*Communication*, *GPD Goals*, *X-samples Planning Process* and *PMO/Radar Alignment*), the author first asked some questions about the continuous improvement system of groups that was being tested in the team (Figure 38).

Is continuous improvement worth it?

- Benefits
- Motivation
- Involvement
- Suitability for day-to-day work

Figure 38 - Assessment by the team (*Is Continuous Improvement Worth It?*)

The main purpose of these questions was to retain whether the team felt that the activities being carried out and the division in groups/PDCA Cycle were bringing benefits or not, if motivation had decreased over time, if they felt involved with the other groups and in the decisions made regarding the projects themselves, and finally if they felt that the improvement system was adequate for the daily work of the team. In addition to this purpose, the main objective was to get the team to discuss how the internal continuous improvement system should be maintained in the future: whether to continue with the group system or not, whether to increase or decrease the number of groups, how to collect/register topics to be worked on or opportunities for improvement, what kind of review should be carried out, etc. The feedback obtained by the team from these questions was collected in the form of single words or sentences, which are shown in Figure 39.

This system was maintained with discipline.

It made sense with the rest of the work activities.

Some meetings could have been carried out with more objectivity.

It's important to keep a record/backlog of items that remain to be worked on.

Priorities must be set on this backlog of items as the team moves along.

The improvement system with groups should be maintained.

There should be an anual revision/cycle of the topics that must be worked on.

Figure 39 - Building a Continuous Improvement Methodology for the Future - Feedback by the Team

After collecting these opinions, making sure that everyone was involved in implementing a future plan for the team's continuous improvement, th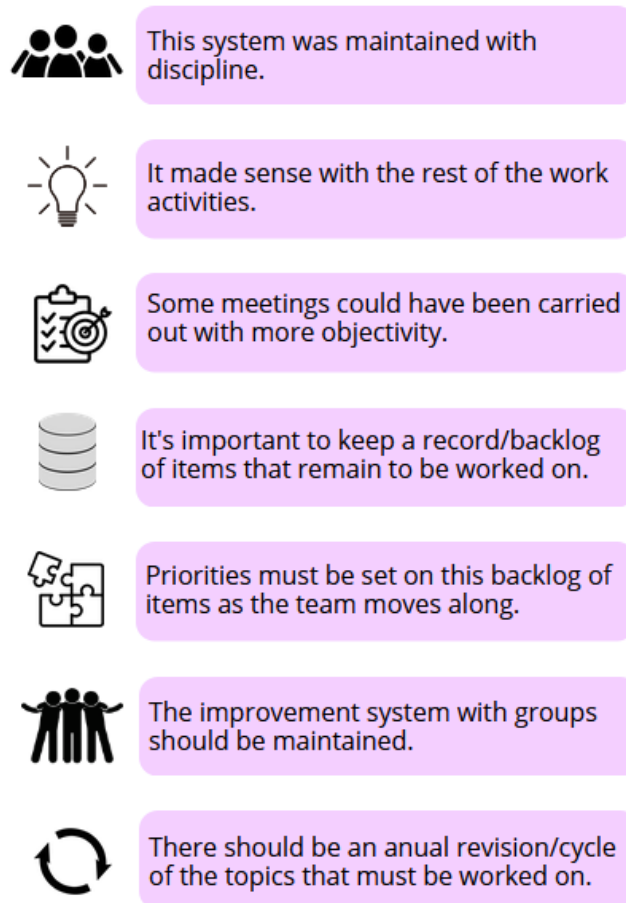is plan was built. By being involved in this decision, the team was more likely to maintain motivation throughout the future process, as well as sustaining that plan.

The plan that was drawn up and presented consisted of an **annual cycle of continuous improvement**. In this cycle, once a year the team would look at a register/backlog of topics, problems, or opportunities for improvement, and could review which topics should be worked on during that year. To do this, there would need to be a record of the topics that had already been worked on to date, as well as those that remained to be addressed. This point will be developed in the next subchapter.

Maintaining the division into groups that was initially proposed, as the team expressed that it would be better, each group could organise itself in the way that suited them best, for example through weekly or fortnightly meetings. That said, on the first Friday of each month, the whole team would meet and the groups would present a current status of the topics they were working on.

In order to visually and clearly define the dates for presentations and reviews, a calendar was drawn up for the years 2024, 2025 and 2026. It contains instructions for the entire plan, including: the dates of team meetings for group presentations for the three years under consideration, the month of the year

chosen for the annual review of topics, as well as how the team should approach this process of choosing topics: that date should also represent a deadline for finalising the work carried out throughout the year. Finally, there were some tips on how the groups could organise themselves throughout the year (on a weekly or bi-weekly basis). This plan can be found in Appendix 7.

ii.   Platform for Improvement Topics and Suggestions– *Improvement Box*

As a complement to the implementation of the continuous improvement cycles in the various working groups, an online platform was created to record the topics worked on by the groups: both those that were finalised and those that remained to be done during the time of the dissertation project. The platform was created in *Microsoft Lists* and shared with the whole team, with the name ***Improvement Box*** (Figure 40).
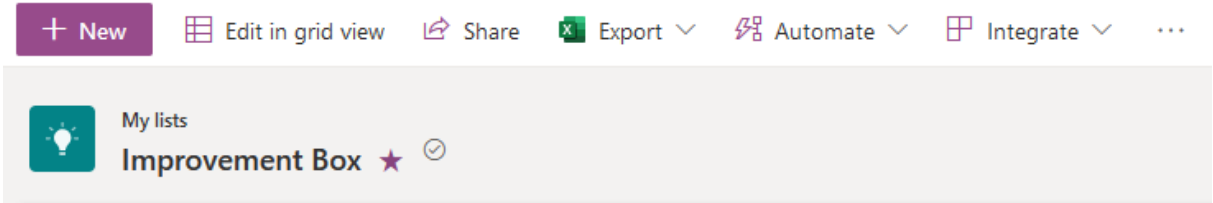
Figure 40 - *Improvement Box* - Platform

The main goal of this platform was to create a visual and easy-to-access record to support the continuous improvement plan that was created and to contain all the activities carried out by the groups during this project. In this way, the team could always continue this cycle, based on everything that had already been achieved, as well as the activities that still needed to be carried out. In addition, the platform allowed, at any time, the creation and addition of new items that the team found relevant to be worked on.

The platform was visible in the team's *Microsoft Teams* channel. This allowed for easy access to the tool in a place that the team already accessed regularly, as it already contained other information related to their day-to-day work.

The way this platform was structured was through a *Kanban* board system, including 3 sections: *Unassigned items*, *In Process* and *Done items* (Figure 41). For confidentiality reasons, the titles of topics in the Kanban were covered.
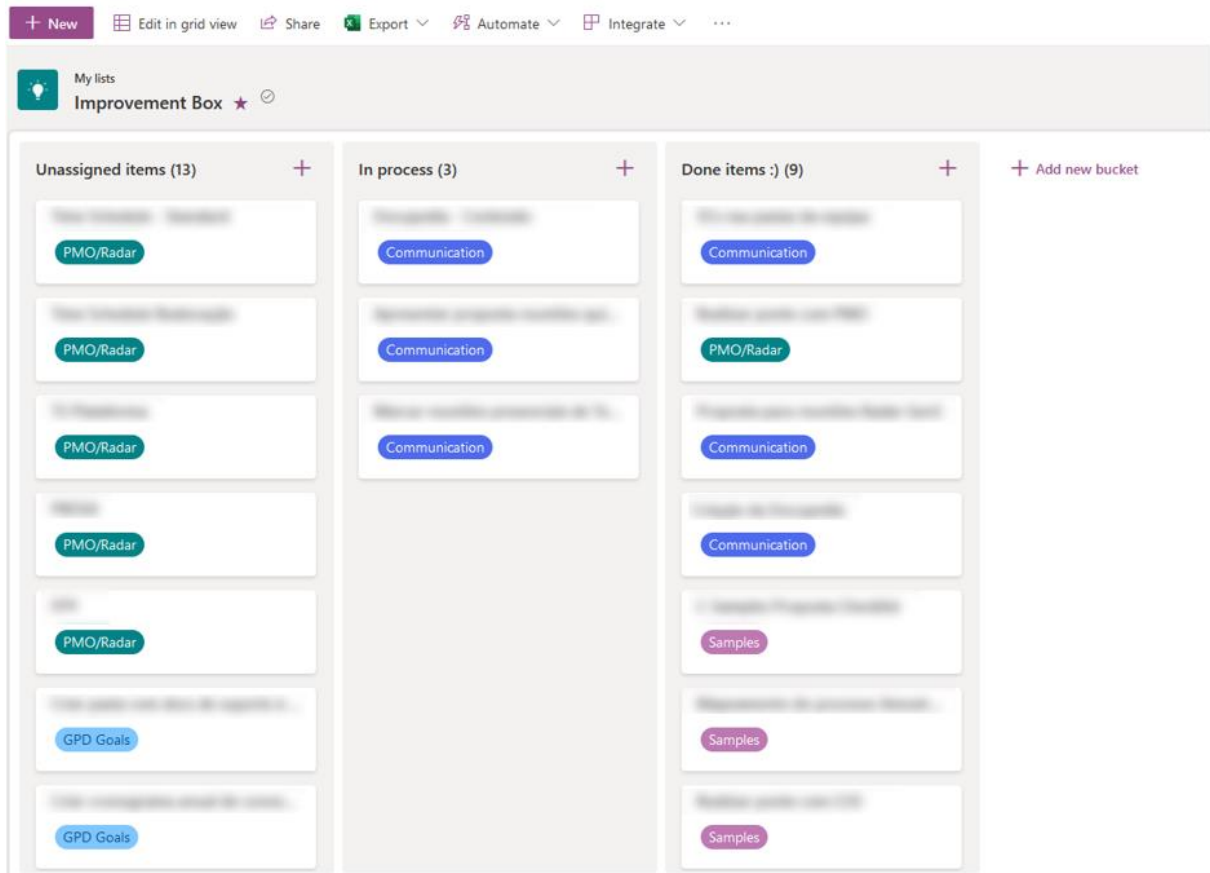
Figure 41 - *Improvement Box* - Kanban View

The *Unassigned Items* section corresponds to items that, as the name implies, are not yet being worked on by the team. The items in the *In Process* section are currently being worked on. Finally, finalised topics are moved to the *Done items* group. It was considered that the cards with the topics could be deleted once finalised, but it was thought better to keep the record, in order to motivate the team, by visually demonstrating on the platform all the work they have already achieved. In addition, the platform has the flexibility to drag the cards with the computer mouse, from group to group, like a *post-it* paper.

As previously mentioned, the app allows for the addition of new items at any time. To do so, the user only needs to click on the *New* option and a short form will appear to fill in (Figure 42 and 43).
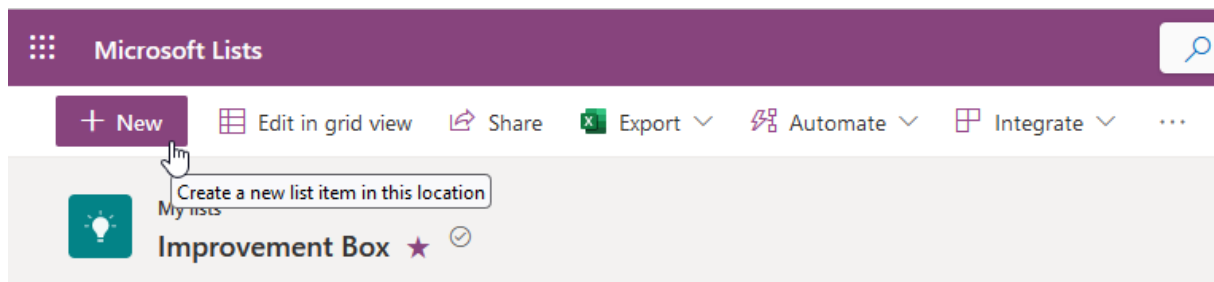
Figure 42 - *Improvement Box* - New Items

Figure 43 - *Improvement Box* - New Item Entry

The content of the form is divided into six fields. The first one, *Issue*, concerns the title of the topic. Then, there is the option for the user to leave additional **comments**, tips, person or group of people who should be in charge of the topic, or even a justification for choosing to introduce the topic in question on the platform. Next comes the *Impact* field where the user can, if they wish, select what kind of impact the issue in question is having on the work of the team. The options are immediate impact and medium-long term impact (Figure 44).

