Transformations and Alignments in Project Management Tools: The PSL-v.2020 Experiments

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Abstract

Project management (PM) is the application of knowledge, techniques and tools to a given project. This application leads to planning the sequence of events and tasks required to complete a project with success. The most popular approach has been the traditional approach that follows the PMBOK guidelines. The agile approach allows iterating on a product during its life cycle, unlike the traditional approach.

Scrum and Kanban are two popular agile methodologies. Scrum recommends the use of a Product Backlog and Sprints Backlog, while Kanban recommends the use of a Kanban board. There are many PM tools, but one problem of traditional PM tools is the absence of interoperability between them, leading to the necessity of using several tools to cover the phases of a project. On the other hand, PM agile tools have minimal options for generating reports that are essential for any project.

The ITLingo is a research initiative that intends to design and develop domain specific languages which support the interoperability of specifications between different tools. One of the ITLingo's languages is the PSL (short name for Project Specification Language).

The purpose of this research is to analyze and discuss the alignments and transformations in PM tools and it concludes there are an extensive collection of them. Based on this research a new PSL/Traditional-v.2020 was developed supporting the 10 Knowledge Areas (KAs) defined by PMBOK, with more customization options, more data alignments, more transformations, and a better user experience, alongside with a new template PSL/Agile-v.2020 that supports Scrum and Kanban frameworks.

Keywords: ITLingo, PSL Excel Template, Project Management, Traditional Methodologies, Agile Methodologies, Project Management Tools

Resumo

Gestão de projeto é a aplicação de conhecimento, técnicas e ferramentas a um determinado projeto. Os gestores de projetos utilizam este processo para planear a sequência de eventos e tarefas necessárias para concluir um projeto com sucesso. A abordagem tradicional é a mais utilizada ao longo dos anos e segue as diretrizes definidas pelo PMBOK. Posteriormente surgiu uma nova abordagem ágil que permite iterar sobre o projeto durante o seu desenvolvimento, ao contrário da abordagem tradicional.

No conjunto de abordagens ágeis as mais usadas são o Scrum e Kanban. O Scrum baseia-se no uso de Sprints e no acumular de informação sobre o Produto, enquanto o Kanban baseia-se no uso de um quadro Kanban. Existem várias ferramentas para gestão de projeto, mas o maior problema das ferramentas que se focam em suportar a aplicação de metodologias tradicionais é a ausência de interoperabilidade entre essas ferramentas. Criando assim uma necessidade de utilizar várias ferramentas para abranger todas as fases e áreas de um projeto. Por outro lado, as ferramentas utilizadas para suportar metodologias ágeis são ferramentas técnicas com uma grande curva de aprendizagem e poucas opções para geração de relatórios que são essenciais para qualquer projeto.

A iniciativa do ITLingo tem por objetivo ser diferente das ferramentas atualmente disponíveis no mercado. Consegue sê-lo ao criar uma linguagem própria, PSL (“*Project Specification Language”)*, que funciona como uma plataforma intermediária que permite transferir especificações do planeamento de um projeto entre ferramentas. O PSL-v.2019 é o trabalho mais recente sobre uma dessas ferramentas, o Excel. Este template permite planear todas as fases de um projeto utilizando uma metodologia tradicional.

O objetivo deste trabalho é analisar e discutir os alinhamentos e transformações presentes em ferramentas de gestão de projeto. Consequentemente um novo template PSL/Traditional-v.2020 será desenvolvido capaz de suportar as 10 áreas de conhecimento definidas pelo PMBOK, com mais opções de customização, incluindo que informação está visível a qualquer momento e a possibilidade de suportar quer o Scrum, quer o Kanban, ou ambos em simultâneo com um outro template PSL/Agile-v.2020.

Palavras-Chave: ITLingo, PSL Excel Template, Gestão de Projeto, Metodologias ágeis, Ferramentas de GP

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Acronyms

PM – Project Management

PMBOK – Project Management Body of Knowledge

KA – Knowledge Area

PSL – Project Specification Language

PSL – Project Management Excel Template

VBA – Visual Basic for Applications

WBS – Work Breakdown Structure

RAM – Responsibility Assignment Matrix

KPI – Key Performance Indicator

WiP – Work in Progress

DSRM – Design Science Research Methodology

1. Introduction

This section introduces the general context of the project management area, as well as the scope and motivation for this research. It also introduces the context of project management and available software tools.

1.1. Context

A project manager typically uses a traditional methodology that consists of defining several aspects of a project for example according to the PMBOK framework [8].

While the traditional methodologies are organized by sequential process groups, many projects require doing repetitive tasks with intermediate demonstrations of the work developed, instead of having just the demonstration of the final product delivery [9]. Agile methodologies appeared with this mindset. It is organized by multiple iterations that produce deliverable in each concluded cycle. This approach is used in IT projects, since it allows the team to get more frequent feedback and adjust the product, leading to a continuous improvement over time.

A new approach PM^2 is less known in the project management world, but it has been used in a high scale company and was recently revealed to the public [13]. This approach follows the same guidelines as the traditional approach, as it identifies the five phases of a project. However, the agile approach is used on the execution phase and for this reason, PM^2 is viewed as the union of traditional and agile approaches.

To apply the practices of these PM methodologies, project managers need appropriate tools supporting their tasks. These PM tools consist mostly of software applications, like Microsoft Project [21], Azure Devops [27] and JIRA [26]. They support different methodologies and sometimes different tasks. The ITLINGO Initiative [2] was started to tackle this problem, as it provides domain specific languages and transfer specifications between different applications. The initiative created the ITLingo studio to develop and test the languages. One of them is PSL [3], it focusses on the project specification and was first tested on MS word and MS Excel [15] using fictional projects. The testing required well defined templates from the MS tools side and so the PSL Excel Template was created. The template has suffered many modifications and improvements since its initial goals and is now a self-sufficient tool capable of supporting traditional methodologies and all its tasks. To do so, it uses excel sheets and a custom ribbon to manipulate, transform and align a project data [18]. However, the tool is not yet ready to support agile methodologies as it only contains a few limited features for them.

1.2. Motivation

The course of Information Systems Project Management [30] integrated in the master's degree in Information Systems and Computer Engineering [31], teaches what project management is and its fundamentals to achieve a successful project. During this course, the students were asked to apply their knowledge into a fictional project using various tools: Excel Template, Microsoft Project [21], Azure Devops [27] and Microsoft Word. One of the tools stood out, the Excel Template. This Template already provided the application of project management practices for traditional methodologies and it led to an interest of what more could be provided from this template, especially being able to reduce the need of using the other tools.

This interest led to a research around the Excel Template and from there the PSL Excel Template [3] was discovered. PSL (Project Specification Language) is a specific language part of the ITLingo initiative [2]. This research initiative develops middle ground languages to allow the transfer of specifications between different software applications. Focusing on the PSL, its Excel Template provides many features, and it allows almost total application of a traditional approach on project management. However, the agile methodologies are still at an early stage on the template. This motivated a research for what could be improved and how the Excel Template could be used by project managers not only for the traditional approach but also for the agile ones.

1.3. Proposal

To continue development of the PSL Excel template it is proposed the complete implementation of the features to support the most common agile methodologies, Scrum and Kanban. This work consists of picking up the current state of the Excel template, v2019, continuing the implementation of the Scrum [10] approach and introducing the Kanban approach [11]. These two additions are interconnected on its applicability and do not affect the use of the template for a traditional approach. More improvements are also proposed: separate the traditional from the agile methodologies in two different templates; implement a resources and task completion rate on the Gantt chart sheet and later on the agile approach sheets; customization options for the visible content of each sheet and what sheets should be visible; automatic production of PDF reports based on the current data; update of the tutorial and addition of Settings buttons; applying a license system for a future market distribution [19].

This proposal also considers a user evaluation to provide feedback and identify possible changes as well as validating the current state of the template further discussed in Section 7. All these features are discussed in Section 4,5 and 6.

1.4. Research Methodology

This research project, including development and testing took four major cycles distributed between October 2019 and October 2020. These cycles were divided in various sprints and are discussed below (Figure 1,Figure 2, Figure 3 and Figure 4 show the schedule and backlog).

To produce this new version of the template we used the Design Science Research Methodology [54]. DSRM always outputs a purposeful artifact which "can be a product or a process; it can be a technology, a tool, a methodology, a technique, a procedure, a combination of any of these, or any other means for achieving some purpose" [53] This method consists of six phases: identify problem and motivation, define objectives of a solution, design and development, demonstration, evaluation, and communication. Alongside the Design Science Research Methodology, we used the Scrum methodology to develop the template with sprints varying from one week to two weeks durations with a meeting at the start of each new sprint.

First Cycle (October 2019 – January 2020). This cycle consisted of researching the current PM tools available on the Market, studying project management, and evaluating the PSL-v.2019. It concluded with a presentation of the research, problems, and proposal.

Second Cycle (January 2020 – March 2020). This cycle involved learning Microsoft Excel, VBA, and PSL-v.2019 in terms of code.

Third Cycle (April 2020 – July 2020). In this period, the core of the PSL-v.2020 was built. The PSL/Traditiona-v.2020 of the Template was finalized, and the PSL/Agile-v.2020 was developed.

Fourth Cycle (August 2020 – October 2020). The last cycle consisted of evaluating the template with the application of various projects, improving it accordingly to feedback from testers and writing the dissertation.

TÉCNICO LISBOA MSc Thesis > Schedule

Planned Start	01/02/2020	Actual Start	03/01/2020	Project Phase	Closed
Planned End	31/10/2020	Actual End	01/10/2020		

					Planned			Actual					Actual		
Task I	ID	Lev	Task	Type	Planned Start	Planned En	Planned Durati...	Actual Start	Actual E	Actual Durat...	Type of Precedenc...	Predecessors	Status	Complete	Resources
1	Project	1	MSc Thesis	Project	01/02/2020	28/10/2020	194	03/01/2020	01/10/2020	195				91%	
1_1	WP_1	2	Second Iteration	Workpackage	01/02/2020	01/04/2020	44	03/01/2020	07/05/2020	90			Concluded	100%	Pedro Baptista - 100%
1_1_1	1_1_1	3	Learn Excel	Activity	01/02/2020	20/02/2020	15	03/01/2020	13/02/2020	30			Concluded	100%	Pedro Baptista - 100%
1_1_2	1_1_2	3	Learn VBA	Activity	21/02/2020	12/03/2020	15	14/02/2020	26/03/2020	30	Finish-To-Start	1_1_1	Concluded	100%	Pedro Baptista - 100%
1_1_3	1_1_3	3	Deep comprehension of PSL Excel Template v.2019 Code	Activity	13/03/2020	02/04/2020	15	27/03/2020	07/05/2020	30	Finish-To-Start	1_1_2	Concluded	100%	Pedro Baptista - 100%
mi_1	mi_1	3	Full Knowledge to develop proposal	Milestone	02/04/2020	02/04/2020	0	07/05/2020	07/05/2020	0	Finish-To-Start	1_1_3	Concluded	100%	Pedro Baptista - 100%
1_2	WP_2	2	Third Iteration	Workpackage	03/04/2020	03/09/2020	110	08/05/2020	03/09/2020	85			Concluded	100%	Pedro Baptista - 100%
1_2_1	1_2_1	3	Sprint 1	Workpackage	03/04/2020	16/04/2020	10	08/05/2020	21/05/2020	10	Finish-To-Start	mi_1	Concluded	100%	Pedro Baptista - 100%
1_2_2	1_2_2	3	Sprint 2	Workpackage	17/04/2020	30/04/2020	10	22/05/2020	18/06/2020	20	Finish-To-Start	1_2_1	Concluded	100%	Pedro Baptista - 100%
1_2_3	1_2_3	3	Sprint 3	Workpackage	01/05/2020	14/05/2020	10	19/06/2020	02/07/2020	10	Finish-To-Start	1_2_2	Concluded	100%	Pedro Baptista - 100%
1_2_4	1_2_4	3	Sprint 4	Workpackage	15/05/2020	28/05/2020	10	03/07/2020	09/07/2020	5	Finish-To-Start	1_2_3	Concluded	100%	Pedro Baptista - 100%
1_2_5	1_2_5	3	Sprint 5	Workpackage	29/05/2020	11/06/2020	10	10/07/2020	16/07/2020	5	Finish-To-Start	1_2_4	Concluded	100%	Pedro Baptista - 100%
1_2_6	1_2_6	3	Sprint 6	Workpackage	12/06/2020	25/06/2020	10	17/07/2020	23/07/2020	5	Finish-To-Start	1_2_5	Concluded	100%	Pedro Baptista - 100%
1_2_7	1_2_7	3	Sprint 7	Workpackage	26/06/2020	09/07/2020	10	24/07/2020	30/07/2020	5	Finish-To-Start	1_2_6	Concluded	100%	Pedro Baptista - 100%
1_2_8	1_2_8	3	Sprint 8	Workpackage	10/07/2020	23/07/2020	10	31/07/2020	06/08/2020	5	Finish-To-Start	1_2_7	Concluded	100%	Pedro Baptista - 100%
1_2_9	1_2_9	3	Sprint 9	Workpackage	24/07/2020	06/08/2020	10	07/08/2020	27/08/2020	15	Finish-To-Start	1_2_8	Concluded	100%	Pedro Baptista - 100%
1_2_10	1_2_10	3	Sprint 10	Workpackage	07/08/2020	20/08/2020	10	28/08/2020	03/09/2020	5	Finish-To-Start	1_2_9	Concluded	100%	Pedro Baptista - 100%
mi_2	mi_2	3	All Implementation Complete	Milestone	21/08/2020	03/09/2020	10	03/09/2020	03/09/2020	0	Finish-To-Start	1_2_10	Concluded	100%	Pedro Baptista - 100%
1_3	WP_3	2	Fourth Iteration	Workpackage	04/09/2020	29/10/2020	40	04/09/2020	01/10/2020	20			Concluded	10%	Pedro Baptista - 100%
1_3_1	1_3_1	3	Testing	Activity	04/09/2020	17/09/2020	10	04/09/2020	01/10/2020	20	Finish-To-Start	mi_2	On Develop	10%	Pedro Baptista - 100%
1_3_2	1_3_2	3	Writing Thesis	Activity	04/09/2020	29/10/2020	40	04/09/2020	01/10/2020	20	Finish-To-Start	mi_2	On Develop	10%	Pedro Baptista - 100%
mi_3	mi_3	3	Thesis Discussion	Milestone	29/10/2020	29/10/2020	0	01/10/2020	01/10/2020	0	Finish-To-Start	1_3_2	Planned	0%	Pedro Baptista - 100%

Figure 1 – Thesis Work Schedule, Traditional

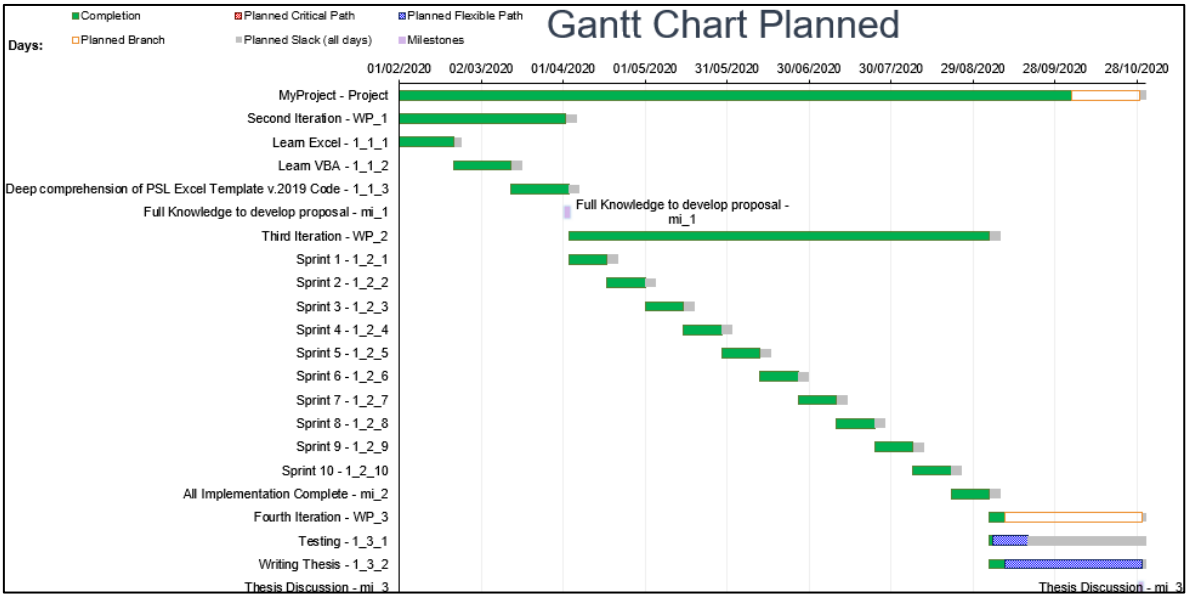


Figure 2 - Thesis Work Schedule, Planned Gantt Chart

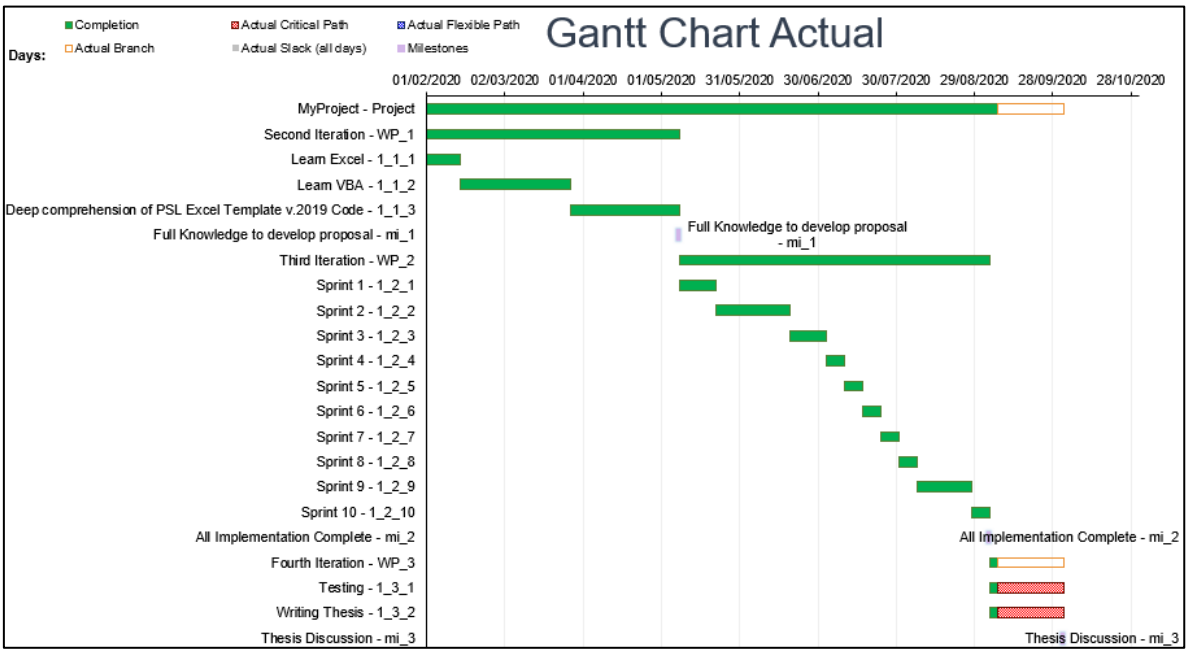
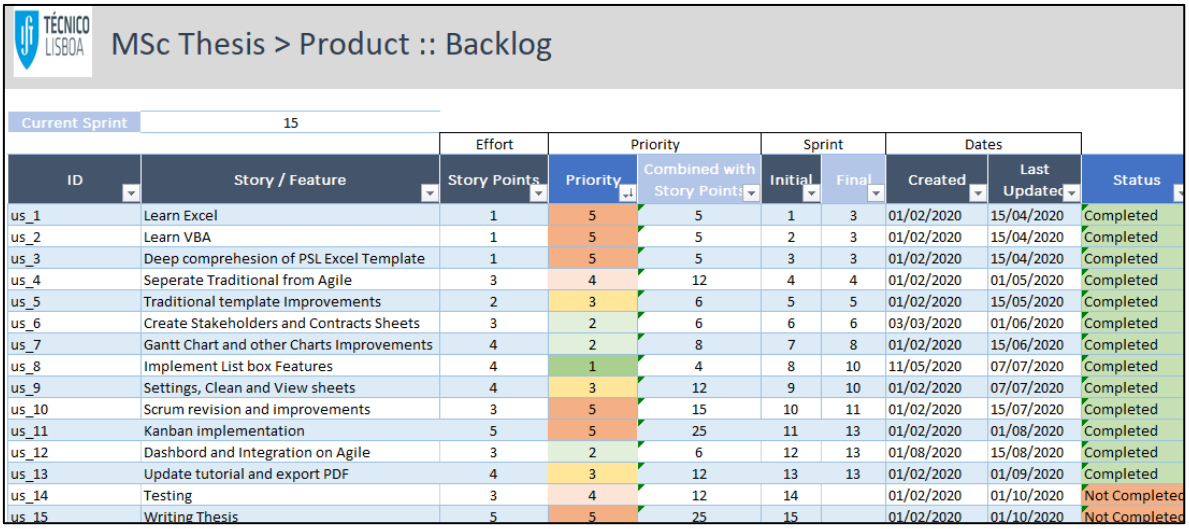


Figure 3 - Thesis Work Schedule, Actual Gantt Chart



MSc Thesis > Product :: Backlog

Current Sprint	15								
		Effort	Priority		Sprint		Dates		
ID	Story / Feature	Story Points	Priority	Combined with Story Points	Initial	Final	Created	Last Updated	Status
us_1	Learn Excel	1	5	5	1	3	01/02/2020	15/04/2020	Completed
us_2	Learn VBA	1	5	5	2	3	01/02/2020	15/04/2020	Completed
us_3	Deep comprehesion of PSL Excel Template	1	5	5	3	3	01/02/2020	15/04/2020	Completed
us_4	Seperate Traditional from Agile	3	4	12	4	4	01/02/2020	01/05/2020	Completed
us_5	Traditional template Improvements	2	3	6	5	5	01/02/2020	15/05/2020	Completed
us_6	Create Stakeholders and Contracts Sheets	3	2	6	6	6	03/03/2020	01/06/2020	Completed
us_7	Gantt Chart and other Charts Improvements	4	2	8	7	8	01/02/2020	15/06/2020	Completed
us_8	Implement List box Features	4	1	4	8	10	11/05/2020	07/07/2020	Completed
us_9	Settings, Clean and View sheets	4	3	12	9	10	01/02/2020	07/07/2020	Completed
us_10	Scrum revision and improvements	3	5	15	10	11	01/02/2020	15/07/2020	Completed
us_11	Kanban implementation	5	5	25	11	13	01/02/2020	01/08/2020	Completed
us_12	Dashbord and Integration on Agile	3	2	6	12	13	01/08/2020	15/08/2020	Completed
us_13	Update tutorial and export PDF	4	3	12	13	13	01/02/2020	01/09/2020	Completed
us_14	Testing	3	4	12	14		01/02/2020	01/10/2020	Not Completed
us_15	Writing Thesis	5	5	25	15		01/02/2020	01/10/2020	Not Completed

Figure 4 - Thesis Work Schedule, Agile

1.5. Structure

The structure of this report is as follows:

Section 2 provides research on the topic of project management and the technologies that are used during the project development.

Section 3 describes an in-depth analysis and evaluation of the software tools available on the market for project management.

Section 4 presents the thesis proposal and a thorough discussion of the general implemented features and changes.

Section 5 presents the alignments, transformations, and modifications of the PSL/Traditional-v.2020.

Section 6 presents the alignments, transformations, and modifications of the PSL/Agile-v.2020.

Section 7 includes the evaluation of the proposal.

Section 8 presents the conclusion of this research and the future work.

2. Background

This section explains the research regarding the topics of project management, specifically project planning, with a focus on agile project methodologies and PM^2. It also introduces the current state of the ITLingo initiative, specifically the PSL Excel template developed. In that context this section finishes with an analysis of the tools being used on the current Excel Template, namely Microsoft Excel, Visual Basic for Applications (VBA), Office RibbonX editor and the tool Software Key.

2.1. Project Management

Project management (PM) is the application of practices, principles, processes, tools, and techniques to project activities to meet project requirements [37], [38]. PM can be also described as an organizational approach to the management of ongoing operations [37] and the managers of these projects shall satisfy their stakeholders, the people involved and affected by the result of the project. To improve and disseminate the best practices of PM some international frameworks and standards have been defined, such as PMI PMBOK [38], IPMA ICB [39] or ISO 21500 [40]. For example, PMBOK describes a project as the combination of time, financial, and technical performance goals defined by the project stakeholders and, according to PMBOK, the analysis of the PM discipline is divided into five process groups: initiating, planning, executing, monitoring & controlling and closing; and ten knowledge areas (KA) integration, scope, schedule, cost, quality, resource, communications, risk, procurement, and stakeholder. The waterfall process [41] is one example of a traditional or predictive approach, in which a project is broken down into sequential and linear phases and tasks. All its phases are well defined since the beginning of a project, and a given phase only starts after the milestones of the previous phase are reached, and its deliverables formally accepted [6]. However, these processes often involve long planning phases with a big design up front and large documentation efforts and are not designed to adapt to changing requirements, unexpected events or even the interaction with customers [9].

Therefore, due to these limitations, agile methods, like Kanban [11] or Scrum [10], have increased their popularity over the last two decades, mainly because they have been able to mitigate some of these challenges by emphasizing collaboration within teams, active customer involvement, change tolerance, and iterative delivery of features in an uncertain context [9]. However, they are designed for small, self-organized, and collaborative teams that work closely with customers, which is not the case in many situations. Nowadays the need to develop or improve products and services is critical for the survival of any organization, and therefore these achievements have been conducted as projects. A project should be planned, analyzed, and controlled throughout its lifecycle and should

adopt the best approaches and software tools to support such effort regardless if these approaches are more agile or more predictive [51].

2.2. PM Agile Methodologies

Agile project management focuses on deliverables and respective customer feedback. To create those deliverables, it uses an iterative approach with small cycles because agile development is about continuous improvement over best practice. As such, agile methodologies have conceptual differences with traditional methodologies regarding three main categories [9]:

At a project level a traditional approach begins with a document with all the requirements while the agile approach collects them during the various cycles of the project, it may be riskier compared to a traditional approach but it removes uncertainty and is flexible to changes in the requirements.

Considering on project managers, in traditional approach they manage the project according to the budget, schedule, and scope, focusing on the whole process, while in agile approach they focus on deliverables and product value leaving time and schedule to secondary metrics.

Regarding the teams, the projects that apply the traditional approach can have more distributed teams while the agile approach requires a co-location of team members with a higher commitment level [9]. To achieve PM goals using the agile approach, there exist some frameworks, the most relevant ones are Scrum and Kanban.

2.2.1. Scrum

Scrum is a framework for developing and sustaining complex products [10]. Scrum was founded on the empiricism that asserts that knowledge comes from experience, and on every empirical process iteration there are three pillars present: transparency, inspection, and adaptation. Transparency consists of keeping the process visible and understandable for every party involved, those that are developing and those that accept it. Inspection consists of reviewing the Scrum artifacts at a given time to detect any flaws that may exist. Adaptation consists of adjusting the process of work as soon as possible to tackle the problems or undesired outcomes identified by the inspection. Scrum is categorized by Scrum's roles, events, artifacts, and the rules that bind them together [10] as shown in Figure 5. Scrum team is a self-organized and cross-functional group of people responsible for the completion of the project. These people can have one of the following roles:

Product owner: Responsible for defining the value of the product and the work of the development team. He or she is responsible for defining the product backlog with all its requirements and further changes can only be done or approved by him. Since he or she is responsible for these definitions, he or she is responsible for the outcome of the project and the work developed by the team.

Development team: Constituted by developers that work on the product backlog and produce a product along all the iterations including the final product. The team defines their work schedule and assigns their own work based on the product backlog. There are not any titles inside the team, so they are all accountable.

Scrum Master: The bridge between the most important parties of the project and ensures everyone understands Scrum. He or she helps the product owner to define the product backlog, aiming to maximize product value and facilitates the product owner's contact with the development team. He or she helps the development team understand the product backlog and the desires of the product owner, he or she also helps to solve any problem that may slow down the team. He or she helps the organization adopt the framework, helps the employees understand it, improves its effectiveness and its productivity.

Events are defined in Scrum to avoid unnecessary meetings outside of the established ones and allow a consistent flow of work. Other than the Sprint itself, which is a container for all other events, each event in Scrum is a formal opportunity to inspect and adapt something. These events are specifically designed to enable critical transparency and inspection [10].

Sprint: The iterative concept present in agile methodologies is defined on Scrum as a Sprint. The sprint consists of a well-defined period that cannot be changed afterwards where all the processes and activities are executed.

Sprint Planning: Usually takes eight hours and it is held at the beginning of a new sprint. All the members of the team are involved, and the content of the sprint is defined. The content consists of selecting what items of the product backlog are going to be done, how they are done and what are the goals to be achieved.

Daily Scrum: A flash meeting of fifteen minutes at the beginning of the day where the development team shows what they did on the previous day, what they expect to do on that day and if they found any obstacles towards achieving the sprint goal.

Sprint Review: Held at the end of the sprint with all the team members where it is discussed what the sprint has achieved and any modification that can be done on the product backlog to further improve the product's value.

Sprint Retrospective: After the sprint review, this last meeting is held with the goal of improving the team's productivity. Every member does a retrospective on the dynamics of the last sprint, what went well, how are the relations between members and what can be improved.

Artifacts represent the work of the project, provide transparency, and allow for inspections. Two main artifacts are:

Product Backlog: Is the core of the project to be developed. It is defined by the product owner and it contains a list of all the changes to be made in the product, consisting of features, functionalities, requirements, and so on. The backlog is not a static repository, because at an early stage it only has the initial requirements. It is updated and changed as the project is executed and receives feedback. These changes can be the addition of new requirements or refinement of current ones in terms of detail and estimation of work leading to a much larger list at later stages of the project.

Sprint Backlog: A list of items selected from the Product Backlog for the sprint. A plan for achieving the sprint goal and completing all the items. It allows for a live view of the team's remaining work and it can be changed daily.

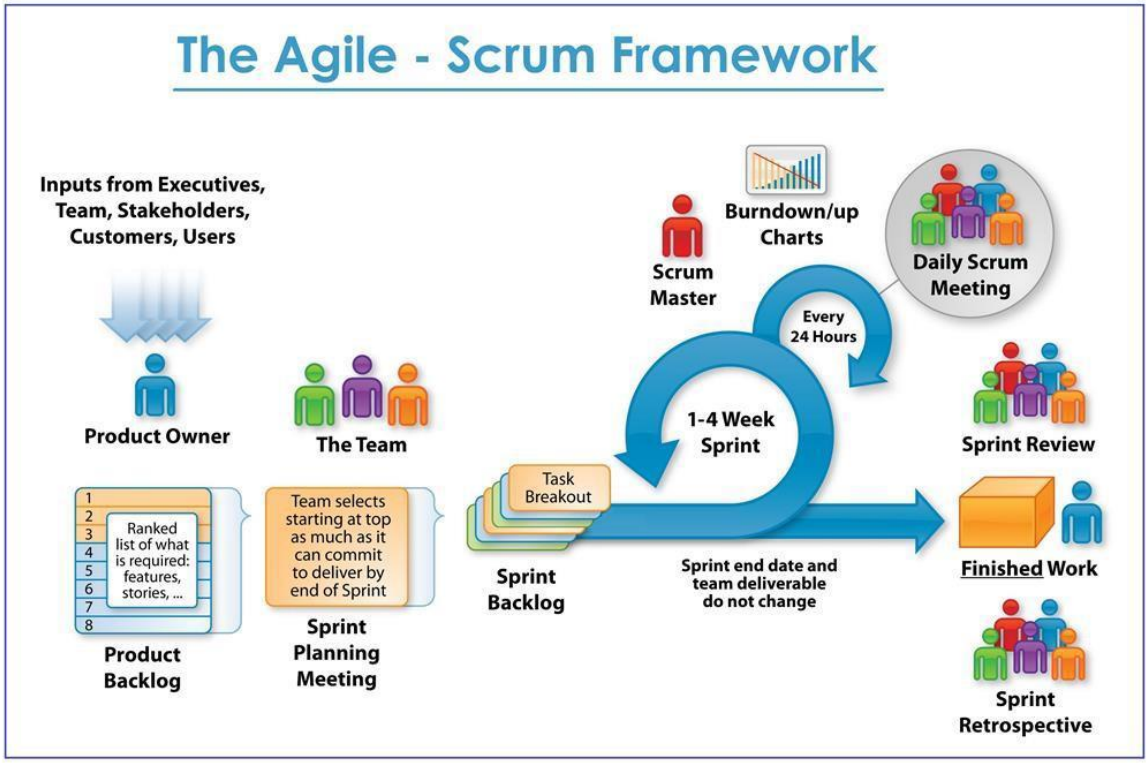


Figure 5 - The Scrum Framework [55]

2.2.2.Kanban

Kanban [11] is another framework for agile project management and its goal is to improve workflow to get things done and fast. To achieve this improvement, it divides the work into the smallest possible tasks and allows for a simple visualization of the workflow through a board, known as Kanban Board.

This board is divided in three major columns: To Do, In Progress and Done. These three columns can be extended with more columns to accommodate every situation, while the three concepts remain the same. Figure 6 is an example of a Kanban Board where “prioritized backlog” is the To Do column. The In-Progress column is divided into two columns, “Work-In-Progress'' and “Validate”. Finally, “complete” represents the Done column. The work is then divided into work items, these pieces or items are then written on a card and put on the board according to its current situation.

A critical aspect of Kanban is the use of a restriction to limit the quantity of Work in Progress (WIP), defined at the beginning of the project for each workflow state. This limit is not restrictive, but it gives the team an idea of the number of tasks that should be present in the In-Progress Column at every moment. This mitigates the team's underworking or overworking problem. The value of the WIP is defined by the team leader because he or she has a better understanding of each member's work capacity and the value is also correlated with the number of members in the team.

Another aspect of Kanban is its capacity to measure lead time and cycle time. The Lead Time represents how long an item took to move through all the operations to the finish line, the rightmost column. The Cycle Time is initiated when an item joins the In-Progress Column and finished when the item moves to the Done Column. That is how long it took to finish a task since it was started. Having a long Cycle Time could mean the tasks are not small enough, that the team is underperforming or that the WIP is too high. A long Lead Time with small cycle time means the number of input items, left column, is larger than the output items, right column, during a certain period. These three measures relate as follows: Lead Time = WIP / Cycle Time

Looking at the main qualities of Kanban compared to other agile approaches, Kanban is easier to implement and adopt, and consequently, it is a more gradual approach for teams that are looking to move from traditional to agile methodologies. Due to its simplicity, Kanban can be easily spread to an entire company after being adopted by a team, leading to more visibility to everyone on what the company is currently In Progress, creating one of the pillars of the framework workflow transparency. Another pillar is completing work before starting. This happens because everyone is focused on completing their assigned tasks before moving to a new one. This avoids multi-tasking which increases the likelihood of burnout [52]. This situation also leads to an increased customer satisfaction because the team focuses on what is on demand and does not create work to accommodate future demands, requests, or possible situations. Demands are delivered faster and easier because with the various metrics Cycle Time, Lead Time and WIP, it is simpler to achieve flow

efficiency since it helps pushing forward work and wasteful activities that sometimes could get stuck and delay its completion increasing the team stress. With this increased delivery frequency of customer demands the team gets feedback faster and feels accomplished which leads to an increased team morale. This approach allows for easy evaluation productivity across a team and it is better used on teams with constant flow of work and deliverables since it does not use time-boxes like the Sprints on Scrum. Teams that use the Kanban framework do not use predetermined roles, incentivizing cooperation and avoiding identity problems as they tend to have a stronger self-organization since all the processes of a task are well defined.

Kanban, despite having so many qualities, has also its disadvantages that are related to team discipline. There are no time constraints, and, because of that, deliverables can take longer to complete. It also requires the team to keep the board consistently updated because, otherwise, all the good qualities of the framework become ineffective and lead to poor productivity.

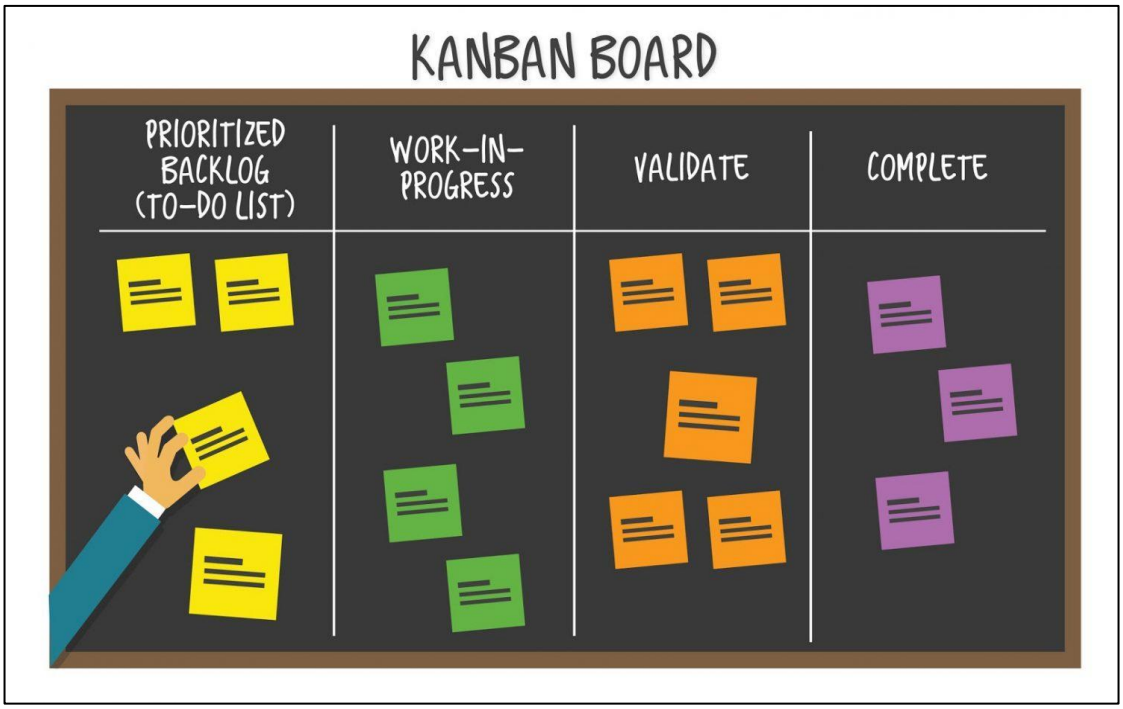


Figure 6 - Kanban Board [56]

2.2.3.PM^2

Moving further into project management approaches, a new approach that is slowly being adopted is PM^2. It does not get into the group of traditional or agile methodologies and it is not a general framework like PMBOK guidelines, it is something in between. It has been used for a long time by the European Commission and only in 2016 became open to the public. PM^2 is above all a mindset [12], it provides guidelines that are well defined and structured to ease its understanding and application. It follows the same phases as the ones defined by the PMBOK but inside each phase a manager

decides what processes are relevant for a project and those that can be left out. This gives more decision power to the project manager and with his correct assessment of the project needs, it will lead to better results upon the project conclusion.