Figure 44 - *Improvement Box* - Impact of New Item

Next, there is the *Status* field (Figure 45). The user does not need to fill it in when inserting a new item, since the platform is programmed to automatically, when inserting a new item, go directly to the *Unsigned Items* group. The *Status* domain serves mainly to allow the platform, as mentioned above, to be organised based on this field. It also allows, in cases of, for example, forgetfulness, when adding an item that is already in process or finished, to place it directly in the corresponding field.

Figure 45 - *Improvement Box* - Status of New Item

Next, a field called *Group* appears (Figure 46), which corresponds to the four groups of the team, i.e., *Communication*, *GPD Goals*, *Samples* and *PMO alignment with Radar*. This field is also optional, since at any time team members can add topics that do not belong to any of the existing groups and that cover other topics.
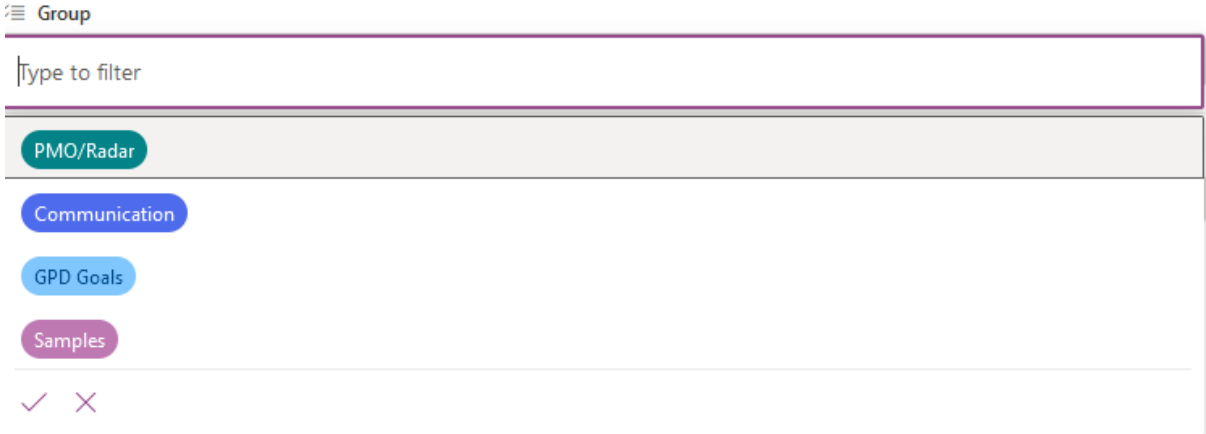
Figure 46 - *Improvement Box* - Group of New Item

Finally, there is a field for attaching documents, images, or any type of file that may be useful and support the analysis of the topics and future work (Figure 47).
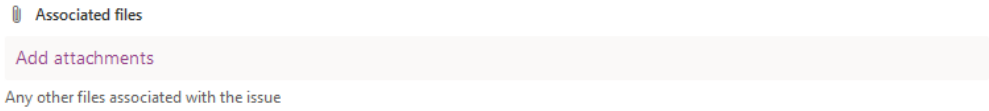
Figure 47 - *Improvement Box* - Attachments of New Item

Regarding the content of the cards themselves, at a first glance the only parts of it the user can see are the title of the topic and the working group to which that topic belongs (*Communication*, *GPD Goals*, *Samples* and *PMO/Radar*). However, by clicking and opening the card, it is possible to visualize all the information that has been filled in when introducing the topic/problem. As previously mentioned, the finished topics and the ones to be worked on by the group were all recorded on this platform. In figures 48 and 49, it is possible to see an example of one of the topics worked on by the *PMO/Radar* group: the connection made with PMO. By clicking on this card, it is possible to see in the comments the description of this topic, which relates to the meeting with the PMO to present the improvement opportunities, as well as an explanation of the attachments: an attachment with the meeting minutes and another one with the presentation that was made, with all the topics that were presented. It's also possible to see the impact, the status and the group responsible for it. In addition, on the right-hand side, any member who has access to this platform can write additional comments and even identify/notify specific people.
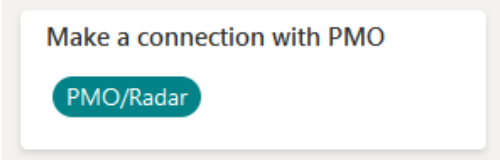
Figure 48 - *Improvement Box* – Example of *Kanban* Card
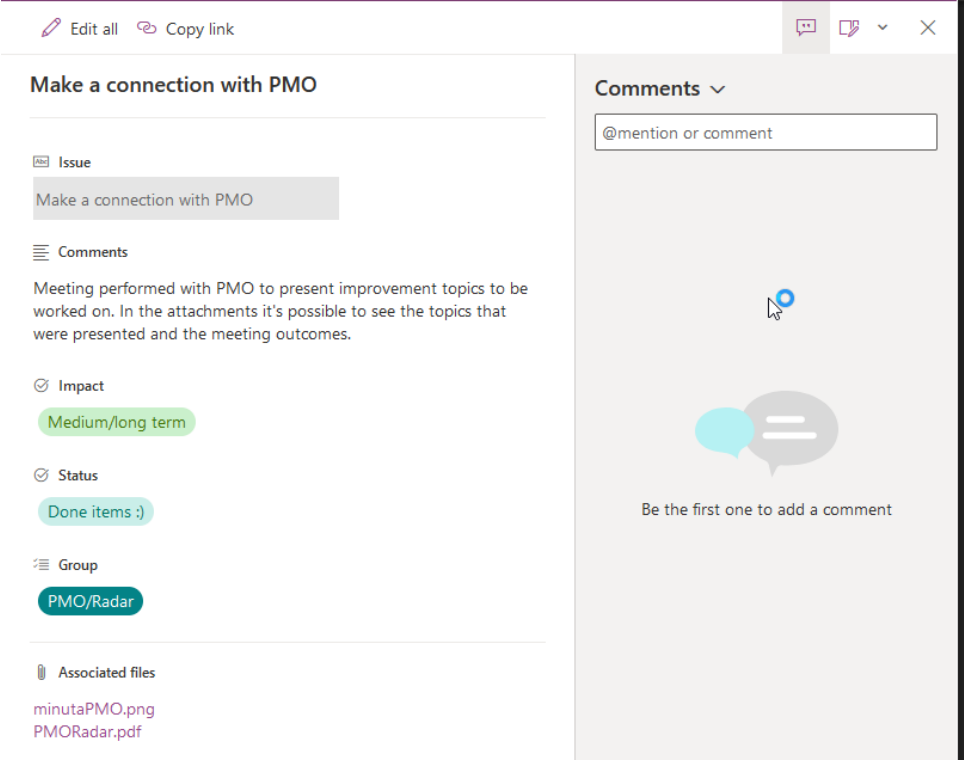
Figure 49 - *Improvement Box* - Example of *Kanban* Card (Details and Fields)

The same was applied to all the other cards regarding the continuous improvement group system that was implemented. In this way, it was possible to create a visual record, with all the necessary notes for each action or topic and files and information that were involved in the work developed or to be developed. Finally, the platform created also allows visualization through filters, i.e., if the user or the team wants to visualize only the topics referring to a specific group or with a certain level of impact, it is possible. Thus, one can visualise the most urgent or less urgent topics, or those belonging to one or more specific groups. Each user can select and combine several filters from the two different fields, group and impact and one for the time frame in which the issue was inserted in the platform (Figure 50).
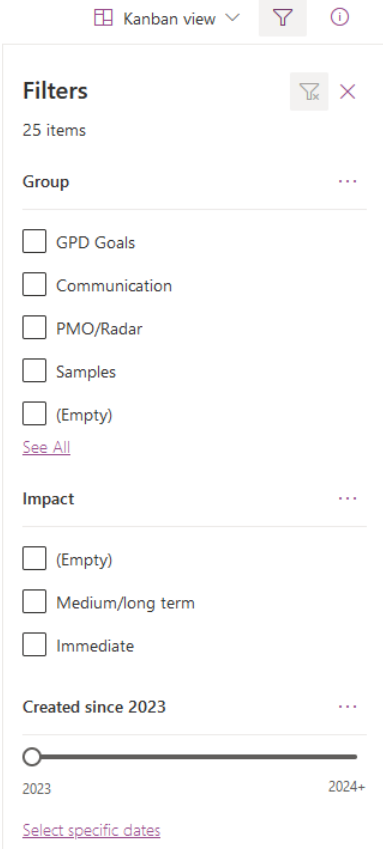
Figure 50 - *Improvement Box* - Filters

This platform serves as a basis for the continuous improvement of the team for the future, allowing a constant feed of new topics that may arise, and a record of previous topics, as well as all their information and inherent documentation.

As a complement to this platform and support for the team's future continuous improvement work, another tab was also created in *Microsoft Teams* for MFE16 with weekly logs and notes that were taken during the project time of this dissertation, in case of needing access to a more in-depth record of the work developed.

These notes included feedback given by the team on presentations, ideas suggested by other members or by the group itself, and activities or tasks that arose in the course of the work. The purpose of this record was, in the future, if the team needed to refer back in detail to the work done, to use as a basis for new ideas or opportunities for improvement. For confidentiality motives, these notes will not be shown.

5.3 Centralized Information and Standard Work – *Docupedia*

In addition to implementing the continuous improvement system and documenting the steps taken for future archiving and reference, a *Docupedia* page was developed for the team. *Docupedia* is an online tool for internal documentation at Bosch. Departments use this platform to post work instructions, FAQs, shortcuts to files or information in general that is useful for everyone. A page can be organized into several subpages or chapters, allowing each team to organize themselves as they see fit. Furthermore, *Docupedia* pages can be public to all other departments, which makes it easier to share information and processes with other teams when it is convenient to understand how other parties work.

As MFE16 is a recent team, it did not have a *Docupedia* page created yet. The advantages seen in it were:

1. The centralisation of information and important links and redirections to processes of other departments that the team works with.
2. Standardization of processes and work instructions.
3. Gathering as much already-existing information as possible about processes.
4. The presentation of the team to other departments, as well as the identification of those responsible for each Radar project, thus facilitating contact by external people.
5. It becomes easier to share information and the way the team works with other sections.
6. *Docupedia* allows for the integration of other web *Docupedia* pages, as well as other websites.
7. It serves as a base for future process automatization – while mapping work instructions, it's possible to gain consciousness of processes' wastes and improvement opportunities.
8. This platform is constantly being updated and it's a Bosch standard tool.

Figure 51 - *Docupedia* Logo

Throughout this chapter, the *Docupedia*'s structure and content will be explained. However, for confidentiality motives, some of the content will be covered or not fully developed. The goal is to present the idea that formed the tool that allowed for the centralisation of information and process standardization. As a first step, it was necessary to define a page structure for the team's *Docupedia* page. The following structure was found convenient:

1. *MFE16 Projects and iPMs* – a page for the presentation of the team and the ongoing projects, as well as the respective industrialization project manager for each project.

2. *Radar Support* – this page would gather shortcuts for documents and links that support the processes inherent to the product Radar.

3. *Processes and Work Instructions* – this page would serve as a base for the mapping of processes or placement of work instructions, with the objective of standardizing processes within the team and to share with other departments how MFE16 works.

4. *Directives* – this page is dedicated to Bosch directives on quality, project management, products and more.

5. *Applications & Useful Links* – in order to make it easier to search for and access Bosch applications and useful links for everyday work, this page was created.

6. *Continuous Improvement Plan* – this page contained the annual continuous improvement cycle that was developed previously in this dissertation.

7. *How to?* – this section contains instructions, not really about work or processes, but related to small everyday actions, particularly with regard to the technologies and platforms that are used.

In Figure 52 it's possible to see the hierarchal structure of the new MFE16 page in *Docupedia*.