PM^2 innovates the implementation phase by allowing the manager to decide if he or she wants to follow a more traditional approach with a sequential planning like waterfall, that may be useful for production projects, or an agile approach with multiple iterations, like the Scrum framework, that is more appropriate for projects that require a dynamic interaction with the client.

PM^2 ends up bringing the good of both traditional and agile methodologies, especially the novelty of its focus on the business and effectiveness aspects of a project. A new role is defined, the business manager. The business manager embraces the responsibilities that the traditional project manager has with the client. While the project manager focuses on the product, finding a solution and being responsible for the execution and production of the final product, the business manager keeps a close contact with the product owner, helping to identify the problem, defining requirements, fixing the budget and evaluating the business value of the product. This division tasks in two managers ensures more efficiency during the project development and effectiveness of the final product. PM^2 is still in an early stage regarding its adoption by companies. To change this scenario an alliance called the PM^2 Alliance focuses on promoting this new model, informing the public of its qualities and form managers so they can correctly apply it and bring it to their companies, in hopes they can adopt it in all their projects[13].

2.3. ITLingo PSL

The ITLingo [2] or namely ITLingo-studio is a tool composed of four languages: Requirement Specification Language (RSL), Application Specification Language (ASL), Project Specification Language (PSL), and Enterprise Architecture Specification Language (EASL). RSL supports the usage of Natural Language for writing requirements specifications, ASL is a textual language that allows the specification of software applications, PSL [3] builds multiple mechanisms and tools to provide a more rigorous specification of project plans. Focusing on PSL, it aims to provide something that other project management(PM) tools do not, the centralization of the project in one place [4].Currently there are many PM tools that allow the planning of various features of a project but none allows for planning all at the same time. This is where the PSL approach distinct itself from the rest of the competition. It defines a rigorous domain-specific language for project plans, using Xtext based on a PSL Excel Template.

The ITLingo studio allows editing these types of files and to verify its correctness. Among the studio features Import and Export are available for Microsoft Word and Microsoft Excel. The PSL Excel Template used as a basis for the PSL development was then further improved. This improvement

consisted in providing more detail and correctness to the already available features adding new features, automatisms, and validations systems. The new principal features consisted of a project report, a Gantt chart essential in waterfall methodology, support for the Scrum framework, financial features and a ribbon to incorporate most of the template features and macros [5] [6]. During this template's various iterations, the studio was never updated and so it is not up to date with the PSL Excel Template.

2.4. Technologies

This section describes the technologies that were used during this research and development of the thesis (see Figure 7).

2.4.1. Microsoft Excel

Microsoft Excel is a well-known tool distributed by Microsoft and is used on most companies for many purposes mainly to treat large amounts of data. Excel consists of spreadsheets with collections of cells distributed in rows and columns allowing for data management, these cells can have either just data or formulas to calculate the desired content for the specific cell based on other cells. It is a tool commonly used because it provides easy access to stored data, input of new data, simple to complex math's calculations, built in operations for alignment purposes, various types of graphs for representation, creation of tables, and development of macros. The macros are developed using another Microsoft tool, Visual Basic for Applications (VBA), described in more detail in the next section. All these characteristics permit the user to arrange the data and visualize it in various ways to satisfy his needs.

Excel is a common tool with a fast learning curve, but it still provides challenges to newcomers. To mitigate this problem, remove the need for users to fully understand Excel before they can use the PSL Excel Template and to improve the correct usage of the template, the template contains a tutorial sheet with the basic notions, organization and operations[14]. For more advanced users of the tool desiring more specific complex tasks the Excel Bible is the support they need since it provides a thorough walkthrough on every feature [15].

2.4.2. Visual Basic for Applications

Visual basic is another tool distributed by Microsoft, it is used to develop programs for the windows operating system [16]. Visual basic for applications (VBA) is an internal programming language for Microsoft Office tools [16]. VBA allows for programmers to customize the graphical user interface (GUI) and develop features beyond those already available. These features are accomplished using macros that translate a sequence of inputs, commonly referred to as events, into a desired output.

These macros were implemented on the PSL-v.2020 to remove the necessity of doing repetitive tasks and helping the user define the project specifications. They provide new features for a better user experience and to manipulate the data in new practical ways. The user can activate macros by clicking on elements in the new GUI that is customized with Office RibbonX. Other macros are always running in the background to validate data and lastly, there are macros triggered by user input. The actual process and operations are not visible to the user, but they are explained by the options name, support text and visual modifications.

2.4.3.Office RibbonX Editor

Office RibbonX Editor is a free, open-source tool that allows the customization of the ribbon using a Custom UI Editor for Microsoft Office [18]. It allows a user to open an Excel file and customize the ribbon as he or she sees fit, with new separators, new clickable items with the desired names and respective icons. The tool itself has no restrictions regarding the customization and provides a validation mechanism for the editor file. The repository where the tool is kept updated, has various tutorials and explanations that facilitate the learning curve for a new user. This tool is used to create and customize the ribbon of the PSL-v.2020 with the options that trigger (once clicked) the associated VBA macros.

2.4.4.Software Key

Software Key is used to license software securely. Looking at the distribution of paid software it is necessary to implement a secure system. This system is known as the instant protection plus (IPP), that uses public-key cryptography. The tool itself is distributed with a license meaning that there is only a trial-version of 30-days, and only providing the IPP3. Every computer has a unique identification meaning the tool does not work on computers that have not purchased any type of license beyond the 30-days trial. IPP3 provides a wizard-based interface and requires no changes to add the most used licensing and activation features [19]. With these restrictions and following the recommendation of the previous developer of the Excel Template [6] that guaranteed the viability of the tool to distribute the Excel Template, the tool is only tested and used during its implementation. Each feature of the template needs to be analyzed and evaluated to identify what should be available on the trial version. Consequently, this tool should only be incorporated when the template is close to being ready for distribution with all features implemented and a positive evaluation from user testing.

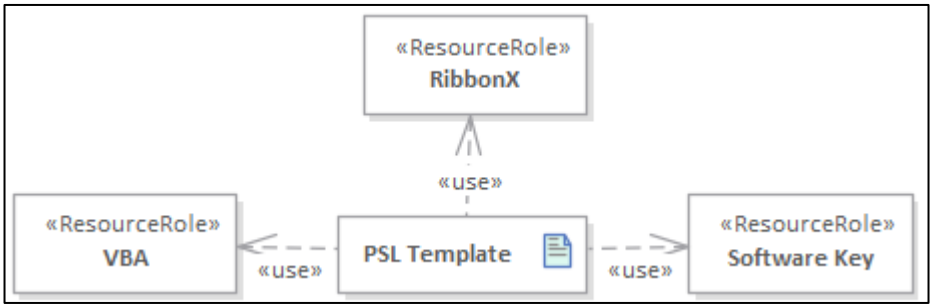


Figure 7 - Relationship between PSL-v.2020 Tools

3. Related Work

This section analyses the current state of PM software tools. With the introduction of Kanban, the improvements of the Scrum implementation and traditional approach, it is necessary to search, analyze and discuss the available market offers. This research tries to understand what other features exist and how they can help to improve the PSL-v.2020.

This analysis focuses on various aspects. First it analyses the supported methodologies, traditional or agile. The Traditional is analyzed in what knowledge areas are supported and Agile is analyzed in terms of support for Scrum, Kanban, and both.

Other analyzed aspects of both methodologies: customization options; user learning curve; simplicity to visualize critical data; generation of reports and graphs for presentations.

3.1. PM Tools

The following subsections shows the research of software applications for project management. These applications give a good overview of what features exist in the market for project management.

3.1.1. MS Project

The first tool discussed is Microsoft Project or MS project [21], another tool distributed by Microsoft. This tool is specialized on two sections of a project, the timetable where a Gantt chart is used, and the expenses where the resources are described. The Gantt chart is fully customizable, consisting of work packages, activities, milestones, and the multiple dependencies between them. The resources can be thoroughly described and allocated to a specific activity with a specific percentage. Together, these aspects provide a complete view of the project schedule and costs. This tool can be used alongside MS Share Point. The Excel Template does not have the same depth of features for these two sections, but they are still present and can be competently done. The allocation of resources is a feature that can be explored on the Schedule, Scrum and Kanban sheets of the Template.

3.1.2. ProWorkFlow

The next tool is complex and offers project management features at a larger scale. ProWorkFlow [25] focuses on five points of a project: time, tasks, staff, expenses, and reports. The tool is structured to accommodate multiple projects at the same time so all the user projects are viewed on the same page, they have their dates identified, the status of the project and a time graph with the projects. To create a project, the user gives the project details, can add a description, assign the staff involved in it and define an initial planning by choosing a list of templates, these templates are well elaborated

and specific to the many types of project listed. This page also has a project archive where the user can view and analyze previous projects.

The project page contains a brief overview of the staff, expenses, description, and a list of all the tasks of the project accompanied by a timeline. Innovating features are the possibility of automatically generating a PDF document, exporting the information to Excel, and sending an email. The tasks page shows the tasks from all projects and has a timetable for them as well, allowing a project manager to keep track of all the work but not relevant to a specific project. The timetable contains a timesheet, presenting a calendar view of all the work and can be deeply customizable on what tasks and information is shown. It also contains a timeline from a specific project that is no different from a Gantt chart. ProWorkFlow has a reports page that includes a list of reports template options that are automatically generated. These templates are well elaborated and specific to the PM going from project summary to expenses summary and staff workflow overview.

The tool allows managing multiple projects simultaneously, creating detailed reports for any type of presentation and consistently organizes the four focus points without ever feeling the user has too much information on its hands. For the correct application of the remaining ten KA it is necessary to use different software tools and this is the problem of ProWorkFlow.

3.1.3.Confluence

Confluence is distributed by Atlassian and is focused on the traditional PM approach like MS Project and ProWorkFlow. It is primarily a collaborative tool with a vast number of features. The main idea of Confluence is that every web page is a blank page that is developed from scratch and can be customizable by any user at any time. A page is divided in three major groups, personal space, team space, and project space. In each group, there is an option to give different permissions to each member. This type of customization is ideal for a manager who is involved with different teams for the same project and to add more specific content, like milestones, the user can add specific features, like tracking, comments, and others. The tool does not provide PM templates like ProWorkFlow since all the pages start from blank, but there exist features for almost any type of content. From Project descriptions to content tables, activity schedules, risks table, Jira projects, and more. While the blank pages with full customization is what makes confluence a strong software tool it makes it difficult to use for newcomers, inexperienced with the tool, but most importantly managers that are fairly new to the traditional methodologies do not have a base template to guide them through the process.

3.1.4.Azure DevOps

Azure DevOps [27] is the Microsoft tool for teams that use agile methodologies either Scrum or Kanban. The application of these methodologies is provided by a group called boards that provides various divisions: work items, boards, sprints, backlogs, and queries. Each of the pages has more

features and the most common is analytics that provides important KPI (Key Performance Indicator) metrics. These groups are interconnected meaning that a change on a board can affect, if the user wants, the current sprint, backlog and working items. They are also customizable to every detail, meaning the user can choose what he or she wants to see at each group page and there is also a global option to choose which features should be present across the whole tool. The previous aspects are good but what sets Azure DevOps apart from its competition is the other groups called: repos, pipeline, test plans.

The repository allows for the incorporation of the code being developed, either using a new one or incorporating from other online repositories like Git.

Pipeline allows for the application of a pipeline architecture during development, this architecture consists of a series of instructions that are overlapped during execution. This process is divided into stages that are connected sequentially with each other creating the pipe like structure.

Test plans are more focused on testing the code allowing for the creation of tests and consequent run on the repository code leading to a centralization of everything, code, test, plan, methodology.

Azure DevOps ends up feeling short for the long loading times for switching between any page on the website but it compensates this problem with the many export options it has: saving as HTML, email items, export as CSV and open a section with Microsoft Excel and Microsoft Project.

3.1.5.JIRA Agile

JIRA agile [26] is a versatile software that can be used for Scrum and Kanban. For the application of the Scrum, JIRA identifies the important items: Sprint and Backlog, and uses a board to demonstrate the stages of the items on the current sprint. This board features item management, item visualization, drag and drop, reorder an item on the backlog, sprint planning, use Story points, Hours, or a new unique method to estimate a sprint effort. For sprint tracking, management and Daily Scrum meetings JIRA Agile offers customizable workflows and a custom dashboard to accommodate the team's special needs.

A Kanban type project has a Board working with drag and drop functionality using Story Cards, a cumulative flow diagram and a control graph. The control graph is particularly useful to follow the work items with a different perspective. Other features present are WIP limit configurations to avoid bottlenecks and ensure the flow is smooth customization of the columns and creation of swim lanes to group up work. The most outstanding feature is the flexible workflows that allows a team to have a central workflow as normal or different workflows for different types of items. JIRA Agile also offers multiple report options KPI's.

The software has all the features required to apply the most common agile approaches but what distinguishes JIRA agile is the interoperability between Scrum and Kanban where the board

on each project type can be adapted to the other as the items offer no constraints regarding their use on either one of the frameworks. This feature is an opportunity for teams to enjoy qualities of both approaches and using a mixed methodology mostly known as Scrumban or Kanplan.

3.1.6.Asana

Asana [28] is a similar tool to JIRA but simpler and more customizable. The concept behind Asana is offering the user with seven categories, list, board, schedule, panel, calendar, progress, and forms.

List contains a customizable list with all the project tasks. Board is a direct transformation of the list section into a Kanban like board, where the customization options are the same and it uses a drag and drop feature to move items around the board. Schedule is a representation of every task from both list and board at the same time, organizing it to facilitate the project management and ensuring it reaches the desired goals. Calendar contains a classic calendar where each item is allocated in the respective date. Panel section contains a dashboard of the most relevant KPI of the project. Progress shows the most recent modifications of the project. Lastly, Forms provide a customizable template to transform requested work into items. Each of the categories are straight-forward on what they offer and have a fast learning curve. These categories can be customized to the user needs and are supported with a personal section for each team member, a conversation section to discuss ideas or project information and an archive section to review concluded items.

Asana flexibility makes it usable for Scrum, Kanban, or a mixture of both, like JIRA Agile. The tool is easy to understand, making it ideal for teams that are looking to start using agile approaches before transitioning to JIRA agile.

3.1.7.Quire

Quire [29] is the simplest it gets for using a Kanban approach. The software starts from a simple principle of unfolding ideas, a user creates a breakdown list of all the tasks with tags, deadlines, and collaborators. Moving from there the software allows for the creation of a board and inserting the tasks on the respective column that is fully customizable. These tasks can then be moved from column to column as they move through the process. On the last page there is an overview of all the tasks with a timeline and a progress statistic. Quire is a minimalist software that guarantees success and user satisfaction with visualizing and managing a project.

3.1.8.Smartsheet

The last tool analyzed was Smartsheet [23]. This tool is like an excel template since it is divided by sheets each focusing on a different area of the project. These sheets can be customizable during

their utilization and upon their building phase, where the user is presented with various pre-built templates that can be used for managing tasks, creating timelines or dashboards. Besides having these customizations there are other two major differences compared to an Excel Template. The first one is the flexibility of a sheet, the same data can be used for different purposes and different views on the same sheet, for example it can be a grid, card, Gantt or calendar view and the user just needs to indicate the one desired at every moment. The second one is providing the users with live updates, since Smartsheet is built on a cloud service every member can work simultaneously on the sheet. Some other features also include the creation of a new form; creating workflows that are extremely useful for dependencies between sheets or even notifying the team if a specific change is made; importing date from Microsoft Excel, Microsoft Project, Google Sheets and Atlassian Trello, and the options of exporting directly to Microsoft Excel, PDF, Microsoft Project, XML format, and Google Sheets.

Smartsheet can almost be described as the next generation sheet it terms of features, flexibility, and customization. The tool also has a vast market because it can be used for dashboard, Gantt charts, budget management, sprints, and Kanban boards. Smartsheet is the direct rival to the PSL-v.2020 and while the Template provides support to all areas of the KA, it can improve in terms of flexibility and customization.

3.2. PM Excel Templates

The following subsections shows an analysis of Excel Templates that allow a project manager to do his management. These templates were used as a base study for possible improvements of the PSL-v.2020 since they are all built on the MS Excel tool.

3.2.1. PSL-v.2019

The PSL-v.2019 is the last iteration of the PSL-v.2020 and has many improvements and new features compared to his predecessor. Minor improvements include the addition of movable objects, reorganizing the sheets and creating new charts. The configuration sheets were restructured to tackle some problems and now are separated between two groups: configuration sheets that require user input and the ones that need to be kept inalterable. On a similar note there were cells that got consistently altered by the user when they should not. To address this situation, a sheet protection is now present that protects cells content from undesired modifications. The new features include the software license, export to word and a Customized Ribbon. The software license makes it possible to distribute the trial version of the template by using the Software Key tool. The export to word feature makes a simple copy of the sheets selected by a user on a Word file. This Word file can then be altered and its data modifiable for various purposes. The Customized Ribbon allows the use of macros developed in VBA that facilitate the insertion of data, removes the necessity of performing

some tasks and execute other operations like the Export to Word Feature. The features triggered by clickable buttons on sheets were removed and are now present on the v2019 Ribbon alongside a list of new features.

This template is evaluated using a fictional project, designed for the course of Information Systems Project Management of the year 2018/2019. The application of this project to the v2019 is successfully done, where the template allows performing all the tasks required for a traditional approach. The fictional project has the execution phase using the Scrum Framework and trying to support this framework with the template is a much more difficult and unsuccessful task. The template is currently divided into ten groups of sheets. Eight defined by the PMBOK for classic approaches: integration, scope, time, resources, quality, risks, communication, and costs. The number nine is the issues group and number ten support agile approaches named agile. Each group consists of various sheets that contain tables to store the appropriate data and, in some cases, graphs. The Tables contain various columns that are protected and cannot be altered, and rows to fill. While most of the cells on each table require user input some contain formulas that utilize information already present on other cells to automatically fill the cell data. These tables are supported by graphs for a better visualization of the current information.

The evaluation also led to identification of problems. Some of the minor problems arise from bugs and others from user mistakes like deleting a graph leading to the failure of some features, since they exist for some graphs. Another problem comes from the impossibility of customizing validation lists to the user's needs. The Template is also not ready to support any agile methodologies, despite trying to do so for the Scrum Framework. Lastly, what differentiates the PSL-v.2020 from the other market offers is the ability to support all ten KA but as described above the Template only contains eight groups missing the Stakeholders and Procurement groups.

3.2.2.Office Timeline

Office Timeline [24] is a platform that has a wide variety of Excel Templates for PM. Some of these templates were used as case study for previous iterations and for this iteration agile templates were prioritized over traditional ones. The templates were all consistent between them, showing dark colored tables, with light colors for the status column and for the graphs. The most important aspect of these templates is the automatism between the data and the time graph that is updated live as the user makes additions. An add-in for PowerPoint that allows for an instant transformation of the excel data into PowerPoint data is available but was not tested. PowerPoint is still the most used tool for presentations and because of this reason, the export feature is the strongest asset of these templates.

3.2.3.Gantt Excel

Gantt Excel [20] is a template that allows the user to create a Gantt chart with minimal difficulty. It consists of three sheets, one being the project plan, the other consists of a Dashboard and the last one is the help sheet. The project plan sheet is divided in half, the left side has the table ready for user input and on the right, is the Gantt chart. Each table row contains a task and its properties: WBS, name, priority, resources, schedule, status, costs, and notes. The Gantt chart has all the visible information one could expect, tasks schedule, dependencies between them and status. The template dashboard sheet contains a view of the most important information of the project regarding the plan and the costs.

To insert data the user can simply click on the add task option present on the ribbon and it pops up a toolbox to insert all the desired data and the macro does the rest. The template has more insertion options on the ribbon for creating tasks, dependencies, managing resources and customize the view. This customization is what separates the Gantt excel from the competition, allowing a simple, intuitive, and practical way of changing the information that is given to the user by user choice. The user can decide what tasks are shown between completed, in progress and planned. He or she can decide how the chart is visible either by day, week or month and he or she has features for navigating the chart alongside total freedom to choose the colors for everything in the sheet. It is also possible to modify the configuration sheet, but the user is warned that changing the sheet can lead to incorrect outcomes.

Only the trial version was tested so the grouping options were not available and only one Gantt could be used at a time. Still, it was possible to identify some problems. Unlike the Project Plan sheet, the Dashboard sheet has no features and is unprotected meaning that the developers expect the user to create graphs to accommodate his needs.

3.2.4.Vertex42

Vertex42 [22] is a platform containing various excel templates for different tasks of project management, having various options for the project time (Gantt charts) and project budget. This research focused on the options available for agile methodology, that consisted only of Kanban boards. An example of an Agile Kanban Board template consists of two sheets. One sheet with the sprint history that was manually edited and the sheet with the Kanban Board. This sheet has a table comprising various columns with each phase identified by different colors and by headers. Inserting and editing data is done manually with the sheets having just a few formulas for calculating the state of the sprint progress. There is also a Project Management KPI Dashboard available that contains some metrics for analyzing the performance of a project, but it is locked behind a 39,99$ price and for that reason it was not tested.

3.3. Tools Comparison

Many tools are available on the market and they tend to specialize in either one of the two groups of methodologies approaches: traditional or agile. Tools for agile approaches are mostly known for their collaborative features and for directly supporting agile methodologies like Scrum or Kanban; some of these tools are Jira, Azure DevOps, or Asana.

On the other hand, tools for traditional approaches still tend to be collaborative and to follow international frameworks and standards but, in general, they do not support the majority of the KAs of PMBOK. Some of the most popular tools are MS Project, ProWorkFlow or Confluence. For example, MS Project provides a rich and flexible set of features but mainly focused on schedule, cost and resource KAs; ProWorkFlow features vast report templates and allows an overview of multiple projects simultaneously; and Confluence is oriented towards scope, communications and quality. Since these tools do not support all the KAs, project managers must use more than one and to also use Office tools like MS-Office, Google Docs and Sheets, etc. This usually means that a project manager needs to add and manage repetitively the same information in various tools.

The PSL-v.2020 is a tool that tries to mitigate this problem. The Template considers the same international frameworks and guidelines as the other tools but proposes a solution using just one tool that integrates the information spread in such different KAs. It is an Excel template and, therefore, is a simple to use tool, with a fast learning curve that takes advantage of the MS-Excel tool itself by adding further data and features. The template provides validation mechanisms for the inserted data and includes automation features regarding data alignments and transformations. These features provide many options to the user and promote productivity by removing the need for manual or repetitive tasks. Comparing this Template to other available tools, despite its coverage and easy to use and adoption, it loses in terms of collaborative and reporting features. The motivation behind the development of this tool is to allow a project manager to elaborate their plans in a single tool, while providing extensive validation mechanisms and macros that automate several tasks. Considering this general objective, the platform chosen to develop the Template was Microsoft-Excel because it is one of the most popular and most used tools for data management. MS Excel allows every user with a bit of technical knowledge to adapt the initial template to his own needs and use the macros to do the repetitive tasks.

This comparison between all the tools referred before for project management application are compared in terms of: KAs support; Scrum use quality; Kanban use quality; relation between Scrum and Kanban in terms of interoperability features between the two approaches; Customization ; User learning curve; how the data is visualized in terms of presentation quality; generation of reports. The symbol “+” is used as a metric, in absence of the symbol it means the tool does not provide the functionality.

Table 1 - Comparison of tools based on traditional approaches.

	KAs support	Customization	User Friendliness	Report Generation	Data visualization
PSL-v.2019	+++	+	++	+	+++
SmartSheet	++	+++	++	+	+++
MS Project	+		++	++	+++
ProWorkFlow	++	+	++	+++	++
Confluence	++	+++	+	++	+++
Office Timeline	+	+++	+++	+++	++
Vertex42	++	++	+++	++	+++
Gantt Excel	+	+++	+++	++	++

Table 2 – Comparison of tools based on agile approaches

	Scrum Support	Kanban Support	Scrum & Kanban	Customization	User Friend	Reports Generation	Data Vis
PSL-v.2019	+			+	++	+	+++
SmartSheet		++		+++	+++	+	+++
Azure DevOps	+++	+	++	++	+	+	++
JIRA Agile	+++	++	+++	+	++	++	++
Asana	+	++	+	++	+	+	++
Quire		+++		+	+++	+	+++
Vertex 42		++		+	+++	+	+++

4. Proposal

In the previous sections, the research done on the fundamental topics for the tool development was discussed. As seen in Section 2, the research focused on understanding the PM methodologies, particularly the agile ones. In Section 3, the focus was on the available PM software tools, excel templates and most importantly the PSL-v.2019. All this research created the groundwork for the development of an improved Excel Template.

This new version keeps all the qualities of the previous version, fixes some of its problems and provides many new features. These problems are bugs, incorrect results, low scalability, and low tolerance to user error. These modifications are some minor technical improvements, a new architecture, the addition of missing KAs, RAM configuration options, Gantt chart configuration options, a new agile template, support for Scrum, support for Kanban, template options to improve user experience and an export to PDF feature. All these features are discussed in detail on the following sections.

4.1. Improvements

The first thing to be done is to improve the quality of this tool by rectifying and improving the v2019 shortcomings. Some examples of its shortcomings reside on bugs: having one more day on the schedule and the not working “Import from OBS” feature in the Cost.expenses sheet are some examples. Another visible problem is the lack of consistency between all sheets, where for example the Int.Project sheet does not have an automatic ID generation like the rest of the workbook. Lastly, some features are hardcoded, and there is some added difficulty to scale validation lists or add columns to tables.

Starting with the bugs:

The “Update Weekly Schedule” on Weekly Schedule does not work. Since the sheet is protected it is not possible to make direct actions on the table such as filter, add or delete rows and columns. A simple fix to is to temporarily remove the sheets protection once the macro starts and protect the sheet again once the process is complete.

On Integration.Charter the “Update Project Charter” option does not consider the business benefits, success criteria and success factors. This problem occurs because these three groups are not tables so there is no direct link to where the groups start. Turning said groups into tables makes it possible for the update process to identify and copy the tables’ content to the desired sheet. The process code is shown on Figure 8.

```
i = 1

    For Each Cell In BBID

        If Not BBID.item(i).Value2 = "" Then
            Set srcRow = tbBB.ListRows(i).Range
            Set oLastRow = tbCBB.ListRows.Add
            srcRow.Copy
            oLastRow.Range.PasteSpecial xlPasteValues
            Application.CutCopyMode = False
        End If
        i = i + 1
    Next Cell

j = 1

    For Each Cell In SCID

        If Not SCID.item(j).Value2 = "" Then
            Set srcRow = tbSC.ListRows(j).Range
            Set oLastRow = tbCSC.ListRows.Add
            srcRow.Copy
            oLastRow.Range.PasteSpecial xlPasteValues
            Application.CutCopyMode = False
        End If
        j = j + 1
    Next Cell

k = 1

    For Each Cell In SFID

        If Not SFID.item(k).Value2 = "" Then
            Set srcRow = tbSF.ListRows(k).Range
            Set oLastRow = tbCSF.ListRows.Add
            srcRow.Copy
            oLastRow.Range.PasteSpecial xlPasteValues
            Application.CutCopyMode = False
        End If
        k = k + 1
    Next Cell
```

Figure 8 - "Update Project Charter" new code

Scope.Milestones has a suggestion to organize a column to produce better results on the Milestone Time Chart. This originated a problem because the filter option is locked behind the protected sheet, creating an exception to allow filter options on this specific table fixes the problem.

On Resources.RAM the "import from WBS and OBS" feature does not import all the entities and multiple uses of this feature produces multiple copies of the table. This is fixed by cleaning the RAM in an import scenario, with user authorization.

On Cost.Expenses a problem exists that is transversal to the workbook and Excel. Some of the macros on this sheet insert formulas on specific cells using the English notation. If a user is working with a different language, this operation leads to an error because the formulas are written on English. To correct this problem the user needs to install the English Version of Excel and he or she can do this on Microsoft's personal page by changing his language to English. This is not the best solution but to this date it is the only available. Microsoft customer support did not provide any other solution, but this problem needs to be addressed.

Finally, the agile sheets contain many bugs, from import features to Generate IDs, to incorrect graphics display and some of the sheets are still in development. All these problems will be discussed in Section 6 alongside the restructure and Scrum improvements.

In terms of Sheets changes and minor Improvements:

The first change is on the workbook main theme colors, Figure 9. The new colors are present on every table column and each color represents the type of input for every cell on that column. Grey-Blue requires a user input, Blue means each cell has a data validation list and light blue indicates the presence of formulas on each cell and so it does not require any type of user input.

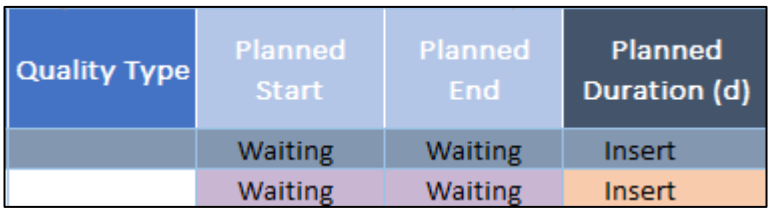


Figure 9 - Workbook main theme colors

Dashboard sheet General information was changed so now instead of a Horizontal description of the project dates, costs and the project status, it has a vertical display to maintain the Excel Tables pattern and to maintain consistency with the other sheets, Figure 10. Another change on this sheet is the new set of colors. These colors are consistent between all the graphs, were green stands for a positive outcome and red for a negative one. All the color choices are made based on the color spectrum to create a good distinction between each Category.

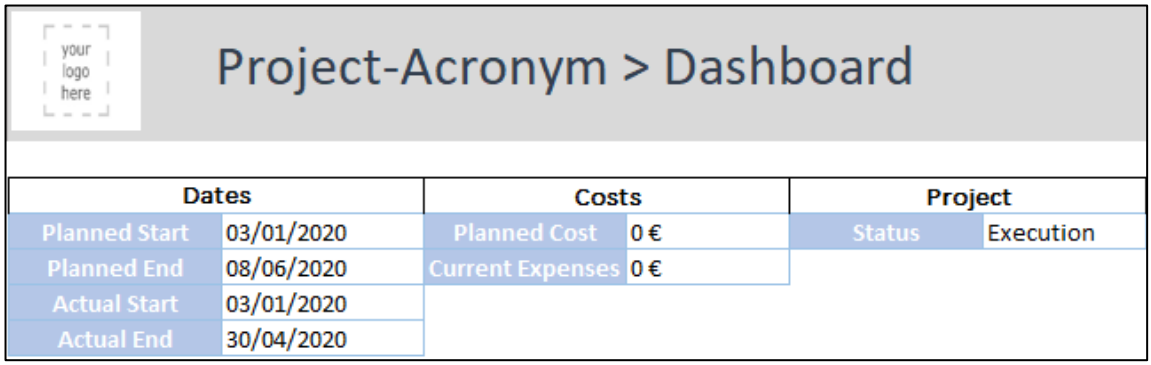


Figure 10 - New Dashboard

Integration.Project sheet has four changes. The first one is the removal of the Price vs Cost graph because of the project information sheet and the graph is already present on the dashboard. The second change consists of creating a Success Factors table to contain the relevant information as mentioned in the previous bugs correction. The third change is the creation of a dependency between the Entities Involved and the Stakeholders group. Each column now has a Data Validation List with a dependency to the previous column choice, meaning that once the user chooses the Entity type, the only available Entity names will be the ones that have that same type. This also happens for the

sponsor and project manager, where each cell list only contains people associated with the Entity name. The last change is the introduction of Project Phase, this phase differentiates three states: Plan, Execution, Close. These states are not only informative but also works as a state control for other project sheets. Depending on the project phase, sheets will have different visible columns and different project information to better accommodate the job of the project manager.

Scope.Milestones sheet now automatically inserts the WP Name based on the WP ID chosen from the data validation list to the respective milestone. The sheet now has two time charts, one for the actual dates and another for the plan dates. These graphs and the column dates are now dependent on the project phase. The Plan phase shows the Plan Milestones chart and their Planned dates, execution phase shows the actual milestones chart and their actual dates, while the Closed phase shows all the information.

Scope.Deliverables sheet now has the same improvements as the Scope.Milestones sheet. Automatic WP name, two time graphs and dependency with project phase.

Resource.Resources is a new sheet that accommodates all the project resources. This sheet is necessary to identify HR, travels, equipment, materials, services, suppliers, general and capital. The resources can then be associated to one person and the respective organization is automatically filled. The sheet has two options: “Generate ID” uses a different ID generation mechanism that uses a different tag for different types of resources to facilitate its reference in other sheets; “Import People” fills the table with resources of the HR type that are imported from the Stakeholders.People sheet.

Cost.Budget previously known as Cost.Expenses now has a working feature to import all the resources already defined on the previous sheet. The operation imports all the resources IDs, and the table uses a formula to automatically insert the respective name. It is also possible to manually add an item to this table but there is a validation list that contains only the resources already defined.

Comm.Meet has two new features: “Generate Positions” works like the same feature on other sheets and defines the positions on the time graph so the information is properly displayed; “Graph Configuration” is a new set of features that are discussed in more detail in future section that allows the configuration of the view of the graph by a time scale that goes from weekly to annually and by a start and end date, Figure 11. This facilitates the identifications of important dates.

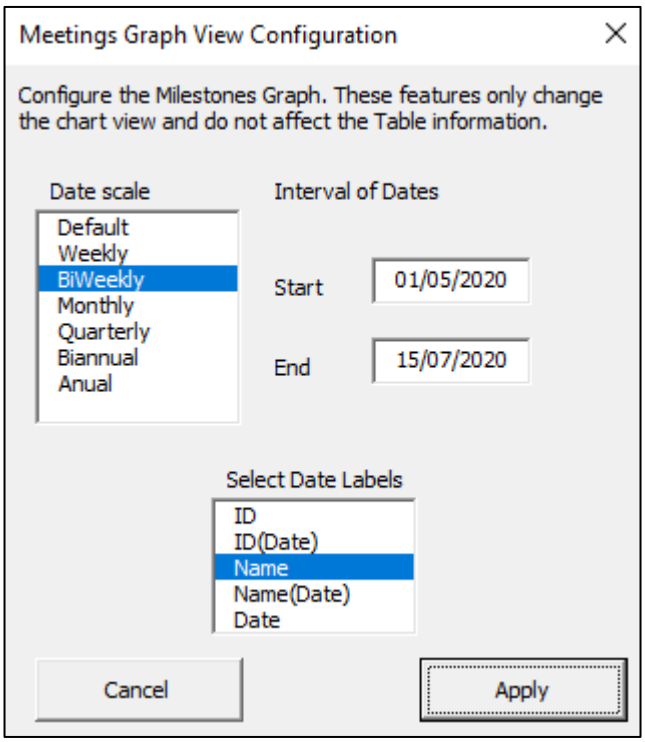
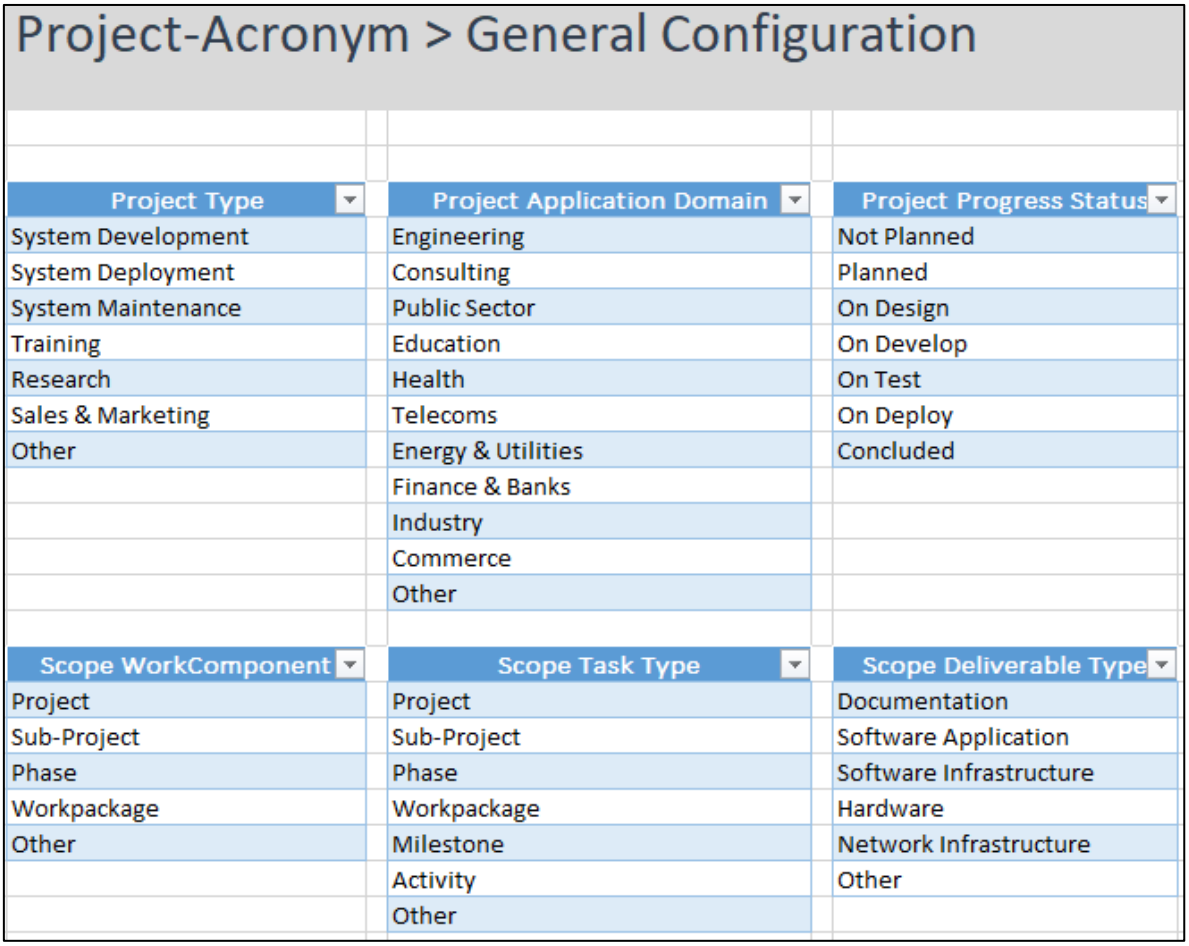


Figure 11 - Comm.Meet "Graph Configuration" menu

Scope.Requirements contains three new columns to better identify some characteristics of a requirement. The priority column is essential to the planning of a project because it indicates which requirements are most important to considerate. It now also has the Defined By group that indicates who defined the requirement and the Date.

Lastly, overall workbook changes were necessary to tackle some of these template problems: scalability, maintenance, and updates. The changes focused on the configuration sheet, export to word feature and macro addresses.

Conf.General sheet contains most of the table statistical values used on the data validation lists. These tables include, resources type, project type, risks probability and many others. The problem with this sheet was adding a new value to a data validation list. This happened because the lists were not tables but just a specific group of cells. This meant that adding a new value implicated changing the data validation list reference cells. This is impractical to a developer and impossible to a user because the sheet is protected. This is no longer the case. Each list of values is now a table, and the data validation list now refers to the columns of the table. This is a dynamic reference because the validation list reference adjusts to every new row on the table. So now it is only necessary to add a new row and insert the desired value to properly update a validation list (see Figure 12).



Project-Acronym > General Configuration

Project Type	Project Application Domain	Project Progress Status
System Development	Engineering	Not Planned
System Deployment	Consulting	Planned
System Maintenance	Public Sector	On Design
Training	Education	On Develop
Research	Health	On Test
Sales & Marketing	Telecoms	On Deploy
Other	Energy & Utilities	Concluded
	Finance & Banks	
	Industry	
	Commerce	
	Other	

Scope WorkComponent	Scope Task Type	Scope Deliverable Type
Project	Project	Documentation
Sub-Project	Sub-Project	Software Application
Phase	Phase	Software Infrastructure
Workpackage	Workpackage	Hardware
Other	Milestone	Network Infrastructure
	Activity	Other
	Other	

Figure 12 - General Configuration

Export to Word is a new addition of the v2019 but it has some problems particularly with scalability. The Macro is developed with specific cell references for each sheet meaning that any changes made on the sheet can produce undesired outcomes. To fix this situation the feature now uses relative references to export for others, this means that the macro considers the table reference by its unique name and then calculates on what cell address the table ends. On top of this, the macro now also does different partitions for different tables leading to a more desirable structure on the MS Word file.

Lastly, the template already had a vast number of sheets that can be hard to maintain and provide constant updates while most operations still used direct cell addresses. To fix the scalability problem with using direct cell addresses, the macros now use relative addresses on its operation the same way they now do with the Export to Word feature. Relatively to the large number of sheets and considering the extension of the Scrum support and the addition of the Kanban support, the template is now divided in two separate templates as we will discuss in the next section.

4.2. Tool New Structure

The PSL Excel Template started as an extension of the PSL Initiative. Its first objective was to validate the language defined on the initiative. Since then, the Template has evolved to much more than that and is now a self-sufficient tool to support project management methodologies. In the current state the template can no longer be used by the ITLingo studio since it is not up to date. With the evolution, development, and iterations of the template, one important aspect was kept the same, its architecture. The tool kept on getting new functionalities and new features to support other frameworks, like Scrum. This made the template a long workbook with a considerable number of sheets and some groups did not relate, or use, any functionality that connected them to the rest of the groups. At this state the tool is difficult to maintain, iterate and if a user only wants to utilize the tool to support one of the available methodologies, the rest of the sheets only serve as a burden for the user and the excel.

To mitigate this new problem, a new solution is required. This solution not only targets the previously mentioned problem, but it also considers the addition of future support mechanisms for other frameworks like Kanban. The Tool is now divided in two different templates, the traditional to support traditional methodologies like Waterfall and the agile to support the application of Scrum and Kanban Frameworks. The traditional template now has the v2019 sheets for the respective traditional methodologies with a new organization and has four new sheets: Stakeholder.Organizations, Stakeholder.People, Resource.Resources and Procurement.Contracts. Some of the existing sheet names are changed to better represent the KA that they support, and the sequence of the sheets is changed with the same goal. The new architecture of this tool is shown on Figure 13.

The agile template contains the sheets from v2019 focused on the Scrum framework but besides these the sheets, few other things are kept, and they will be further discussed in a later section. Joining those sheets are the four new sheets: Stakeholder.Organizations, Stakeholder.People, ProjectIntegration, SprintAnalyzer, Kanban and Kanban analyzer. All the sheets were renamed and lost their “Agile.” identification because it no longer serves as a distinguishable category inside the workbook. This template now consists of three groups. Project has the Stakeholder.Organizations, Stakeholder.People, ProjectIntegration, Team and Team Analyzer sheets. Scrum contains four sheets to correctly support the framework: Product Backlog, Sprint Backlog, Sprint Analyzer and Sprint History. Kanban has the two necessary sheets: Kanban and Kanban Analyzer. These groups are all connected to each other with mechanisms, transformations, and features to facilitate the application of a framework and to provide a better experience to the user. This restructure is detailed in a next section, but the architecture can be already seen in Figure 14.

Figure 13 - PSL/Traditional-v.2020 Architecture

Figure 14 - PSL/Agile-v.2020 Architecture

Now the tool has more advantages with its division in two separate templates. It can still be used as a validation for the PSL language once it is updated and implemented on the ITLingo Studio. New users can now apply their traditional methodologies without having the unnecessary sheets that support the Scrum framework. The same can be done by users that want to apply either Scrum, Kanban, or both. This independence reduces the amount of data present on just one excel workbook since the configuration lists are now separated, the ribbon and the respective VBA code is also separated and it is much easier to update either of the template versions. All this division did not remove any of the transformations and features that were present on the v2019, the architecture merely distributed data that was not related logically or practically. In terms of the new architecture it facilitates future specialization, development, and evolution of the tool for both methodologies. It keeps its most distinguishable quality, the only tool in the market capable of supporting the ten KAs defined by the PMBOK and can now find its place as a tool that supports the application of agile methodologies.

5. PSL Traditional Template

This PSL/Traditional-v.2020 supports all the 10 KAs as defined by the PMBOK, namely: integration, scope, schedule, cost, quality, resource, communications, risk, procurement, and stakeholder. These areas (KAs) are distributed among different sheets but maintain logical and structural dependencies between them. Many Excel formulas presented in various cells and tables assure those dependencies and validate the consistency of data. Some sheets with data configurations are also available to the users. On top of this, a specific Excel ribbon logically aggregates options that allow the alignment and transformation of data from logically dependent sheets, update graphs, and tables already present in the Excel. These extra options are implemented with VBA and RibbonX. This template allows a user to manage all the project information in one place and provide interoperability features such as data export into Word, PDF, JSON and other formats. Compared to the older version, PSL/Traditional-v.2020 supports the 2 missing KAs, provides new graph configurations, control features for the project execution phase, improves user experience, and provides export features.

5.1. Alignments

This PSL/Traditional-v.2020 defines and maintains 22 dependencies between its sheets, as shown in Figure 15. These dependencies are classified in 3 categories: weak, moderate, and strong. A **weak** dependency means the existence of a logical dependency, but with no representation on PMet. A **moderate** dependency means the existence of automatic mechanisms or suggestions of data to insert. A **strong** dependency means the existence of one or more macros options that guarantee that dependency. These dependencies are the following, represented as Di:

D1 represents the dependencies of the work packages (WPs), defined in the WBS, with the requirements of the project.

D2 represents the dependencies between each work package (WP) in the WBS and one or more milestones. These are defined in the milestone sheet and automatically fill the Milestone ID and Milestone Name columns on the WBS for the respective WP.

D3 represents the dependencies between each deliverable and a respective WP, in which work context that deliverable will be produced.

D4 represents the dependencies between the milestones and WPs of the Timetable (or Gantt Chart) with the respective milestone defined in the Milestones table.

D5 represents the dependencies between the activities defined in Timetable (or Gantt Chart) and the Phases and WPs of the WBS.

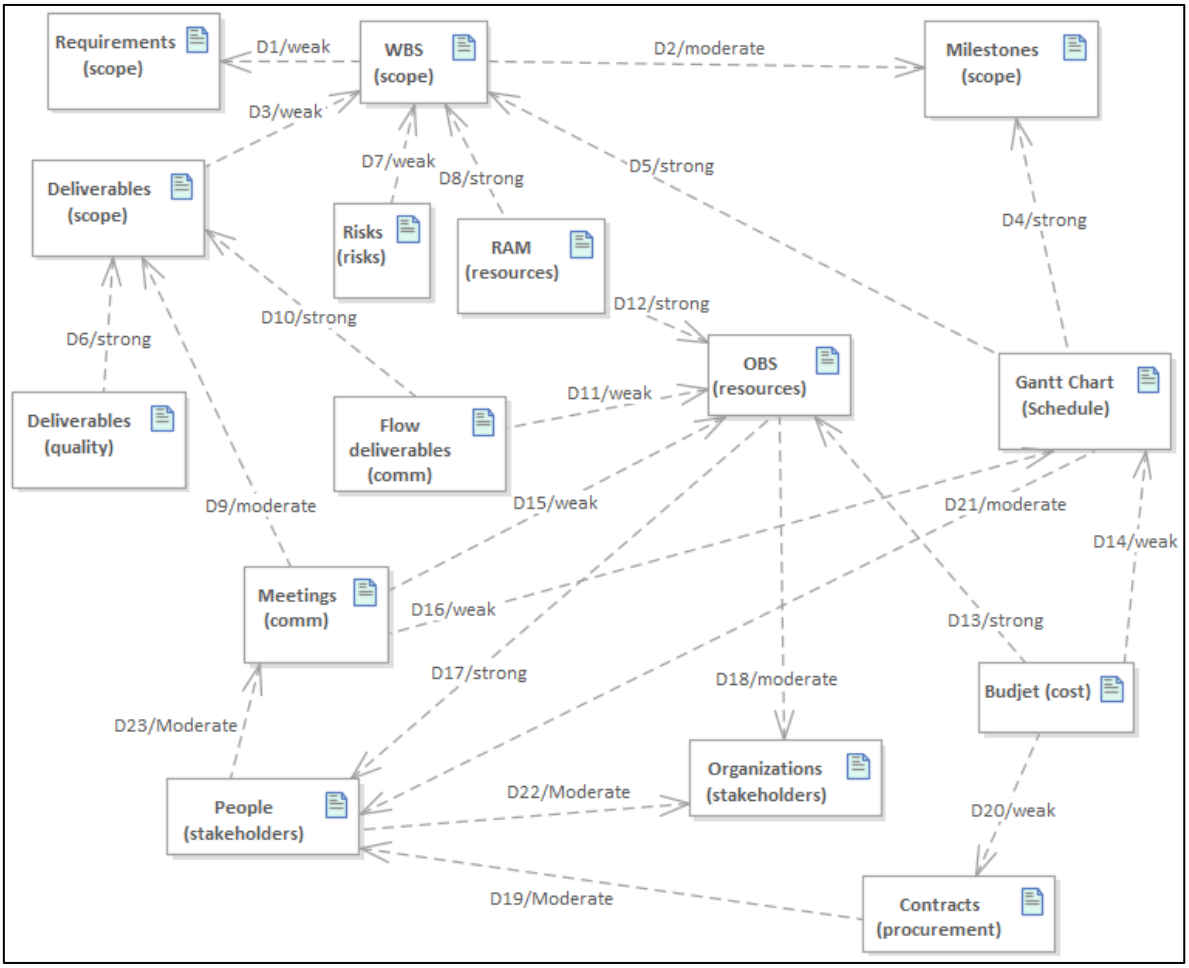


Figure 15 - Dependencies in the scope of PSL/Traditional-v.2020 (in BPMN)

D6 represents the dependencies of the quality criteria of deliverables and the respective deliverables defined in the scope.

D7 represents the dependencies of risks that might be defined according to the structure of the WBS (e.g., phases and WPs).

D8 represents the dependencies between the rows of the RAM (i.e., phases and WPs) and the WPs defined in the WBS.

D9 represents the dependencies between each meeting and the deliverables that should be analyzed and/or approved in the context of each meeting.

D10 defines the deliverables that are used in the context of each communication flow.

D11 defines the people or resources that are involved in the context of each communication flow.

D12 represents the dependencies between the column's headers of the RAM and the top-level resources defined in the OBS.

D13 represents the dependencies between budget and each resource defined in the OBS.

D14 represents the dependencies between costs of people assigned to activities defined in the Timetable (or Gantt chart).

D15 represents the dependencies between the meeting participants with the resources defined in the OBS.

D16 represents the dependencies between the meetings with the respective activities defined in the Timetable (or Gantt chart).

D17 represents the dependencies between the OBS and the people defined in stakeholders.

D18 represents the dependencies between the OBS defined people and the organizations defined in the stakeholders.

D19 defines the people or resources involved in the context of each contract.

D20 represents the dependency between budget and contracts values.

D21 defines the people or resources that are assigned to activities defined in the Timetable (or Gantt chart)

D22 represents the dependency between each person and the respective organization.

D23 represent the dependency between each person and the assigned meetings.

5.2. Illustrative Example and Transformations

The best way to demonstrate some PSL/Traditional-v.2020 features, namely its distinctive aspects, related alignments, and transformations, is by illustrating it with an application example. Figure 15, shows a recommend process for using the PSL/Traditional-v.2020. This example is of a fictional project, although it is representative of a real project.

Step 1: Read the Tutorial sheet (or other help documentation) to be aware, namely, that different color cells mean different things; for instance: red is for error messages; dark blue is for user data input; light blue is for automatically filled data; and grey cells means that they shall stay empty.

Step 2: Set the Configuration sheets by defining the holidays, user rates, user metrics and configure **Settings**.

Step 3: Identify the project Stakeholders by filling the Organizations and People sheets and **manage the Integration data** by filling the **Project sheet** with the general project information and then by accessing the **Charter sheet** to get the produced project charter report.

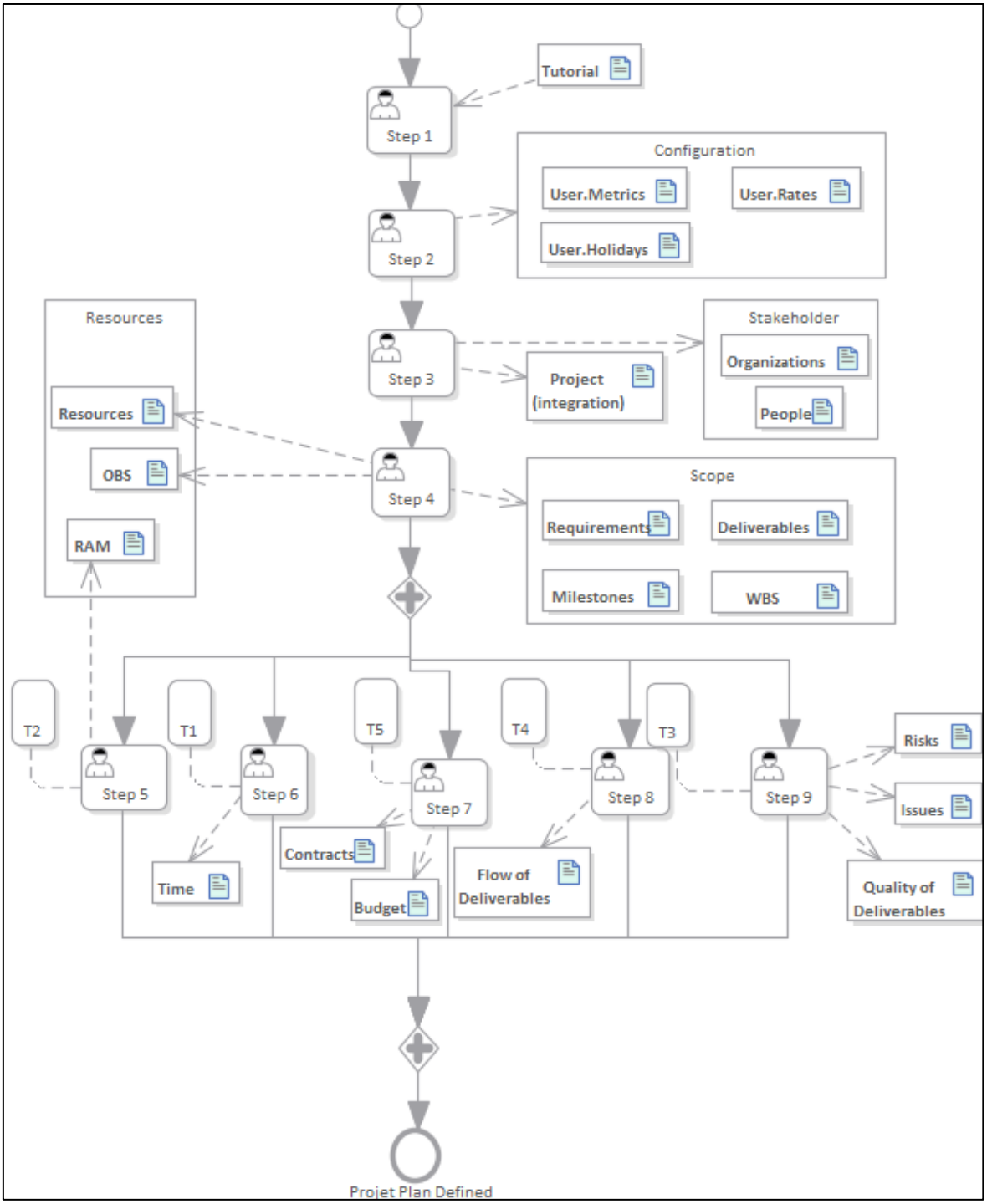


Figure 16 - Traditional Planning Process (in BPMN)

Step 4: Fill the scope group that consists of the **Requirements sheet, WBS sheet, Milestones sheet, and Deliverables sheet.** Once it is finished, the Resources sheet is the next to take into consideration. With the help of **"Import people"** the resources are now defined, and it is easy to view the OBS of the project.

Step 5: Define the relationship between the OBS and WBS, through the RAM. Press the **"Import from WBS and OBS" (T2)** that constructs the table. The legend box provides possible responsibilities and is movable.

Step 6: Define the schedule in the Time sheet. The first action is to **"Update from WBS and Milestone" (T1)** that inserts this information in the table. The second action is to add other activities, defined execution times, precedencies, allocate resources, and the rest is automatic. The third action is to **"Update Chart"** that updates the Gantt Chart with the new information and the fourth action is to customize the view.

Step 7: Define the project budget in the budget sheet. First **"Import from Resources" (T5)**, second define the resources rate, and third define the resources usage. Then, **define the project contracts** in the contracts sheet.

Step 8: Define the flow of deliverables and meetings, using in both cases the **"Import deliverables" (T4)** before starting to fill the table.

Step 9: Identify the issues, the quality of the deliverables with the help of **"Update deliverables" (T3)** option to import the deliverables, and **the risks**. At the end of this step the project plan can be complete with the majority of the KAs considered.

5.3. Missing KAs

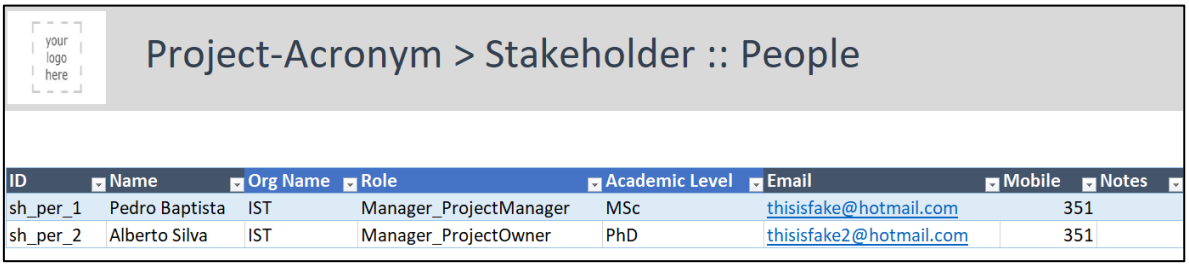
The design of the new architecture identified a problem. Critical information was missing to correctly support the ten KAs, the stakeholders and the procurement KAs are missing. According to the PMBOK guidelines, Stakeholders are the people, groups, or organizations that could impact or be impacted by the project. Procurement management includes the processes necessary to purchase or acquire products, services, or results outside the project team. These processes develop agreements such as contracts, purchase orders, memoranda of agreements, or internal service levels agreements.

With the new architecture defined and the KAs understood, a solution was designed and implemented. This solution consists of three new sheets, two for the Stakeholders and one for the Procurement. The Stakeholders sheets are grouped under the stakeholder name and are called Stakeholder.Organizations and Stakeholder.People (see Figure 17 and Figure 18). The Organizations sheet contains a table to identify an organization's most important aspects: ID, Name, Type as a data validation list, Domain as a data validation list, Email, Mobile, Postal Address and Notes. All the columns provide a simple and easy way to insert and store data relevant to the organizations participating in the project. The People sheet is structured in a similar way to the previous sheet and contains a table with: ID, Name, Org Name as a data validation list from the Organizations sheet, Role as a data validation list, Academic Level as a data validation list, Email,

Mobile, and Notes. Both sheets possess the Generate IDs feature present in the RibbonX to generate IDs for each item if the user does not desire to do it manually. Other sheets, interact directly with this information, for example the Integration.Project sheet uses data validation list to identify the entities involved based on the data present on the Stakeholder.Organizations and the Resources.Resources sheet uses a feature called “Import People” that imports all of the Stakeholder.People items.

ID	Name	Type	Domain	Email	Mobile	Postal Address	Notes
sh_org_1	IST	Performing	Engineering	mail@tecnico.ulisboa.pt	351 218 417 729	Av. Rovisco Pais, Nº 1. 1049-001 Lisboa	

Figure 17 - Stakeholder.Organizations



ID	Name	Org Name	Role	Academic Level	Email	Mobile	Notes
sh_per_1	Pedro Baptista	IST	Manager_ProjectManager	MSc	thisisfake@hotmail.com	351	
sh_per_2	Alberto Silva	IST	Manager_ProjectOwner	PhD	thisisfake2@hotmail.com	351	

Figure 18 - Stakeholder.People

The Procurement sheet is named Procurement.Contracts (see Figure 19). This sheet is a bit more complex since it requires the identification of the Contract, Supplier, Dates, Cost and Status. For this reason the sheet contains a table with the following columns: ID, Name, Type as a data validation list, Organization ID as a data validation list, Organization Name with a built in formula to get the correct value, Contract Supplier as a data validation list, Start Date, End Date, Estimated, Paid, Variance with a built in formula to calculate the difference between Estimated and Paid cost, Status as a data validation list and Notes. The Generate IDs feature is also present on this sheet and produces the expected outcome. Identifying the requirements needed outside of the project team is never an easy task, but once they are done and the contracts are made this sheet provides good support for storing and managing that data.

Contract			Supplier			Dates		Cost				
ID	Name	Type	Organization ID	Organization Name	Contract Person	Start Date	End Date	Estimated	Paid	Variation	Status	Notes
crt_1	Guidance on Thesis	Time and Material	sh_org_1	IST		03/01/2020	31/10/2020	0 €	0 €	0 €	Started	

Figure 19 - Procurement.Contracts

With these two new groups, Stakeholders and Procurement, additions the PSL Excel Traditional Template now possesses the necessary tools to support all the ten KAs.

5.4. RAM Configurations

While the Traditional Template is closer to achieve its goals, some groups still require improvements. One of those groups is Resource group. The group has a new sheet Resource.Resources that was described in the minor improvements section and the Resources.RAM has new configuration option and control features. RAM is the responsibility assignment matrix and is important for the correct planning of a project, for this reason it was necessary to guarantee that the import feature works correctly, the RAM can be updated at any time because sometimes unforeseen activities appear, and the user can adjust the RAM visualization to his needs (see Figure 20).

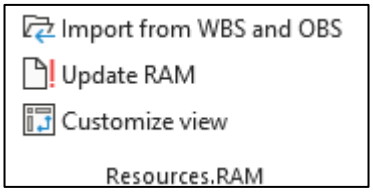


Figure 20 - Resources.RAM Ribbon Options

"Import from WBS and OBS" now correctly imports all the information necessary to fill the RAM. Before the process starts, there is a warning that the current action will delete the information in this sheet. This deletion is required to avoid multiple and unnecessary copies of the information as it was the case. If the user wants to proceed, the process starts by reading all the data from the OBS table, storing it, and grouping each person by their organization. The next step is placing the data as the RAM table headers. Each item is inserted as a column header and the Organizations are identified in the row above to indicate which item belongs to which group. Once this is complete, the next information required is on the WBS. In this phase the process reads one row at a time from the WBS table and copies it to a new row on the RAM table. If the item is a Work package, a Data Validation list with the possible responsibilities is created for each cell of each column on that row. If this is not the case, the cells are grayed out because it is not possible to make a person responsible for other activities that are not work packages. Now the table is complete and ready to be used.

"Update RAM" option focuses on keeping the RAM table flexible and able to tolerate errors. What this feature does is find discrepancies between the WBS, the OBS, the RAM table and fix them. These discrepancies can arise from adding more work packages or creating a new Organization group during the planning phase while the RAM table is already built. Previously it was required to do another import process to update the RAM table, but with this new flexibility the macro behind the update option inserts the new work package or new organization in the correct row and column, respectively. The process works the same way in the eventuality that a user makes an error and deletes a column or a row making the table capable of tolerating errors. The macro is unidirectional meaning that if data is deleted from the WBS or OBS, the same data is not deleted from the RAM table.

“Customize view” is part of a group of new features to improve the user experience, these features are detailed in a next section. This customization allows the user to select which data should be visible. The options for the WBS are: Project, Sub-Project, Phase, Work Package, Other and Unidentified Type. For the OBS there are: Customer, Performing, Sub-Contractor, Other and Unidentified Type. This mechanism is built on a form that associates a check box to each of the options. Once the user selects the desired boxes and presses “apply”, a macro is triggered in the background that hides the row and columns belonging to an option with a false value. This feature facilitates the assessment of responsibilities of every work package and every entity involved on the project (see Figure 21).

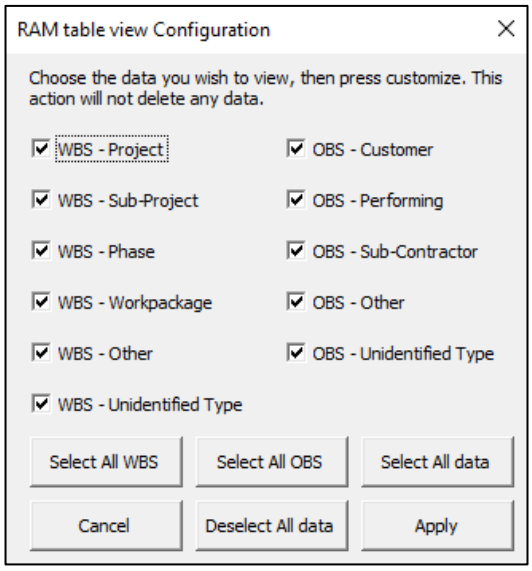


Figure 21 - Customize RAM table view

Each of these features bring something new to the process of creating and managing a RAM table. One makes it simple to build by using data already defined. The other fortifies the dependency that exists between the RAM, the OBS and the WBS. And the last one makes it easier to read the RAM and identify situations or possible problems.

5.5. Gantt chart

Another group that requires significant improvements is the Schedule sheet and its Gantt chart. Traditional methodologies are based on sequential execution of a project. For this to happen with good results it is necessary to have good planning. One of the characteristics of this plan is the definition of the activities date. This specification is made on the Project Schedule, and it has a Gantt chart that shows all the tasks of the project. The schedule is not only used as a tool for planning but also as a control tool for the present, to show if a project is progressing according to the plan and what are the actual dates of the project. To accomplish this, it is necessary to identify what resources are allocated, what is the current completion status, and what are the predecessors of each activity.

The current template already supports the planning phase, but does not support other phases of the project, namely does not provide much support for project control. To mitigate this problem, the schedule sheet was extended with the following features.

The first set of features allows the **allocation of resources** to an activity. This is necessary to manage what resources are working at a given time and manage the budget based on the amount of time a resource is expected to work on the project. This feature is implemented using the Worksheet Before Double Click mechanism, that triggers a macro every time a new cell is double clicked within the sheet. This specific macro evaluates if the cell belongs to the resource's column from the Timetable, and if so, it shows a form to allow the allocation of resources. The form uses a ListBox to show all the resources already allocated to this activity, a ComboBox that provides a drop down list with all the resources defined in the Resources Table, and a TextBox to specify what is the % allocation of the selected resource. To conclude the action, the "Apply" button writes all the allocated resources to the specific cell, using special characters so the information is read when the cell is clicked again (see Figure 22). All the information is editable, an allocated resource can be removed or redefined in terms of % allocation.

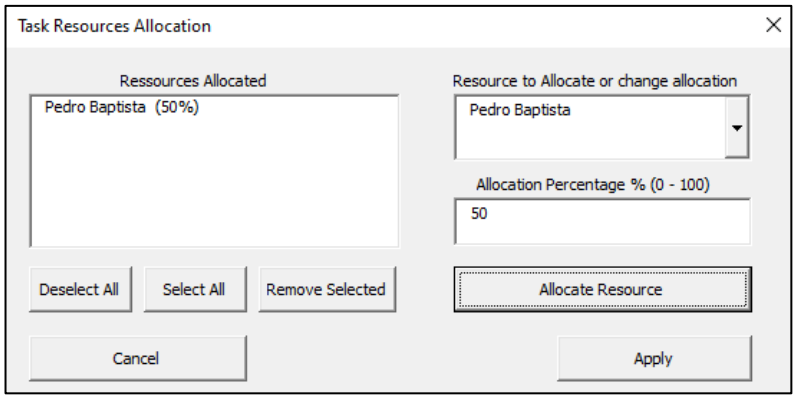


Figure 22 - Task Resources Allocation

The **Completion Status** of an activity is necessary to accompany the activity progress which is now possible. This possibility resides on the new "Completion %" column. This column requires user input for the activities and milestones tasks but any task with a lower level is calculated automatically. This means that a work package completion % is calculated using a formula and a macro. The formula verifies if there is a change on any of the cells that are used by the macro "CompletionAggregate" and if that is the case the macro is triggered, (see Figure 23). This macro reads the values of the cells with a higher level and calculates the value of the current cell. This calculus considers the duration, the precedence, and the lag.

```
=IFERROR(@COMPLETIONAGGREGATE(ROW()-ROW(TTimetable[#Headers]);
[@[Task ID]];[Level];[Task ID];[@Predecessors];[@[Type of Precedence]];
[Actual Start];[Actual End];[@[Actual Duration (d)]];ID_TimetableStart;
[Actual Duration (d)];[Completion %]) / 100;ID_Waiting_Message)
```

Figure 23 - Completion % Formula

The previously mentioned **Project State** variable is now used on this sheet. It is used to adjust all the information available depending on the phase. To incorporate this mechanism the Timetable requires a reorganization. The previous columns Start, End, Critical Path, Late Start, Late Finish and Slack are now divided into two distinct groups: The Plan and Actual group. Both groups have the same columns but referring to different situations. One contains only the planned dates and the other contains the actual execution dates. Other columns, like the predecessors, are not modified because they do not change during a project execution. Since we now have a plan and actual group of dates the Gantt chart is divided into two different charts, each referring to the appropriate group. The mechanism is a simple process that uses the Project Phase as a state machine with three states: Plan state has the plan groups and plan chart visible while the actual information is hidden; Execution state has the actual groups and actual chart visible while the plan information is hidden; Closed state has all the information available. Meanwhile, the columns common to both groups are always visible, Figure 20.

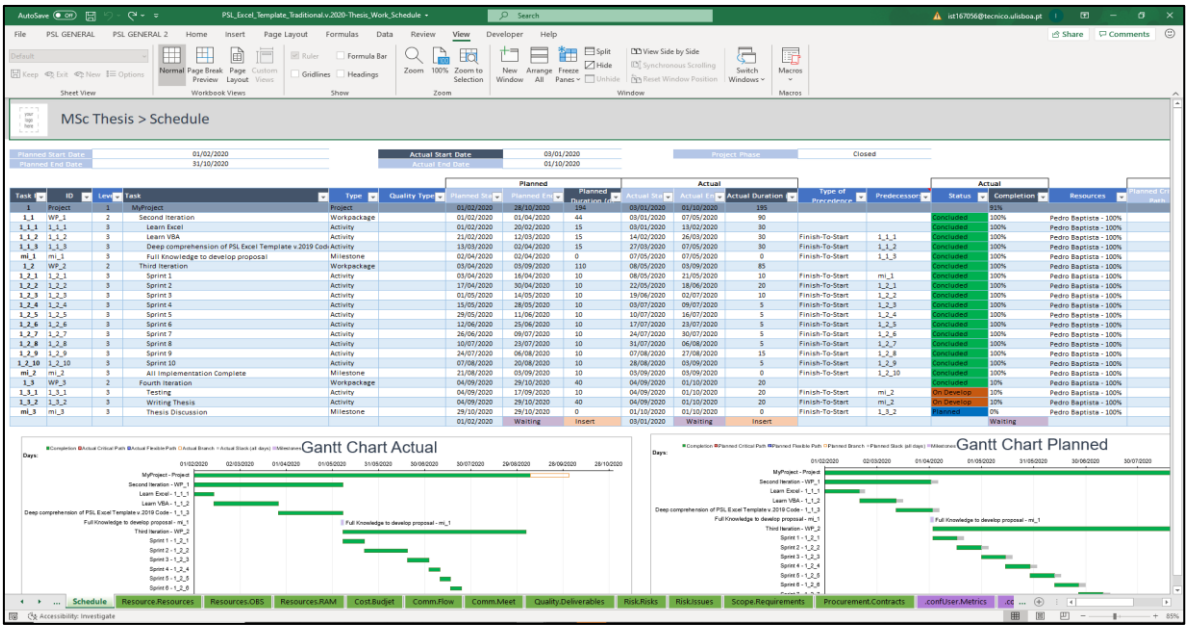


Figure 20 - Schedule with Project Phase

Lastly, the **Gantt Chart** got some upgrades. The colors used for the chart were modified to maintain consistency with the Dashboard colors and to provide a more intuitive visualization. A new available color is Green, it represents the completion % of a task and fills the task bar accordingly to the data from “Completion %” column. The Schedule sheet has the “Graph Configuration” option that allows to configure the tasks representation on the horizontal categories, the date scales from weekly to annually, the dates range and the visible tasks depending on their type. These configurations are applied to both the plan and actual chart, Figure 21.

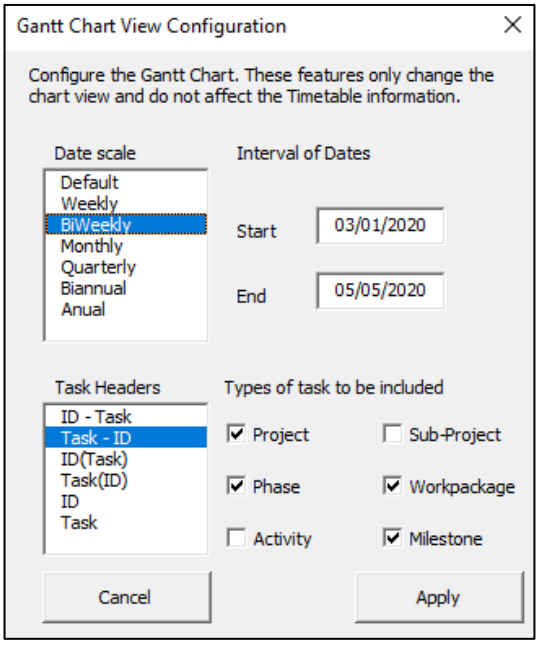


Figure 21 - Gantt Chart view configuration

The improved Schedule sheet kept its structure to support the planning of a schedule but now makes it possible to properly control the schedule execution. Resource allocation is essential to organize the teams, Completion % provides a good indicator if tasks are going smoothly or facing problems, Project Phase separates the planning from the execution for future analysis, and the Gantt chart view configuration allows an easy way to automatically adjust the graph to according to users preference.

5.6. Improved User Experience

A general problem that existed was the difficulty to navigate the workbook. It meant difficulty to navigate from one sheet to another, start a new project or simply clean some sheet information, and changing global variables was done on specific sheets. To mitigate this problem and provide a better user experience a new Ribbon group called “Settings” is available. This group is common to both Traditional and Agile templates and is always active.

“General Settings” organizes the basic information of a project that has influence on many sheets in one form. This form shows the data of cells containing the general information and allows its modification. Each version of the template has its unique form. The Traditional form contains the key information also available on the Integration.Project sheet as shown in Figure 24.

The Agile form is more complex and has information from ProjectIntegration, ProductBacklog, SprintBacklog and a configuration option for personal roles. While this last option is not available on any sheet it affects the resource allocation feature and the team analyzer sheet (see Figure 25).

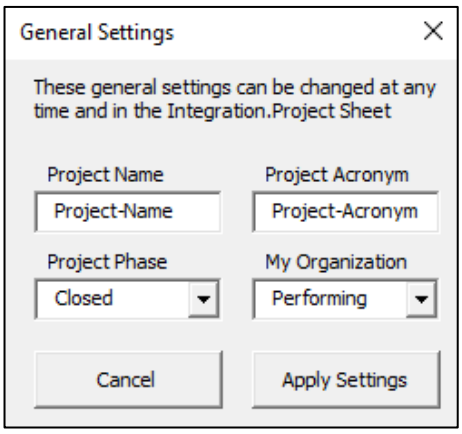


Figure 24 - PSL/Traditional-v.2020 General Settings

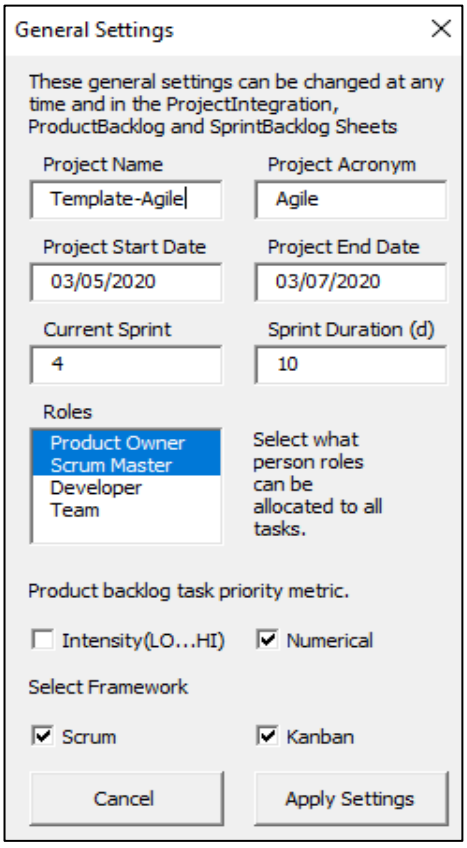


Figure 25 - PSL/Agile-v.2020 General Settings

The form General Settings eliminates the need to move around sheets to change specific information. Particularly on the PSL/Traditional-v.2020 that has many sheets, this is not a simple task. To facilitate this process the **"Sheets Visibility"** feature allows a user to specify what sheets should be visible or not. This mechanism considers the current workbook state when initiating the form to avoid errors and follows the workbook sheets sequence. This feature is identical in both versions of the template but only considers the respective template sheet (see Figure 26).