Figure 52 – MFE16 *Docupedia*'s Structure

i.   MFE16 Projects and iPMs

The team's presentation page first featured a photo of a canvas that had been painted in a workshop held with the whole team, which included the name of the section and its slogan. The page then contains tables with Radar's projects, as well as the respective industrialisation project manager (iPM). This page can be partially seen in Appendix 8.

ii.   Radar Support

The support page for the Radar product, as previously mentioned, was intended to serve as an aggregator of all the shortcuts and documents relevant to the processes related to the industrialisation of this product. To this end, some tables were created with the name of the links and a brief description about them. It included, documents, shortcuts for shared files with other teams and platforms to support daily work on the different phases of the product industrialization. For example, as it can be seen in Figure 53, one of the squares of the table regarding Process Support, there's a link that, by clicking on it, the team could reach another Docupedia page with the contacts of the testing team for this product.
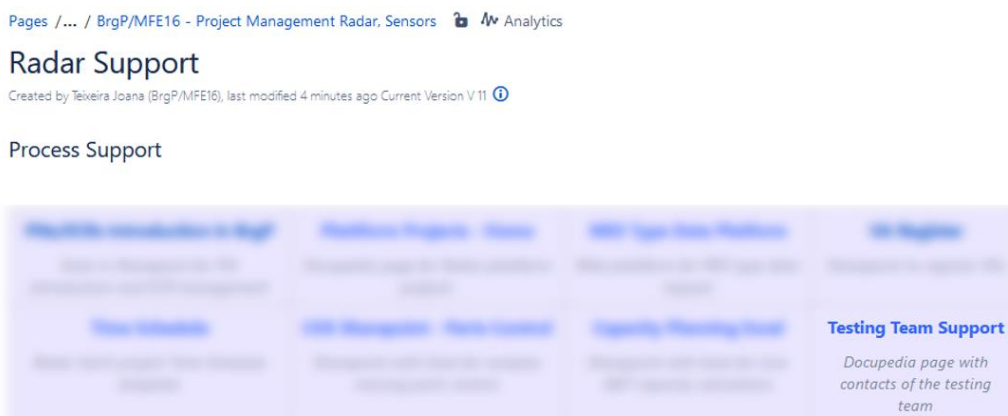
Figure 53 - *Docupedia* - Radar Support

iii.   Processes and Work Instructions

As previously described, this section served to map out processes and put in place work instructions that could standardize the way the team worked. The processes that needed to be standardized or included in this section were chosen through the team's manifestations during the workshops and individual interviews that were conducted, as well as through meetings that were carried out with the purpose of discussing what should be placed in the *Docupedia* page, having, in this way, everyone involved in the decision-making of this tool. The goal was to gather all already existing information about processes in

one place, and drawing new information to standardize as much as possible the work that was being conducted.

In total, eight subchapters of this page were created. They included information on general Bosch processes, samples planning, software, data and email templates.

AE Process Compass & Project Management

As previously described in the company's presentation, one of the Bosch group's business sectors is Mobility Solutions. Within this sector, there is the Automotive Electronics (AE) section, which includes the Bosch Car Multimedia, SA. company in Braga. AE has a set of standardized processes that are mapped. That said, it was important that these processes were present and easily accessible to the MFE16 team. To this end, this page was created to include some of the processes most relevant to the industrialisation of products, something that concerns the daily work of the team members. In addition, the page includes standards from the Bosch Group regarding project management itself, such as workbooks, manuals and websites that include the good practices promoted by the company in project management activities. For example, in Figure 54, it's possible to see an example related to project management links, which shows the link for the PMO page.
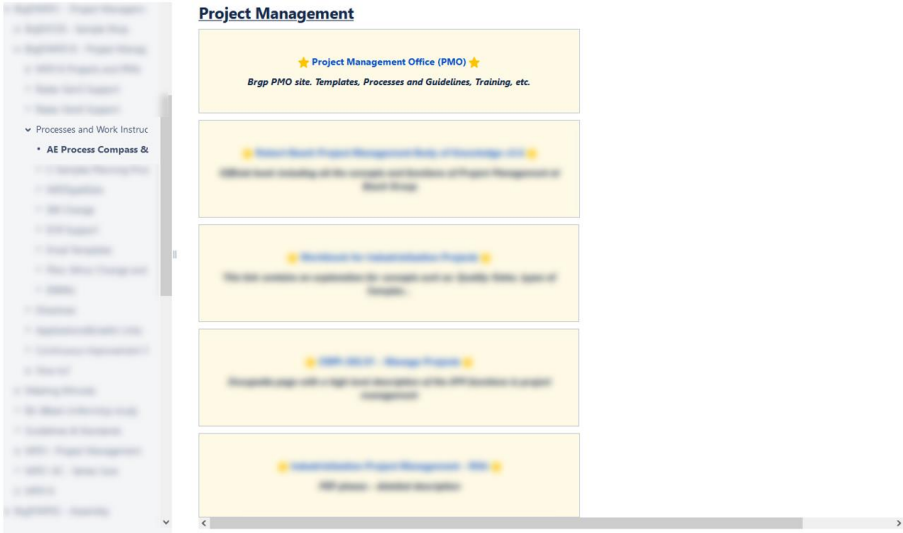
Figure 54 - Docupedia - Project Management Links

X-Samples Planning Process

With regard to the planning of a certain type of samples for the Radar product (naming those samples as X-Samples again for an easier reading of this dissertation) as the team has already expressed several times and mentioned throughout this dissertation, the X-sample production planning process was quite complex and not understood or standardized by all parts of the team. As such, it was felt important to

map out this process and create work instructions that were visible to everyone. These instructions would then be visible on *Docupedia*, on this page.

Firstly, a table template was drawn up with all the steps to follow in this process, in a kind of checklist, so that each project manager could use it to guide their notes. As well as serving as a checklist of points to follow, the table also defines who is responsible for each activity and sections for deadlines and observations. This table was drawn up by the team and it can be seen in Figure 55. Next to the table, there is a shortcut to two links, one that relates to material management and another one regarding a platform with important information on this process.

Figure 55 - X-Samples Table of Work Instructions

Finally, at the end of this page, the process appears mapped out in detail, with the respective functions, responsibles and process phases (Figure 55).

Figure 56 - X-samples Process Map

Software Changes

Based on documentation previously drawn up by the team, this *Docupedia* page has mapped out instructions for the process when a change occurs in the SW of a product. This process goes through several phases, and each phase, in the *Docupedia* page, had a table for the activity, the duration and the responsible. This process had been mapped by the team before, and the purpose of this page was simply to gather its information in the same place where all the other processes would be. In the end of the page, a time schedule was placed too. In Appendix 9 it's possible to see the template of the tables and an overview of the final time schedule can be seen.

Change Management Support

This page served for the support of Change Management, including specific procedures that need to be followed, templates, steps and hints on these processes, as well as directives.
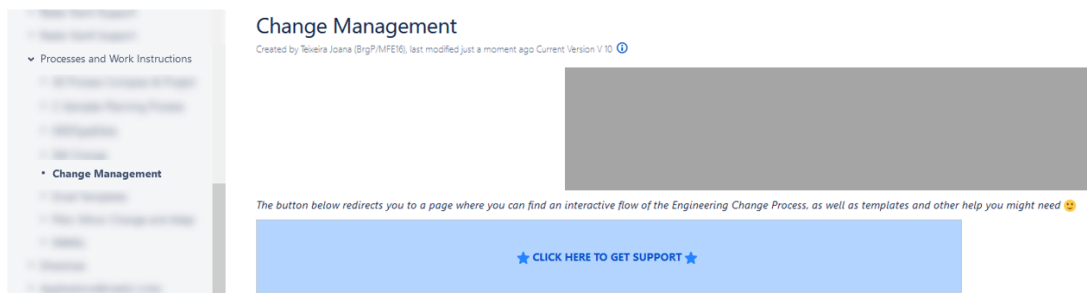

Figure 57 - Change Management Support

Email Templates

This page served to gather all standardize e-mails. In that way, the team could have a quick access to templates for emails regarding activities that required standard contact.
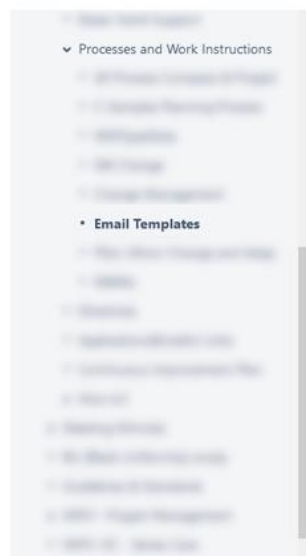

Figure 58 - Email Templates Tab

Throughout this chapter for *Processes and Work Instructions*, more tabs were created and developed with other processes. However, as mentioned previously, for confidentiality reasons they will neither be addressed or explained. Besides this, these processes, as well as the ones that are mentioned in this dissertation and that are covered, already existed and were not mapped by the author of this dissertation, but by the team as a whole, and, therefore, in order to maintain focus in the tool that was the developed, the *Docupedia* page, and its purpose, they do not need to be attended to.

iv.   Directives

The directives selected to be put on this page were directives that the team had previously been interested in keeping.

They concerned project management at Bosch, concepts and functions that were used in this practice, quality, change management, and other activities regarding the final product or the samples. They were gathered in a simple table, containing the name and theme of the directive and the corresponding file, as it can be seen in Figure 59.
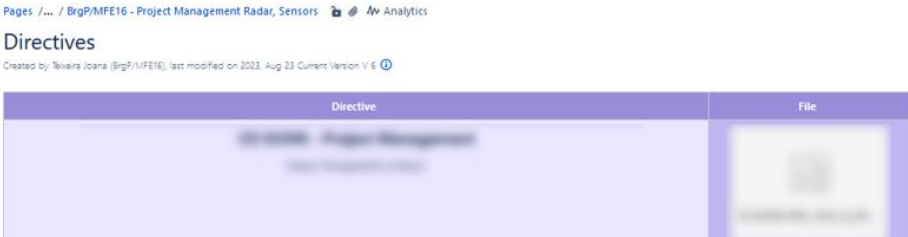
Figure 59 - Directives

v.   Applications & Useful Links

Prior to the creation of the docupedia page, the MFE16 team used the *Calili* application as an aggregator of important or useful day-to-day links at work. In order to center all relevant information in one place, without forcing employees to use several platforms at the same time, it was decided to eliminate the use of *Calili* and move all relevant links to *Docupedia*. As this page contains various categories, themes and types of links or information, it has been organised in alphabetical order. An overview of this page can be seen in Figure 60.
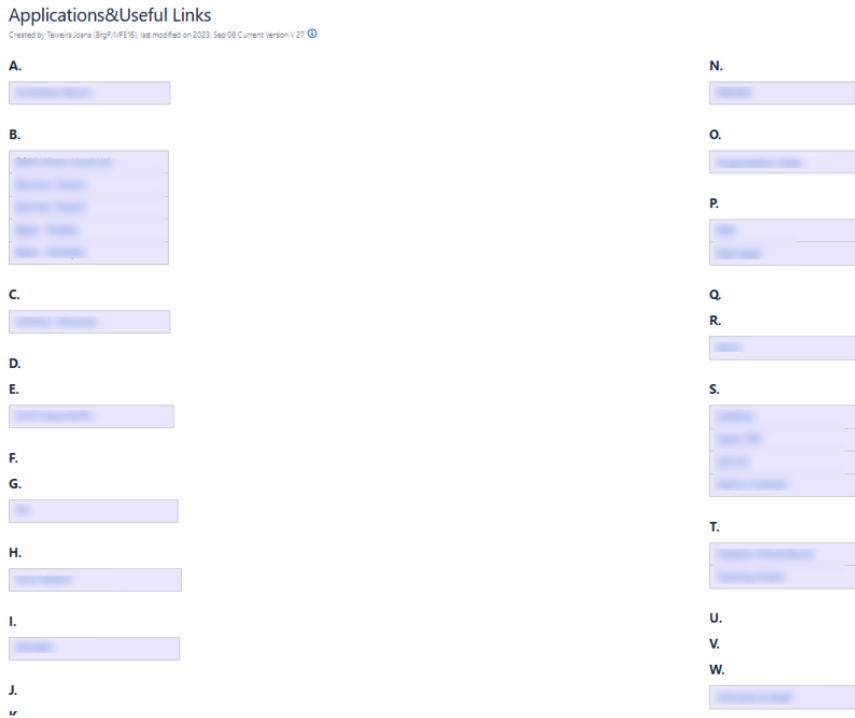
Figure 60 - Applications & Useful Links

vi. Continuous Improvement Plan

As it was formerly mentioned, this page contained the annual continuous improvement plan created for the team, as well as instructions on how the *Improvement Box* in the *Microsoft Teams* channel. It can be seen in Figure 61.

Figure 61 - Continuous Improvement Plan (*Docupedia*)

This page was created so that whenever someone had a quick question about platforms, technologies, etc., they could create brief instructions that could be shared by everyone.

Pages /... / BrgP/MFE16 - Project Management Radar, Sensors

How to?

Figure 62 - *Docupedia - How To?*

6. ANALYSIS AND DISCUSSION OF THE RESULTS

This chapter is meant to assess the results of the improvement proposals that were suggested, developed and implemented throughout this dissertation project. The method that was used to evaluate these results was the conduction of a survey for the team, which will be explained in detail. After this, this chapter is divided in another three chapters, corresponding to each one of the improvement proposals and their respective outcomes.

6.1 Survey

Since one of the main objectives of this dissertation project was to involve people as much as possible in identifying problems and creating and implementing proposals for improvement that corresponded to the needs of all parties, during the results evaluation phase it was felt pertinent that the method used for this analysis was by collecting people's opinions. To this end, an anonymous survey was carried out for all team members.

The questionnaire was divided into three sections: one aimed at evaluating the consequences of implementing the continuous improvement system in groups and the plan that was implemented along the lines of the PDCA Cycle; a second section to evaluate the proposal presented for MFE16's annual continuous improvement cycle, along with the platform for recording improvement topics; and a final section to evaluate the *Docupedia* page that was developed for the MFE16 team. The full survey can be found in Appendix 10.

The survey was answered by 9 members of the team, all project managers that were aware and a part of the solutions that were implemented or suggested. All the questions used the qualitative Likert Scale as the response options, which is explained in Table 4.

Table 4 - Likert Scale

1	Totally disagree
2	Disagree
3	Neither agree nor disagree
4	Agree
5	Fully agree

The next chapters will analyse each of the three sections.

6.2 Continuous Improvement System

i. General Assessment

One of the expected solutions for this dissertation was the implementation of a continuous improvement system that would enable the dynamization of topics related to improvement opportunities or problems that had been obstacles for the team for some time.

To do this, based on the concepts explored in a PDCA Cycle, the team was divided into four groups which, according to a defined plan common to all four groups, exchanged ideas with each other and relied on the feedback received by the team on those pre-established presentation dates, thus involving everyone and allowing several topics to be worked on simultaneously. With this initial idea in mind, when the project was finalised, it became important to assess whether this system of continuous improvement met the expectations and needs of the team.

As mentioned earlier, the first part of the form that was shared with the MFE16 team corresponded to the evaluation of this continuous improvement plan. The first questions were aimed at evaluating the improvement system in general, in terms of the idea, the plan and its impact, followed by questions relating to the work of each group specifically. The scores of these questions can be seen in Figure 63.

The first, regarding the impact that the system had on the team, was based on agreeing or disagreeing with the statement that the impact was positive, with an average score of 4,67. This score shows the team agreed with the statement that was made in the question and that, in general terms, this proposal had a positive impact on the team.

The second wanted to assess whether the continuous improvement plan that was implemented, including both the actions put into practice and their planning and presentations to the team, was adequate for the workload sustained by its members. This question had an average score of 4,33, showing a positive result on this topic with, naturally, some space for improvements.

In order to assess whether the team, having previously shown so many topics to work on that had been stalled for some time, question number three rose, which evaluated whether this system had allowed for progress to be made on those same topics. The score obtained was 4,67, which showed the team agreed that the continuous improvement was streamlined in the team.

The last question regarding the evaluation of this improvement system in general was intended to assess whether everyone was involved in this process, both in decision-making and in getting to know the work of all the groups. The score obtained was 4,11, being the lowest in these four questions but showing, nonetheless, a positive result and that the team felt involved in the whole process.
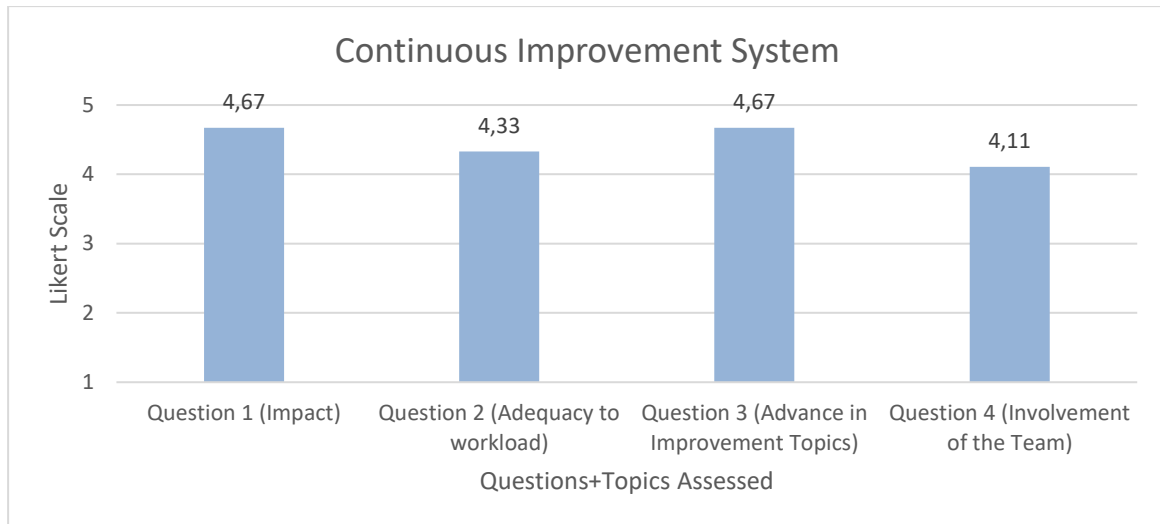
Figure 63 – Results for the Continuous Improvement System (General Assessment)

To summarize these four questions, it can be concluded that the continuous improvement system achieved the initial objectives of this project, regarding its impact, the adequation of its plan to the team's daily work, the team's advance in topics that needed to be worked on and in the involvement of everyone throughout the process.

ii.   Assessment of the work developed by the Groups

Moving on to the questions related to the work of the groups, first the actions put into practice by the Communication group were evaluated through two questions, one on the application of the 5S's in the team's shared folders and the other on the proposal drawn up by this group for the new structure of the weekly project meetings. The ratings obtained were 4,44 and 4,56, respectively (Figure 64).
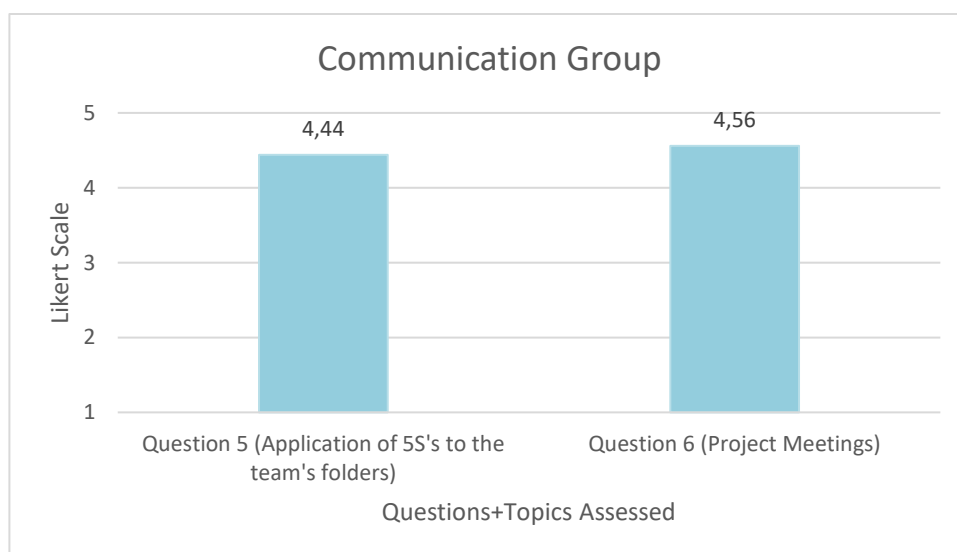
Figure 64 - Results of the Communication Group

Regarding the application of the 5S's technique to the folders, the team mostly agreed that the new structure for the shared folders was more *Lean* than the previous one and that this action would make their daily work easier. The proposal on the improvement of the project meetings also showed good results, since the team showed in this question that it agreed the new structure for these meetings will make them more productive.

Next, two questions were asked to assess the work carried out by the PMO alignment group with the Radar processes: the meeting held with the PMO and the usefulness of registering the outcomes of this meeting, i.e. the follow up actions and feedback gathered on the problems faced by the team on this issue. The scores for the usefulness of holding the meeting itself were 4,44 and for the usefulness of recording the feedback and follow up actions for the future were 4,22 (Figure 65) showing a positive outcome of these two main topics in the team.
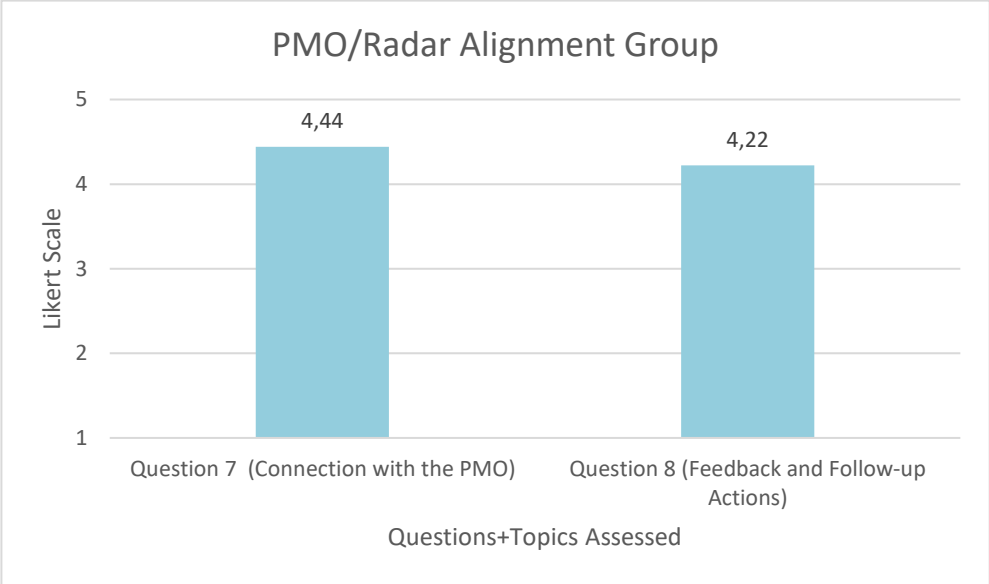
Figure 65 - Results of the PMO/Radar Alignment Group

With regard to the group responsible for improving production planning for X Samples, there were also two questions. The first was to gather feedback on the proposal developed by the group to carry out this planning using a platform consisting of a web-based checklist. The question assessed whether or not the team considers that this process could be more *Lean* than the current process. The results obtained were 4,67, which demonstrates the team was very satisfied with this group's idea of creating a web platform for the planning of X-Samples. The second question on this topic sought to assess whether or not the meeting held with the Sample Shop department to present the proposal and the recording of it, as well

as of the feedback gathered, were useful steps for improving this process. The rating obtained was 4,33 (Figure 66), showing that, even though this proposal for a web-based checklist was not put in practice during the period in which this dissertation occurred, the team believed its development and the documentation of the feedback and follow-up actions were useful steps towards the overall improvement of this complex process.
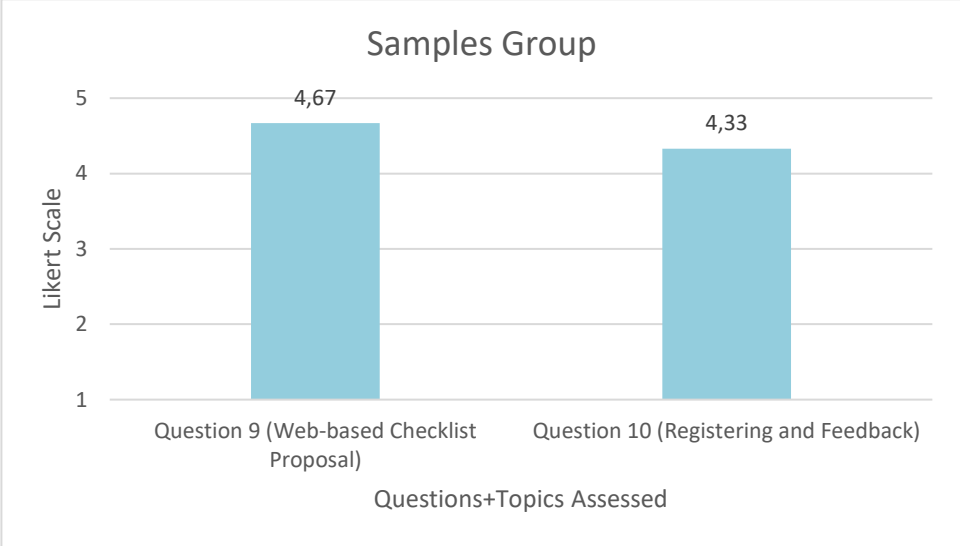
Figure 66 – Results of the Samples Group

Finally, two questions were asked to assess the consequences of the work of the group in charge of the GPD Goals topic, the first assessed whether or not the extensive study of how to achieve these objectives and if the registering of difficulties faced by the team was useful for future fulfilment. The rating obtained was 3,89. This question showed the lowest result in the entire survey, which allows for the conclusion that this group could've done a more intensive research and approached other teams for the clarification of doubts on procedures to achieve the GPD Goals, as well as developing more of their ideas in the action plan. However, this score was still positive as it shows that the study conducted by this group was not useless and it gave an opportunity for improvement in the future.