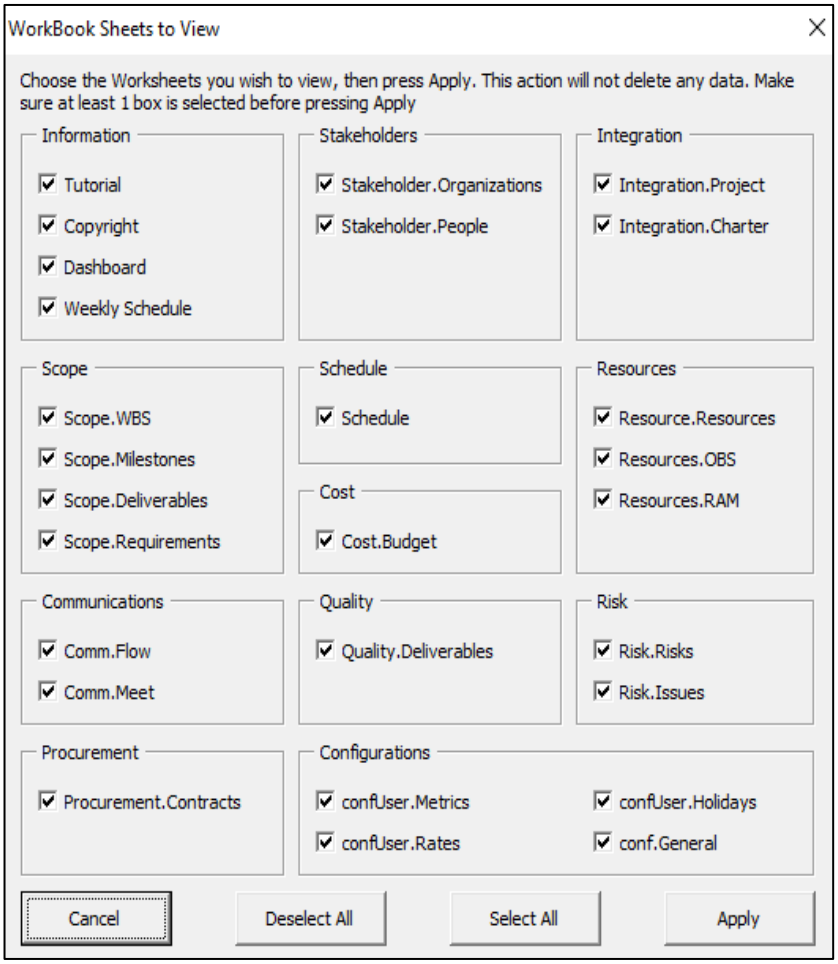


Figure 26 - PSL/Traditional-v.2020 Sheets Visibility form

The last improvement was on the data cleaning. Deleting the current sheet contents manually can result in losing the tables format, losing formulas, or generating macro errors. While none of these situations is common the option **"Clean Sheets Content"** makes it completely safe to delete data. The feature uses an identical structure to the "Sheets Visibility Feature" to show what sheets shall be cleared. The operation deletes the information of every table and singular cells, while preserving hidden formulas, table format and macros references. In addition to this feature, shown in Figure 27, both templates can now tolerate other errors like accidently deleting the Gantt Chart or Milestones Chart. These exceptions are tolerated by each sheet macro that creates a new chart if needed.

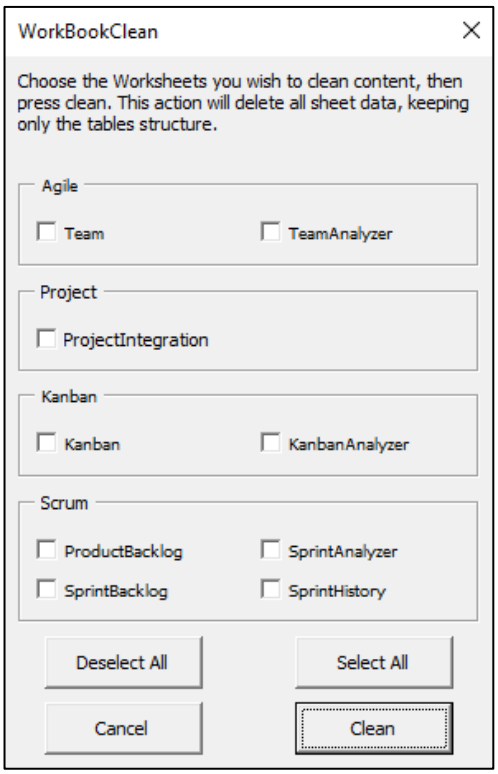


Figure 27 - PSL/Agile-v.2020 WorkBookClean form

5.7. Export to PDF

"Export to PDF" is the last general implemented feature. It focuses on improving the template report generation by creating an easy way to export any or all the sheets to a PDF file (see Figure 28). This Ribbon element is available on the tools group and uses a form equivalent to the WorkBookClean and Sheets Visibility Forms. Once the sheets are selected the form exports the defined print area of every sheet. This print area is adjusted to the current template contents but if a user wants to just export a specific range of a sheet or creates new graphs or tables, it needs to manually adjust the print area.

The other element of the tools groups is "Export to Word". This feature was already available, but it was hard built into a specific range so if a table had a larger size than that range the full table would not be exported. This situation is no longer true because the macro now adjusts the range to the table size. During the exportation process the status bar has a message "Copying XXXX…", where XXXX is the name of the sheet, to give the user a notion of what is happening.

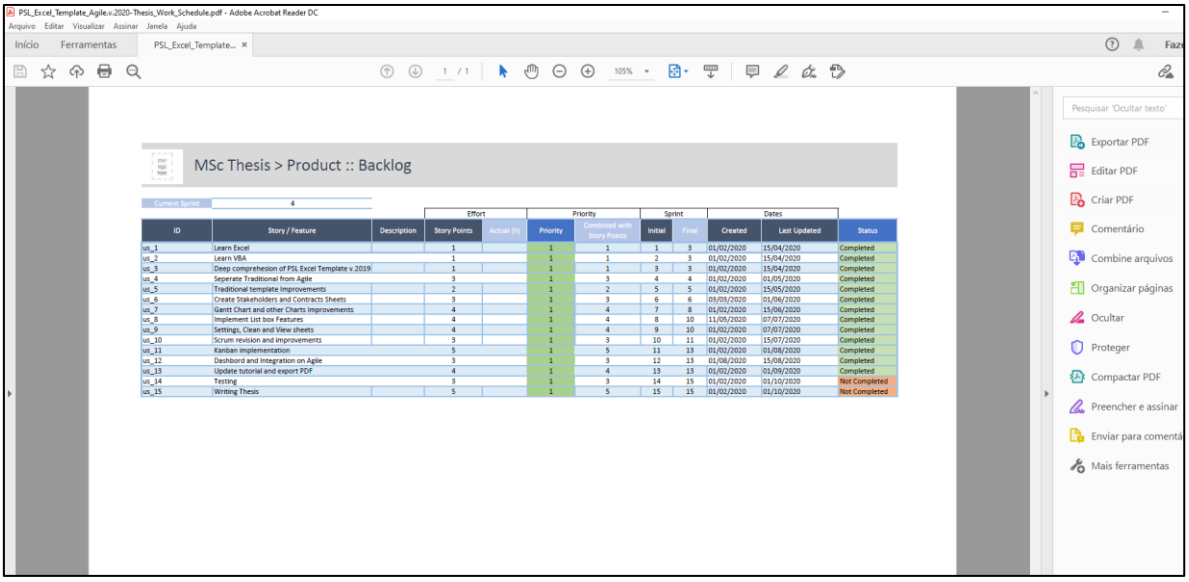


Figure 28 - Export to PDF, PSL/Agile-v.2020 Product Backlog

6. PSL Agile Template

The PSL/Agile-v.2020 is the new template that supports the application of agile best practices based on Scrum and Kanban frameworks, utilizing Excel Formulas, VBA and RibbonX like the PSL/Traditional-v.2020.

6.1. Alignments

This PSL/Agile v.2020 is organized in 3 groups of sheets: Project, Scrum and Kanban (see Figure 14). The tool defines 7 dependencies between its sheets, as shown in Figure 29. These dependencies are classified in 2 categories: moderate and strong. A **moderate** dependency means the existence of automatic mechanisms or suggestions of data to insert. A **strong** dependency means the existence of one or more macros options that guarantee that dependency. These dependencies are the following, represented as Di:

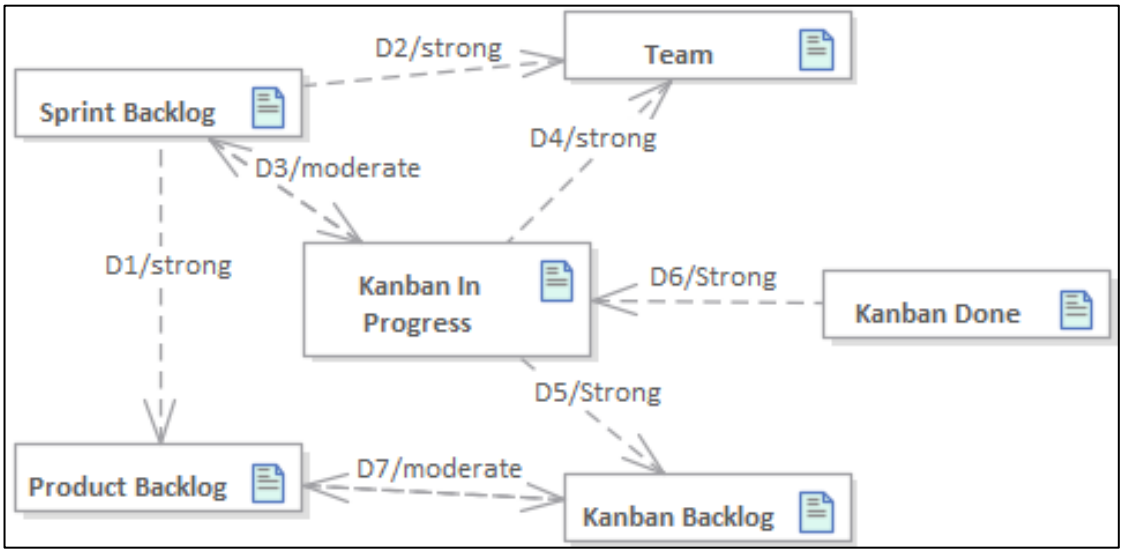


Figure 29. Dependencies in the scope of PSL/Agile-v.2020 (in BPMN)

D1 represents the dependencies of the Sprint Backlog tasks with the user stories defined in the Product Backlog.

D2 represents the dependency between a sprint task and the Team since only a team member can be allocated to a task.

D3 represents the dependency between the Sprint Backlog tasks and Kanban In Progress tasks. Since logically they represent the same, they can be transformed into one another.

D4 represents the same dependency as D2 but for Kanban tasks.

D5 represents the dependency between the Kanban In Progress tasks and Kanban Backlog tasks since all the Kanban In Progress were defined in the Kanban Backlog.

D6 represents the same dependency as D5 but between the Kanban Done tasks and Kanban In Progress tasks.

D7 represents the same dependency as D3 but between the Product Backlog and Kanban Backlog.

6.2. Illustrative Example and Transformations

The best way to demonstrate some PSL/Agile-v.2020 features, namely its distinctive aspects, related alignments, and transformations, is by illustrating it with an application example. Figure 30 shows a recommend process for using the PSL/Agile-v.2020. This example is of a fictional project, although it is representative of a real project.

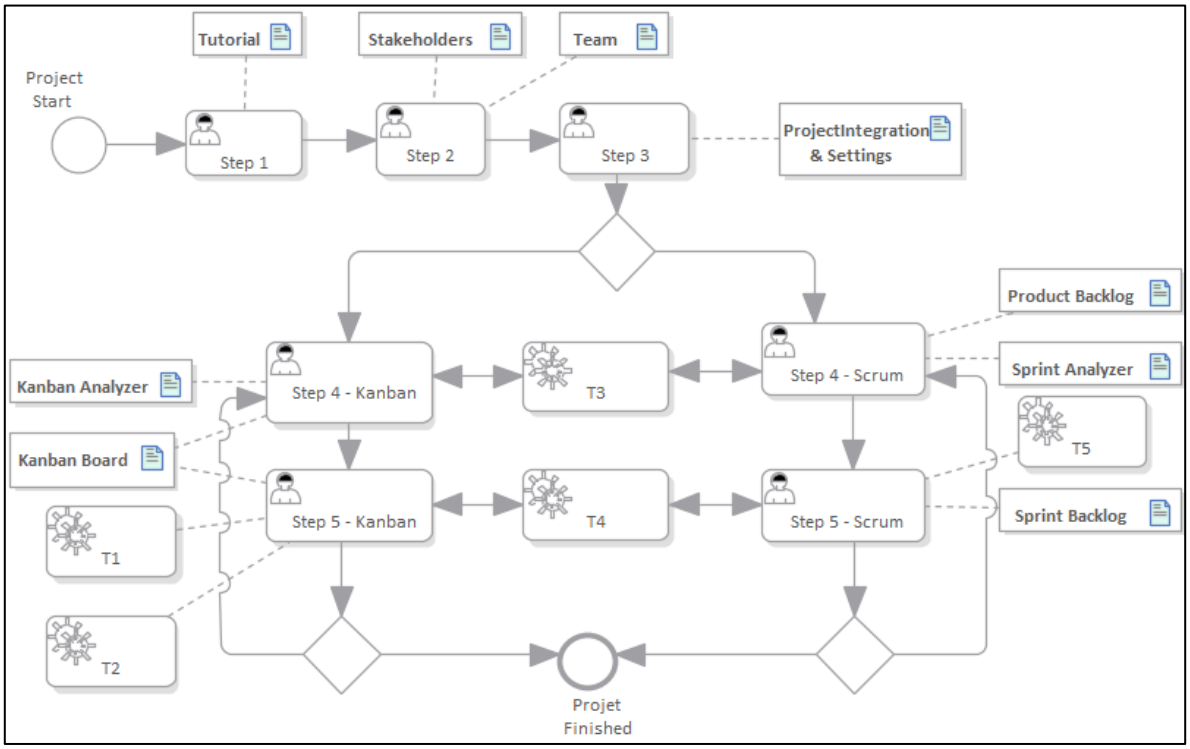


Figure 30. Agile project execution process (in BPMN)

Step 1: Read the Tutorial sheet (or other help documentation) to be aware, namely, that different color cells mean different things; for instance red is for error messages; dark blue is for user data input; light blue is for automatically filled data; and grey cells means that they shall stay empty.

Step 2: Identify the stakeholders and team by filling the StakeholdersOrganization, StakeholdersPeople and then Team sheets.

Step 3: Manage the Integration data by filling the ProjectIntegration sheet with the general project information and define what agile framework will be used by clicking the **Settings**.

Step 4 – Scrum: Set the Product Backlog in the Product Backlog by defining user stories, priorities, and effort. In case this is not the first cycle, check SprintAnalyzer sheet for KPIs. It is possible to change to the Kanban framework by going to the Step 4 – Kanban and using **"Update from the Product Backlog" (T3)** filling the Kanban Backlog table with this Product Backlog information.

Step 5 – Scrum: Start a new Sprint by clicking on the **"Start new Sprint"** option and defining the sprint attributes. Then click the **"Update from Product Backlog" (T5)** to insert the user stories on the sprint and then **define tasks.** When the sprint is finished, use **"Finish Sprint"** to store the data in the SprintHistory sheet and update both SprintAnalyzer and Product Backlog sheets. Now it is possible to cycle back to Step 4 or finish the project. At any given time, it is possible to change to the Kanban framework by going to the Kanban sheet and using **"Update from Sprint Backlog" (T4)** filling the Kanban In Progress table with the sprint information.

Step 4 – Kanban: Define the project tasks in the Kanban Backlog table from the Kanban sheet. Double-clicking the "**description**" column helps doing the task. In case this is the not the first cycle, check Kanban Analyzer sheet for KPIs. It is possible to change to the Scrum framework by going to the Step 4 – Scrum and using **"Update from the Kanban Backlog"** (**T3)** filling the Product Backlog with this Kanban Backlog table information.

Step 5 – Kanban: Go to the Kanban sheet and start a task execution by clicking on the "**Move >**" **(T1)** column of the Kanban Backlog table. This moves the task to the Kanban In Progress table and records the start date. Then allocate people to each task. Once a task is done click the "**Move >**" **(T1)** column to move the task into the Kanban Done table. When all tasks are complete, and a cycle is finished "**Update Team Analyzer and Kanban Analyzer**" **(T2)** updates both analyzers with the relevant information from each task. Now it is possible to either finish the project or start a new cycle on Step 4. At any given time, it is possible to change to the Scrum framework by going to the SprintBacklog sheet and using **"Update from Kanban in Progress" (T4)** filling the sprint with this Kanban In Progress table information**.**

6.3. Agile Organization

PSL/Agile-v.2020 brought some sheets from the previous PSL-v.2019 but since it is a new template this is the first iteration. With its independence it is necessary to restructure the Scrum sheets and introduce new ones to create a good structure for the upcoming agile methodologies. The general sheets used by multiple methodologies are: StakeholdersOrganizations, StakeholdersPeople, Team, TeamAnalyzer, ProjectDashboard, ProjectIntegration, and ProductBacklog. The rest of the sheets are focused on supporting the application of Scrum and Kanban.

Team provides the necessary fields to identify the team members and their traits. Compared to its previous version, the table lost the Organization column because there is no need to track from what organization the team member belongs to. The table got two new columns to better access and check each person's skills, the columns are named Technical Skill and Other Skills. An important change on the table is the Role column, the Data Validation List now provides roles that are aligned to an agile methodology: Product Owner, Scrum Master, Developer. The List also has the Team option in case multiple teams need to be managed. In terms of features, "Import from OBS" was removed because there is no OBS on agile. "Generate ID" replaces the previous feature.

TeamAnalyzer is a Data analysis sheet. It contains a table with a person ID, Name, Role and some KPIs focused on tasks and effort. The KPI's evaluate a person assigned tasks with the concluded tasks and the assigned effort with the actual effort. For further data analysis, the table has a total row with the full team numbers. This sheet has all the content protected meaning it is used just for visualization and does not require user input. The input for the table entries comes from "Update from Team'' feature which validates the current entries on the table with the entries on the Team table and makes the necessary corrections if needed. For the KPI's values, both groups are filled by macros belonging to the framework sheets. Kanban has the "Update Team Analyzer'' feature while Scrum has "Finish Sprint".

ProjectDashboard is the agglomeration of the most important information existing on the workbook. This sheet allows for a quick overview of the project schedule and costs. It contains many charts that visually tracks, analyzes, and displays KPI's. These indicators refer to both the Kanban and Scrum framework. Figure 31 shows the first rows of the sheet, but more graphs are displayed here, to mention some: Current Sprint, Sprint Effort History, Kanban Tasks Conclusion.

The **ProjectIntegration** area is not as important in Agile as it was in Traditional, but it is still relevant because it identifies the basic aspects of a project (see Figure 32). These aspects are divided into four tables, Project Identification, Types, Project Schedule, and Project cost. Each table requires a manual insertion of the data with a few exceptions that have a Data Validation List. The sheet has some formulas to calculate the Nº Days, Price, and Profit but does not have any feature available in the Ribbon.

Defining the **ProductBacklog** is one of the most complex tasks. It requires a manager to identify the project features and corresponding user stories. He or she then needs to consider each item effort in terms of story points and define its priority. The Product Backlog table provides support to all these tasks as well as allowing the designation of an item initial sprint, status, and dates. Adding to this, the table automatically fills the Actual Effort data, the Value of a feature using a combination of the Story Points with Priority, and the Final sprint. These extra automatisms operate during the project execution favoring a good control of the project development. While the table is more focused on Scrum it has a feature named "Update from Kanban Backlog" that compares the current Kanban

board backlog and adds any entries that are missing. This operation is bi-directional inside the workbook meaning the Kanban sheets have an identical feature to fetch data from the product backlog.

The initial structuring of the template holds the common information required for agile methodologies, be it Scrum, Kanban or both. The information designates the team, dashboard, integration, and backlog.

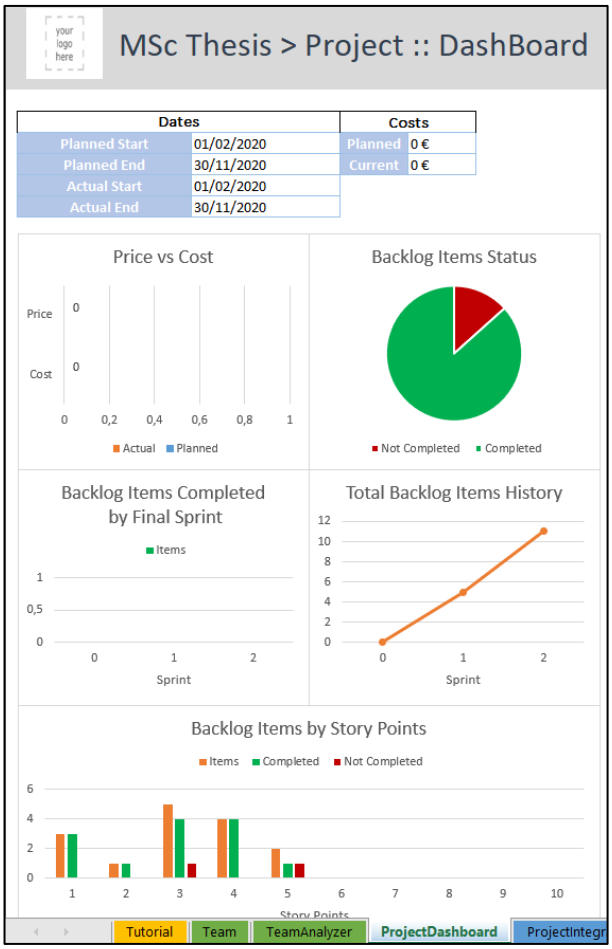


Figure 31 - PSL/Agile-v.2020 DashBoard

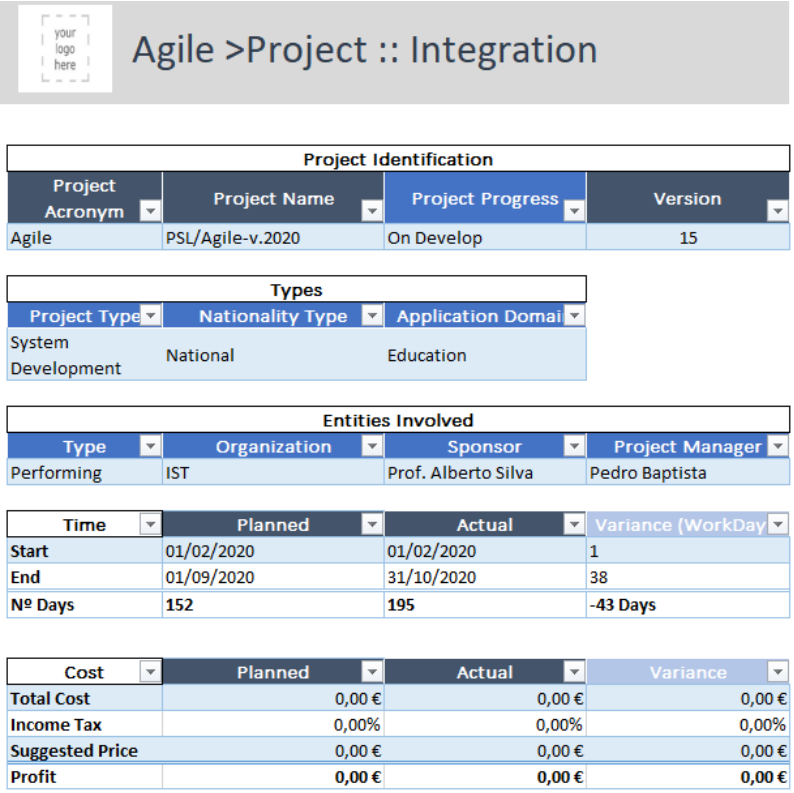


Figure 32 - PSL/Agile-v.2020 Project Integration

6.4. Scrum Improvements

The previous version of the template already supported to some extent the application of the Scrum framework. The problems were the many limitations each sheet had, either by lack of features to reduce repetitive work, or bugs that prevented the correct input of data and in most cases, that prevented the correct functioning of the available features. All these problems needed to be addressed to correctly support this framework and now the Scrum group has the Product Backlog, Sprint Backlog, Sprint Analyzer and Sprint history.

Product Backlog and **Sprint Backlog** are two important areas of information for the development of a project. The Product Backlog is now part of a general area of the template but is essential for Scrum because it contains all the project work. This work is then distributed along multiple sprints during the project schedule. Each sprint is defined in the Sprint Backlog. This sheet allows the declaration of tasks, associate them to a user story, allocate team members, estimate the required effort, update the remaining effort daily and confer the status. There are also entries for the Sprint number, date, duration, work hours and a graph that analyzes the sprint effort. The graph was fixed to show the data now correctly. Focusing on the technical aspects of the sheet, it contains a formula to change a task status to complete when the remaining hours reach 0, it updates the remaining hours for following up days when a value is changed, it has a macro that triggers when the duration value is changed

that modifies the size of the table for the correct number of days and adjusts the graph horizontal entries. The allocation process is done the same way as it was on the Schedule sheet from the Traditional template to maintain consistency between features even if they belong to different Templates. The ribbon has new elements to facilitate data transformation (see Figure 33).

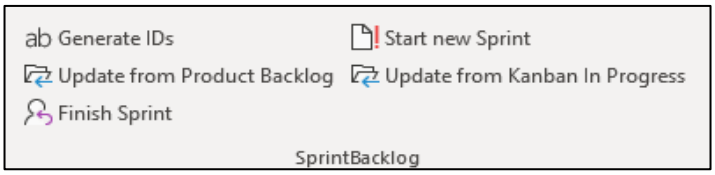


Figure 33 SprintBacklog Ribbon Options

"Update from Product Backlog" guarantees that all the Not Completed User Stories from the Product Backlog are assigned to at least one row on the SprintBacklog table. "Update from Kanban In Progress utilizes the same logic for this table tasks with the tasks in the Kanban In Progress table. "Finish Sprint" sets the sprint status to closed, updates the information on the Product Backlog for the Actual Effort and Final Sprint, updates the information on the SprintAnalyzer sheet, and stores this sprint information on the sprint history. Finally, "Start New Sprint" opens a form with the next sprint number, next sprint dates, and other configurations regarding the next sprint (see Figure 34).

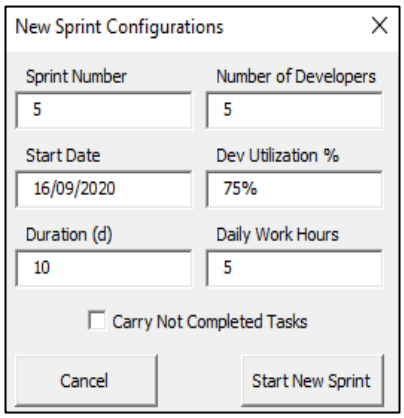


Figure 34 - New Sprint Configurations

SprintAnalyzer is a new sheet that follows the same approach as the TeamAnalyzer but for sprints. There is a table containing information of the past sprints in terms of duration, number of developers, tasks, effort, and story points. The three last groups of columns provide an insight of each sprint performance. The major difference between this sheet and TeamAnalyzer is on the method used to update the table. While TeamAnalyzer resorts to an "Update Team Analyzer" feature the SprintAnalyzer is updated each time the "Finish Sprint" feature is used.

Sprint History is the last sheet used for the Scrum framework and is the simplest of all. The sheet serves as a storage for previous sprint information. The data here is separated for each sprint and keeps its original format. Since the data is stored from the Sprint Backlog side there is no need for extra features on this sheet and like the SprintAnalyzer is not editable.

The three specific sheets plus the Product Backlog allow the full application of a Scrum methodology. It is possible to declare, configure and control, all the features, tasks and sprints required for the project. The tool is now more flexible, stores more data and provides a better analysis of the information. While all these concepts follow what is expected of an agile tool, this template operates with no problem with Kanban in conjunction with Scrum while also keeping consistency in its operation with the Traditional Template. In terms of consistency the resource allocation form demonstrates that while we have two separate templates, they apply the same design ideas. In terms of operability it is easy with the use of a few macros to transform Kanban data into Scrum data and the other way around, as we will see in the next section.

6.5. Kanban Implementation

To further extend the Agile Template usage, it now can support the application of the Kanban Framework. The most important quality of Kanban is its simplicity to track and organize tasks. To maintain this quality the template has two new sheets, one for the Kanban Board and one for the respective analyzer.

The logic behind the **Kanban** sheet is for each Kanban Board column to have an associated table that allows the creation of tasks and defines their characteristics. These tasks can then be moved from one table to another using a built-in macro. The sheet currently has the three tables displayed horizontally to represent the three pillar stages of a task: Backlog, In Progress and Done (see Figure 35 and Figure 36). Backlog is the beginning of a task life, the table has four columns that require manual: ID, Task, Description and Created. The ID column is filled with the Generate ID feature available on the Ribbon and the Description cells once clicked pops a form containing all the task information. The form facilitates the process to define a task and provides a text box for the description section removing the need to extend the description column size. Above this table is the defined WIP.

The next phase of a task is the development phase supported by the In-Progress table. To move a task from the Backlog to this one, the user clicks on the ID cell from In Progress and a Data Validation List shows the current tasks available on the Backlog. Once a task is chosen, a macro using the Selection Change mechanism of excel to identify the cell selected, moves the information from one table to the other and identifies the task started date as the day of this action. In this new phase, the task description shows again a form with all the information but this time only the description is modifiable. Here it is also possible to allocate the resources defined on the Team sheet to a task, using the same process as the one to allocate resources on a sprint and on the Traditional Template Schedule. Above this table the current WIP is calculated automatically based on the table information and shows if the team is working above or under the defined WIP.

The final phase of a task starts when the task is complete. This phase is supported by the Done table that uses the same logic as the previous table. Clicking on the ID cell shows a Data Validation List containing all the tasks belonging to the development phase and choosing one triggers a different macro that uses the same process to move the task from one phase to the other but identifies the task Completed date instead of the Started date. This table provides an updated task description form and shows two new important values, the Lead and Cycle time. These two values are calculated using an excel formula that operates with the three dates from a task, Started, Created and Completed. Like its two predecessors' tables, above it we have the Calculated WIP. While it does not provide as useful information as the current WIP it provides an overview of the project so far work performance.

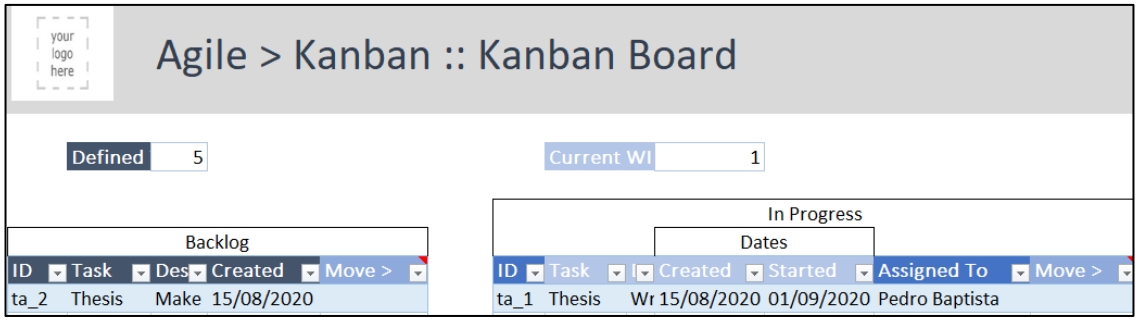


Figure 35 - Kanban Board: Backlog and In Progress tables

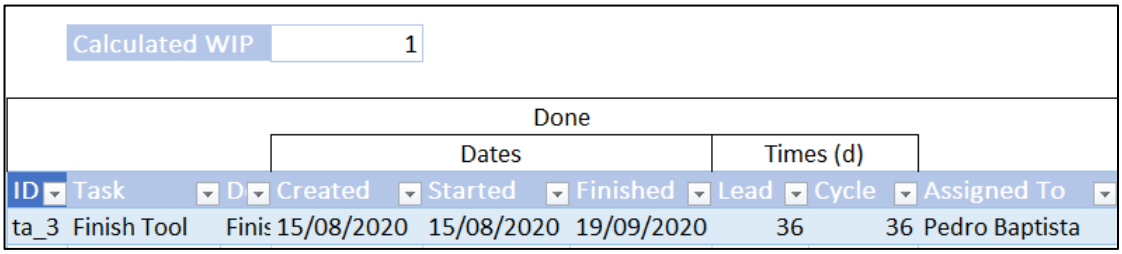


Figure 36 - Kanban Board: Done table

These tables and mechanics describe the Kanban Board, but the Kanban sheet has more options available on the Ribbon. The elements available besides the Generate ID provide the necessary information to the analyzers sheets and allow the transformation of Scrum data into Kanban data, Figure 33. The "Update Team Analyzer and Kanban Analyzer" verifies the allocated resources of the Done table and updates each resource information on the Team Analyzer table. The Kanban Analyzer part is more complex, the process verifies if the completed date exists on the table and if not, it creates a new entry, inserts one task completed, and inserts the lead and cycle time. If the date already exists, it reverses the lead and cycle time average, then adds the specific task values to that date and calculates the new average. The other ribbon elements are "Update from Product Backlog" and "Update from Sprint Backlog". These options do the same process as the previous features "Update from Kanban Backlog" and "Update from Kanban in Progress" in the opposite direction, they guarantee the items on the respective sheets table are defined on the Backlog and In Progress tables.

Figure 33 - Kanban Ribbon Elements

The other sheet used for supporting the Kanban framework is the **Kanban Analyzer**. This sheet is purely information and contains one table and two charts. The table stores data from each day that had a completed task during the project with the day number of completed tasks, cumulative completed tasks, average cycle time and average lead time. The charts are histograms, one references the completed tasks and cumulative tasks by each day and the other references the lead and cycle time by each day.

The Agile template now supports Kanban with the use of tables, automatisms, worksheet functions, formulas, and macros, working together. These additions are dependent on the team sheets for the resource allocation, make use of the Dashboard to analyze its own contents, resort to the Integration sheet for managing the project, and work alongside Scrum.

7. Evaluation

The Evaluation phase serves as a validation mechanism for the work developed during any project. While the work developed for the PSL followed the Scrum framework with weekly evaluations from the thesis Advisor, a more in-depth evaluation is needed! This evaluation consists of the application of two projects using PSL: The 2018/2019 Information Systems Project Management course project called DOCIST and this MSc Thesis. The first case study was used to evaluate the initial stage of the tool, v2019 and is now used on the v2020 to test it and compare the differences between each version using the same project. The second case study tested the traditional template on its final stage and used the agile template during its development.

DOCIST is a fictional project designed by the Thesis adviser that is also the Information System Project Management course teacher. The project goal is to provide a document management system to a fictional retail company. To achieve success, the first stage of the project is to evaluate the Business Case. From here it is possible to assess the situation, identify requirements, design a solution, and plan the whole schedule of the project. The project uses the Waterfall framework, and these two previous processes represent the Project Initiation Phase, Requirements Definition and Planning phase. The third phase of a project is execution, the students leave the role of project managers and change to developers. No actual work is executed but rather simulated using the Scrum and Kanban frameworks. The fourth phase, control, and monitoring are simulated with a fictional environment that defines how long passed since the project started and what unexpected situations occurred. This exercise allows the application of both traditional and agile methodologies and makes it an appropriate case study to evaluate PSL.

7.1.1. Case study A: DOCIST on PSL-v.2019 and PSL-v.2020

Prior to any work developed during this MSc Thesis, the DOCIST project plan specification was built on PSL-v.2019. The building process was much like the exercise of the Information System Project Management course, but the tool was more appropriate to the task. The exercise required multiple tools: MS Excel, MS Project, Azure Devops, and MS Word to simulate the four phases and to apply both methodologies. While on the PSL-v.2019, the tool provided all the necessary features to specify the same tasks and had a few automatisms for repetitive tasks improving the experience.

Although, there were a few problems with that version during the evaluation process. Some macros produced incorrect results like the “Import from WBS and OBS” ribbon element on the Resources.RAM sheet that would retain the current RAM content and therefore not validating the current content and creating multiple copies if executed multiple times (see Figure 37).

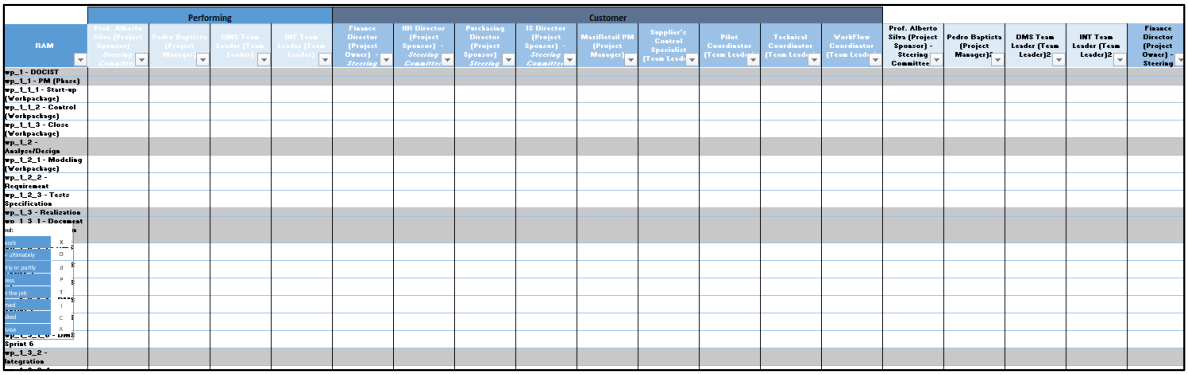


Figure 37 - PSL-v.2019 Resources.RAM duplicate problem.

Other macros would not execute like the “Import from OBS” on the Cost.Expense sheet (see Figure 38).