The second and final question was to assess whether or not the proposal of the *Buddy System* developed by this group helped the team with this task. A score of 4,56 was obtained for this question, allowing for the conclusion that the goal of this proposal was achieved and that this pairs system would now help the team members to fulfil the objective in question. Both of the results can be seen in Figure 67.
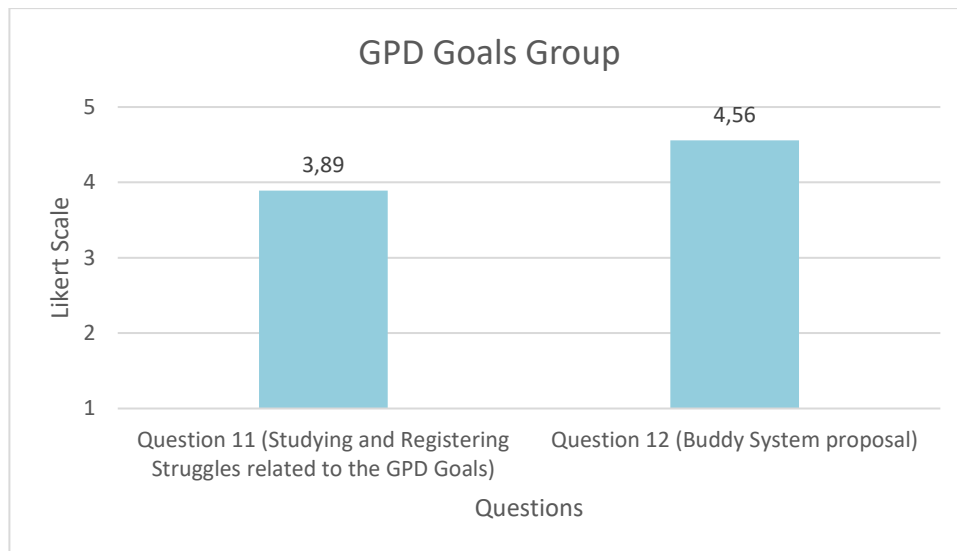
Figure 67 - Results of the GPD Goals group

In general terms, it can be seen that this continuous improvement system allowed the team to move around various topics that needed to be studied and worked on. Before this dissertation project, the team didn't have a dynamic system for improving points and was stagnating on these problems.

Since one of the main objectives was to involve people in all phases of the project, adapting the implementation of the proposals to their needs, it can be said that in general the team felt involved and listened to in this process, fulfilling the objective of including Design Thinking concepts in this project.

In short, this system has brought several advantages to the MFE16 team in different areas, both in the topics worked on and in the impulse given to the creativity of each group in building solutions for these topics, making it possible to get out of the norm, develop ideas and register them so that they can be implemented now or in the future or originate new ideas.

6.3 Annual Continuous Improvement Plan proposal and Improvement Topics Platform

One of the main objectives of this project was that continuous improvement should not be forgotten by the team when the dissertation period came to an end. To this end, a visual calendar was created in which stipulated dates were set for monthly team meetings, as well as for the review of improvement topics to be worked on by the team. The aim was to create an annual cycle, maintaining the division into groups, so that each year several topics would be worked on simultaneously, with the status of these topics being checked once a month. To support this idea, an interactive platform was created where the topics that had been worked on by the four groups in the previously implemented system could be seen,

as well as those that remained to be worked on. In addition, the platform made it possible at any time to add new topics that the team members felt should be worked on, on any subject.

The aims of these two proposals were:

- To create a future continuous improvement plan that suited the needs of the team.
- Involve the team in creating this plan.
- To create a clear record of all the work that has been done in relation to the previous improvement proposal.

Again, in order to assess whether these objectives had been met, the team was approached via a section in the questionnaire conducted.

The first two questions were about the topic registration platform, *Improvement Box*, and aimed to assess whether the platform was easy to understand or use and whether it would be useful to the team. The results were 4.56 and 4.67, respectively (Figure 68). Standing close to the highest score, 5, it can be affirmed that the objectives with the creation of this platform were fulfilled: a clear and easy-to-use record of the continuous improvement work was achieved.
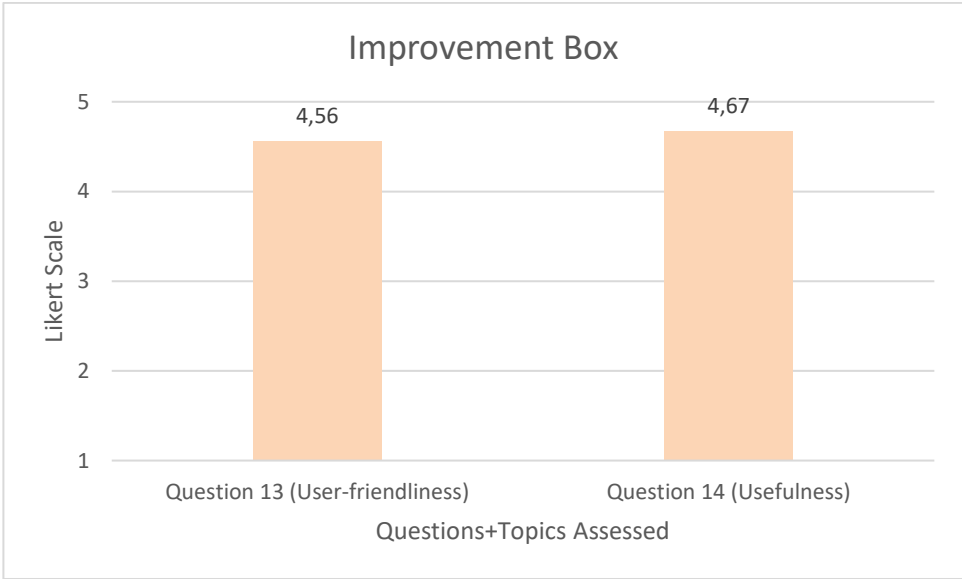
Figure 68 - Improvement Box – Results

Regarding the proposal of the annual continuous improvement plan for the team, two other questions were asked: one to assess whether the user's needs were aligned with the proposed plan and the other to assess whether the employee thought the plan would be sustained in the future. The ratings obtained were 4.25 and 4 respectively (Figure 69), showing that the team agreed that their needs had been taken into account and that the plan would be followed in the future. It can therefore be concluded that the objectives were met, although there is still some room to better adapt this plan to the team's needs.
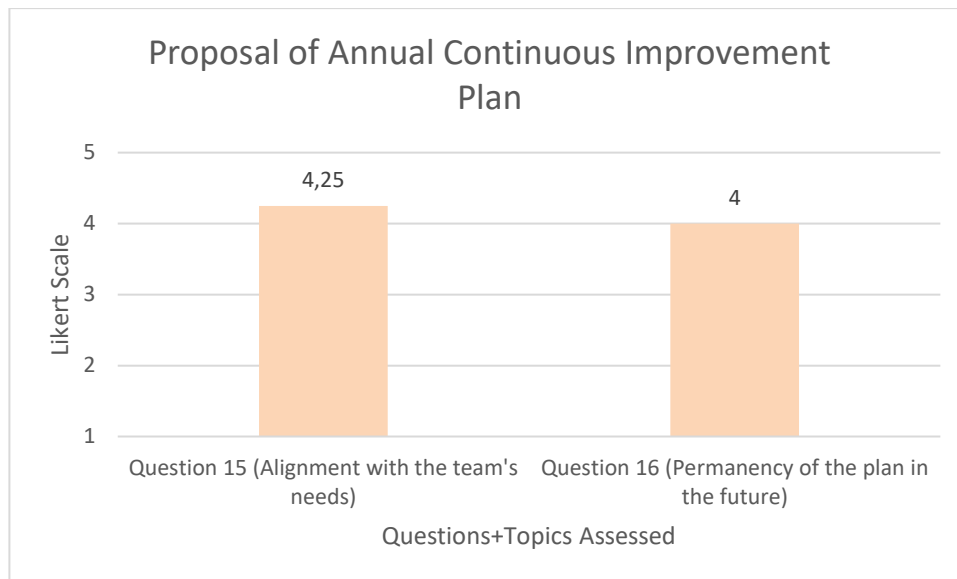
Figure 69 - Annual Continuous Improvement Plan – Results

Overall, the objectives proposed in the beginning of this project regarding the creation of a clear and visual record of the work developed and involving the team's needs in the creation of how their continuous improvement activities should look like in the future were achieved.

6.4 *Docupedia* Page

One of the team's initial difficulties was the fact that the information was scattered and that different platforms were used simultaneously, which made the work harder and caused employees to waste time looking for files, links, other web pages, etc. To combat this problem, a *Docupedia* page was created for the team. This page made it possible to centralise and organise various documents, links, process mapping, work instructions, contacts from other teams, etc. As well as belonging to the Bosch standard, the *Docupedia* page allowed access to this information in a clean and accessible way. In order to assess whether the team actually felt these positive consequences, the third part of the questionnaire was designed to evaluate this proposal. The results of this part can be seen in Figure 70.

The first question in this section of the questionnaire related to the content of the *Docupedia* page created, and whether it was aligned with the team's work, i.e., whether it contained useful information for that work. The score obtained was 4,67, proving the content chosen for this page made sense for the activities conducted.

The second question was about whether or not the structure was well organised. The rating obtained was 4,75, showing a really good result on this subject and that the structure matched the team's expectations.

Thirdly, a question was asked about the user-friendliness of the page. The rating obtained was 4,67: the team agreed that the page was easy to use and understand.

The fourth question aimed to assess whether the team agrees that the creation of a *Docupedia* page has been useful in standardizing processes within the team. The results obtained were 4,67, demonstrating that the goal of using the *Docupedia* to standardize processes within the team was achieved.

Finally, it was assessed whether or not the centralization of information on the docupedia page was facilitating the daily work of the team members. The classification obtained was 4,44, proving the team agreed that this page was making their daily activities lighter.
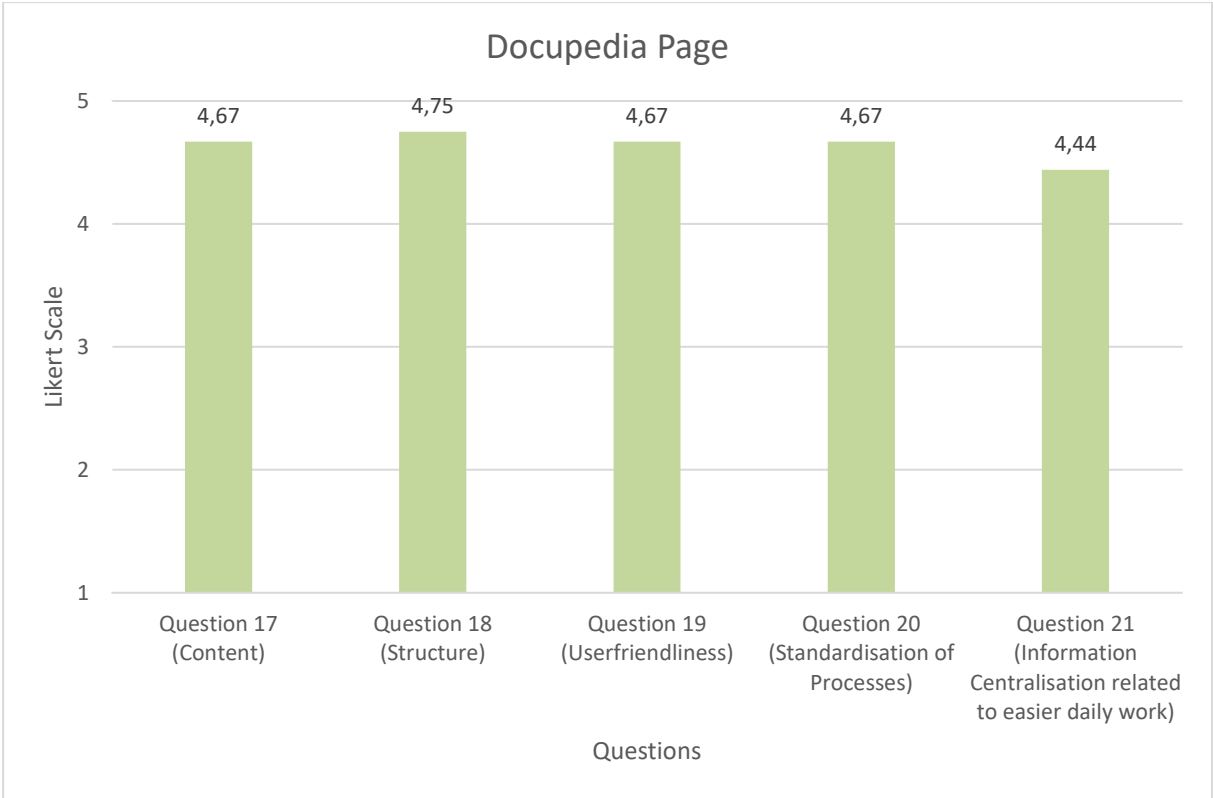
Figure 70 - *Docupedia* Page - Results

In conclusion of this topic, it's possible to affirm that the *Docupedia* page came to help the team in one of their main struggles demonstrated in the first stages of this process: the need to improve the information and communication management on the time and to standardize their processes and work instructions. Centralizing information reduces wastes of time, as well as the possibility to have doubled information or documents, which might lead to flaws or mistakes.

6.5 Initial Team Goals and *Lean Office* Wastes vs. Results Obtained and corresponding Design Thinking stage

This chapter intends to make a connection between the team goals that were shown in the early stages of this project, through the workshops and individual interviews that were conducted, the *Lean* Office wastes that were identified and the improvement proposals that were put in practice or suggested. It also includes a relation between the solution and the Design Thinking phase to which it relates to. This relation can be seen in Table 5.

Table 5 - Team Objectives, *Lean* Office Wastes, Solutions Implemented and Design Thinking Phase

Team Objectives	*Lean* Office Wastes Related to the Objective	Solutions Developed	Design Thinking Phase of the Solution
Processes well defined with value	Overproduction, Defects, Over-processing, Inventory and Waiting	Creation of a *Docupedia* page	Implementation
Clarified responsabilities for each stakeholder	Overproduction, Waiting	Creation of a *Docupedia* page	Implementation
Increase automatization of activities	Defects, Over-processing and Waiting	Development of the idea of a web-based checklist process flow + connection and definition of next steps with COS	Ideation
		Creation of a *Docupedia* page	Implementation
Streamline continuous improvement	Overproduction, Defects, Over-processing, Inventory and Waiting	Implementation of a Continuous Improvement System (4 groups)	Ideation
		Creation of a platform for improvement opportunities/topics	Inspiration
		Development of an annual continuous improvement plan	Implementation
Standardize working tools	Defects	Creation of a *Docupedia* page	Implementation
		Connection, discussion and development of follow-up actions with the PMO on improvement topics	Ideation
Centralize information	Overproduction, Over-processing, Inventory	Creation of a *Docupedia* page	Implementation
Align with the PMO some of the standards for the Radar processes	Defects	Connection, discussion and development of follow-up actions with the PMO on improvement topics	Ideation
Simplification, streamlining and understanding of the X-Samples process by all parties	Overproduction, over-processing, Waiting	Development of the idea of a web-based checklist process flow + connection and definition of next steps with COS	Ideation
		Creation of a *Docupedia* page	Implementation
GPD Goals	Defects	Creation of a *Buddy System*	Implementation
		Exploring the struggles faced by the team on each GPD Goal and identification of follow-up actions/ideas	Inspiration/Ideation

At the start of this project, after an in-depth study of the team's needs and expectations, it was possible to identify its main objectives, visible in Figures 18 and 19. The proposals or actions that were put into practice came as a result of these objectives.

As can be seen in Table 5, the team initially expressed the desire to have **well-defined processes** with value, as well as **well-defined responsibilities**. The creation of the *Docupedia* website helped to achieve these goals, as it made it possible to create various tabs with mapped processes and work instructions with defined responsibilities and links to contacts for employees in other areas. With this, the aim was to circumvent the existing *Lean* Office wastes previously identified: overproduction, defects, overprocessing, inventory and waiting. Mapping the processes also created the possibility to optimize them in the future

and eliminate non valuable activities. The creation of this web work tool relates to the phase of *Implementation* of Design Thinking, as it was a solution that was put in practice and will now be monitored throughout time.

With regard to the objective of increasing the **automatization of activities**, which, when not automatized created the possibility of defects, overprocessing and waiting, several actions were taken that can serve as a solution or a path to achieve this goal, namely: the development of the idea of a web-based checklist and the presentation and connection with COS by the group responsible for the X-Samples topic, which corresponds to the *Ideation* phase of Design Thinking, and the creation of a *Docupedia* page, as it allowed for the mapping of processes and less time-wasted on the search for information.

The team also expressed a wish to **make continuous improvement more dynamic** and, with the implementation of the continuous improvement system by groups, the creation of a platform to hold improvement topics and suggestions and the creation of an annual continuous improvement cycle allowed the team to begin working on topics that were on hold for a long time and to finally establish the continuous improvement philosophy in the work environment.

Regarding the **standardization of working tools**, the creation of the *Docupedia* page and the connection with the PMO were very important steps taken in the direction of having all the processes standardize within the team. Without process standardization, there was a higher chance for the *Lean Office* waste of defects to happen.

The objective retrieved from the team of **having centralized information** was taken care of with the creation of the *Docupedia*. As it was analysed in the results, the team agreed this tool was making their daily work easier.

The **simplification of the X-Samples process and understanding by all parties** was also approached with the *Docupedia* page, since it had a tab for the mapping of this process, as well as a table with the sequence of activities and the respective responsible. Besides this, the group responsible for this topic created the proposal of a web-based checklist, with the intent of making this process lighter.

Regarding the **GPD Goals**, this objective was directly related to all the work developed by the group responsible for this topic in the continuous improvement system that was implemented.

In sum, and with the results that were previously analysed, it can be said that the team's necessities and goals for the future were all taken into consideration and improvement proposals were developed, implemented or initiated for each one of them.

7. CONCLUSIONS

This final chapter is intended as a final reflection on the work carried out, the limitations that were felt and prospects and suggestions for future work.

7.1 Final considerations

The objectives stipulated at the beginning of this dissertation were all addressed and met. In order to adjust these objectives in the best possible way to the context in which the project took place, an initial diagnosis was carried out to identify the main problems and needs in relation to project management in the MFE16 team. Recalling the objectives initially stipulated, Table 6 lists them.

Table 6 - Initial Objectives of the Dissertation

1.	Conduct this project with an approach that will at all phases involve people's opinions and needs and maintain them as the main focus.	✔
2.	Conduct an in-depth research into the problems faced by the team where the project will take place.	✔
3.	Analyse the data that will emerge from objective 2 and draw concrete conclusions.	✔
4.	Implement and test a continuous improvement system on the team.	✔
5.	Involve the team in evaluating and deciding how the continuous improvement system should look like in the future.	✔
6.	Improve the information and communication management on the team, as well as the standardisation of processes and work instructions.	✔
7.	Evaluate the results of this project and leave notes and clear visual records of the work conducted, to support on future work.	✔

In line with the first objective, relating to conducting this project with an approach that involved people and their opinions and needs at all stages of the project, it can be concluded that this goal was achieved on different fronts.

Firstly, the research that was conducted to diagnose the team's problems and needs was always centred on the people involved. Workshops and individual interviews were held, opinions were listened to and registered, data was processed and the various inputs were synthesized into clear objectives and problems.

Then, by implementing a system of continuous improvement with a division into smaller groups and following a planning structure similar to a PDCA Cycle, it was possible to involve all the groups in the work carried out as a whole. Four groups were created with the topics: *Communication Strategy*, *Radar and PMO Alignment*, *X-Samples planning process* and *GPD Goals*. The Communication group helped explore, as the name implies, the topics concerning the communication of the team, internally and externally, as well as the standardization of processes. The group related to the alignment of the Radar and PMO topic

was responsible for forming a connection with the PMO in order to standardize some documents and work practiced. The X-Samples planning process group developed an idea to make this process more productive, using a web-based checklist to check all the activities and establishing clear responsibilities for them, before starting production, thus eliminating unnecessary meetings and wasting less time contacting people to fulfil their activities. Finally, the group of the topic GPD Goals implemented in the team a system to work together in the process of achieving one of their individual goals, studied and noted all the struggles faced in each GPD Goals and developed several actions to be implemented in the future and make the achievement of said goals easier for all the members. It can be affirmed this system helped streamline some topics that were on hold by the lack of time and availability by the team to be worked on, and it also allowed for everyone to explore their creativity in the creation of solutions for simultaneous topics.

Furthermore, by testing this system in groups, it was possible to understand the best format for the future continuous improvement of the team, which expressed satisfaction with the group system and helped shape the future of the team regarding this topic. The creation of the proposal for an annual continuous improvement plan was one of the most striking points in terms of the involvement of all team members. A session was held in which everyone was heard about the group improvement system that had been in place up to that point and their suggestions for what continuous improvement should look like in the future.

Furthermore, regarding the objective of improving the information and communication management on the team, while establishing the continuous improvement systems by groups, one of the groups was responsible for the theme of communication. With this, it was possible to point out what was missing in this topic and what problems were being faced and, consequently, figure out the best actions to take, namely: the application of the 5S's technique to the team shared folders and make the Radar project meetings more productive. This allowed for a more productive daily work and less time wasted searching for documentation.

Also related to the communication and information management, a *Docupedia* page was developed to centralize information, documents, links, among other important tools for work activities. The *Docupedia* page was created on the basis of what the team expressed as necessary, turning once again to the first objective: to involve everyone in decision-making and creation of solutions. Besides this, gathering almost all of the information in one place helps, naturally, to reduce wasted time and possibility of making mistakes, which doubled information can bring.

On another hand, the *Docupedia* page served as a tool for the goal of standardizing processes and work instructions. This web tool contained various tabs on different processes with all the information the author could find or create on them with the team, as well as mapped work instructions made by the team previously. Besides this, the group responsible for the topic of aligning the intrinsic processes of the Radar and the PMO also helped the team walk towards the standardization of work activities, since its main goal was to, in connection with the PMO, improve the standards for these processes.

Finally, the objective of evaluating the results of the whole project and leave clear notes on the work developed was fulfilled by the creation of the interactive platform *Improvement Box*, which registered all the work developed by the groups of the continuous improvement system. This platform also served to support the future work of the team, when following the continuous improvement annual plan that was created and proposed. With it, it would be possible to know deeply about each improvement opportunity and add new topics that needed to be worked on, at any time.

Regarding the evaluation of results, a survey was conducted on the team members, using the Likert Scale, from 1 to 5, evaluating if the user agreed or disagreed with certain statements. The results were very positive and, in sum, it can be said that the team felt their needs were heard and addressed in this project.

All the proposals suggested and implemented are, in a way, connected to each other and address several objectives at the same time. By combining the use of *Lean Office* tools, theoretical Project Management concepts and Design Thinking approaches, it was possible to achieve goals in a way where people were at the heart of the issues, suiting the increase of productivity to the demands and processes inherent in project management practices.

7.2 Limitations and Obstacles

This project, both in its proposals for improvement and in the study conducted, involved various departments, people and processes. Naturally, some challenges were encountered.

At first, it was challenging to find the scope of what the team needed. A lot of information emerged from the workshops held and the individual interviews conducted, as well as from observing the team's day-to-day activities. Processing this information and drawing synthesized conclusions from it was a task that required critical thinking and concentration, so that clear objectives, needs, problems and opportunities for improvement could be named.

Since this dissertation dealt with several topics, it can be pointed out that one of the main difficulties was the complexity and size of some work processes. The project occurred in a company with various

standards and norms. Bearing this in mind, and the dimension of Bosch, some actions took some time to be dynamized, since they depended on various people and parties.

Finally, it can be concluded that keeping people motivated to participate in continuous improvement activities can be a struggle, since they have their workload to worry about.

Nonetheless, these limitations were faced, and the work intended was carried out anyway, in order to achieve the goals initially proposed.

7.3 Future Work

As future work, several points were identified that could be developed by the team in order to improve the proposals that were presented and/or implemented. In addition, some of the work that has been done in itself requires further work by the team.

Firstly, with regard to the continuous improvement system implemented by the team, both the group responsible for the GPD Goals topics and the group responsible for aligning the Radar processes with the PMO standards, as presented in chapter 5, drew up a table of follow-up actions. In addition to these, the group for the topic of improving the X-Samples planning process will, in the future, have to support the development of the idea they worked on, of creating a web-based checklist, if the idea is put in practice. Finally, the Communication group can review new topics to work on and improve those that have already been completed.