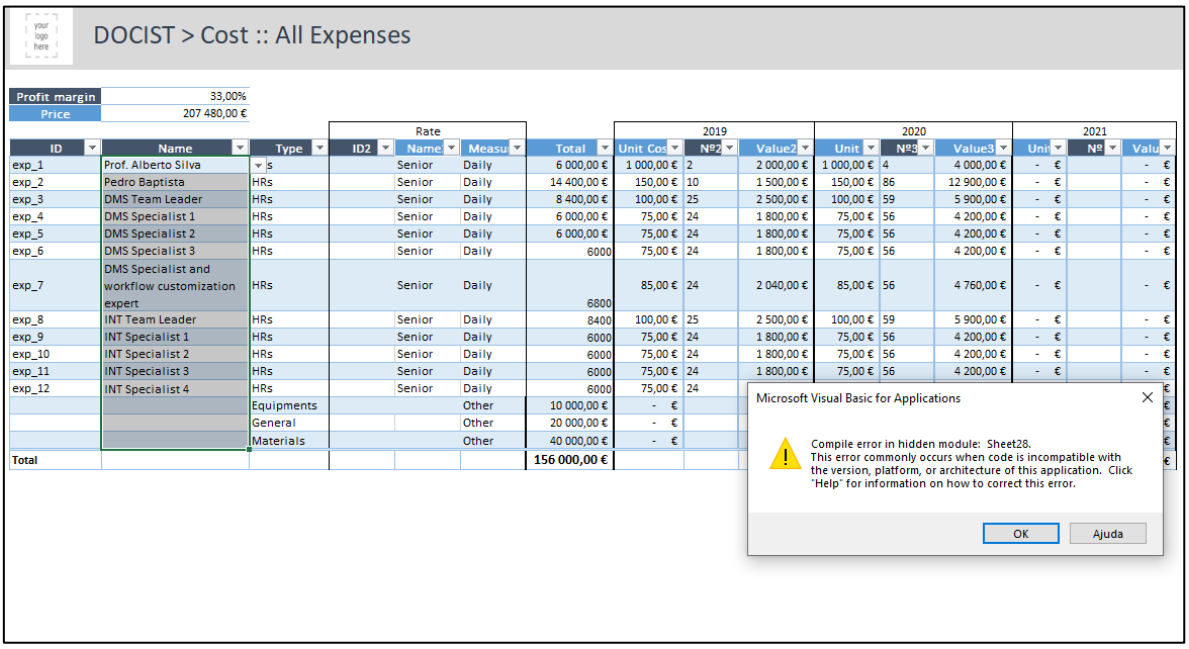


Figure 38 - PSL-v.2019 Cost.Expenses broken macro.

The sheets also contained a few formatting problems but in terms of supporting a Traditional Methodology the tool was close to being in a deployable state. The sheets allocated to support agile methodologies had multiple problems, with macros, format, and graphs. It became a difficult task to simulate the execution phase and these sheets only had one macro in total that operated with the rest of the sheets raising the question on why were both Traditional and Agile sheets on the same workbook. Appendix A – has the figures of the project plan specification using the 2019 version. Building the same project plan specification on PSL-v.2020 went much smoother and overall provided an easy experience. This can be justified to some extent to the personal experience and knowledge of working with the tool but there no longer exist problems with macros, formats, or graphs. Figure 39

shows the improvements on the previous mentioned problem with the RAM, that is maintaining an updated and customizable RAM.

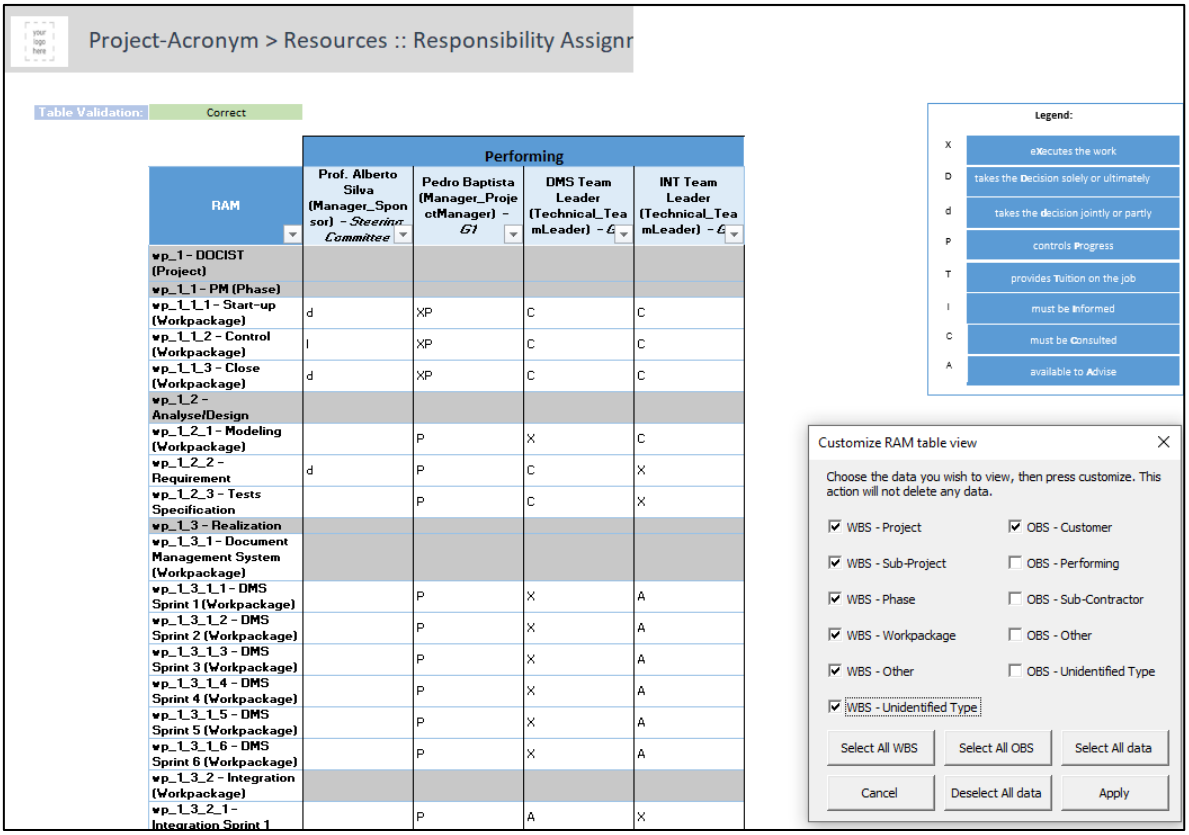


Figure 39 - PSL/Traditiona-v.2020 Resources RAM

This type of customization present on various sheets facilitated the fourth phase of the project making it easier to monitor the project development. The settings group also made it easier to clean every sheet, start a new project and insert new information. Testing the Agile sheets was an experience like testing a new tool that supports agile methodologies. It was easy to specify the backlog, organize sprints, and move tasks from one phase to another on the Kanban board. Testing these sheets with the MSc Thesis Project during its execution would provide a deep evaluation but this was not possible since the tool was being developed and most features were not available in the early-mid stages of the project.

Appendix B – contains figures of this evaluation that were created using the “Generate Report onto PDF” feature.

7.1.2. Case Study B: My MSc Thesis

The Second case study to evaluate the tool is the MSc Thesis Project. On the project plan phase, it was defined that the project would use the Scrum framework, starting with the beginning of the thesis and concluding it on the evaluation.

The Product backlog contained the proposal objectives of the thesis at start but would get new tasks and user stories almost each sprint. The tasks would range from interface difficulties to macro errors. These difficulties always surged from lack of information or clarity available on the template that would lead a user to make mistakes. The tool was not able to recover from the mistakes and possibly lead to the loss of data because a user had to roll back to a previous state of the template. The macro errors mostly occurred because the previous version of the tool was not adjusted to the new transformations and alignments before they were evaluated. The sprint duration was one week but sometimes it extended to two weeks depending on the amount of work defined on each sprint. The sprints did not follow the usual daily short meetings but instead focused on the Sprint review and retrospective. These meetings served as a validation and testing of the tasks developed during the sprint. These short cycles proved extremely valuable to maintain the tool stable, identify bugs, simulate features, analyze inconsistencies and in some cases brainstorm new solutions and optimizations. While the process proved valuable for the developed work it did not evaluate in depth the control and monitoring phase because it would prove a challenge to use the tool for the project while it was still under development. This phase was tested on the PSL-v.2019 but this version was not sufficiently stable to support the Scrum framework.

Once the project was concluded we proceeded to evaluate the tool using a traditional methodology of this thesis and transforming the data available from the PSL-v.2019 agile sheets to the new version. The evaluation of the traditional template was almost effortless, while testing the agile template proved more difficult because it was tested with a closed project and it should be tested during a project execution. Both evaluations are available on Appendix C – MSc Thesis Project on .

7.2. Comparison

With the conclusion of these evaluations we now move to a comparison between the previous and current version of PSL and the market tools analyzed on Section 3.

The most recurrent problem with PSL-v.2019 is the absence of transformations and alignments regarding the input data. As identified previously, import features are either not working or providing erroneous results, some graphs are incorrectly analyzing data, it is difficult to manipulate data and it

is easy to make mistakes making the tool unstable. The mistakes can be as simple as deleting a line on a table, losing all the formulas and format of the same table, deleting a graph, and trying to execute features over the missing graph would produce errors.

All these problems are no longer occurring on the v2020. All available features are correctly working, the graphs are consistent and can be recovered in case they are deleted, tables have filter options available and the available cleaning features achieve the desired goal and remove the possibility of user mistakes. This version is much more user friendly. Focusing on the Traditional Template, a difference is the possibility to monitor the project schedule. Previously this schedule was based on the plan schedule and any modifications were on this same plan. Now it is possible to keep the planned schedule and use a parallel actual schedule that monitors the actual work. This also allows for a review, comparison, and identifications of problems that occurred during a project execution that led to the differences between the planned and actual Gantt Chart. The Agile Template, grew in terms of complexity because it can now support the Kanban Framework, can identify the integration specifics of a project, and has new and functional sheets to support the Scrum framework. Both frameworks are intuitive and easy to apply on the template while also providing transformations between them.

Overall the new version improves the monitoring and closing processes, creates a stable template with the PSL/Traditional-v.2020 and PSL/Agile-.v2020, provides a much better user experience with general customization and features, offers support to Agile methodologies and reduces the amount of generated exceptions, while also being able to handle them. The next table shows the comparison between the two most recent versions of PSL.

Table 3 – Comparison between PSL-v.2019 and PSL-v.2020

	PSL-v.2019	PSL-v.2020
Monitor and Control processes	++	+++
Scalability	++	+++
Customization	+	++
User Error Exceptions	+	+++
Scrum Framework	+	+++
Kanban Framework		++

Focusing just on the PSL-v.2020 both versions and the available market tools described on section 3, the tool now has exclusivity of supporting the ten KAs, separates the actual from the planned schedule leading to numerous possibilities, facilitates the transition from traditional to agile methodologies, and is the only available template that supports Scrum. All these characteristics are analyzed in Table 4 for the PSL/Traditional-v.2020 and Table 5 for the PSL/Agile-v.2020. This comparison is made in terms of the following aspects: KAs support for traditional tools, Scrum and Kanban support for agile tools, customization, report generation, user friendliness and collaboration.

The subjective classification metric is in the following scale: - in the absence of any features, + for minimal applicability, ++ competent, +++ high-quality features.

For users looking for support to the majority of the PMBOK **KAs**, PSL/Traditional-v.2020 is the only one capable of doing so. PSL-v.2019 supports 8 KAs, while ProWorkFlow, Confluence, Vertex42 and Smartsheet support 5 to 7 KAs. MS Project and Office Timeline do not go beyond 2 to 3 KAs.

For users looking for **Scrum** support, Azure DevOps and JIRA Agile offer complex dependency features between sprint backlog and product backlog with multiple dashboard options. For Kanban support, PSL/Agile-v2020 provides the most intuitive Kanban Board. SmartSheet can be customized to some extent to replicate a Kanban Board while Azure DevOps and JIRA agile focus more on the board concept making the Kanban Board more complex than it should be.

Most of the tools provide **customizable** options for treating data and changes to its presentation, but confluence is the best solution for users looking for a clean start with no restrictions to the organization of the data. Smartsheet features to customize the view for different purposes with the same data are of high-quality.

Focusing on the **user friendliness**, PSL/Traditional-v.2020 and PSL/Agile-v.2020 are some of the best solutions because they provide a complete template to a very popular environment and an easy to learn and understand solution. Smartsheet, MS Project, ProWorkFlow and JIRA agile are tools with a more overwhelming first impression and require some adaptation and practice before being able to utilize the full potential of the tools. Confluence is the most complicated tool to learn because it starts from a blank state and Azure DevOps is a tool oriented towards IT making it difficult to use for other types of teams.

Office Timeline and ProWorkFlow are two good tools in what concerns **generate reports**. Office Timeline offers vast and quality options for presentations and ProWorkFlow provides a list of complex and detailed reports for any preference. For agile methodologies JIRA agile offers standard reports options that comprise a wide range of reporting applications.

Confluence is the best **collaborative** tool, it focuses on communication and making sure every member involved is part of the project and actively participates. It also has various interoperability features with many popular tools, like JIRA, Trello, and others. Smartsheet distinguishes itself by allowing to create workflows triggered by data changes, with custom notifications. Focusing on the agile tools, JIRA Agile offers similar features to Confluence making sure every member involved is part of the project and knows what is being developed. It also has interoperability features with MS Word, MS Excel, SQL, and others.

Finally, focusing on just the PMet, the tool has its quality features but also has a few shortcomings. Currently it does not have any collaborative mechanisms, besides the ones provides by Excel and Office 365, making it difficult for more than one person to use it simultaneously. Another aspect is the

difficulty to use PMet in larger projects. While the tool is prepared for any size of information having very large data sheets could become difficult to manage.

Table 4 – Comparison of tools based on Traditional Approaches

		KAs support	Customization	User Friendliness	Report Generation	Collaboration
Tools	SmartSheet	++	+++	++	+	+++
	MS Project	+		++	++	-
	ProWorkFlow	++	+	++	+++	+
	Confluence	++	+++	+	++	+++
	PSL-v.2020	+++	++	+++	++	-
Template	Office Timeline	+	+++	+++	+++	++
	Vertex42	++	++	+++	++	-
	Gantt Excel	+	+++	+++	++	-

Table 5 – Comparison of tools based on Agile Approaches

		Scrum Support	Kanban Support	Scrum And Kanban	Customization	User Friend	Reports Generation	Collaboration
Tools	SmartSheet		++		+++	+++	+	+++
	Azure DevOps	+++	+	++	++	+	+	+++
	JIRA Agile	+++	++	+++	+	++	++	+++
	Asana	+	++	+	++	+	+	++
	Quire		+++		+	+++	+	++
	PSL-v.2020	++	+++	+++	++	+++	++	-
Templates	Vertex 42		++		+	+++	+	-

8. Conclusion

In this final section we present the conclusion of the study and implementations of the PSL-v.2020. We discuss the achieved goals, the state of the tool and possible future work to improve the template.

8.1. Discussion

Project management is the application of practices, principles, processes, tools, and techniques to project activities to meet project requirements. To achieve this goal, it is necessary to have the correct tools for proper planning, control, and communication. The current available market tools are used standalone and prioritize some of these activities but not all of them.

The ITLingo initiative takes the opposite approach and defines a language, PSL, that agglomerates all project management activities. This is done through import and exports of project specifications making the tool a middle ground between other tools. At the start of this thesis, it was already possible to import and export for Microsoft Excel, and export for Microsoft Word. Transferring data requires a well-defined structure and the Excel Template serves as a guide.

The PSL-v.2019 follows the ITLingo initiative goal by providing support to most Knowledge Areas present in a traditional approach to project management. This aspect alone differentiates the template from other excel templates and project management tools. However, this version of the tool does not provide support to all ten Knowledge and while it has an improved user interface, using the tool is a complicated task. Moreover, agile methodologies need to be considered if the initiative wants to achieve its goal.

The new PSL-v.2020 tries to fix the previous problems, focuses on improving the user experience and extends the tool towards agile methodologies. To fix the shortcomings, we added sheets for stakeholders and procurement, they offer support to the missing Knowledge areas and provide more data transformation and alignment options. To deliver a better user experience, we implemented a state machine that differentiates the planning phase from the execution phase, leading to a separation of the planned and actual schedule. This feature not only opens the possibility to identify differences between each state but also facilitates the control and monitoring phase of a project. Furthermore, the template is now divided into two different templates, traditional and agile. The Agile template supports both Scrum and Kanban frameworks simultaneously. The template is structured with a common group of sheets that contain the project general information and a dashboard. While the S

Scrum group contains a state flag defining if a sprint is open or closed, where it is possible to identify tasks, insert work hours each day, concluding and starting new sprints. Kanban is the last group of

the template, containing a Kanban board that uses dynamic validation lists, macros, forms, formulas, and an analyzer of key performance indicators.

Additionally, both templates now have general configuration options, providing an easy alignment of common identifiers like project state or sprint dates, cleaning, and visualization options for all sheets. Lastly, recovery mechanisms are implemented for exceptional scenarios like deleting a graph, specific cells are unlocked to allow the insertion and deletion of cells without creating format abnormalities, some table filters are now accessible and an export feature to PDF format is available.

The final templates were evaluated using two case studies, the DOCIST fictional project and this MSc thesis. First, we tested the DOCIST project on v2019 and v2020 to identify the main differences, secondly, we used the MSc thesis to identify possible problems and minor fixes that needed to be corrected.

To conclude, the PSL-v.2020 now correctly supports all ten knowledge areas of a traditional methodology, supports agile methodologies, and provides a smooth user experience. These features make the template a unique and competitive tool for project management activities.

8.2. Future Work

PSL-v.2020 is a vast improvement over the PSL-v.2019. Although some can still be improved before the tool is deployed.

ITLingo and deployment: ITLingo is the structural base of the PSL-v.2020 and is not up to date with the recent iterations of the template. On the far side, it is necessary to implement a deployable mechanism, software key is an interesting tool for this goal.

Export/Import Features: With the addition of the export to PDF feature more export features need to be considered. For example, exporting to Microsoft PowerPoint would allow a user to make an easy presentation with the template information. However, a more important feature that needs to be considered is transforming data from the Agile template to the Traditional template and vice-versa, this would prove valuable for project managers transitioning from one approach to the other, or applying a framework like PM^2 that uses both templates.

User Testing: Our evaluation confirmed the value of the template, yet it is not enough for a tool as complex as this template because it was a small evaluation from the developer point of view. A different evaluation session is required with multiple users before we can consider deploying the tool.

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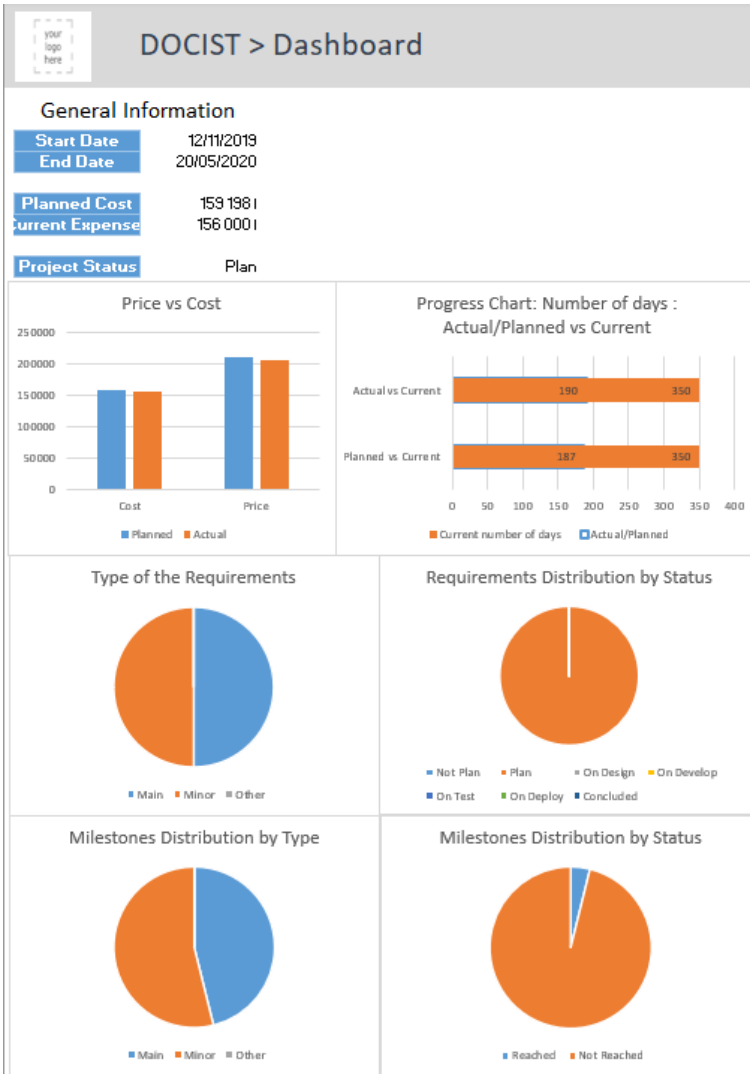
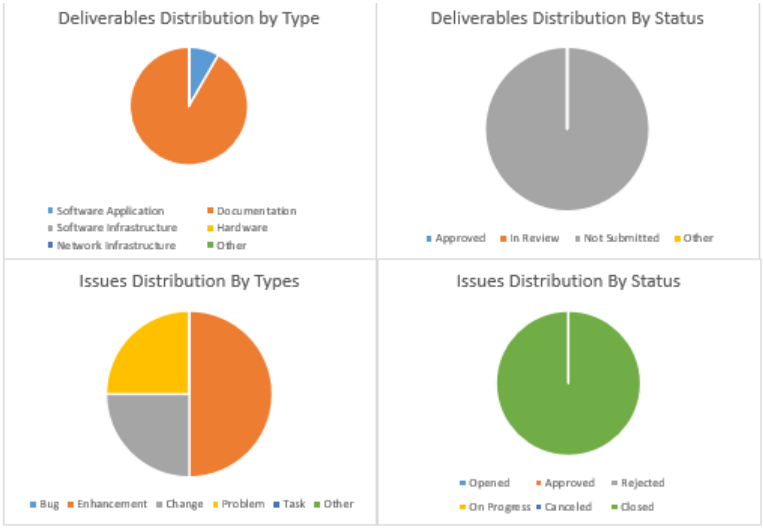
Appendix A – PSL-v.2019




Deliverables Distribution by Type
Software Application
Documentation
Software Infrastructure
Hardware
Network Infrastructure
Other
Deliverables Distribution By Status
Approved
In Review
Not Submitted
Other
Issues Distribution By Types
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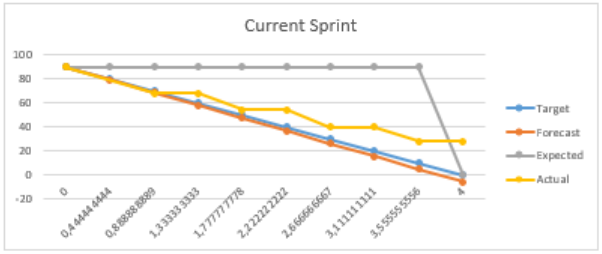
Approved
Rejected
On Progress
Canceled
Closed

Scheduling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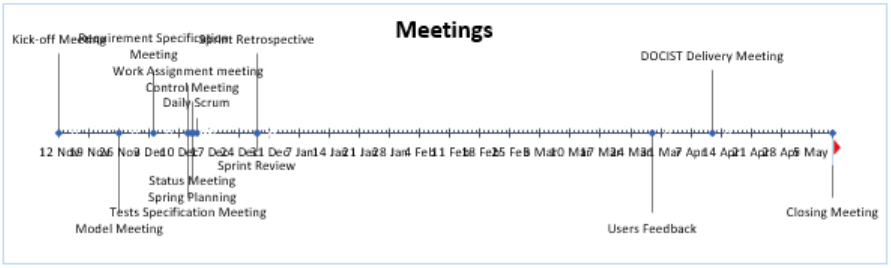
40
20
0
-20
Target
Forecast
Expected
Actual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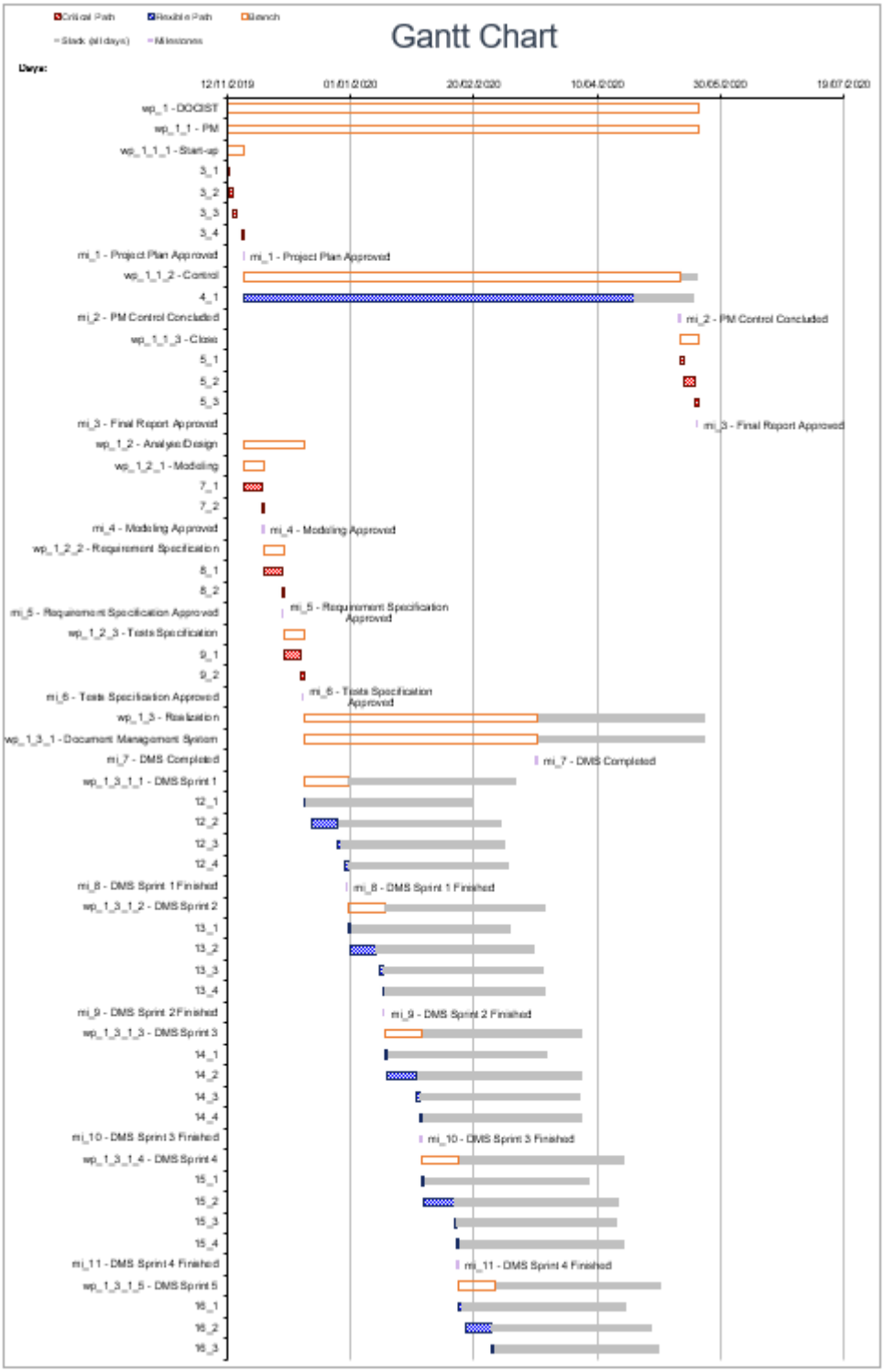
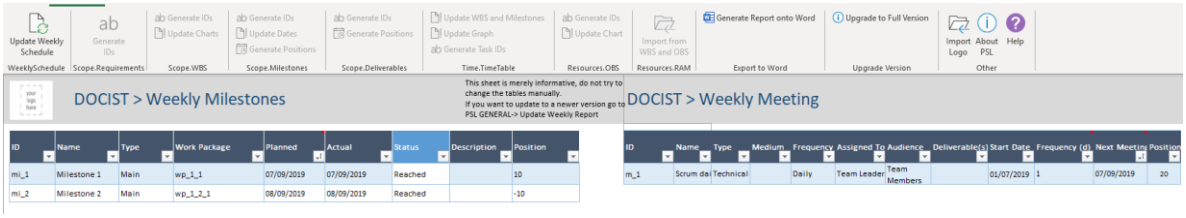
Kick-off Meeting
Requirement Specification Meeting
Sprint Retrospective
Work Assignment meeting
Control Meeting
Daily Scrum
DOCIST Delivery Meeting
Sprint Review
Status Meeting
Spring Planning
Tests Specification Meeting
Model Meeting
Users Feedback
Closing Meeting


Critical Path
Flexible Path
Branch
Slack (all days)
Milestones
Gantt Chart
Days:
12/11/2019
01/01/2020
20/02/2020
10/04/2020
30/05/2020
19/07/2020
wp_1 - DOCSIST
wp_1_1 - PM
ws_1_1_1 - Start-up
3_1
3_2
3_3
3_4
mi_1 - Project Plan Approved
mi_1 - Project Plan Approved
ws_1_1_2 - Control
4_1
mi_2 - PM Control Concluded
mi_2 - PM Control Concluded
wp_1_1_3 - Close
5_1
5_2
5_3
mi_3 - Final Report Approved
mi_3 - Final Report Approved
wp_1_2 - Analysis/Design
ws_1_2_1 - Modeling
7_1
7_2
mi_4 - Modeling Approved
mi_4 - Modeling Approved
wp_1_2_2 - Requirement Specification
8_1
8_2
mi_5 - Requirement Specification Approved
mi_5 - Requirement Specification Approved
wp_1_2_3 - Tests Specification
9_1
9_2
mi_6 - Tests Specification Approved
mi_6 - Tests Specification Approved
wp_1_3 - Realization
ws_1_3_1 - Document Management System
mi_7 - DMS Completed
mi_7 - DMS Completed
wp_1_3_1_1 - DMS Sprint 1
12_1
12_2
12_3
12_4
mi_8 - DMS Sprint 1 Finished
mi_8 - DMS Sprint 1 Finished
wp_1_3_1_2 - DMS Sprint 2
13_1
13_2
13_3
13_4
mi_9 - DMS Sprint 2 Finished
mi_9 - DMS Sprint 2 Finished
wp_1_3_1_3 - DMS Sprint 3
14_1
14_2
14_3
14_4
mi_10 - DMS Sprint 3 Finished
mi_10 - DMS Sprint 3 Finished
wp_1_3_1_4 - DMS Sprint 4
15_1
15_2
15_3
15_4
mi_11 - DMS Sprint 4 Finished
mi_11 - DMS Sprint 4 Finished
wp_1_3_1_5 - DMS Sprint 5
16_1
16_2
16_3



ID	Name	Type	Work Package	Planned	Actual	Status	Description	Position
mi_1	Milestone 1	Main	wp_1_1	07/09/2019	07/09/2019	Reached		10
mi_2	Milestone 2	Main	wp_1_2_1	08/09/2019	08/09/2019	Reached		-10

ID	Name	Type	Medium	Frequency	Assigned To	Audience	Deliverable(s)	Start Date	Frequency (d)	Next Meeting	Position
m_1	Scrum dai	Technical		Daily	Team Leader	Team Members		01/07/2019	1	07/09/2019	20

DOCIST > Weekly Deliverables

ID	Deliverable	Type	Work Package	Assigned To	Submitted	Approved	Actual Submissi	Actual Approval	Status	Description	Position
dble_1	System Depl	Other			05/09/2019				In Review		10

DOCIST > Integration :: Project Main Data

Project Identification

Project Acronym	Project Name	Project Progress	Version
DOCIST	Document Management System	Plan	1.0

Types

Project Type	Nationality Type	Application Domain
System Development	National	Other

Entities Involved

Type	Name	Sponsor	Project Manager
Customer	MaxiRetail	HR Director	To be Appointed
Performing	IST - GPI	Prof. Alberto Silva	Mr.Pedro Baptista

My Organization	Performing

Time	Planned	Actual	Variance (WorkDays)
Start	12/11/2019	12/11/2019	1
End	17/05/2020	20/05/2020	-3
N° Days	133,00	136,00	-3 Days

Cost	Planned	Actual	Variance
Cost	159 198 €	156 000 €	-3 198 €
Income Tax	33%	33%	0
Price	211 733 €	207 480 €	-4 253 €
Profit	52 535 €	51 480 €	-1 055 €

Executive Summary

Purpose: Why?	Document flows between stores and head office represents today a large volume of paper information, no longer adequate to the Company's fast growth witch originated problems with: -Loss of some important documents -Large volumes of information with slow access -Control documents physical location -Control of information flow -Employees expense claims -Difficulty to store large amount of documents in paper format
Purpose: What?	New Document Management System (DOCIST) with the following modules: -Document Managemet (DM) -Invoice Approval (IA) -Purchase Management (PM) -Expense Claims (EC) It also includes: -Integration with Existing ERP -Migration of current solutions in terms of data documents -End Users training -Technical Training -Supply the required framework and all needed cuztomization

Business Benefits			
ID	Description	Logical Expresion	Value
BB_1	Employees complaints reduction	>=	50%
BB_2	Ensuring expenses reimbursement X days after submission	<=	5
BB_3	Ensure supplier's invoices approval time x working days after	<=	10
BB_4	Reduce paper costs and paper archive physical space	>=	50%
BB_5	Reduce administrative costs	>=	25%

Success Criteria			
ID	Description	Logical Expresion	Value
SC_1	Finish Project	<=	5 months
SC_2	Cost of Project	<	200.000l + 10%
SC_3	Non_conformities during acceptance tests	<=	10%
SC_4	Time for non-conformities correction	<	24 hours
SC_5	Training sessions satisfaction	>=	3,75

Success Factors	
SF_1	Project Owner fully commited
SF_2	Good communication channels between the Supplier and Client so all the needs are satisfied.
SF_3	All of the involved organization's employees have the required technical capacities to implement the project.
SF_4	Hardware and related infrastructures provided by the IS Department available on time

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DOCIST > Integration :: Project Charter

Project Identification			
Project Name	DOCIST	Project Acronym	Document Management Syster
Project Sponsor	Prof. Alberto Silva	Project Manager	Mr.Pedro Baptista
Application Domain	Other	Nationality Type	National

Planned Dates		Actual Dates	
Start	12/11/2019	Start	12/11/2019
End	17/05/2020	End	20/05/2020

Executive Summary	
Purpose: Why?	Document flows between stores and head office represents today a large volume of paper informat
Purpose: What?	New Document Management System (DOCIST) with the following modules:-Document Managemet (I

Business Benefits			
ID	Description	Logical Expressio	Value
BB_1	Employees complaints reduction		
BB_2	Ensuring expenses reimbursement X days after submission		
BB_5	Reduce administrative costs		

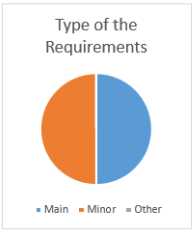
Success Criteria			
ID	Description	Logical Expressio	Value
SC_1	Finish Project	<=	5 months
SC_2	Cost of Project	<	200.000€ + 10%
SC_5	Training sessions satisfaction	>=	3,75

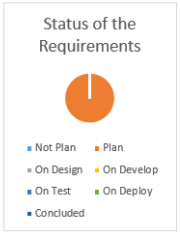
Success Factors	
SF_1	Project Owner fully commited
SF_2	Good communication channels between the Supplier and Client so all the needs are satisfied.
SF_4	Hardware and related infrastructures provided by the IS Department available on time

Project Sponsor	Signature:
	Name:
	Date:

DOCIST > Integration :: System Requirements

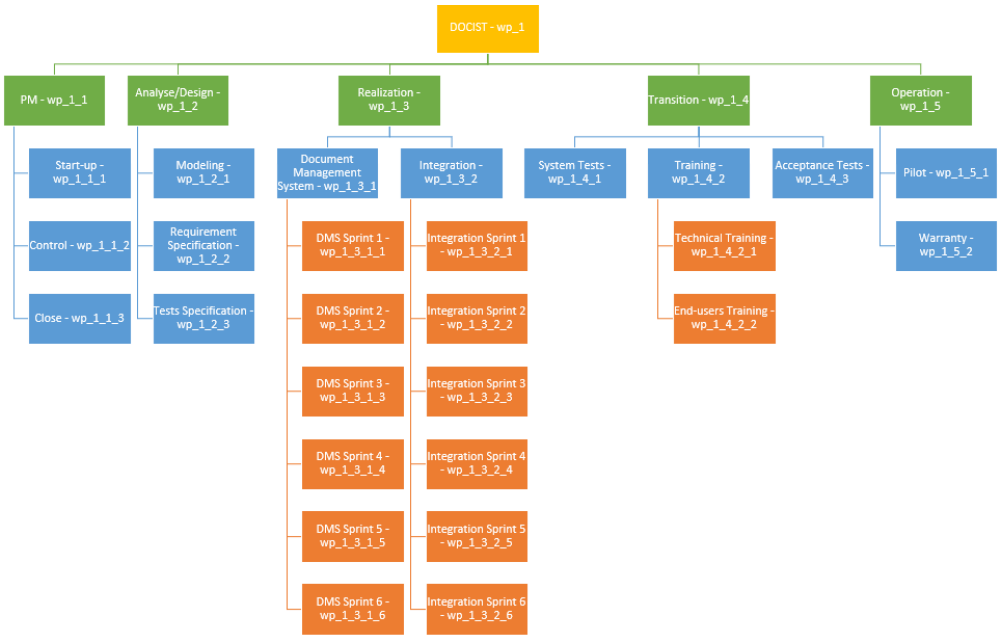
ID	Name	Type	Status	Description
reqs_1	Document Management Module	Main	Plan	Features of document management, and document repository
reqs_2	Invoices approval module	Main	Plan	Suppliers´ invoices are received by the finance department, who creates electronic copies in DOCIST and initiates the approval workflow. The process will be defined based on approvals authority, as defined in MR-IS human resources module. As soon as the invoice is approved, it is inserted in MR-IS finance module, ready for payment.
reqs_3	Purchase module	Main	Plan	All purchase documents, such as, requests for proposal (RFP); requests for quotation (RFQ); suppliers' proposals and suppliers' orders shall be archived and make available based on MaxiRetail purchasing rules and policies. The purchases' workflow shall implement the orders' required approvals according to defined organization's authority levels.
reqs_4	Expense claims module	Main	Plan	DOCIST shall allow employees to present their expense claims and attached documents. Expense claims shall automatically be sent to management approval. The workflow shall be defined based on organization hierarchy and approvals authority, as defined in MR-IS human resources module. As soon as expenses are approved, they are inserted in MR-IS finance module, ready for payment.
reqs_5	Integration	Minor	Plan	Integration of the system with existing ERP
reqs_6	Migration	Minor	Plan	Migration of the current MaxiRetail solutions in terms of data and documents
reqs_7	End-Users training	Minor	Plan	Training for the MaxiRetail employes users
reqs_8	Technical training	Minor	Plan	Technical training (for the IT Department's people responsible for the future system maintenance and additional configurations)