The application of the 5S's in the team's shared folders is something that should be reviewed periodically, as there are files that become outdated and should be deleted. In addition, the organization of the folders can eventually become inadequate for the team's needs.

The team's *Docupedia* page should also be reviewed, for example on an annual basis, so that the processes mapped out there are updated as they change, both in terms of activities and those responsible. Consideration should also be given to the links placed there, contacts and the structure in general, since new chapters or sub-chapters can be added at any time.

Finally, the creation of the *Improvement Box* platform, coupled with the proposed annual continuous improvement cycle, creates some ongoing future work for the team. Through the platform, the team can find new opportunities for improvement at any time. As for the annual plan, work has to be conducted in order to keep the team committed to continuous improvement. To do this, for example, a reward system for the groups could be created or other creative ways to motivate the team.

REFERENCES

6Sigma (2017). *Understanding the 5S's of Kaizen*. Available at: https://www.6sigma.us/six-sigma-articles/understanding-5ss-of-kaizen/

Ade Bilau, A., Witt, E., & Lill, I. (2018). Research methodology for the development of a framework for managing post-disaster housing reconstruction. Procedia Engineering, 212, 598–605. https://doi.org/10.1016/j.proeng.2018.01.077

Allway, M., & Corbett, S. (2002). Shifting to lean service: stealing a page of manufacturers' palybooks. *Jounal of Organizational Excellence, 21*(2), 45-54. https://doi.org/10.1002/npr.10019

Amaro, A., & Pinto, J. (2007). Criação de valor e eliminação de desperdícios. *Lean Thinking Community*.

Ashkenas, R. (2012). *It's Time to Rethink Continuous Improvement*. Harvard Business Review. https://hbr.org/2012/05/its-time-to-rethink-continuous

Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International Journal of Project Management, 17*(6), 337–342. https://doi.org/10.1016/S0263-7863(98)00069-6

Aziz R. F. & Hafez S. M. (2013). Applying lean thinking in construction and performance improvement. *Alexandria Engineering Journal 52*(4):679–95. DOI: 10.1016/j.aej.2013.04.008

Bencheva, M. (2020). *9 tips to apply 5S principles for your electronic files and folders*. Medium. Available at: https://medium.com/@marietabencheva/9-tips-to-apply-5s-principles-for-your-electronic-files-and-folders-724c2de74f19

Bonini, L. A., & Sbragia, R. (2011). O modelo de design thinking como indutor da inovação nas empresas: um estudo empírico. *Gestão e Projetos: GeP, 2*(1), 3-25. http://dx.doi.org/10.5585/gep.v2i1.36

Borgia, E. T., & Schuler, D. (1996). Action Research in Early Childhood Education. ERIC Digest.

Bosch (2023a). *Our History*. https://www.bosch.com/company/our-history/#company-history

Bosch (2023b). *Global steps 1906-1925*. https://www.bosch.com/stories/1906-1925-globalization-and-new-beginning/

Bosch (2023c). *Bosch around the world*. https://www.bosch.com/websites-worldwide/

Bosch (2023d). *Bosch Today – Facts and Figures*. https://assets.bosch.com/media/global/bosch_group/our_figures/pdf/bosch-today-2023.pdf

Bosch (2023e). *Annual report 2022*. https://assets.bosch.com/media/global/bosch_group/our_figures/pdf/bosch-annual-report-2022.pdf

Bosch (2023f). *Bosch em Portugal*. https://www.bosch.pt/a-nossa-empresa/bosch-em-portugal/

Bosch (2023g). *Braga*. https://www.bosch.pt/a-nossa-empresa/bosch-em-portugal/braga/

Carvalho, R., Alves A. e Lopes, L. (2011). Principles and Practices of Lean Production applied in a Metal Structures Production System. *Proceedings of the World Congress on Engineering 2011 Vol I*, WCE 2011, July 6 - 8, 2011, London, U.K.

Chiarini, A. (2013). Lean Organization: from the Tools of the Toyota Production System to Lean Office. In *Springer Milan* (Vol. 3, Issue 9). Springer Milan. https://doi.org/10.1007/978-88-470-2510-3

Deming, W. E. (2006). *Encyclopedia of Production and Manufacturing Management: Deming Cycle PDCA* (P. M. Swamidass, Ed.). Springer Science & Business Media. https://doi.org/10.1007/1-4020-0612-8

Do, D. (2017a). *TheFive Principles of Lean*. The Lean Way Blog. https://theleanway.net/The-Five-Principles-of-Lean

Do, D. (2017b). *What is Muda, Mura and Muri?*. The Lean Way Blog. https://theleanway.net/muda-mura-muri

Drucker, P. F (2007). *The Essential Drucker*. Routledge. https://doi.org/10.4324/9780080939322

Edwards, J. S. (2022). Where knowledge management and information management meet: Research directions. *International Journal of Informational Journal of Information Management, (63),* ISSN 0268-4012. https://doi.org/10.1016/j.ijinfomgt.2021.102458

Emiliani, M. L. (2008). Standardized work for executive leadership. Leadership and Organization Development Journal, 29(1), 24–46. https://doi.org/10.1108/01437730810845289

Fritze, C. (2016). The Toyota Production System. *The Key Elements and the Role of Kaizen within the System*.

Helsingin Yliopisto. 2019. *How do I use 5S method for organizing data files?* https://blogs.helsinki.fi/thinkopen/5s-method/

Hicks, B. J. (2007). Lean information management: Understanding and eliminating waste. *International Journal of Information Management, 27*(4), 233–249. https://doi.org/10.1016/j.ijinfomgt.2006.12.001

Hines, P., Holweg, M. & Rich, N. (2004). Learning to evolve: a review of contemporary lean thinking. *International Journal of Operations & Production Management,* Vol. 24 No. 10, pp. 994-1011.

Holweg, M., Staats, B. & Upton, D. M. (2018). *Making Process Improvements Stick*. Harvard Business Review. https://hbr.org/2018/11/making-process-improvements-stick?registration=success

Howell, J. M., & Higgins, C. A. (1990). Champions of Technological Innovation. *Administrative Science Quarterly, 35*(2), 317. https://doi.org/10.2307/2393393

IDEO.org (2015). *The field Guide to Human-Centered Design.* (1ˢᵗ edition ©) ISBN: 978-0-9914063-1-9.

IDEO.org (2023). *What is Design Thinking?* https://www.ideou.com/blogs/inspiration/what-is-design-thinking?_pos=1&_sid=a484504d6&_ss=r

Ikome, J. M., Laseinde, O. T., & Katumba, M. G. K. (2022). The Future of the Automotive Manufacturing Industry in Developing Nations: A Case Study of its Sustainability Based on South Africa's Paradigm. *Procedia Computer Science*, *200*, 1165–1173. https://doi.org/10.1016/j.procs.2022.01.316

Imai, M. (1997). *Gemba Kaizen: A commonsense, low-cost approach to management*. New York: MCGraw-Hill.

IPMA. (2015). *Individual Competence Baseline for Project, Programme and Portfolio Management* (4th ed.). International Project Management Association.

Jaqueline Melara, Rui M. Lima, & Thiago Souza. (2017). *Lean Office: A Systematic Literature Review (Raúl Poler, Josefa Mula, Manuel Díaz-Madroñero, & Raquel Sanchis, Eds.).*

Khan, M. A. (2022). Toyota Production System: "Epistemology of Paradigm shift in Japan. *Global Scientific Journal, 10*(2), 785-.

Lago, N., Carvalho, D., & Ribeiro, L. M. M. (2008). *Lean Office. Revista Fundição*, 6–8. http://Lean.dps.uminho.pt/ArtigosRevistas/LeanOffice.pdf

Lareau, W. (2002). *Office kaizen: transforming office operations into a strategic competitive advantage*. Quality Press.

Liker, J. K. (2004). The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer. In McGraw-Hill (Ed.), *The Toyota Way* (Issue UshaDarshni).

Liker, J. K., & Morgan, J. M. (2006). The toyota way in services: The case of lean product development. *Academy of Management Perspectives*, 20(2), 5–20. https://doi.org/10.5465/AMP.2006.20591002

Lima, P. N., Tegner, M. G., Neto, S. L. C. & Veit, D. R. (2015). Lean Office na Prática: Proposição e Aplicação de Método à Luz do Gerenciamento de Processos. *In: XXV Encontro Nacional de Engenharia de Produção*. DOI: 10.13140/RG.2.1.3782.4724

Maia, L. C., Alves, A. C., & Leão, C. P. (2014). Implementar o modelo de produção Lean na ITV para promover sistemas eco-eficientes. *Revista Nova Têxtil*, 18–25. https://hdl.handle.net/1822/36861

Meiling J., Backlund F. & Johnsson H. (2012). Managing for continuous improvement in off-site construction: Evaluation of lean management principles. *Engineering Construction & Architectural Management 19*(2):141–58. DOI: 10.1108/09699981211206089

Melton, T. (2005). The benefits of Lean manufacturing: What Lean thinking has to offer the process industries. *Chemical Engineering Research and Design, 83*(6 A), 662–673. https://doi.org/10.1205/cherd.04351

Mironiuk, K. (2012). *Lean Office Concept: Implementation in R-Pro Consulting Company*. Mikkeli University of Applied Sciences: Bachelor's Thesis Bussiness Management.

Monden, Y. (1998). *Toyota Production System: An integrated approach to Just-in-Time*. Industrial Engineering and Management Press.

Moura, J. A. (2016). Desenvolver pessoas Lean numa organização de serviços. Sítio do Livro.

Nunes, D. M., & Faccio, K. (2014). Avaliação fatores chave implementação Lean office. *Produto & Produção, 15*(4). https://doi.org/10.22456/1983-8026.51564

Ohno, T. (1988). *Toyota Production System: Beyond Large-Scale Production*. CRC Press.

Oliveira, J., Sá, J. C., & Fernandes, A. (2017). Continuous improvement through "Lean Tools": An application in a mechanical company. Procedia Manufacturing, 13, 1082–1089. https://doi.org/10.1016/j.promfg.2017.09.139

Ortiz, C. A. (2006). *Kaizen assembly: designing, constructing, and managing a Lean assembly line* (1 ed). CRC Press.

Patel, P. M. & Deshpande, V. A. (2017). Application Of Plan-Do-Check-Act Cycle For Quality And Productivity Improvement-A Review. *International Journal for Research in Applied Science & Engineering Technology*. 5. 197-201.

Pavnaskar, S. J., Gershenson, J. K., & Jambekar, A. B. (2003). Classification scheme for Lean manufacturing tools. *International Journal of Production Research*, 41(13), 3075–3090. https://doi.org/10.1080/0020754021000049817

Piercy, N., Caldwell, N. e Rich, N. (2009). *Considering Connectivity in Operations Journals*, International Journal of Productivity and Performance Management. v. 58, p. 607-631. https://doi.org/10.1108/17410400910989449

Pinto, J. P. (2006). *Gestão de operações na indústria e nos serviços*. Lidel.

Pinto, J. P. (2009). *Lean Thinking, novas janelas de oportunidades para as organizações*. https://pt.slideshare.net/Comunidade_Lean_Thinking/Lean-thinking

Pinto, J. P. (2014). *Pensamento Lean- A filosofia das organizações vencedoras*. Lidel.

PMI. (2021a). *The Standard for Project Management*. (*PMBOK ® GUIDE*) (7ᵗʰ ed). Project Management Institute.

PMI. (2021b). *A guide to the project management body of knowledge (PMBOK® GUIDE)* (7ᵗʰ ed). Project Management Institute.

Popa, V., & Tănăsescu, D. A. (2010). Project management on new product development and launch in the automotive industry. *2nd International Conference on Manufacturing Engineering, Quality and Production Systems*. https://doi.org/10.1089/104454603322572525

Project Management Institute. (2017). *A Guide to the Project Management body of Kowledge* (6th ed.). Project Management Institute.

Raithatha, Y. (2017). Understanding the economic impact terrorism has on the destination decision making: Northern Irish tourists. Doctoral dissertation. Dublin Business School.

Rentes, A. F., Araujo, C. A. C., & Rentes, V. C. (2009). Best Practice Examples in Sustaining Improvements from Lean Implementation. *IIE Annual Conference.Proceedings*, 362–367. https://www.proquest.com/scholarly-journals/best-practice-examples-sustaining-improvements/docview/192461115/se-2

Rubrich, L., & Watson, M. (2004). *Implementing World Class Manufacturing (Includes Lean Enterprise)*. Fort wayne: Indiana: WCM Associates.

Saunders et al. (2007). *Research Onion Model*. Available in: https://theinnovidea.com/understanding-research-onion-for-research-methodology/

Saunders, M., Lewis, P., & Thornhill, A. (2016). Research Methods for Business Students. England: Pearson Education Limited.