DOCIST > Scope :: Work Breakdown Structure

Level	WBS	ID	Name	Type	Description	Milest	Milestone Name
1	1	wp_1	DOCIST	Project			
2	1.1	wp_1_1	PM	Phase			
3	1.1.1	wp_1_1_1	Start-up	Workpackage	Elaborate the project plan according to maxiretail needs	mi_1	Project Plan Approved
3	1.1.2	wp_1_1_2	Control	Workpackage	Accompany project exection and guarantee all the activities go according to plan	mi_2	PM Control Concluded
3	1.1.3	wp_1_1_3	Close	Workpackage	Close all Project activities	mi_26	Final Report Approved
2	1.2	wp_1_2	Analyse/Design	Phase			
3	1.2.1	wp_1_2_1	Modeling	Workpackage	Process design using BPMN notation	mi_3	Modeling Approved
3	1.2.2	wp_1_2_2	Requirement Specification	Workpackage	Software requirements specification listing sufficent and necessary requirements for the project development	mi_4	Requirement Specification Approved
3	1.2.3	wp_1_2_3	Tests Specification	Workpackage	Define how will the project be tested after implementation	mi_5	Tests Specification Approved
2	1.3	wp_1_3	Realization	Phase			
3	1.3.1	wp_1_3_1	Document Management System	Workpackage	Document Management System Development	mi_16	DMS Completed
4	1.3.1.1	wp_1_3_1_1	DMS Sprint 1	Workpackage	Document Management System Sprint 1 Realization	mi_6	DMS Sprint 1 Finished
4	1.3.1.2	wp_1_3_1_2	DMS Sprint 2	Workpackage	Document Management System Sprint 2 Realization	mi_8	DMS Sprint 2 Finished
4	1.3.1.3	wp_1_3_1_3	DMS Sprint 3	Workpackage	Document Management System Sprint 3 Realization	mi_10	DMS Sprint 3 Finished
4	1.3.1.4	wp_1_3_1_4	DMS Sprint 4	Workpackage	Document Management System Sprint 4 Realization	mi_12	DMS Sprint 4 Finished
4	1.3.1.5	wp_1_3_1_5	DMS Sprint 5	Workpackage	Document Management System Sprint 5 Realization	mi_14	DMS Sprint 5 Finished
4	1.3.1.6	wp_1_3_1_6	DMS Sprint 6	Workpackage	Document Management System Sprint 6 Realization	mi_17	DMS Sprint 6 Finished
3	1.3.2	wp_1_3_2	Integration	Workpackage	Integration of DMS	mi_18	Integration
4	1.3.2.1	wp_1_3_2_1	Integration Sprint 1	Workpackage	Integration Sprint 1 Realization	mi_7	INT Sprint 1 Finished
4	1.3.2.2	wp_1_3_2_2	Integration Sprint 2	Workpackage	Integration Sprint 2 Realization	mi_9	INT Sprint 2 Finished
4	1.3.2.3	wp_1_3_2_3	Integration Sprint 3	Workpackage	Integration Sprint 3 Realization	mi_11	INT Sprint 3 Finished
4	1.3.2.4	wp_1_3_2_4	Integration Sprint 4	Workpackage	Integration Sprint 4 Realization	mi_13	INT Sprint 4 Finished
4	1.3.2.5	wp_1_3_2_5	Integration Sprint 5	Workpackage	Integration Sprint 5 Realization	mi_15	INT Sprint 5 Finished
4	1.3.2.6	wp_1_3_2_6	Integration Sprint 6	Workpackage	Integration Sprint 6 Realization	mi_19	INT Sprint 6 Finished
2	1.4	wp_1_4	Transition	Phase			
3	1.4.1	wp_1_4_1	System Tests	Workpackage	Test the new system	mi_20	Systems Tests Approved
3	1.4.2	wp_1_4_2	Training	Workpackage	Train MaxiRetail IT team and employee's	mi_22	Training concluded
4	1.4.2.1	wp_1_4_2_1	Technical Training	Workpackage	Technical training for the IT Department's people responsible for the future system maintenance and additional configurations	mi_21	IT Department people trained
4	1.4.2.2	wp_1_4_2_2	End-users Training	Workpackage	Manuals and additional training materials shall be delivered in Lisbon and Porto	mi_23	Manuals and Additional Materials
3	1.4.3	wp_1_4_3	Acceptance Tests	Workpackage	Test the system with users	mi_24	Acceptance Tests Approved
2	1.5	wp_1_5	Operation	Phase			
3	1.5.1	wp_1_5_1	Pilot	Workpackage	Pilot and experiment performed to evaluate the documentation management system operability	mi_25	DOCIST Approved
3	1.5.2	wp_1_5_2	Warranty	Workpackage	Provide warranty of the new system		



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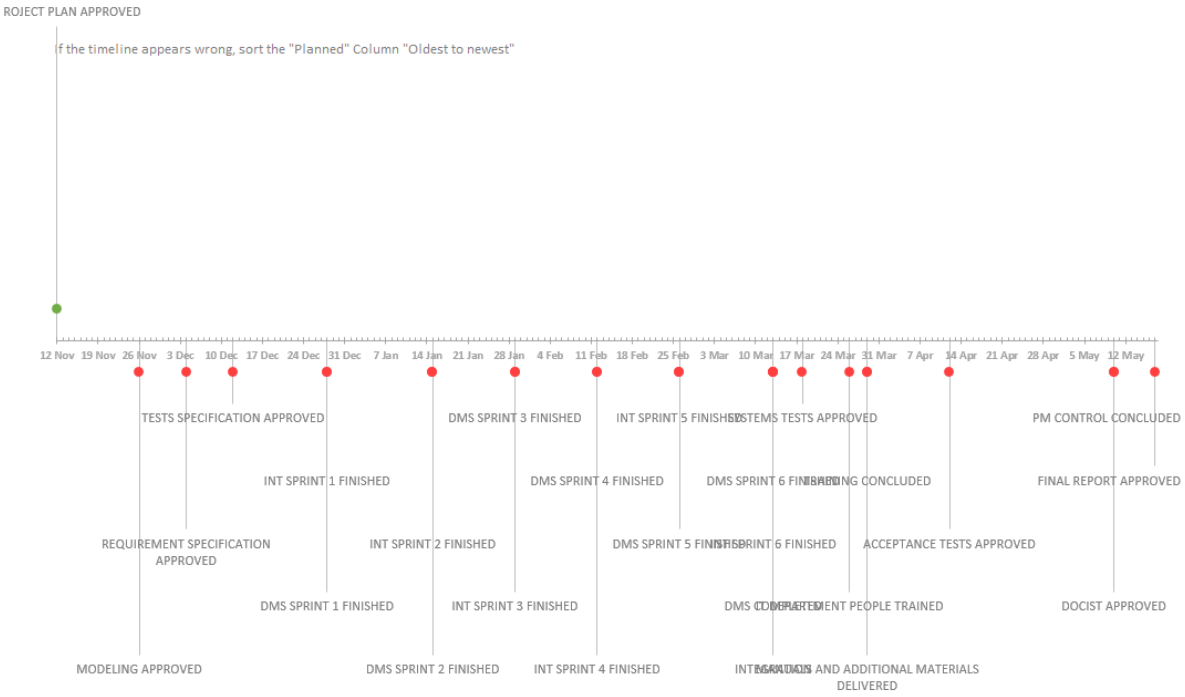
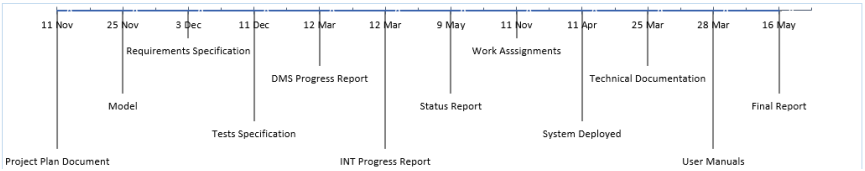
DOCIST > Scope :: Milestones

ID	Name	Type	Work	Planned	Actual	Status	Description
mi_1	Project Plan Approved	Main	wp_1_1_1	12/11/2019		Reached	
mi_3	Modeling Approved	Main	wp_1_2_1	26/11/2019		Not Reached	
mi_4	Requirement Specification Approved	Main	wp_1_2_2	04/12/2019		Not Reached	
mi_5	Tests Specification Approved	Main	wp_1_2_3	12/12/2019		Not Reached	
mi_6	DMS Sprint 1 Finished	Minor	wp_1_3_1_1	28/12/2019		Not Reached	
mi_7	INT Sprint 1 Finished	Minor	wp_1_3_2_1	28/12/2019		Not Reached	
mi_8	DMS Sprint 2 Finished	Minor	wp_1_3_1_2	15/01/2020		Not Reached	
mi_9	INT Sprint 2 Finished	Minor	wp_1_3_2_2	15/01/2020		Not Reached	
mi_10	DMS Sprint 3 Finished	Minor	wp_1_3_1_3	29/01/2020		Not Reached	
mi_11	INT Sprint 3 Finished	Minor	wp_1_3_2_3	29/01/2020		Not Reached	
mi_12	DMS Sprint 4 Finished	Minor	wp_1_3_1_4	12/02/2020		Not Reached	
mi_13	INT Sprint 4 Finished	Minor	wp_1_3_2_4	12/02/2020		Not Reached	
mi_14	DMS Sprint 5 Finished	Minor	wp_1_3_1_5	26/02/2020		Not Reached	
mi_15	INT Sprint 5 Finished	Minor	wp_1_3_2_5	26/02/2020		Not Reached	
mi_16	DMS Completed	Main	wp_1_3_1	13/03/2020		Not Reached	
mi_17	DMS Sprint 6 Finished	Minor	wp_1_3_1_6	13/03/2020		Not Reached	
mi_18	Integration	Main	wp_1_3_2	13/03/2020		Not Reached	
mi_19	INT Sprint 6 Finished	Minor	wp_1_3_2_6	13/03/2020		Not Reached	
mi_20	Systems Tests Approved	Main	wp_1_4_1	18/03/2020		Not Reached	
mi_21	IT Department people trained	Minor	wp_1_4_2_1	26/03/2020		Not Reached	
mi_22	Training concluded	Main	wp_1_4_2	29/03/2020		Not Reached	
mi_23	Manuals and Additional Materials Deli	Minor	wp_1_4_2_2	29/03/2020		Not Reached	
mi_24	Acceptance Tests Approved	Main	wp_1_4_3	12/04/2020		Not Reached	
mi_2	PM Control Concluded	Main	wp_1_1_2	10/05/2020		Not Reached	
mi_25	DOCIST Approved	Main	wp_1_5_1	10/05/2020		Not Reached	
mi_26	Final Report Approved	Main	wp_1_1_3	17/05/2020		Not Reached	



DOCIST > Scope :: Deliverables

					Planned Dates		Actual Dates			
ID	Deliverable	Type	Work Packag	Assigned To	Submitted	Approved	Submitted	Approved	Status	Description
ible_1	Project Plan Document	Documentation	wp_1_1_1	Pedro Baptista	11/11/2019	12/11/2019			Not Submitte	Project planning present to maxiretail
ible_2	Model	Documentation	wp_1_2_1	DMS Team Leader	25/11/2019	26/11/2019			Not Submitte	Process desing using BPMN notation
ible_3	Requirements Specification	Documentation	wp_1_2_2	INT Team Leader	03/12/2019	04/12/2019			Not Submitte	Requirements specification document
ible_4	Tests Specification	Documentation	wp_1_2_3	INT Team Leader	11/12/2019	12/12/2019			Not Submitte	Tests specification document
ible_5	DMS Progress Report	Documentation	wp_1_3_1	DMS Team Leader	12/03/2020	13/03/2020			Not Submitte	Weekly update on what the DMS team has accomplished
ible_6	INT Progress Report	Documentation	wp_1_3_2	INT Team Leader	12/03/2020	13/03/2020			Not Submitte	Weekly updapte on what the INT team has accomplished
ible_7	Status Report	Documentation	wp_1_1_2	Pedro Baptista	09/05/2020	10/05/2020			Not Submitte	Bi-Weekly update on where the project stands
ible_8	Work Asssignments	Documentation	wp_1_1_1	Pedro Baptista	11/11/2019	12/11/2019			Not Submitte	Set of activities and who is responsible for doing them
ible_9	System Deployed	Software Application	wp_1_4_3	INT Team Leader	11/04/2020	12/04/2020			Not Submitte	DOCIST application integrated with all the implemented
ible_1(	Technical Documentation	Documentation	wp_1_4_2_1	DMS Team Leader	25/03/2020	26/03/2020			Not Submitte	Technical documentation of all the modules
ible_1	User Manuals	Documentation	wp_1_4_2_2	INT Team Leader	28/03/2020	29/03/2020			Not Submitte	Manuals with the description of the system use and
ible_1	Final Report	Documentation	wp_1_1_3	Pedro Baptista	16/05/2020	17/05/2020			Not Submitte	Conclusion of the project



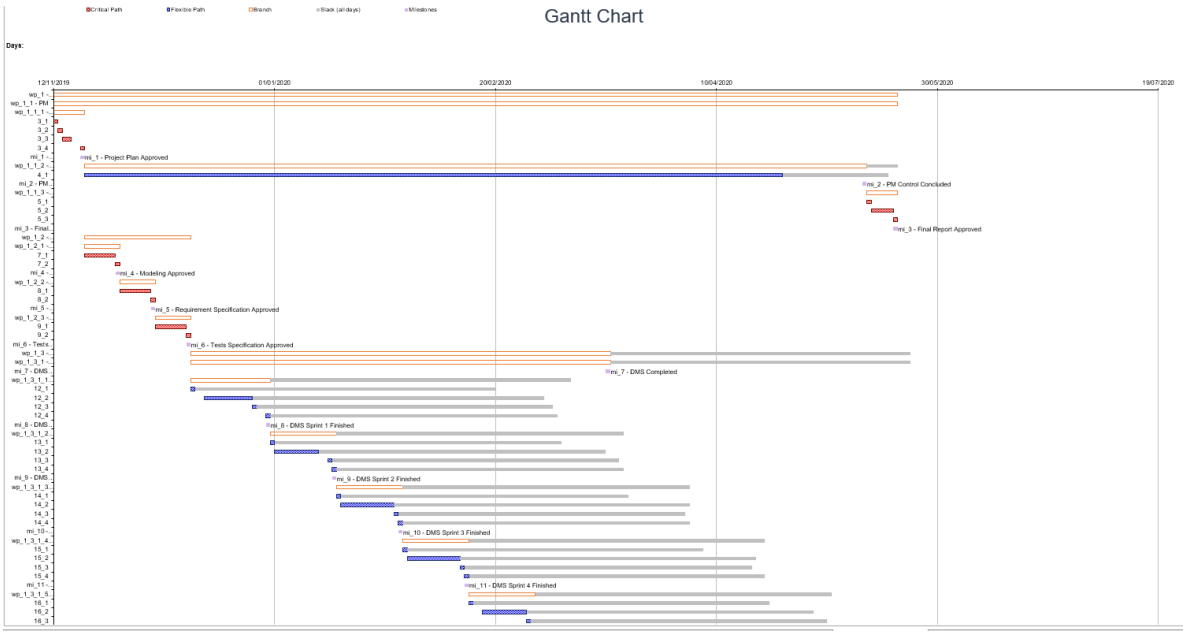
DOCIST > Time :: Timetable

Project Start Date	12/11/2019
Project End Date	20/05/2020

Task I	ID	Lev	Task	Type	Quality Type	Start	End	Duration (d)	Type of Precendenc	Predecessors	Status	Critical Path	Late Start	Late Finish	Slack
1	wp_1	1	DOCIST	Project		12/11/2019	20/05/2020	136				Critical Path	12/11/2019	20/05/2020	0
2	wp_1_1	2	PM	Phase		12/11/2019	20/05/2020	136				Critical Path	12/11/2019	20/05/2020	0
3	wp_1_1_1	3	Start-up	Workpackage		12/11/2019	18/11/2019	5				Critical Path	12/11/2019	18/11/2019	0
3_1		4	Read Project Proposal	Activity		12/11/2019	12/11/2019	1			Concluded	Critical Path	12/11/2019	12/11/2019	0
3_2		4	Team Definition	Activity		13/11/2019	13/11/2019	1	Finish-To-Start	3_1	Concluded	Critical Path	13/11/2019	13/11/2019	0
3_3		4	Elaborate Project Execution Plan	Activity		14/11/2019	15/11/2019	2	Finish-To-Start	3_2	On Develop	Critical Path	14/11/2019	15/11/2019	0
3_4		4	Kick-off Meeting	Activity		18/11/2019	18/11/2019	1	Finish-To-Start	3_3	Not Plan	Critical Path	18/11/2019	18/11/2019	0
mi_1	mi_1	4	Project Plan Approved	Activity		18/11/2019	18/11/2019	0	Finish-To-Start	3_4	Not Plan	Critical Path	18/11/2019	18/11/2019	0
4	wp_1_1_2	3	Control	Workpackage		19/11/2019	13/05/2020	126					26/11/2019	20/05/2020	5
4_1		4	Monitoring	Activity		19/11/2019	24/04/2020	113	Finish-To-Start	mi_1	Not Plan		13/12/2019	20/05/2020	18
mi_2	mi_2	4	PM Control Concluded	Milestone		13/05/2020	13/05/2020	0	Finish-To-Start	mi_26	Not Plan	Critical Path	13/05/2020	13/05/2020	0
5	wp_1_1_3	3	Close	Workpackage		14/05/2020	20/05/2020	5				Critical Path	14/05/2020	20/05/2020	0
5_1		4	Team Members Feedback	Activity		14/05/2020	14/05/2020	1	Finish-To-Start	mi_2	Not Plan	Critical Path	14/05/2020	14/05/2020	0
5_2		4	Final Report	Activity		15/05/2020	19/05/2020	3	Finish-To-Start	5_1	Not Plan	Critical Path	15/05/2020	19/05/2020	0
5_3		4	Close Contract	Activity		20/05/2020	20/05/2020	1	Finish-To-Start	5_2	Not Plan	Critical Path	20/05/2020	20/05/2020	0
mi_3	mi_3	4	Final Report Approved	Milestone		20/05/2020	20/05/2020	0	Finish-To-Start	5_3	Not Plan	Critical Path	20/05/2020	20/05/2020	0
6	wp_1_2	2	Analyse/Design	Phase		19/11/2019	12/12/2019	18				Critical Path	19/11/2019	12/12/2019	0
7	wp_1_2_1	3	Modeling	Workpackage		19/11/2019	26/11/2019	6				Critical Path	19/11/2019	26/11/2019	0
7_1		4	Process Design	Activity		19/11/2019	25/11/2019	5	Finish-To-Start	mi_1	Not Plan	Critical Path	19/11/2019	25/11/2019	0
7_2		4	Meeting to review the model	Activity		26/11/2019	26/11/2019	1	Finish-To-Start	7_1	Not Plan	Critical Path	26/11/2019	26/11/2019	0
mi_4	mi_4	4	Modeling Approved	Milestone		26/11/2019	26/11/2019	0	Finish-To-Start	7_2	Not Plan	Critical Path	26/11/2019	26/11/2019	0
8	wp_1_2_2	3	Requirement Specification	Workpackage		27/11/2019	04/12/2019	6				Critical Path	27/11/2019	04/12/2019	0
8_1		4	Requirements document elaboration	Activity		27/11/2019	03/12/2019	5	Finish-To-Start	mi_4	Not Plan	Critical Path	27/11/2019	03/12/2019	0
8_2		4	Meeting to review the requirements document	Activity		04/12/2019	04/12/2019	1	Finish-To-Start	8_1	Not Plan	Critical Path	04/12/2019	04/12/2019	0
mi_5	mi_5	4	Requirement Specification Approved	Milestone		04/12/2019	04/12/2019	0	Finish-To-Start	8_2	Not Plan	Critical Path	04/12/2019	04/12/2019	0
9	wp_1_2_3	3	Tests Specification	Workpackage		05/12/2019	12/12/2019	6				Critical Path	05/12/2019	12/12/2019	0
9_1		4	Test Specification Document elaboration	Activity		05/12/2019	11/12/2019	5	Finish-To-Start	mi_5	Not Plan	Critical Path	05/12/2019	11/12/2019	0
9_2		4	Meeting to review the Test specification document	Activity		12/12/2019	12/12/2019	1	Finish-To-Start	9_1	Not Plan	Critical Path	12/12/2019	12/12/2019	0
mi_6	mi_6	4	Tests Specification Approved	Milestone		12/12/2019	12/12/2019	0	Finish-To-Start	9_2	Not Plan	Critical Path	12/12/2019	12/12/2019	0
10	wp_1_3	2	Realization	Phase		13/12/2019	16/03/2020	66					19/02/2020	20/05/2020	47
11	wp_1_3_1	3	Document Management System	Workpackage		13/12/2019	16/03/2020	66					19/02/2020	20/05/2020	47
mi_7	mi_7	4	DMS Completed	Milestone		16/03/2020	16/03/2020	0	Finish-To-Start	mi_13			20/05/2020	20/05/2020	47
12	wp_1_3_1_1	4	DMS Sprint 1	Workpackage		13/12/2019	30/12/2019	11					19/02/2020	04/03/2020	47
12_1		5	Planning Meeting	Activity		13/12/2019	13/12/2019	1	Finish-To-Start	mi_6	Not Plan		19/02/2020	19/02/2020	47
12_2		5	Sprint Execution	Activity		16/12/2019	26/12/2019	8	Finish-To-Start	12_1	Not Plan		20/02/2020	02/03/2020	47
12_3		5	Review Meeting	Activity		27/12/2019	27/12/2019	1	Finish-To-Start	12_2	Not Plan		03/03/2020	03/03/2020	47
12_4		5	Retroespective Meeting	Activity		30/12/2019	30/12/2019	1	Finish-To-Start	12_3	Not Plan		04/03/2020	04/03/2020	47
mi_8	mi_8	5	DMS Sprint 1 Finished	Milestone		30/12/2019	30/12/2019	0	Finish-To-Start	12_4	Not Plan		04/03/2020	04/03/2020	47
13	wp_1_3_1_2	4	DMS Sprint 2	Workpackage		31/12/2019	14/01/2020	11					05/03/2020	19/03/2020	47

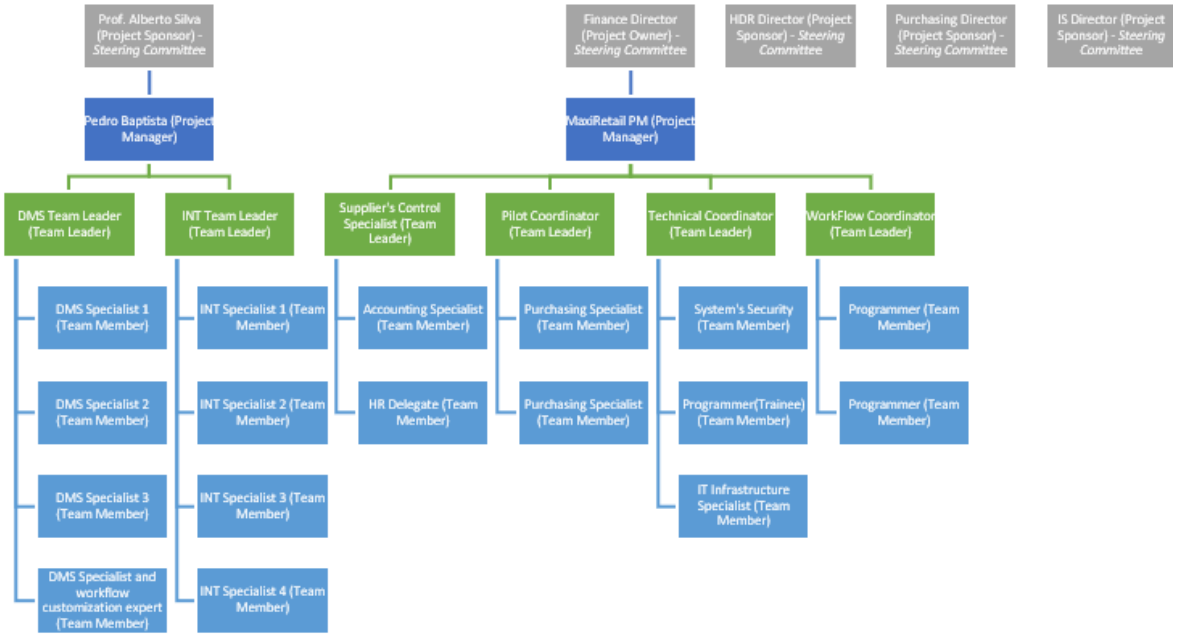
B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
11	wp_1_3_1	3	Document Management System	Workpackage		13/12/2019	16/03/2020	66					19/02/2020	20/05/2020	47
mi_7	mi_7	4	DMS Completed	Milestone		16/03/2020	16/03/2020	0	Finish-To-Start	mi_13			20/05/2020	20/05/2020	47
12	wp_1_3_1_1	4	DMS Sprint 1	Workpackage		13/12/2019	30/12/2019	11					19/02/2020	04/03/2020	47
12_1		5	Planning Meeting	Activity		13/12/2019	13/12/2019	1	Finish-To-Start	mi_6	Not Plan		19/02/2020	19/02/2020	47
12_2		5	Sprint Execution	Activity		16/12/2019	26/12/2019	8	Finish-To-Start	12_1	Not Plan		20/02/2020	02/03/2020	47
12_3		5	Review Meeting	Activity		27/12/2019	27/12/2019	1	Finish-To-Start	12_2	Not Plan		03/03/2020	03/03/2020	47
12_4		5	Retroespective Meeting	Activity		30/12/2019	30/12/2019	1	Finish-To-Start	12_3	Not Plan		04/03/2020	04/03/2020	47
mi_8	mi_8	5	DMS Sprint 1 Finished	Milestone		30/12/2019	30/12/2019	0	Finish-To-Start	12_4	Not Plan		04/03/2020	04/03/2020	47
13	wp_1_3_1_2	4	DMS Sprint 2	Workpackage		31/12/2019	14/01/2020	11					05/03/2020	19/03/2020	47
13_1		5	Planning Meeting	Activity		31/12/2019	31/12/2019	1	Finish-To-Start	mi_8	Not Plan		05/03/2020	05/03/2020	47
13_2		5	Sprint Execution	Activity		01/01/2020	10/01/2020	8	Finish-To-Start	13_1	Not Plan		06/03/2020	17/03/2020	47
13_3		5	Review Meeting	Activity		13/01/2020	13/01/2020	1	Finish-To-Start	13_2	Not Plan		18/03/2020	18/03/2020	47
13_4		5	Retroespective Meeting	Activity		14/01/2020	14/01/2020	1	Finish-To-Start	13_3	Not Plan		19/03/2020	19/03/2020	47
mi_9	mi_9	5	DMS Sprint 2 Finished	Milestone		14/01/2020	14/01/2020	0	Finish-To-Start	13_4	Not Plan		19/03/2020	19/03/2020	47
14	wp_1_3_1_3	4	DMS Sprint 3	Workpackage		15/01/2020	29/01/2020	11					20/03/2020	03/04/2020	47
14_1		5	Planning Meeting	Activity		15/01/2020	15/01/2020	1	Finish-To-Start	mi_9	Not Plan		20/03/2020	20/03/2020	47
14_2		5	Sprint Execution	Activity		16/01/2020	27/01/2020	8	Finish-To-Start	14_1	Not Plan		23/03/2020	01/04/2020	47
14_3		5	Review Meeting	Activity		28/01/2020	28/01/2020	1	Finish-To-Start	14_2	Not Plan		02/04/2020	02/04/2020	47
14_4		5	Retroespective Meeting	Activity		29/01/2020	29/01/2020	1	Finish-To-Start	14_3	Not Plan		03/04/2020	03/04/2020	47
mi_10	mi_10	5	DMS Sprint 3 Finished	Milestone		29/01/2020	29/01/2020	0	Finish-To-Start	14_4	Not Plan		03/04/2020	03/04/2020	47
15	wp_1_3_1_4	4	DMS Sprint 4	Workpackage		30/01/2020	13/02/2020	11					06/04/2020	20/04/2020	47
15_1		5	Planning Meeting	Activity		30/01/2020	30/01/2020	1	Finish-To-Start	mi_10	Not Plan		06/04/2020	06/04/2020	47
15_2		5	Sprint Execution	Activity		31/01/2020	11/02/2020	8	Finish-To-Start	15_1	Not Plan		07/04/2020	16/04/2020	47
15_3		5	Review Meeting	Activity		12/02/2020	12/02/2020	1	Finish-To-Start	15_2	Not Plan		17/04/2020	17/04/2020	47
15_4		5	Retroespective Meeting	Activity		13/02/2020	13/02/2020	1	Finish-To-Start	15_3	Not Plan		20/04/2020	20/04/2020	47
mi_11	mi_11	5	DMS Sprint 4 Finished	Milestone		13/02/2020	13/02/2020	0	Finish-To-Start	15_4	Not Plan		20/04/2020	20/04/2020	47
16	wp_1_3_1_5	4	DMS Sprint 5	Workpackage		14/02/2020	28/02/2020	11					21/04/2020	05/05/2020	47
16_1		5	Planning Meeting	Activity		14/02/2020	14/02/2020	1	Finish-To-Start	mi_11	Not Plan		21/04/2020	21/04/2020	47
16_2		5	Sprint Execution	Activity		17/02/2020	26/02/2020	8	Finish-To-Start	16_1	Not Plan		22/04/2020	01/05/2020	47
16_3		5	Review Meeting	Activity		27/02/2020	27/02/2020	1	Finish-To-Start	16_2	Not Plan		04/05/2020	04/05/2020	47
16_4		5	Retroespective Meeting	Activity		28/02/2020	28/02/2020	1	Finish-To-Start	16_3	Not Plan		05/05/2020	05/05/2020	47
mi_12	mi_12	5	DMS Sprint 5 Finished	Milestone		28/02/2020	28/02/2020	0	Finish-To-Start	16_4	Not Plan		05/05/2020	05/05/2020	47
17	wp_1_3_1_6	4	DMS Sprint 6	Workpackage		02/03/2020	16/03/2020	11					06/05/2020	20/05/2020	47
17_1		5	Planning Meeting	Activity		02/03/2020	02/03/2020	1	Finish-To-Start	mi_12	Not Plan		06/05/2020	06/05/2020	47
17_2		5	Sprint Execution	Activity		03/03/2020	12/03/2020	8	Finish-To-Start	17_1	Not Plan		07/05/2020	18/05/2020	47
17_3		5	Review Meeting	Activity		13/03/2020	13/03/2020	1	Finish-To-Start	17_2	Not Plan		19/05/2020	19/05/2020	47
17_4		5	Retroespective Meeting	Activity		16/03/2020	16/03/2020	1	Finish-To-Start	17_3	Not Plan		20/05/2020	20/05/2020	47
mi_13	mi_13	5	DMS Sprint 6 Finished	Milestone		16/03/2020	16/03/2020	0	Finish-To-Start	17_4	Not Plan		20/05/2020	20/05/2020	47
18	wp_1_3_2	3	Integration	Workpackage		13/12/2019	16/03/2020	66				Critical Path	13/12/2019	16/03/2020	0
mi_14	mi_14	4	Integration	Milestone		16/03/2020	16/03/2020	0	Finish-To-Start	mi_20		Critical Path	16/03/2020	16/03/2020	0
19	wp_1_3_2_1	4	Integration Sprint 1	Workpackage		13/12/2019	30/12/2019	11				Critical Path	13/12/2019	30/12/2019	0
19_1		5	Planning Meeting	Activity		13/12/2019	13/12/2019	1	Finish-To-Start	mi_6	Not Plan	Critical Path	13/12/2019	13/12/2019	0
19_2		5	Sprint Execution	Activity		16/12/2019	26/12/2019	8	Finish-To-Start	19_1	Not Plan	Critical Path	16/12/2019	26/12/2019	0
19_3		5	Review Meeting	Activity		27/12/2019	27/12/2019	1	Finish-To-Start	19_2	Not Plan	Critical Path	27/12/2019	27/12/2019	0
19_4		5	Retroespective Meeting	Activity		30/12/2019	30/12/2019	1	Finish-To-Start	19_3	Not Plan	Critical Path	30/12/2019	30/12/2019	0
mi_15	mi_15	5	INT Sprint 1 Finished	Milestone		30/12/2019	30/12/2019	0	Finish-To-Start	19_4	Not Plan	Critical Path	30/12/2019	30/12/2019	0
20	wp_1_3_2_2	4	Integration Sprint 2	Workpackage		31/12/2019	14/01/2020	11				Critical Path	31/12/2019	14/01/2020	0
20_1		5	Planning Meeting	Activity		31/12/2019	31/12/2019	1	Finish-To-Start	mi_15	Not Plan	Critical Path	31/12/2019	31/12/2019	0
20_2		5	Sprint Execution	Activity		01/01/2020	10/01/2020	8	Finish-To-Start	20_1	Not Plan	Critical Path	01/01/2020	10/01/2020	0
20_3		5	Review Meeting	Activity		13/01/2020	13/01/2020	1	Finish-To-Start	20_2	Not Plan	Critical Path	13/01/2020	13/01/2020	0
20_4		5	Retroespective Meeting	Activity		14/01/2020	14/01/2020	1	Finish-To-Start	20_3	Not Plan	Critical Path	14/01/2020	14/01/2020	0
mi_16	mi_16	5	INT Sprint 2 Finished	Milestone		14/01/2020	14/01/2020	0	Finish-To-Start	20_4	Not Plan	Critical Path	14/01/2020	14/01/2020	0
21	wp_1_3_2_3	4	Integration Sprint 3	Workpackage		15/01/2020	29/01/2020	11				Critical Path	15/01/2020	29/01/2020	0
21_1		5	Planning Meeting	Activity		15/01/2020	15/01/2020	1	Finish-To-Start	mi_16	Not Plan	Critical Path	15/01/2020	15/01/2020	0

20_2		5	Sprint Execution	Activity		01/01/2020	10/01/2020	8	Finish-To-Start	20_1	Not Plan	Critical Path	01/01/2020	10/01/2020	0
20_3		5	Review Meeting	Activity		13/01/2020	13/01/2020	1	Finish-To-Start	20_2	Not Plan	Critical Path	13/01/2020	13/01/2020	0
20_4		5	Retroespective Meeting	Activity		14/01/2020	14/01/2020	1	Finish-To-Start	20_3	Not Plan	Critical Path	14/01/2020	14/01/2020	0
mi_16	mi_16	5	INT Sprint 2 Finished	Milestone		14/01/2020	14/01/2020	0	Finish-To-Start	20_4	Not Plan	Critical Path	14/01/2020	14/01/2020	0
21	wp_1_3_2_3	4	Integration Sprint 3	Workpackage		15/01/2020	29/01/2020	11				Critical Path	15/01/2020	29/01/2020	0
21_1		5	Planning Meeting	Activity		15/01/2020	15/01/2020	1	Finish-To-Start	mi_16	Not Plan	Critical Path	15/01/2020	15/01/2020	0
21_2		5	Sprint Execution	Activity		16/01/2020	27/01/2020	8	Finish-To-Start	21_1	Not Plan	Critical Path	16/01/2020	27/01/2020	0
21_3		5	Review Meeting	Activity		28/01/2020	28/01/2020	1	Finish-To-Start	21_2	Not Plan	Critical Path	28/01/2020	28/01/2020	0
21_4		5	Retroespective Meeting	Activity		29/01/2020	29/01/2020	1	Finish-To-Start	21_3	Not Plan	Critical Path	29/01/2020	29/01/2020	0
mi_17	mi_17	5	INT Sprint 3 Finished	Milestone		29/01/2020	29/01/2020	0	Finish-To-Start	21_4	Not Plan	Critical Path	29/01/2020	29/01/2020	0
22	wp_1_3_2_4	4	Integration Sprint 4	Workpackage		30/01/2020	13/02/2020	11				Critical Path	30/01/2020	13/02/2020	0
22_1		5	Planning Meeting	Activity		30/01/2020	30/01/2020	1	Finish-To-Start	mi_17	Not Plan	Critical Path	30/01/2020	30/01/2020	0
22_2		5	Sprint Execution	Activity		31/01/2020	11/02/2020	8	Finish-To-Start	22_1	Not Plan	Critical Path	31/01/2020	11/02/2020	0
22_3		5	Review Meeting	Activity		12/02/2020	12/02/2020	1	Finish-To-Start	22_2	Not Plan	Critical Path	12/02/2020	12/02/2020	0
22_4		5	Retroespective Meeting	Activity		13/02/2020	13/02/2020	1	Finish-To-Start	22_3	Not Plan	Critical Path	13/02/2020	13/02/2020	0
mi_18	mi_18	5	INT Sprint 4 Finished	Milestone		13/02/2020	13/02/2020	0	Finish-To-Start	22_4	Not Plan	Critical Path	13/02/2020	13/02/2020	0
23	wp_1_3_2_5	4	Integration Sprint 5	Workpackage		14/02/2020	28/02/2020	11				Critical Path	14/02/2020	28/02/2020	0
23_1		5	Planning Meeting	Activity		14/02/2020	14/02/2020	1	Finish-To-Start	mi_18	Not Plan	Critical Path	14/02/2020	14/02/2020	0
23_2		5	Sprint Execution	Activity		17/02/2020	26/02/2020	8	Finish-To-Start	23_1	Not Plan	Critical Path	17/02/2020	26/02/2020	0
23_3		5	Review Meeting	Activity		27/02/2020	27/02/2020	1	Finish-To-Start	23_2	Not Plan	Critical Path	27/02/2020	27/02/2020	0
23_4		5	Retroespective Meeting	Activity		28/02/2020	28/02/2020	1	Finish-To-Start	23_3	Not Plan	Critical Path	28/02/2020	28/02/2020	0
mi_19	mi_19	5	INT Sprint 5 Finished	Milestone		28/02/2020	28/02/2020	0	Finish-To-Start	23_4	Not Plan	Critical Path	28/02/2020	28/02/2020	0
24	wp_1_3_2_6	4	Integration Sprint 6	Workpackage		02/03/2020	16/03/2020	11				Critical Path	02/03/2020	16/03/2020	0
24_1		5	Planning Meeting	Activity		02/03/2020	02/03/2020	1	Finish-To-Start	mi_19	Not Plan	Critical Path	02/03/2020	02/03/2020	0
24_2		5	Sprint Execution	Activity		03/03/2020	12/03/2020	8	Finish-To-Start	24_1	Not Plan	Critical Path	03/03/2020	12/03/2020	0
24_3		5	Review Meeting	Activity		13/03/2020	13/03/2020	1	Finish-To-Start	24_2	Not Plan	Critical Path	13/03/2020	13/03/2020	0
24_4		5	Retroespective Meeting	Activity		16/03/2020	16/03/2020	1	Finish-To-Start	24_3	Not Plan	Critical Path	16/03/2020	16/03/2020	0
mi_20	mi_20	5	INT Sprint 6 Finished	Milestone		16/03/2020	16/03/2020	0	Finish-To-Start	24_4	Not Plan	Critical Path	16/03/2020	16/03/2020	0
25	wp_1_4	2	Transition	Phase		17/03/2020	15/04/2020	22				Critical Path	17/03/2020	15/04/2020	0
26	wp_1_4_1	3	System Tests	Workpackage		17/03/2020	19/03/2020	3				Critical Path	17/03/2020	19/03/2020	0
26_1		4	Test System	Activity		17/03/2020	19/03/2020	3	Finish-To-Start	mi_14	Not Plan	Critical Path	17/03/2020	19/03/2020	0
mi_21	mi_21	4	Systems Tests Approved	Milestone		19/03/2020	19/03/2020	0	Finish-To-Start	26_1	Not Plan	Critical Path	19/03/2020	19/03/2020	0
27	wp_1_4_2	3	Training	Workpackage		20/03/2020	01/04/2020	9				Critical Path	20/03/2020	01/04/2020	0
mi_22	mi_22	4	Training concluded	Milestone		01/04/2020	01/04/2020	0	Finish-To-Start	mi_24	Not Plan	Critical Path	01/04/2020	01/04/2020	0
28	wp_1_4_2_1	4	Technical Training	Workpackage		20/03/2020	27/03/2020	6				Critical Path	20/03/2020	27/03/2020	0
28_1		5	Technical documentation	Activity		20/03/2020	23/03/2020	2	Finish-To-Start	mi_21	Not Plan	Critical Path	20/03/2020	23/03/2020	0
28_2		5	Organize technical training	Activity		24/03/2020	24/03/2020	1	Finish-To-Start	28_1	Not Plan	Critical Path	24/03/2020	24/03/2020	0
28_3		5	Technical Training to the IT department	Activity		25/03/2020	27/03/2020	3	Finish-To-Start	28_2	Not Plan	Critical Path	25/03/2020	27/03/2020	0
mi_23	mi_23	5	IT Department people trained	Milestone		27/03/2020	27/03/2020	0	Finish-To-Start	28_3	Not Plan	Critical Path	27/03/2020	27/03/2020	0
29	wp_1_4_2_2	4	End-users Training	Workpackage		30/03/2020	01/04/2020	3				Critical Path	30/03/2020	01/04/2020	0
29_1		5	Elaborate manuals and training materi	Activity		30/03/2020	31/03/2020	2	Finish-To-Start	mi_23	Not Plan	Critical Path	30/03/2020	31/03/2020	0
29_2		5	Deliver the Manuals and Additional Ma	Activity		01/04/2020	01/04/2020	1	Finish-To-Start	29_1	Not Plan	Critical Path	01/04/2020	01/04/2020	0
mi_24	mi_24	5	Manuals and Additional Materials Deli	Milestone		01/04/2020	01/04/2020	0	Finish-To-Start	29_2	Not Plan	Critical Path	01/04/2020	01/04/2020	0
30	wp_1_4_3	3	Acceptance Tests	Workpackage		02/04/2020	15/04/2020	10				Critical Path	02/04/2020	15/04/2020	0
30_1		4	Test End-Users	Activity		02/04/2020	14/04/2020	9	Finish-To-Start	mi_22	Not Plan	Critical Path	02/04/2020	14/04/2020	0
30_2		4	End-Users Feadback	Activity		15/04/2020	15/04/2020	1	Finish-To-Start	30_1	Not Plan	Critical Path	15/04/2020	15/04/2020	0
mi_25	mi_25	4	Acceptance Tests Approved	Milestone		15/04/2020	15/04/2020	0	Finish-To-Start	30_2	Not Plan	Critical Path	15/04/2020	15/04/2020	0
31	wp_1_5	2	Operation	Phase		16/04/2020	13/05/2020	20				Critical Path	16/04/2020	13/05/2020	0
32	wp_1_5_1	3	Pilot	Workpackage		16/04/2020	13/05/2020	20				Critical Path	16/04/2020	13/05/2020	0
32_1		4	Evaluate DOCIST	Activity		16/04/2020	13/05/2020	20	Finish-To-Start	mi_25	Not Plan	Critical Path	16/04/2020	13/05/2020	0
mi_26	mi_26	4	DOCIST Approved	Milestone		13/05/2020	13/05/2020	0	Finish-To-Start	32_1	Not Plan	Critical Path	13/05/2020	13/05/2020	0