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research Methods for Business Students* (8th Editio). Pearson.

Seraphim, E. C., Silva, Í. B. da, & Agostinho, O. L. (2010). *Lean Office* em organizações militares de saúde: estudo de caso do Posto Médico da Guarnição Militar de Campinas. *Gestão & Produção, 17*(2), 389–405. https://doi.org/10.1590/S0104-530X2010000200013

Shingo, S. (1981). *A Study of the Toyota Production System From an Industrial Engineering Viewpoint* (Revison (ed.)).

Singh, S. & Kumar, K. 2021. A study of lean construction and visual management tools through cluster analysis. *Ain Shams Engineering Journal, 12*(1), 1153-4479. https://doi.org/10.1016/j.asej.2020.04.019.

Smeds, R. (1994). Managing Change towards Lean Enterprises. *International Journal of Operations & Production Management, 14*(3), 66–82. https://doi.org/10.1108/01443579410058531

Sugimori, Y., Kusunoki, K., Cho, F., & Uchikawa, S. (1977). Toyota production system and kanban system materialization of just-in-time and respect-for-human system. *International Journal of Production Research, 15*(6), 553–564. https://doi.org/10.1080/00207547708943149

Suri, R. (1998). *Quick response manufacturing: A company-wide approach to lead timereduction*. Portland, OR: Productivity Press.

Susman, G. I., & Evered, R. D. (1978). An Assessment of the Scientific Merits of Action Research. *Administrative Science Quarterly*, 23.

Tapping,D. Shuker,T. (2003). *Value Stream Management for the Lean Office: Eight Steps to Planning, Mapping, and Sustaining Lean Improvements in Administrative areas*. New York: Productivity Press.

Tapping, D.; Shuker, T. (2010). *Lean Office, Gerenciamento do fluxo de valor para áreas administrativas – 8 passos para planear, mapear e sustentar melhorias Lean nas áreas administrativas*, Leopardo Editora, pp.186.

The University of Tennessee, Health Science Center (2022). *Naming and Organizing Files and Folders Using 5S*. Available at: https://uthsc.teamdynamix.com/TDClient/2280/Portal/KB/ArticleDet?ID=135328

Toussaint, S. & Chandrasekaran, A. 2019. *Creating a Culture of Continuous Improvement*. Harvard Business Review. https://hbr.org/2019/05/creating-a-culture-of-continuous-improvement

Turner, R. (2008). *The Handbook of Project-based Management: Leading Strategic Change in Organizations (3 ed)*. McGraw-Hill Education.

Watts, R., Rudder, A. & Main, K. (2023). *What is The Project Management Triangle?*. Forbes Advisor.

Womack, J. P., & Jones, D. T. (1996). *Lean Thinking: Banish Waste and Create Wealth in Your Organisation*. London: Simon & Schuster

Womack, J. P., Jones, D. T., & Roos, D. (1990). *The Machine that Changed the World*. Macmillan Publishing Company.

Appendix 1 – Survey Conducted in the Initial Workshop

Workshop - 24/03/2023

...

* Obrigatório

1. How are you feeling right now? *

○ Sad

○ Suspicious

○ Motivated

○ Tired

○ Angry

○ Surprised

2. Briefly, describe your team's biggest strengths. *

Introduza a sua resposta

3. Define the three biggest struggles/challenges you face currently. *

Introduza a sua resposta

4. If you were granted three wishes, what would you change/implement in your daily work? *

Introduza a sua resposta

Based on your last repplies, make your own user stories:

5.   *

As a *(role)*____, **I want** *(something)* _____, **so that** *(benefits)*_____ .

Introduza a sua resposta

Submeter
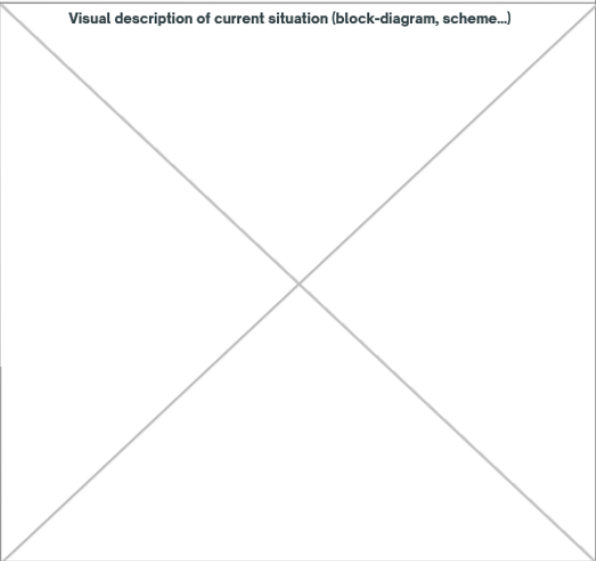
Appendix 2 – Struggles faced by the team

Struggles		
Processes	**Platforms and Documents**	**Continuous Improvement**
		Communication
		Time
	Roles, responsabilities and other teams	

Appendix 3 – Communication Strategy: Problem Identification

Problem Definition

Filled in by: [redacted]

Topic: **Communication Strategy**

What are the problems/improvement opportunities involved?

- Lack of process standardization
- Poor use of the *Microsoft Teams* team channel
- Repeating the same information in different meetings
- Several storage locations for information
- Team shared folders structure too confusing

Visual description of current situation (block-diagram, scheme...)

Appendix 4 – PMO vs Radar Alignment: Problem Identification

Problem Definition

Filled in by: [redacted]

Topic: **PMO vs. Radar alignment**

What are the problems/improvement opportunities involved?

Some documents need to be reviewed and better adapted to some of the Radar inherent processes.

[redacted]

Visual description of current situation (block-diagram, scheme...)

Appendix 5 – X-Samples Planning Process: Problem Identification

Problem Definition

Filled in by:
~~Ana C., Ana V., Pedro S.~~

Topic: X Samples Planning Process

What are the problems/improvement opportunities involved?

1. Planning carried out on different platforms and files.
2. Lack of information regarding the process flow
3. Need for a platform with aggregated data that would provide a real-time view of planning.
4. The startmeeting checklist is not well adapted to the Radar processes and there's low participation
5. The dates, deadlines, lead times or quantities should be more transparent.
6. Some meetings are not fully efficient

Visual description of current situation (block-diagram, scheme…)

The process needs to be mapped and agreed on.

Appendix 6 – GPD Goals: Problem Identification

Problem Definition

Filled in by:

Topic: **GPD Goals**

What are the problems/improvement opportunities involved?

1. Some objectives are complex
2. Lack of strategies and templates to follow these objectives

Visual description of current situation (block-diagram, scheme...)

ANNUAL MFE16 CONTINUOUS IMPROVEMENT PLAN

> ON THE FIRST FRIDAY OF EACH MONTH, THE TEAM GETS TOGETHER AND EACH GROUP GIVES AN UPDATE ON THE CURRENT STATUS OF THEIR TOPICS

> REVISION OF WORKING TOPICS IN APRIL - THIS MARKS, IF POSSIBLE, THE CLOSING OF CURRENT WORKING TOPICS. THE TEAM GATHERS, EVALUATES AND CHOSES NEW TOPICS TO WORK ON.

APRIL	MAY	JUNE	JULY
! CHOSE/REVIEW WHICH TOPICS SHOULD BE WORK ON	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS
2024 - **05/04**	2024 - **03/05**	2024 - **03/06**	2024 - **05/07**
2025 - **04/04**	2025 - **02/05**	2025 - **02/06**	2025 - **04/07**
2026 - **03/04**	2026 - **01/05**	2026 - **01/06**	2026 - **03/07**
…	…	…	…

AUGUST	SEPTEMBER	OCTOBER	NOVEMBER
MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS
2024 - **02/08**	2024 - **06/09**	2024 - **04/10**	2023 - **03/11**
2025 - **01/08**	2025 - **05/09**	2025 - **03/10**	2024 - **01/11**
2026 - **07/08**	2026 - **04/09**	2026 - **02/10**	2025 - **07/11**
…	…	…	2026 - **06/11**
			…

DECEMBER	JANUARY	FEBRUARY	MARCH
MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS	MONTHLY REVIEW - CURRENT STATUS OF TOPICS/GROUPS
2023 - **01/12**	2024 - **05/01**	2024 - **02/02**	2024 - **01/03**
2024 - **07/12**	2025 - **03/01**	2025 - **07/02**	2025 - **07/03**
2025 - **05/12**	2026 - **02/01**	2026 - **06/02**	2026 - **06/03**
2026 - **04/12**	…	…	…
…			

> THROUGHOUT THE YEAR, EACH GROUP MEETS WEEKLY OR FORTNIGHTLY, ACCORDING TO WHAT IS MOST APPROPRIATE

Appendix 8 – Docupedia – *Presentation Page*

MFE16 Projects and iPMs

Created by Teixeira Joana (BrgP/MFE16), last modified on 2023, Sep 27 Current Version V 25 ⓘ

Appendix 9 – Docupedia – *Software Changes*

1.3. Time Schedule

Appendix 10 – Survey for Assessment of Results

Assessment of Results - Dissertation Project

The form is divided into three short parts:
   -1st part: concerns the continuous improvement work carried out by the groups (Communication, Samples, PMO/Radar and GPD Objectives);
   - Part 2: platform for recording topics and the annual continuous improvement plan I suggested for the team;
   - 3rd part: Docupedia MFE16 page.

* Obrigatório

Continuous Improvement System

This section aims to evaluate the work carried out by the groups (*Samples, Communication Strategy, PMO/Radar Alignment, GPD Goals*) in terms of the idea itself, the plan that has been implemented over the last few months and the results obtained with this system by each group.

Scale:
1- strongly disagree; 2- disagree; 3- neither agree nor disagree; 4- agree; 5- strongly agree

1. The continuous improvement system in groups has had a positive impact on the team.
   *

1	2	3	4	5

2. The continuous improvement plan in groups was appropriate to the workload.
   *

1	2	3	4	5

3. The continuous improvement system in groups made it possible for the team to move forward and dynamise topics for improvement.
   *

1	2	3	4	5

4. Everyone was involved in decision-making and was aware of the work of the other groups. *

1	2	3	4	5

5. **[Communication Group]** The new folder structure is more *Lean* than the previous structure and will make daily work easier. *

1	2	3	4	5

6. **[Communication Group]** The proposal to include members of other sections to present at the Radar Project meetings made sense and will make the meetings more productive. *

1	2	3	4	5

7. **[PMO/Radar Alignment Group]** It was useful to create a bridge with the PMO to discuss topics for improvement. *

1	2	3	4	5

8. **[PMO/Radar Alignment Group]** The record of the feedback and follow-up actions obtained at the meeting with the PMO will be useful for future work on the topics in question. *

1	2	3	4	5

9. **[Sample Group]** The proposal developed for planning using a web-based checklist could make this process more *Lean*.
*

1	2	3	4	5

10. **[Sample Group]** The bridge made with COS and the record of this proposal+feedback collected were useful steps for improving the Sample planning process.
*

1	2	3	4	5

11. **[GPD Goals Group]** The fact that this group explored and registered the difficulties and doubts in the various GPD goals is useful for the team's future fulfilment of them.
*

1	2	3	4	5

12. **[GPD Goals Group]** The Buddy System proposal will help the team fulfil the objective.
*

1	2	3	4	5

Seguinte

Platform for Recording Improvement Topics + Proposal for an Annual Continuous Improvement Plan

Scale:
1- strongly disagree; 2- disagree; 3- neither agree nor disagree; 4- agree; 5- strongly agree

13. The platform for registering topics is easy to understand/use.

1	2	3	4	5

14. The platform for registering topics will be useful for the team.

1	2	3	4	5

15. The proposal for the annual continuous improvement plan is in line with my needs.

1	2	3	4	5

16. The annual continuous improvement plan will be sustained in the future.

1	2	3	4	5

Anterior   Seguinte

Docupedia MFE16

Scale:
1- strongly disagree; 2- disagree; 3- neither agree nor disagree; 4- agree; 5- strongly agree

17. The content of the Docupedia MFE16 page is aligned with the team's daily work.

1	2	3	4	5

18. The Docupedia MFE16 page has a well-organised structure.

1	2	3	4	5

19. The Docupedia MFE16 page is easy to understand/use.

1	2	3	4	5

20. The Docupedia MFE16 page is useful for standardising processes within MFE16.

1	2	3	4	5

21. The centralisation of diverse information on the Docupedia MFE16 page makes daily work easier.

1	2	3	4	5