DOCIST > Resources :: Organization Breakdown Structure

ID	Name	Type	Role	Organization	PartO	Report To	Description
org_1	Steering Committee	Organization	Other	Other			
org_2	Prof. Alberto Silva	Person	Project Sponsor	Performing	org_1		
org_3	Finance Director	Person	Project Owner	Customer	org_1		
org_4	HR Director	Person	Project Sponsor	Customer	org_1		
org_5	Purchasing Director	Person	Project Sponsor	Customer	org_1		
org_6	IS Director	Person	Project Sponsor	Customer	org_1		
org_7	Pedro Baptista	Person	Project Manager	Performing		org_2	
org_8	DMS Team Leader	Person	Team Leader	Performing		org_7	
org_9	DMS Specialist 1	Person	Team Member	Performing		org_8	
org_10	INT Team Leader	Person	Team Leader	Performing		org_7	
org_11	INT Specialist 1	Person	Team Member	Performing		org_10	
org_12	MaxiRetail PM	Person	Project Manager	Customer		org_3	
org_13	Supplier's Control Specialist	Person	Team Leader	Customer		org_12	
org_14	Accounting Specialist	Person	Team Member	Customer		org_13	
org_15	HR Delegate	Person	Team Member	Customer		org_13	
org_16	Pilot Coordinator	Person	Team Leader	Customer		org_12	
org_17	Purchasing Specialist	Person	Team Member	Customer		org_16	
org_18	Purchasing Specialist	Person	Team Member	Customer		org_16	
org_19	Technical Coordinator	Person	Team Leader	Customer		org_12	
org_20	System's Security	Person	Team Member	Customer		org_19	
org_21	Programmer(Trainee)	Person	Team Member	Customer		org_19	
org_22	IT Infrastructure Specialist	Person	Team Member	Customer		org_19	
org_23	WorkFlow Coordinator	Person	Team Leader	Customer		org_12	
org_24	Programmer	Person	Team Member	Customer		org_23	
org_25	Programmer	Person	Team Member	Customer		org_23	
org_26	DMS Specialist 2	Person	Team Member	Performing		org_8	
org_27	DMS Specialist 3	Person	Team Member	Performing		org_8	
org_28	DMS Specialist and workflow	Person	Team Member	Performing		org_8	
org_29	INT Specialist 2	Person	Team Member	Performing		org_10	
org_30	INT Specialist 3	Person	Team Member	Performing		org_10	
org_31	INT Specialist 4	Person	Team Member	Performing		org_10	



DOCIST > Resources :: Responsibility Assignment Matrix

Table | Correct

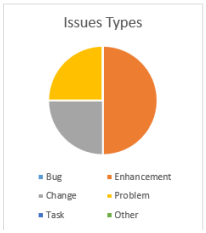
	Performing				Customer								
RAM	Prof. Alberto Silva (Project Sponsor) - Steering Committee	Pedro Baptista (Project Manager)	DMS Team Leader (Team Leader)	INT Team Leader (Team Leader)	Finance Director (Project Owner) - Steering	HDR Director (Project Sponsor) - Steering Committee	Purchasing Director (Project Sponsor) Steering	IS Director (Project Sponsor) - Steering Committee	MaxiRetail PM (Project Manager)	Supplier's Control Specialist (Team Leade	Pilot Coordinator (Team Leade	Techaical Coordinator (Team Leade	WorkFlow Coordinator (Team Leade
wp_1 - DOCIST													
wp_1_1 - PM (Phase)													
wp_1_1_1 - Start-up (Workpackage)	d	XP	C	C	D	d	d	d	C				
wp_1_1_2 - Control (Workpackage)	I	XP	C	C	I	I	I	I	I	I	A	A	A
wp_1_1_3 - Close (Workpackage)	d	XP	C	C	D	d	d	d	C			C	C
wp_1_2 - Analyse/Design													
wp_1_2_1 - Modeling (Workpackage)		P	X	C									
wp_1_2_2 - Requiremeat	d	P	C	X	D	d	d	d				C	C
wp_1_2_3 - Tests Specification		P	C	X									
wp_1_3 - Realization													
wp_1_3_1 - Documeat Management System (Workpackage)													
wp_1_3_1_1 - DMS Sprint 1		P	X	A									C
wp_1_3_1_2 - DMS Sprint 2		P	X	A									C
wp_1_3_1_3 - DMS Sprint 3		P	X	A									C
wp_1_3_1_4 - DMS Sprint 4		P	X	A									C
wp_1_3_1_5 - DMS Sprint 5		P	X	A									C
wp_1_3_1_6 - DMS Sprint 6		P	X	A									C
wp_1_3_2 - Integration													
wp_1_3_2_1 - Integration Sprint 1		P	A	X									C
wp_1_3_2_2 - Integration Sprint 2		P	A	X									C
wp_1_3_2_3 - Integration Sprint 3		P	A	X									C
wp_1_3_2_4 - Integration Sprint 4		P	A	X									C
wp_1_3_2_5 - Integration Sprint 5		P	A	X									C
wp_1_3_2_6 - Integration Sprint 6		P	A	X									C
wp_1_4 - Transition													
wp_1_4_1 - System Tests (Workpackage)		P	A	X									
wp_1_4_2 - Training (Workpackage)													
wp_1_4_2_1 - Technical Training		P	T	T								X	
wp_1_4_2_2 - End-users Training		P	T	T								X	
wp_1_4_3 - Acceptance Tests	d	P	A	A	D	d	d	d			X		
wp_1_5 - Operation													
wp_1_5_1 - Pilot (Workpackage)		P	A	A							X		

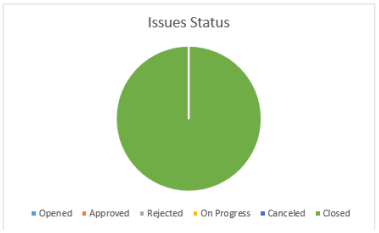
Legend:

eXecutes the work	X
takes the Decision solely or ultimately	D
takes the decision jointly or partly	d
controls Progress	P
provides Tuition on the job	T
must be Informed	I
must be Consulted	C
available to Advise	A

DOCIST > Issues :: Issue Tracker

				Opened		Validated		Expected closing		Closed					
ID	Issue	Type	Priorit	Date	By Whom	Date2	By Whom3	Expecte	Duratio	Date4	By Whom5	Released	Status	Comments	Percentage
iss_1	Task 4	Change	Low	02/06/2018				10/06/2018	8	15/06/2018			Closed	done	
iss_2	Task 2	Problem	Medium	03/06/2018				15/06/2018	12						
iss_3	Task 1	Enhancement	Very High	01/06/2018				05/06/2018	4					in progress	0,5
iss_4	Automatize	Enhancement	High	06/11/2019	Pedro Baptista	11/11/2019	Finance Director	01/04/2020	147	01/04/2020	DMS Team Leader		Closed		100



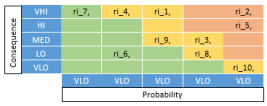


DOCIST > Quality :: Deliverables - Acceptance Criteria

Deliverable			Acceptance Criteria				
Identification		Status	Identification			Objective	Assessement	
ID	Name	Status	ID AC	Name AC	Metric	Expression Value	Achieved Resu	Comments
dble_1	Project Plan Document	Not Submitted	dble_1_1	PO satisfied	User Satisfaction	100%		
dble_2	Model	Not Submitted	dble_2_1	PM, DMS and INT Leader approve	Percentage	100%		
dble_3	Requirements Specification	Not Submitted	dble_3_1	PO satisfied	User Satisfaction	100%		
dble_4	Tests Specification	Not Submitted	dble_4_1	PM, DMS and INT Leader approve	Percentage	100%		
dble_5	DMS Progress Report	Not Submitted	dble_5_1	Work Done	Percentage	80%		
dble_6	INT Progress Report	Not Submitted	dble_6_1	Work Done	Percentage	80%		
dble_7	Status Report	Not Submitted	dble_7_1	PO satisfied	User Satisfaction	75%		
dble_8	Work Asssignments	Not Submitted	dble_8_1	Conflicts in schedule	Percentage	10%		
dble_9	System Deployed	Not Submitted	dble_9_1	System Functionallity	Percentage	100%		
dble_10	Technical Documentation	Not Submitted	dble_10_1	Features present in document	Percentage	100%		
dble_11	User Manuals	Not Submitted	dble_11_1	Users find the manuals readable	User Satisfaction	75%		
dble_12	Final Report	Not Submitted	dble_12_1	PO satisfied	User Satisfaction	80%		

DOCIST > Risk :: Risk Table

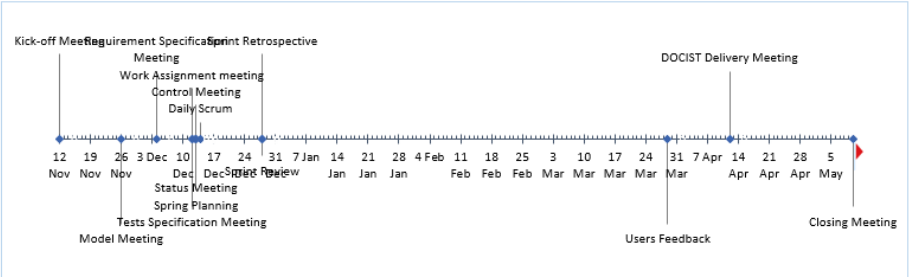
Identification					Assessement				Treatment					
ID	Name	Type	SWOT Categ	Description	Probability	Consequence	Impact Value	Impact Level	Strate	Treatment	Owne	Created	Last Updat	Statu
i_1	Cascating Delays due to development team	Scheduling	Weakness	Cannot start testing	50%	10	5	Medium	Mitigate	Mitigate - Increase work hours	Mr Brown	29/10/2019	29/10/2019	Identifie
i_2	Need to integrate a new worker	Resource	Threat	Steep Learning Curve	90%	9	8,1	High	Accept	Accept - Integrate new co-worker as fast as possibl	Mr Lee	29/10/2019	29/10/2019	Identifie
i_3	Team Member leaves the Project	Resource	Threat	Member leaves for any reason	60%	5	3	Medium	Mitigate	Mitigate - Find a replacement	Pedro Bapti	29/10/2019	29/10/2019	Identifie
i_4	Client experiences financial problems	Resource	Threat	Client unable to pay for the service	20%	9	1,8	Medium	Mitigate	Mitigate - Make ensurance	Finance Dir	29/10/2019	29/10/2019	Identifie
i_5	Data Migration Problems	Technology	Weakness	Duplicates, missing information,	80%	6	4,8	High	Transfer	Transfer - Clear MaxiRetail data	INT Team Le	29/10/2019	29/10/2019	Identifie
i_6	Unable to get softwared licenses	Technology	Opportunity	Fail to get framework and its	25%	3	0,75	Low	Accept	Accept - Find a new FrameWork	DMS Team L	29/10/2019	29/10/2019	Identifie
i_7	Sponsor stop supporting the project	Scheduling	Threat	Sponsor stop financing the project	1%	10	0,1	Low	Accept	Accept - Find other Sponsors	Finance Dir	29/10/2019	29/10/2019	Identifie
i_8	Users unsatisfied	Scheduling	Opportunity	Acceptance tests with low marks	60%	3	1,8	Medium	Avoid	Avoid - More detailed System	DMS Team L	29/10/2019	29/10/2019	Identifie
i_9	New Requirements	Scope	Threat	SR while project is already running	50%	5	2,5	Medium	Exploit	Exploit - Increase price of project	Finance Dir	29/10/2019	29/10/2019	Identifie
i_10	System requirements delayed	Scheduling	Strength	SR take longer to get approved	80%	1	0,8	Medium	Mitigate	Mitigate - Envolve the PO more on the defenition of	DMS Team L	29/10/2019	29/10/2019	Identifie
i_11	IT Departments low qualified	Other	Weakness	Client technical team unqualified	75%	5	3,75	Medium	Accept	Accept - Extend Training Duration	IS Director	29/10/2019	29/10/2019	Identifie



DOCIST > Communication :: Meetings

Today's Date	27/10/2020

ID	Name	Type	Medium	Frequenc	Assigned To	Audience	Deliverable(s	Start Dat	Frequency (d	Next Meetin
m_1	Kick-off Meeting	Steering	Conference Call	Once	Finance Director	Everyone	Project Plan	12/11/2019	1	12/11/2019
m_2	Model Meeting	Technical	Face-To-Face	Once	Pedro Baptista	DMS and INT	Model	26/11/2019	1	26/11/2019
m_3	Requirement	Technical	Face-To-Face	Once	Pedro Baptista	DMS and INT	Requirements	04/12/2019	1	04/12/2019
m_4	Tests Specification	Technical	Face-To-Face	Once	Pedro Baptista	DMS and INT	Tests	12/12/2019	1	12/12/2019
m_5	Work Assignment	Technical	Face-To-Face	Once	Pedro Baptista	DMS and INT	Work	12/12/2019	1	12/12/2019
m_6	Spring Planning	Technical	Conference Call	Weekly	DMS Team Leader	Scrum	DMS Progress	13/12/2019	15	13/12/2019
m_10	Control Meeting	Management	Face-To-Face	Weekly	Pedro Baptista	Maxi Retail PM	Status Report	13/12/2019	15	13/12/2019
m_11	Status Meeting	Steering	Conference Call	Monthly	Finance Director	Steering		13/12/2019	31	13/12/2019
m_7	Daily Scrum	Technical	Face-To-Face	Daily	DMS Team Leader	DMS and INT		14/12/2019	1	14/12/2019
m_8	Sprint Review	Technical	Face-To-Face	Weekly	DMS Team Leader	Scrum		28/12/2019	15	28/12/2019
m_9	Sprint	Technical	Face-To-Face	Weekly	DMS Team Leader	DMS and INT		28/12/2019	15	28/12/2019
m_13	Users Feedback	Technical	Face-To-Face	Once	MaxiRetail PM	Users(MaxiReta	User Manuals	29/03/2020	1	29/03/2020
m_12	DOCIST Delivery	Technical	Conference Call	Once	Pedro Baptista	Steering	System Deployed	12/04/2020	1	12/04/2020
m_14	Closing Meeting	Steering	Face-To-Face	Once	Finance Director	Everyone	Final Report	10/05/2020	1	10/05/2020



If you want to export this page to word, You will need to adjust the graph in the Word Document.

DOCIST > Communication :: Flow of Deliverables

What				Who		When		How		
	Deliverable									
ID	ID Dbl	Name	Type	Owner (From)	Audience (To)	Frequenc	When	Medium	Format	Description
fl_1	dble_1	Project Plan Document	Management	Pedro Baptista	Steering Comittee	Once	At the end of Start-Up	Email	Document	Project Planning present to
fl_2	dble_2	Model	Technical	DMS Team Leader	Pedro Baptista	Once	End of Modeling	Email	Document	Process design using BPMN
fl_3	dble_3	Requirements Specification	Technical	INT Team Leader	Pedro Baptista	Once	End of Requirement S	Email	Document	Requirements Specification
fl_4	dble_4	Tests Specification	Technical	INT Team Leader	Pedro Baptista	Once	End of tests Specificat	Email	Document	Test Specification
fl_5	dble_5	DMS Progress Report	Management	DMS Team Leader	Pedro Baptista	Weekly	Thursday until 6pm du	Face-To-Face	Colaborative tool	Weekly update on DMS team
fl_6	dble_6	INT Progress Report	Management	INT Team Leader	Pedro Baptista	Weekly	Thursday until 6pm du	Face-To-Face	Colaborative tool	Weekly update on INT team
fl_7	dble_7	Status Report	Steering	Pedro Baptista	Finance Director	Monthly	Friday until 6pm durin	Email	Document	Bi-weekly update on project
fl_8	dble_8	Work Asssignments	Technical	Pedro Baptista	DMS and INT Team	Once	Planing of Start-up	Face-To-Face	Document	Assignments to team leaders
fl_9	dble_9	System Deployed	Technical	INT Team Leader	Pedro Baptista	Once	Acceptance tests appr	Other	Software	DOCIST application with all
fl_10	dble_10	Technical Documentation	Technical	INT Team Leader	Pedro Baptista	Once	After technical trainin	Email	Document	Technical documentation of
fl_11	dble_11	User Manuals	Technical	DMS Team Leader	Pedro Baptista	Once	After end-users trainir	Email	Document	Manual with description of
fl_12	dble_12	Final Report	Steering	Pedro Baptista	Alberto Silva	Once	Pilot is approved	Email	Document	Report of the whole project

DOCIST > Cost :: All Expenses

Profit margin	33,00%
Price	207 480,00 €

				Rate				2019			2020		
ID	Name	Type	ID2	Name	Measu	Total	Unit Cos	№2	Value2	Unit	№3	Value3
exp_1	Prof. Alberto Silva	HRs		Senior	Daily	6 000,00 €	1 000,00 €	2	2 000,00 €	1 000,00 €	4	4 000,00 €
exp_2	Pedro Baptista	HRs		Senior	Daily	14 400,00 €	150,00 €	10	1 500,00 €	150,00 €	86	12 900,00 €
exp_3	DMS Team Leader	HRs		Senior	Daily	8 400,00 €	100,00 €	25	2 500,00 €	100,00 €	59	5 900,00 €
exp_4	DMS Specialist 1	HRs		Senior	Daily	6 000,00 €	75,00 €	24	1 800,00 €	75,00 €	56	4 200,00 €
exp_5	DMS Specialist 2	HRs		Senior	Daily	6 000,00 €	75,00 €	24	1 800,00 €	75,00 €	56	4 200,00 €
exp_6	DMS Specialist 3	HRs		Senior	Daily	6000	75,00 €	24	1 800,00 €	75,00 €	56	4 200,00 €
exp_7	DMS Specialist and workflow customization expert	HRs		Senior	Daily	6800	85,00 €	24	2 040,00 €	85,00 €	56	4 760,00 €
exp_8	INT Team Leader	HRs		Senior	Daily	8400	100,00 €	25	2 500,00 €	100,00 €	59	5 900,00 €
exp_9	INT Specialist 1	HRs		Senior	Daily	6000	75,00 €	24	1 800,00 €	75,00 €	56	4 200,00 €
exp_10	INT Specialist 2	HRs		Senior	Daily	6000	75,00 €	24	1 800,00 €	75,00 €	56	4 200,00 €
exp_11	INT Specialist 3	HRs		Senior	Daily	6000	75,00 €	24	1 800,00 €	75,00 €	56	4 200,00 €
exp_12	INT Specialist 4	HRs		Senior	Daily	6000	75,00 €	24	1 800,00 €	75,00 €	56	4 200,00 €
		Equipments			Other	10 000,00 €	- €		- €	- €		- €
		General			Other	20 000,00 €	- €		- €	- €		- €
		Materials			Other	40 000,00 €	- €		- €	- €		- €
Total						**156 000,00 €**			**23 140,00 €**			**62 860,00 €**

DOCIST > Agile :: Team Description

ID	Name	Type	Role	Organizatio	Part of	ReportTo	Descriptio
org_2	Prof. Alberto Silva	Person	Project Sponsor	Performing	org_1	-	-
org_7	Pedro Baptista	Person	Project Manager	Performing	-	org_2	-
org_8	DMS Team Leader	Person	Team Leader	Performing	-	org_7	-
org_9	DMS Specialist 1	Person	Team Member	Performing	-	org_8	-
org_10	INT Team Leader	Person	Team Leader	Performing	-	org_7	-
org_11	INT Specialist 1	Person	Team Member	Performing	-	org_10	-
org_26	DMS Specialist 2	Person	Team Member	Performing	-	org_8	-
org_27	DMS Specialist 3	Person	Team Member	Performing	-	org_8	-
org_28	DMS Specialist and workflc	Person	Team Member	Performing	-	org_8	-
org_29	INT Specialist 2	Person	Team Member	Performing	-	org_10	-
org_30	INT Specialist 3	Person	Team Member	Performing	-	org_10	-
org_31	INT Specialist 4	Person	Team Member	Performing	-	org_10	-

DOCIST > Agile :: Team Analyzer

			Sprint #0							Sprint #1						
			Tasks (#)			Effort (h)				Tasks (#)			Effort (h)			
ID	Name	Role	Assigned	Concluded	% Concludec	Assigned2	Actual	Concluded2	%Concludec	Assigr	Concl	%	Assigr	Actua	Concl	%Con
org_2	Prof. Alberto Silva	Project Sponsor														
org_7	Pedro Baptista	Project Manager														
org_8	DMS Team Leader	Team Leader														
org_9	DMS Specialist 1	Team Member														
org_10	INT Team Leader	Team Leader														
org_11	INT Specialist 1	Team Member														
org_26	DMS Specialist 2	Team Member														
org_27	DMS Specialist 3	Team Member														
org_28	DMS Specialist and wc	Team Member														
org_29	INT Specialist 2	Team Member														
org_30	INT Specialist 3	Team Member														
org_31	INT Specialist 4	Team Member														

DOCIST > Agile :: Product Backlog

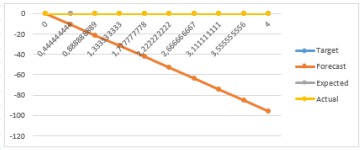
Current	7

					Dates				
ID	Story / Feature	Effort	Sprint	Priority	Created	Last Updated	Status	Actual Effort	Final Sprint
us_1	As the Purchase	46	6	VHI	11/11/2018	04/12/2018	Completed	50	6
us_2	As the Purchase	15	6	MED	11/11/2018	04/12/2018	Completed	12	6
us_3	As the Purchase	19	6	HI	11/11/2018	04/12/2018	Completed	19	6
us_4	As the Purhcase	20	6	HI	11/11/2018	04/12/2018	Completed	22	6
us_5	As the IS Director I	20	6	HI	11/11/2018	04/12/2018	Completed	20	6

Agile.SprintBacklog's Button "Send to History" fills in these last two columns

DOCIST > Agile :: Sprint Backlog

Sprint Number	7
Start date	06/11/2019
Duration (d)	4
End Date	06/01/1900
Number of Developers	3
Dev Utilization	100%
Daily Work hours	8
Dev total hours	96
Dev Daily hours	24
Today's Date	27/10/2020

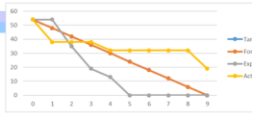


Write here the remainder Effort per task each day(it can be higher)
"Waiting" means we haven't reached the day yet

								Effort Remaining each day								
ID	Task	User Story	Expected Concluded Day	Status	Assigned to	Actual Effort	Planned Effort	1	2	3	4	5	6	7	8	9
						0	0	0	0	0	0	0	0	0	0	0

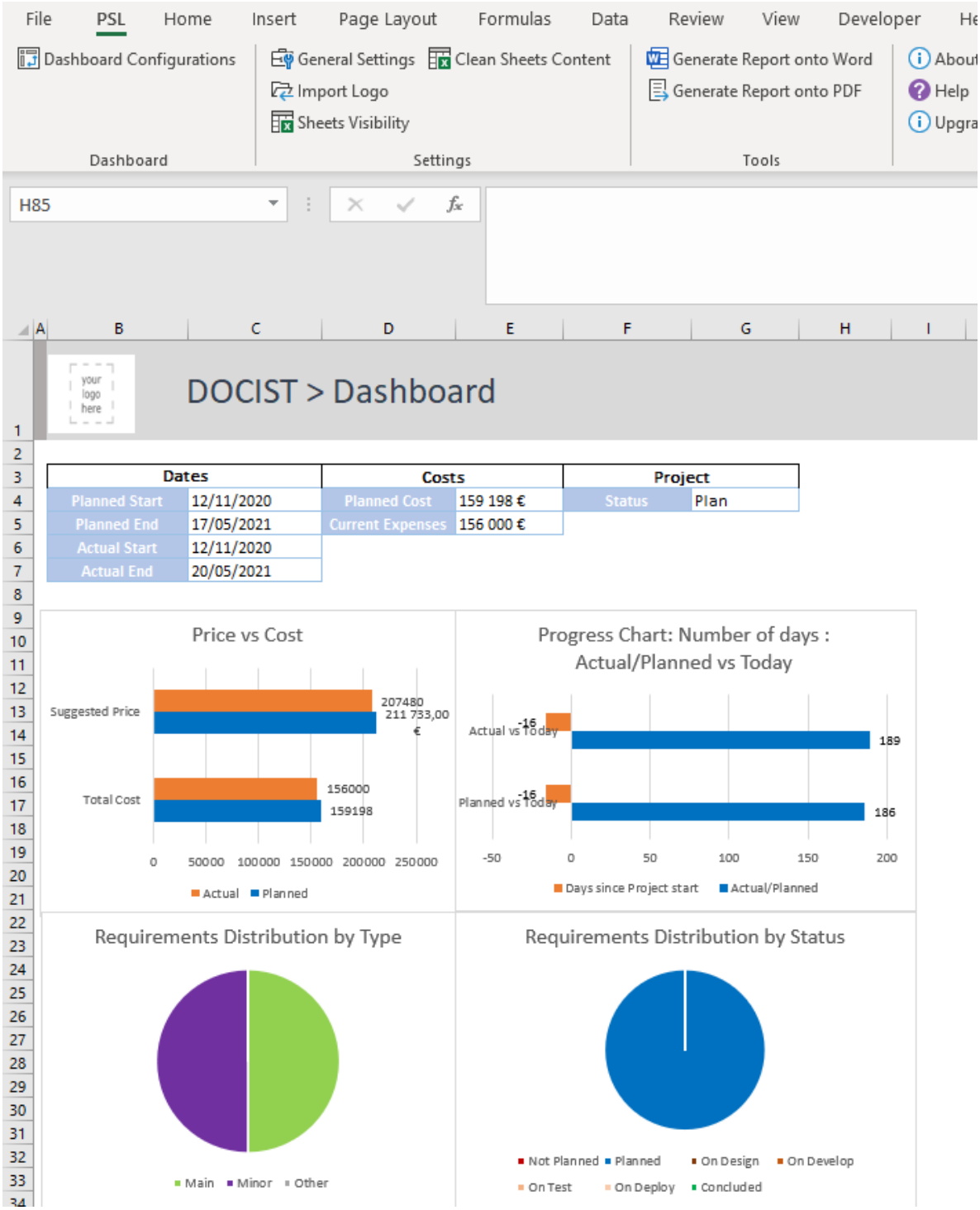
DOCIST > Agile :: Sprint History

Sprint # 6	
Sprint Started on 20/07/2018	
Sprint Number	6
Start date	12/11/2018
Duration (d)	10
End Date	25/11/2028
Number of Developers	3
Dev Utilization	100%
Daily Work hours	8
Dev total hours	54
Dev Daily hours	5
Today's Date	27/10/2020



ID	Task	User Story	Expected Concluded Day	Status	Assigned to	Actual Effort	Planned Effort	1	2	3	4	5	6	7	8	9
ts_1	As the Purchase Manager I want to create a purchase order	us_1	1	Completed	DMS Team Leader	8	7									
ts_2	As the Purchase Manager I want to create a purchase order	us_1	1	Completed	DMS Team Leader	8	7									
ts_3	As the Purchase Manager I want to create a purchase order	us_1	2	Completed	DMS Team Leader	7	7									
ts_4	As the Purchase Manager I want to create a purchase order	us_1	2	Completed	DMS Team Leader	5	7									
ts_5	As the Purchase Manager I want to create a purchase order	us_1	3	Completed	DMS Team Leader	8	6									
ts_6	As the Purchase Manager I want to create a purchase order	us_1	3	Completed	DMS Team Leader	9	6									
ts_7	As the Purchase Manager I want to create a purchase order	us_1	4	Completed	DMS Team Leader	6	6									
ts_8	As the Purchase Manager I want to consult, forecast, and validate Project Budjets	us_2	4	Completed	DMS Team Leader	5	5									
ts_9	As the Purchase Manager I want to consult, forecast, and validate Project Budjets	us_2	5	Completed	DMS Team Leader	5	5									
ts_10	As the Purchase Manager I want to consult, forecast, and validate Project Budjets	us_2	5	Completed	DMS Team Leader	5	5									
ts_11	As the Purchase Manager I want to choose different workflow paths triggered by specific business rules	us_3	6	Completed	DMS Team Leader	5	5									
ts_12	As the Purchase Manager I want to choose different workflow paths triggered by specific business rules	us_3	6	Completed	DMS Team Leader	10	7									
ts_13	As the Purchase Manager I want to choose different workflow paths triggered by specific business rules	us_3	7	Completed	DMS Team Leader	8	7									
ts_14	As the Purhcase Director I want to have the flexibility to change the authorization levels regarind and Order	us_4	7	Completed	DMS Team Leader	6	6									
ts_15	As the Purhcase Director I want to have the flexibility to change the authorization levels regarind and Order	us_4	8	Completed	DMS Team Leader	5	6									
ts_16	As the Purhcase Director I want to have the flexibility to change the authorization levels regarind and Order	us_4	8	Completed	DMS Team Leader	8	8									
ts_17	As the IS Director I need a report containing all purchase orders by project type and comparing project budgets with actual values	us_5	9	Completed	DMS Team Leader	5	6									
ts_18	As the IS Director I need a report containing all purchase orders by project type and comparing project budgets with actual values	us_5	9	Completed	DMS Team Leader	7	8									
ts_19	As the IS Director I need a report containing all purchase orders by project type and comparing project budgets with actual values	us_5	10	Completed	DMS Team Leader	6	6									
						47	54	38	38	38	32	32	32	32	32	19

Appendix B – PSL/Traditional-v.2020



DOCIST > Stakeholder :: Organizations

ID	Name	Type	Domain	Email	Mobile	Postal Address	Notes
sh_org_1	IST	Performing	Engineering	mail@tecnico.ulisboa.pt	351 218 417 729	Av. Rovisco Pais, Nº 1. 1049-001 Lisboa	
sh_org_2	MaxiRetail	Customer	Commerce	maxiretailmail@gmail.com	351 910 000 000	Address of Maxi Retail	
sh_org_3	Supplier	Sub-Contractor	Engineering	suppliermail@gmail.com	351 960 000 000	Supplier Address	

DOCIST > Stakeholder :: People

ID	Name	Org Name	Role	Academic Level	Email	Mobile	Notes
sh_per_1	Prof. Alberto Silva	IST	Manager_Sponsor	PhD	thisisfake@hotmail.com	351 000 000 001	
sh_per_2	Finance Director	MaxiRetail	Manager_ProjectOwner	PhD	thisisfake2@hotmail.com	351 000 000 002	
sh_per_3	HR Director	MaxiRetail	Manager_Sponsor	MSc	thisisfake3@hotmail.com	351 000 000 003	
sh_per_4	Purchasing Director	MaxiRetail	Manager_Sponsor	PhD	thisisfake4@hotmail.com	351 000 000 004	
sh_per_5	IS Director	MaxiRetail	Manager_Sponsor	PhD	thisisfake5@hotmail.com	351 000 000 005	
sh_per_6	Pedro Baptista	IST	Manager_ProjectManager	MSc	thisisfake6@hotmail.com	351 000 000 006	
sh_per_7	DMS Team Leader	IST	Manager_TeamLeader	MSc	thisisfake7@hotmail.com	351 000 000 007	
sh_per_8	DMS Specialist 1	IST	Technical_TeamMember	BSc	thisisfake8@hotmail.com	351 000 000 008	
sh_per_9	INT Team Leader	IST	Technical_TeamLeader	MSc	thisisfake9@hotmail.com	351 000 000 009	
sh_per_10	INT Specialist 1	IST	Technical_TeamMember	BSc	thisisfake10@hotmail.co	351 000 000 010	
sh_per_11	MaxiRetail PM	MaxiRetail	Manager_ProjectManager	MSc	thisisfake11@hotmail.co	351 000 000 011	
sh_per_12	Supplier's Control Specialist	MaxiRetail	Manager_TeamLeader	MSc	thisisfake12@hotmail.co	351 000 000 012	
sh_per_13	Accounting Specialist	MaxiRetail	Technical_TeamMember	BSc	thisisfake13@hotmail.co	351 000 000 013	
sh_per_14	HR Delegate	MaxiRetail	Technical_TeamMember	BSc	thisisfake14@hotmail.co	351 000 000 014	
sh_per_15	Pilot Coordinator	MaxiRetail	Manager_TeamLeader	MSc	thisisfake15@hotmail.co	351 000 000 015	
sh_per_16	Purchasing Specialist	MaxiRetail	Technical_TeamMember	BSc	thisisfake16@hotmail.co	351 000 000 016	
sh_per_17	Purchasing Specialist	MaxiRetail	Technical_TeamMember	BSc	thisisfake17@hotmail.co	351 000 000 017	
sh_per_18	Technical Coordinator	MaxiRetail	Manager_TeamLeader	MSc	thisisfake18@hotmail.co	351 000 000 018	
sh_per_19	System's Security	MaxiRetail	Technical_TeamMember	BSc	thisisfake19@hotmail.co	351 000 000 019	
sh_per_20	Programmer(Trainee)	MaxiRetail	Technical_TeamMember	BSc	thisisfake20@hotmail.co	351 000 000 020	
sh_per_21	IT Infrastructure Specialist	MaxiRetail	Technical_TeamMember	BSc	thisisfake21@hotmail.co	351 000 000 021	
sh_per_22	WorkFlow Coordinator	MaxiRetail	Manager_TeamLeader	MSc	thisisfake22@hotmail.co	351 000 000 022	
sh_per_23	Programmer	MaxiRetail	Technical_TeamMember	BSc	thisisfake23@hotmail.co	351 000 000 023	
sh_per_24	Programmer	MaxiRetail	Technical_TeamMember	BSc	thisisfake24@hotmail.co	351 000 000 024	
sh_per_25	DMS Specialist 2	IST	Technical_TeamMember	BSc	thisisfake24@hotmail.co	351 000 000 025	
sh_per_26	DMS Specialist 3	IST	Technical_TeamMember	BSc	thisisfake25@hotmail.co	351 000 000 026	
sh_per_27	DMS Specialist and workflow	IST	Technical_TeamMember	BSc	thisisfake26@hotmail.co	351 000 000 027	
sh_per_28	INT Specialist 2	IST	Technical_TeamMember	BSc	thisisfake27@hotmail.co	351 000 000 028	
sh_per_29	INT Specialist 3	IST	Technical_TeamMember	BSc	thisisfake28@hotmail.co	351 000 000 029	
sh_per_30	INT Specialist 4	IST	Technical_TeamMember	BSc	thisisfake29@hotmail.co	351 000 000 030	

DOCIST > Integration :: Project Main Data

Project Identification			
Project Acronym	**Project Name**	**Project Progress**	**Version**
DOCIST	Document Management System	Planned	1.0

Types		
Project Type	**Nationality Type**	**Application Domain**
System Development	National	Other

Entities Involved			
Type	**Organization**	**Sponsor**	**Project Manager**
Performing	IST	Prof. Alberto Silva	Pedro Baptista
Customer	MaxiRetail	HR Director	MaxiRetail PM

My Organization	Performing
Project Phase	Plan

Time	Planned	Actual	Variance (WorkDay
Start	12/11/2020	12/11/2020	1
End	17/05/2021	20/05/2021	-4
N° Days	**133**	**136**	**-3 Days**

Cost	Planned	Actual	Variance
Total Cost	159 138,00 €	156 000,00 €	-3 138,00 €
Income Tax	33,00%	33,00%	0,00%
Suggested Price	211 733,00 €	207 480,00 €	-4 253,00 €
Profit	**52 535,00 €**	**51 480,00 €**	**-1 055,00 €**

Executive Summary	
Purpose: Why?	Document flows between stores and head office represents today a large volume of paper information, no longer adequate to the Company's fast growth witch originated problems with: -Loss of some important documents -Large volumes of information with slow access -Control documents physical location -Control of information flow -Employees expense claims
Purpose: What?	New Document Management System (DOCIST) with the following modules: -Document Managemet (DM) -Invoice Approval (IA) -Purchase Management (PM) -Expense Claims (EC) It also includes: -Integration with Existing ERP -Migration of current solutions in terms of data documents -End Users training -Technical Training -Supply the required framework and all needed cuztomization

Business Benefits			
ID	**Description**	**Logical Expressior**	**Value**
bb_1	Employees complaints reduction	>=	50%
bb_2	Ensuring expenses reimbursement	<=	5
bb_3	Ensure supplier's invoices approval	<=	10
bb_4	Reduce paper costs and paper	>=	50%
bb_5	Reduce administrative costs	>=	25%

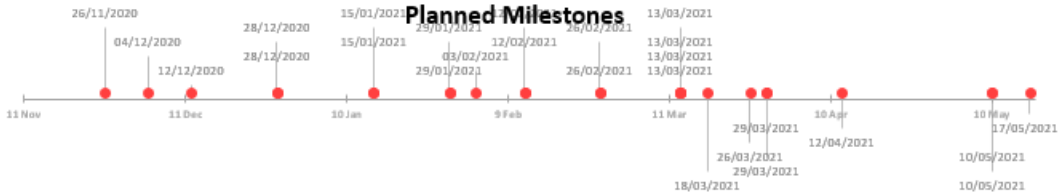
Success Criteria			
ID	**Description**	**Logical Expressior**	**Value**
sc_1	Finish Project	<=	5 months
sc_2	Cost of Project	<	200.000 € + 10%
sc_3	Non_conformities during	<=	10%
sc_4	Time for non-conformities	<	24 hours
sc_5	Training sessions satisfaction	>=	3,75

Success Factors	
ID	**Description**
sf_1	Project Owner fully commited
sf_2	Good communication channels
sf_3	All of the involved organization's
sf_4	Hardware and related

DOCIST > Scope :: Milestones

Project	Plan

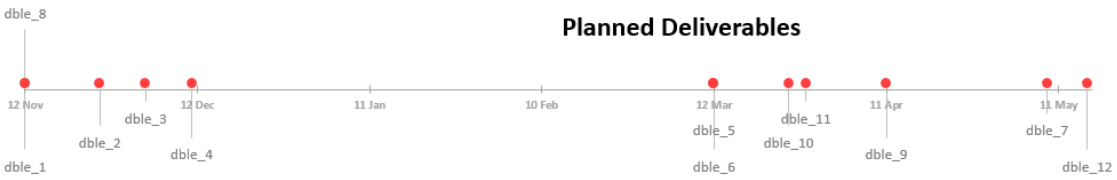
			WP		Dates	
ID	Name	Type	WP ID	WP Name	Planned	Description
mi_2	Modeling Approved	Main	wp_1_2_1	Modeling	26/11/2020	
mi_3	Requirement Specification	Main	wp_1_2_2	Requirement	04/12/2020	
mi_4	Tests Specification	Main	wp_1_2_3	Tests Specification	12/12/2020	
mi_5	DMS Sprint 1 Finished	Minor	wp_1_3_1_1	DMS Sprint 1	28/12/2020	
mi_6	INT Sprint 1 Finished	Minor	wp_1_3_2_	Integration Sprint 1	28/12/2020	
mi_7	DMS Sprint 2 Finished	Minor	wp_1_3_1_2	DMS Sprint 2	15/01/2021	
mi_8	INT Sprint 2 Finished	Minor	wp_1_3_2_	Integration Sprint 2	15/01/2021	
mi_9	DMS Sprint 3 Finished	Minor	wp_1_3_1_3	DMS Sprint 3	29/01/2021	
mi_10	INT Sprint 3 Finished	Minor	wp_1_3_2_	Integration Sprint 3	29/01/2021	
mi_1	Project Plan Approved	Main	wp_1_1_1	Start-up	03/02/2021	
mi_11	DMS Sprint 4 Finished	Minor	wp_1_3_1_4	DMS Sprint 4	12/02/2021	
mi_12	INT Sprint 4 Finished	Minor	wp_1_3_2_	Integration Sprint 4	12/02/2021	
mi_13	DMS Sprint 5 Finished	Minor	wp_1_3_1_5	DMS Sprint 5	26/02/2021	
mi_14	INT Sprint 5 Finished	Minor	wp_1_3_2_	Integration Sprint 5	26/02/2021	
mi_15	DMS Completed	Main	wp_1_3_1	Document	13/03/2021	
mi_16	DMS Sprint 6 Finished	Minor	wp_1_3_1_6	DMS Sprint 6	13/03/2021	
mi_17	Integration	Main	wp_1_3_2	Integration	13/03/2021	
mi_18	INT Sprint 6 Finished	Minor	wp_1_3_2_	Integration Sprint 6	13/03/2021	
mi_19	Systems Tests Approved	Main	wp_1_4_1	System Tests	18/03/2021	
mi_20	IT Department people	Minor	wp_1_4_2_	Technical Training	26/03/2021	
mi_21	Training concluded	Main	wp_1_4_2	Training	29/03/2021	
mi_22	Manuals and Additional	Minor	wp_1_4_2_	End-users Training	29/03/2021	
mi_23	Acceptance Tests	Main	wp_1_4_3	Acceptance Tests	12/04/2021	
mi_24	PM Control Concluded	Main	wp_1_1_2	Control	10/05/2021	
mi_25	DOCIST Approved	Main	wp_1_5_1	Pilot	10/05/2021	
mi_26	Final Report Approved	Main	wp_1_1_3	Close	17/05/2021	



DOCIST > Scope :: Deliverables

Project Phase	Plan

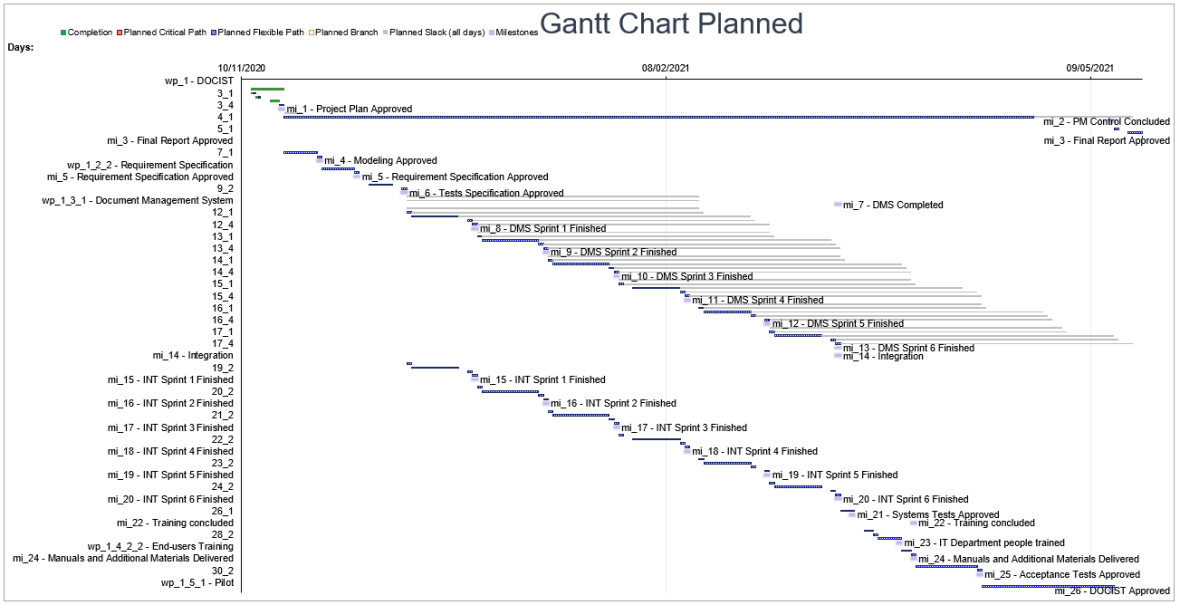
			WP			Planned Dates		
ID	Deliverable	Type	WP ID	WP Name	Assigned To	Submitted	Approved	Description
dble_1	Project Plan Document	Documentation	wp_1_1_1	Start-up	Pedro Baptista	12/11/2020	12/11/2020	
dble_8	Work Asssignments	Documentation	wp_1_1_1	Start-up	Pedro Baptista	12/11/2020	12/11/2020	
dble_2	Model	Documentation	wp_1_2_1	Modeling	DMS Team Leader	25/11/2020	26/11/2020	
dble_3	Requirements Specification	Documentation	wp_1_2_2	Requirement	INT Team Leader	03/12/2020	04/12/2020	
dble_4	Tests Specification	Documentation	wp_1_2_3	Tests	INT Team Leader	11/12/2020	12/12/2020	
dble_5	DMS Progress Report	Documentation	wp_1_3_1	Document	DMS Team Leader	12/03/2021	13/03/2021	
dble_6	INT Progress Report	Documentation	wp_1_3_2	Integration	INT Team Leader	12/03/2021	13/03/2021	
dble_10	Technical Documentation	Documentation	wp_1_4_2_1	Technical Training	DMS Team Leader	25/03/2021	26/03/2021	
dble_11	User Manuals	Documentation	wp_1_4_2_2	End-users	INT Team Leader	28/03/2021	29/03/2021	
dble_9	System Deployed	Software Application	wp_1_4_3	Acceptance Tests	INT Team Leader	11/04/2021	12/04/2021	
dble_7	Status Report	Documentation	wp_1_1_2	Control	Pedro Baptista	09/05/2021	10/05/2021	
dble_12	Final Report	Documentation	wp_1_1_3	Close	Pedro Baptista	16/05/2021	17/05/2021	



DOCIST > Schedule

Planned Start	12/11/2020	Actual Start Date	12/11/2020
Planned End	17/05/2021	Actual End Date	20/05/2021

						Planned								Planned		
Task ID	ID	Level	Task	Type	Quality	Planned Start	Planned End	Planned Duration	Type of Precedence	Predecessors	Resources	Planned Critical	Planned Late Start	Planned Late Finish	Planned Slack
1	wp_1	1	DOCIST	Project		12/11/2020	20/05/2021	136					09/11/2020	17/05/2021	-5
2	wp_1_1	2	PM	Phase		12/11/2020	20/05/2021	136					09/11/2020	17/05/2021	-5
3	wp_1_1_1	3	Start-up	Workpackage		12/11/2020	16/11/2020	5					09/11/2020	13/11/2020	-5
3_1		4	Read Project Proposal	Activity		12/11/2020	12/11/2020	1					09/11/2020	09/11/2020	-5
3_2		4	Team Definition	Activity		13/11/2020	13/11/2020	1	Finish-To-Start	3_1	Pedro		10/11/2020	10/11/2020	-5



DOCIST > Resource :: Resources

			Associated To		
ID	Name	Type	Person	Organization	Description
r_h_1	Prof. Alberto Silva	HR	Prof. Alberto Silva	IST	
r_h_2	Finance Director	HR	Finance Director	MaxiRetail	
r_h_3	HR Director	HR	HR Director	MaxiRetail	
r_h_4	Purchasing Director	HR	Purchasing	MaxiRetail	
r_h_5	IS Director	HR	IS Director	MaxiRetail	
r_h_6	Pedro Baptista	HR	Pedro Baptista	IST	
r_h_7	DMS Team Leader	HR	DMS Team Leader	IST	
r_h_8	DMS Specialist 1	HR	DMS Specialist 1	IST	
r_h_9	INT Team Leader	HR	INT Team Leader	IST	
r_h_10	INT Specialist 1	HR	INT Specialist 1	IST	
r_h_11	MaxiRetail PM	HR	MaxiRetail PM	MaxiRetail	
r_h_12	Supplier's Control Specialis	HR	Supplier's Control	MaxiRetail	
r_h_13	Accounting Specialist	HR	Accounting	MaxiRetail	
r_h_14	HR Delegate	HR	HR Delegate	MaxiRetail	
r_h_15	Pilot Coordinator	HR	Pilot Coordinator	MaxiRetail	
r_h_16	Purchasing Specialist	HR	Purchasing	MaxiRetail	
r_h_17	Purchasing Specialist	HR	Purchasing	MaxiRetail	
r_h_18	Technical Coordinator	HR	Technical	MaxiRetail	
r_h_19	System's Security	HR	System's Security	MaxiRetail	
r_h_20	Programmer(Trainee)	HR	Programmer(Train	MaxiRetail	
r_h_21	IT Infrastructure Specialist	HR	IT Infrastructure	MaxiRetail	
r_h_22	WorkFlow Coordinator	HR	WorkFlow	MaxiRetail	
r_h_23	Programmer	HR	Programmer	MaxiRetail	
r_h_24	Programmer	HR	Programmer	MaxiRetail	
r_h_25	DMS Specialist 2	HR	DMS Specialist 2	IST	
r_h_26	DMS Specialist 3	HR	DMS Specialist 3	IST	
r_h_27	DMS Specialist and workflc	HR	DMS Specialist	IST	
r_h_28	INT Specialist 2	HR	INT Specialist 2	IST	
r_h_29	INT Specialist 3	HR	INT Specialist 3	IST	
r_h_30	INT Specialist 4	HR	INT Specialist 4	IST	
r_eq_1	G1 Office	Equipment	Pedro Baptista	IST	
r_mat_1	Supporting DM and	Material	Pedro Baptista	IST	
r_gen_1	General	General	Prof. Alberto Silva	IST	

DOCIST > Cost :: Budjet

Total Cost	159 198,00 €
Income Tax	33,00%
Suggested	207 480,00 €

			Rate					2020			2021		
ID	Resource	Name	Type	ID2	Name	Measure	Total	Unit Cost	N°1	Value	Unit Cost	N°2	Value2
cost_1	r_h_1	Prof. Alberto Silva	HR	ra_1	Director	Daily	6 000,00 €	1000,00 €	2	2 000,00 €	1000,00 €	4	4 000,00 €
cost_2	r_h_2	Finance Director	HR				0,00 €	- €		- €	- €		- €
cost_3	r_h_3	HR Director	HR				0,00 €	- €		- €	- €		- €
cost_4	r_h_4	Purchasing Director	HR				0,00 €	- €		- €	- €		- €
cost_5	r_h_5	IS Director	HR				0,00 €	- €		- €	- €		- €
cost_6	r_h_6	Pedro Baptista	HR	ra_2	Project Mai	Daily	14 400,00 €	150,00 €	10	1500,00 €	150,00 €	86	12 900,00 €
cost_7	r_h_7	DMS Team Leader	HR	ra_3	Team Leac	Daily	8 400,00 €	100,00 €	25	2 500,00 €	100,00 €	59	5 900,00 €
cost_8	r_h_8	DMS Specialist 1	HR	ra_4	Specialist	Daily	6 000,00 €	75,00 €	24	1800,00 €	75,00 €	56	4 200,00 €
cost_9	r_h_9	INT Team Leader	HR	ra_3	Team Leac	Daily	8 400,00 €	100,00 €	25	2 500,00 €	100,00 €	59	5 900,00 €
cost_10	r_h_10	INT Specialist 1	HR	ra_4	Specialist	Daily	6 000,00 €	75,00 €	24	1800,00 €	75,00 €	56	4 200,00 €
cost_11	r_h_11	MaxiRetail PM	HR				0,00 €	- €		- €	- €		- €
cost_12	r_h_12	Supplier's Control Speci	HR				0,00 €	- €		- €	- €		- €
cost_13	r_h_13	Accounting Specialist	HR				0,00 €	- €		- €	- €		- €
cost_14	r_h_14	HR Delegate	HR				0,00 €	- €		- €	- €		- €
cost_15	r_h_15	Pilot Coordinator	HR				0,00 €	- €		- €	- €		- €
cost_16	r_h_16	Purchasing Specialist	HR				0,00 €	- €		- €	- €		- €
cost_17	r_h_17	Purchasing Specialist	HR				0,00 €	- €		- €	- €		- €
cost_18	r_h_18	Technical Coordinator	HR				0,00 €	- €		- €	- €		- €
cost_19	r_h_19	System's Security	HR				0,00 €	- €		- €	- €		- €
cost_20	r_h_20	Programmer(Trainee)	HR				0,00 €	- €		- €	- €		- €
cost_21	r_h_21	IT Infrastructure Speciali	HR				0,00 €	- €		- €	- €		- €
cost_22	r_h_22	WorkFlow Coordinator	HR				0,00 €	- €		- €	- €		- €
cost_23	r_h_23	Programmer	HR				0,00 €	- €		- €	- €		- €
cost_24	r_h_24	Programmer	HR				0,00 €	- €		- €	- €		- €
cost_25	r_h_25	DMS Specialist 2	HR	ra_4	Specialist	Daily	6 000,00 €	75,00 €	24	1800,00 €	75,00 €	56	4 200,00 €
cost_26	r_h_26	DMS Specialist 3	HR	ra_4	Specialist	Daily	6 000,00 €	75,00 €	24	1800,00 €	75,00 €	56	4 200,00 €
cost_27	r_h_27	DMS Specialist and worl	HR	ra_5	Specialist a	Daily	6 800,00 €	85,00 €	24	2 040,00 €	85,00 €	56	4 760,00 €
cost_28	r_h_28	INT Specialist 2	HR	ra_4	Specialist	Daily	6 000,00 €	75,00 €	24	1800,00 €	75,00 €	56	4 200,00 €
cost_29	r_h_29	INT Specialist 3	HR	ra_4	Specialist	Daily	6 000,00 €	75,00 €	24	1800,00 €	75,00 €	56	4 200,00 €
cost_30	r_h_30	INT Specialist 4	HR	ra_4	Specialist	Daily	6 000,00 €	75,00 €	24	1800,00 €	75,00 €	56	4 200,00 €
cost_31	r_eq_1	G1 Office	Equipment				10 000,00 €	- €		- €	- €		- €
cost_32	r_mat_1	Supporting DM and Worl	Material				20 000,00 €	- €		- €	- €		- €
cost_33	r_gen_1	General	General				40 000,00 €	- €		- €	- €		- €
Total							**156 000,00 €**			**23 140,00 €**			**62 860,00 €**

DOCIST > Communication :: Meetings

Today's Date	27/10/2020

Id	Name	Type	Medium	Frequency	Assigned To	Audience	Deliverable(s)	Actual Start Dat	Frequency (d)	Next Meeting
m_1	Kick-off Meeting	Steering	Conference Call	Once	Finance Director	Everyone	Project Plan	12/11/2020	#N/A	
m_2	Model Meeting	Technical	Face-To-Face	Once	Pedro Baptista	DMS and INT	Model	26/11/2020	#N/A	
m_3	Requirement	Technical	Face-To-Face	Once	Pedro Baptista	DMS and INT	Requirements	04/12/2020	#N/A	
m_4	Tests Specification	Technical	Face-To-Face	Once	Pedro Baptista	DMS and INT	Tests Specification	12/12/2020	#N/A	
m_5	Work Assignment	Technical	Face-To-Face	Once	Pedro Baptista	DMS and INT	Work Asssignments	12/12/2020	#N/A	
m_6	Spring Planning	Technical	Conference Call	Weekly	DMS Team Leader	Scrum	DMS Progress	13/12/2020	7	13/12/2020
m_7	Control Meeting	Management	Face-To-Face	Weekly	Pedro Baptista	Maxi Retail PM	Status Report	13/12/2020	7	13/12/2020
m_8	Status Meeting	Steering	Conference Call	Monthly	Finance Director	Steering		13/12/2020	31	13/12/2020
m_9	Daily Scrum	Technical	Face-To-Face	Daily	DMS Team Leader	DMS and INT		14/12/2020	1	14/12/2020
m_10	Sprint Review	Technical	Face-To-Face	Weekly	DMS Team Leader	Scrum		28/12/2020	7	28/12/2020
m_11	Sprint Retrospective	Technical	Face-To-Face	Weekly	DMS Team Leader	DMS and INT		28/12/2020	7	28/12/2020
m_12	Users Feedback	Technical	Face-To-Face	Once	MaxiRetail PM	Users(MaxiRetai	User Manuals	29/03/2021	#N/A	
m_13	DOCIST Delivery	Technical	Conference Call	Once	Pedro Baptista	Steering	System Deployed	12/04/2021	#N/A	
m_14	Closing Meeting	Steering	Face-To-Face	Once	Finance Director	Everyone	Final Report	10/05/2021	#N/A	

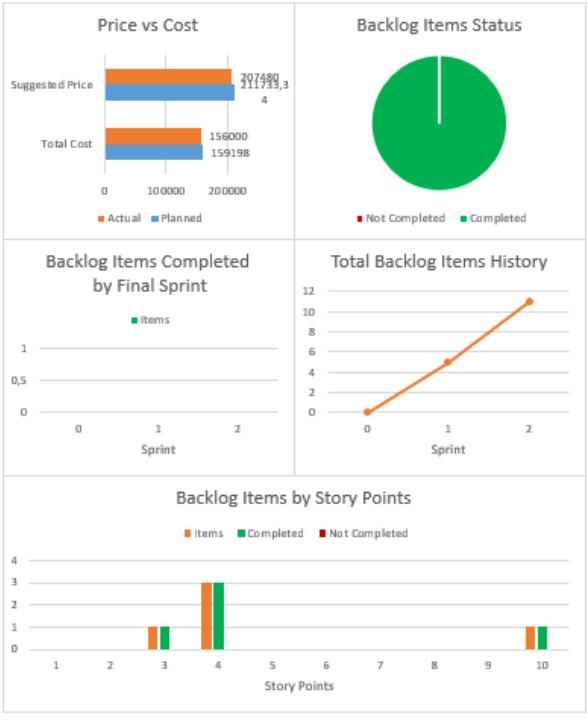
Appendix B – PSL/Agile-v.2020

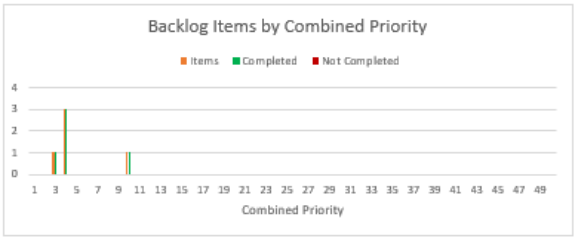
DOCIST > Team :: Team Description

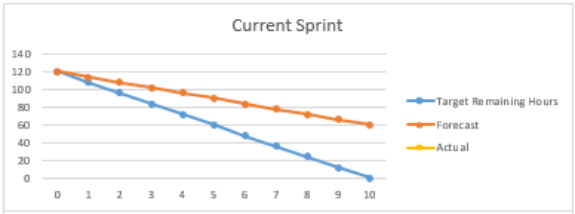
ID	Name	Type	Role	Part Of	Report To	Technical Skills	Other Skills	Description
tm_1	Pedro Baptista	Person	Scrum Master		tm_14			
tm_14	Finance Director	Person	Product Owner					
tm_2	DMS Team Leader	Person	Developer	tm_12	tm_1			
tm_3	DMS Team Specialist 1	Person	Developer	tm_12	tm_2			
tm_4	DMS Team Specialist 2	Person	Developer	tm_12	tm_2			
tm_5	DMS Team Specialist 3	Person	Developer	tm_12	tm_2			
tm_6	DMS Team Specialist and	Person	Developer	tm_12	tm_2			
tm_7	INT Team Leader	Person	Developer	tm_13	tm_1			
tm_8	INT Specialist 1	Person	Developer	tm_13	tm_7			
tm_9	INT Specialist 2	Person	Developer	tm_13	tm_7			
tm_10	INT Specialist 3	Person	Developer	tm_13	tm_7			
tm_11	INT Specialist 4	Person	Developer	tm_13	tm_7			
tm_12	DMS Team	Team	Team		tm_1			
tm_13	INT Team	Team	Team		tm_1			

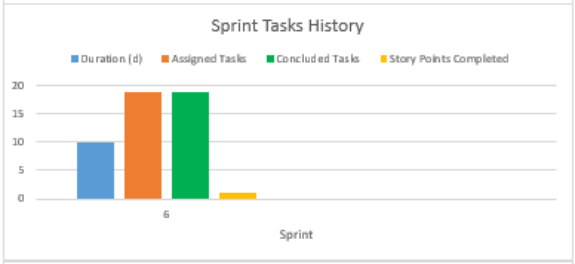
DOCIST > Project :: DashBoard

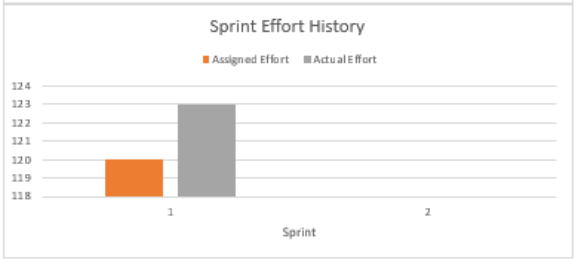
Dates		Costs	
Planned Start	12/11/2020	Planne	159 198 l
Planned End	17/05/2021	Curren	156 000 l
Actual Start	12/11/2020		
Actual End	20/05/2021		











DOCIST > Product :: Backlog

Current Sprint: 7

ID	Story / Feature	Description	Effort: Story Points	Effort: Actual (h)	Priority: Priority	Priority: Combined with Story Points	Sprint: Initial	Sprint: Final	Dates: Created	Dates: Last Updated	Status
us_1	As the Purchase Manager I want to create a purchase		10	50	1	10	6	6	13/11/2020	04/12/2020	Completed
us_2	As the Purchase Manager I want to consult, forecast, and		3	12	1	3	6	6	13/11/2020	04/12/2020	Completed
us_3	As the Purchase Manager I want to choose different		4	19	1	4	6	6	13/11/2020	04/12/2020	Completed
us_4	As the Purhcase Director I want to have the flexibility to		4	22	1	4	6	6	13/11/2020	04/12/2020	Completed
us_5	As the IS Director I need a report containing all purchase		4	20	1	4	6	6	13/11/2020	04/12/2020	Completed

SprintBacklog's Button "Finish Sprint" fills in these last two columns

DOCIST > Kanban :: Kanban Board

Defined WIP: 4 | Current WIP: 0 | Calculated WIP: #DIV/0!

Backlog			
ID	Task	Created	Move >
ta_1	As the Purchase	13/11/2020	
ta_2	As the Purchase	13/11/2020	
ta_3	As the Purchase	13/11/2020	
ta_4	As the Purchase	13/11/2020	
ta_5	As the Purchase	13/11/2020	
ta_6	As the Purchase	13/11/2020	
ta_7	As the Purchase	13/11/2020	
ta_8	As the Purchase	13/11/2020	
ta_9	As the Purchase	13/11/2020	
ta_10	As the Purchase	13/11/2020	
ta_11	As the Purchase	13/11/2020	
ta_12	As the Purchase	13/11/2020	
ta_13	As the Purchase	13/11/2020	
ta_14	As the Purchase	13/11/2020	
ta_15	As the Purchase	13/11/2020	
ta_16	As the Purchase	13/11/2020	
ta_17	As the IS	13/11/2020	
ta_18	As the IS	13/11/2020	
ta_19	As the IS	13/11/2020	

In Progress					
		Dates			
ID	Task	Created	Started	Assigned To	Move >

Done							
		Dates			Times (d)		
ID	Task	Created	Started	Finished	Lead	Cycle	Assigned To
					0	0	
					0	0	

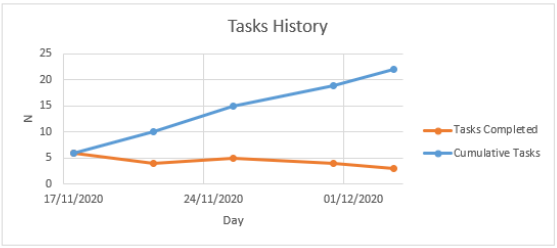
DOCIST > Kanban :: Kanban Board

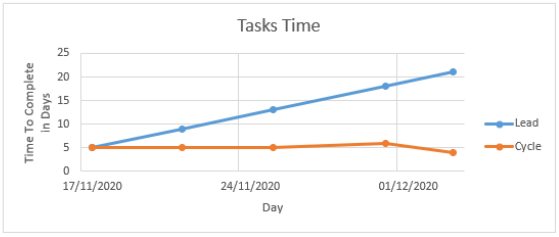
Defined WIP 4 | Current WIP 0 | Calculated WIP #DIV/0!

Backlog				In Progress					Done							
				Dates					Dates			Times (d)				
ID	Task	Created	Move >	ID	Task	Created	Started	Assigned To	Move >	ID	Task	Created	Started	Finished	Lead	Cycle	Assigned To
										ta_1	As the	13/11/2020	13/11/2020	17/11/2020	5	5	Pedro Baptista
										ta_3	As the	13/11/2020	13/11/2020	17/11/2020	5	5	Pedro Baptista
										ta_2	As the	13/11/2020	13/11/2020	17/11/2020	5	5	Pedro Baptista
										ta_4	As the	13/11/2020	17/11/2020	21/11/2020	9	5	Pedro Baptista
										ta_5	As the	13/11/2020	17/11/2020	21/11/2020	9	5	Pedro Baptista
										ta_6	As the	13/11/2020	17/11/2020	21/11/2020	9	5	Pedro Baptista
										ta_7	As the	13/11/2020	17/11/2020	21/11/2020	9	5	Pedro Baptista
										ta_8	As the	13/11/2020	21/11/2020	25/11/2020	13	5	Pedro Baptista
										ta_9	As the	13/11/2020	21/11/2020	25/11/2020	13	5	Pedro Baptista
										ta_10	As the	13/11/2020	21/11/2020	25/11/2020	13	5	Pedro Baptista
										ta_11	As the	13/11/2020	21/11/2020	25/11/2020	13	5	Pedro Baptista
										ta_12	As the	13/11/2020	21/11/2020	25/11/2020	13	5	Pedro Baptista
										ta_13	As the	13/11/2020	25/11/2020	30/11/2020	18	6	Pedro Baptista
										ta_14	As the	13/11/2020	25/11/2020	30/11/2020	18	6	Pedro Baptista
										ta_15	As the	13/11/2020	25/11/2020	30/11/2020	18	6	Pedro Baptista
										ta_16	As the	13/11/2020	25/11/2020	30/11/2020	18	6	Pedro Baptista
										ta_17	As the IS	13/11/2020	30/11/2020	03/12/2020	21	4	Pedro Baptista
										ta_18	As the IS	13/11/2020	30/11/2020	03/12/2020	21	4	Pedro Baptista
										ta_19	As the IS	13/11/2020	30/11/2020	03/12/2020	21	4	Pedro Baptista
															0	0	

DOCIST > Kanban :: Kanban Analyzer

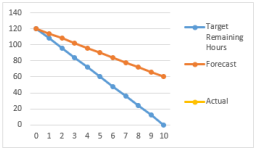
			Average Times (d)	
Day	Tasks Completed	Cumulative Tasks	Lead	Cycle
17/11/2020	6	6	5	5,00
21/11/2020	4	10	9	5,00
25/11/2020	5	15	13	5,00
30/11/2020	4	19	18	6,00
03/12/2020	3	22	21	4,00
	22		68	5,00





DOCIST > Scrum :: Sprint Backlog

Sprint Number	7
Start date	03/12/2020
Duration (d)	10
End Date	17/12/2020
Number of Developers	3
Dev Utilization	100%
Daily Work hours	8
Dev total hours	240
Dev Daily hours	6
Today's Date	27/10/2020
Status	Open



Write here the remainder Effort per task each day(it can be higher).
"Waiting" means we haven't reached the day yet.

Total Row is reflect as "Actual" in the chart so using the "sum" operation reflects the best results.

Effort Remaining ea

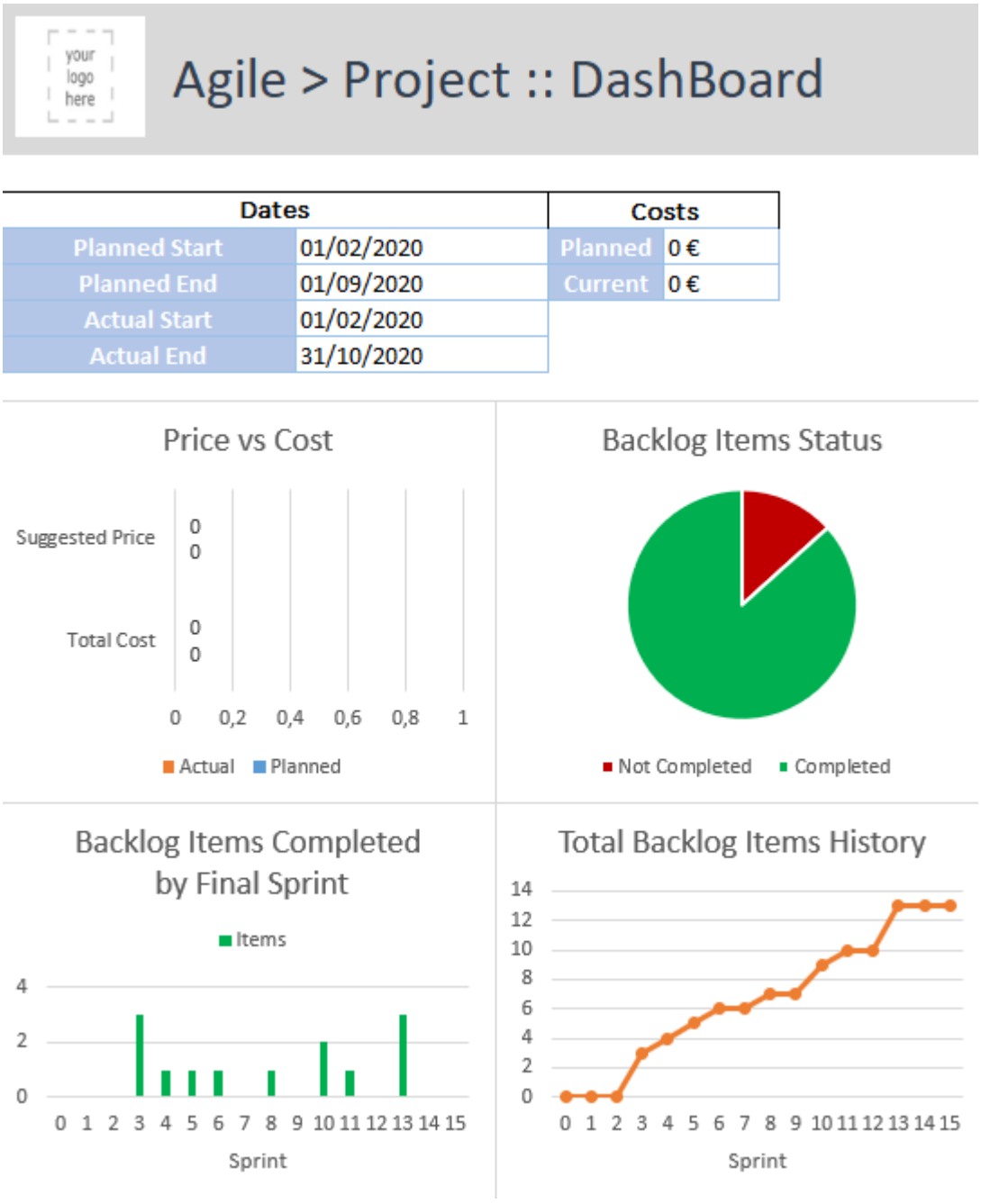
ID	Task	Description	User Story	Status	Assigned to	Planned Effort (h	1	2	3	4	5	6	7	8	9	10	Actual Effort (h)
						120	Waiting	Waiting	Waiting	Waiting	Waiting	Waiting	Waiting	Waiting	Waiting	Waiting	
Total						120	0	0	0	0	0	0	0	0	0	0	0

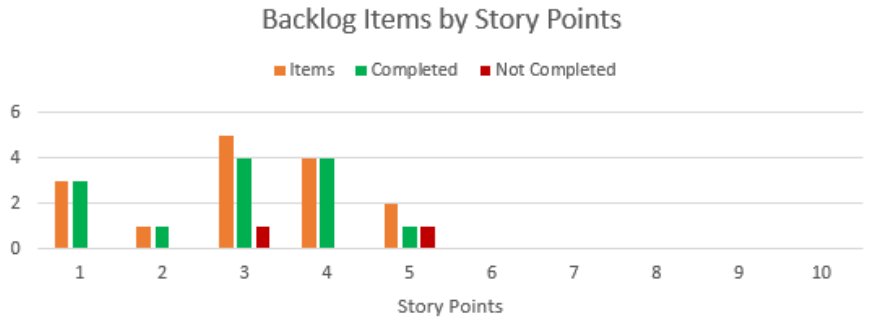
DOCIST > Scrum :: Sprint Analyzer

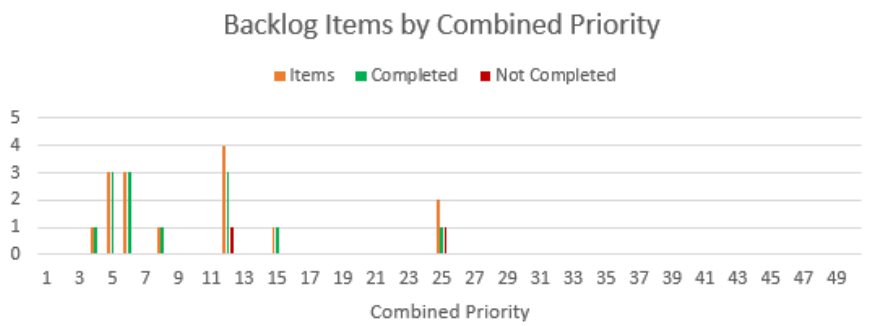
SprintBacklog' Button "Finish Sprint" fills in this table

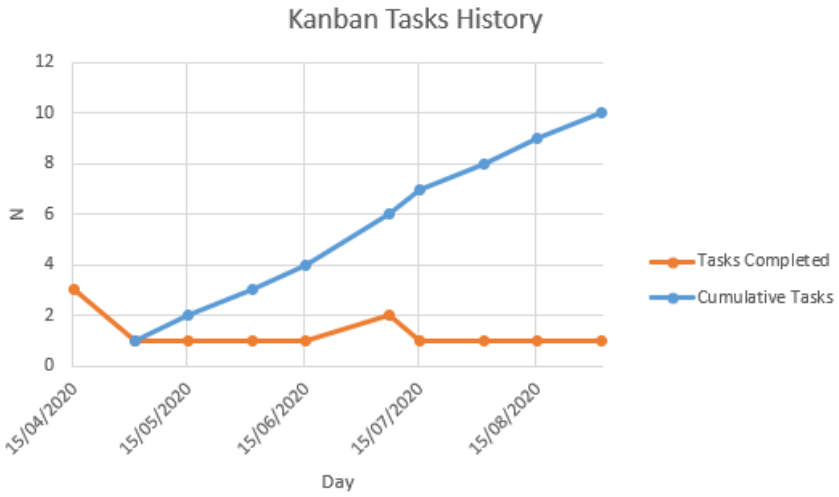
			Tasks (#)			Effort (h)			
Sprint Numbe	Duration (d	Number of Developer	Assigned Task	Concluded Tasks	% Concluded	Assigned Effo	Actual Effort	% Effort	Story Points Completed
6	10	3	19	19	100,00%	120	123	102,50%	25
Total									

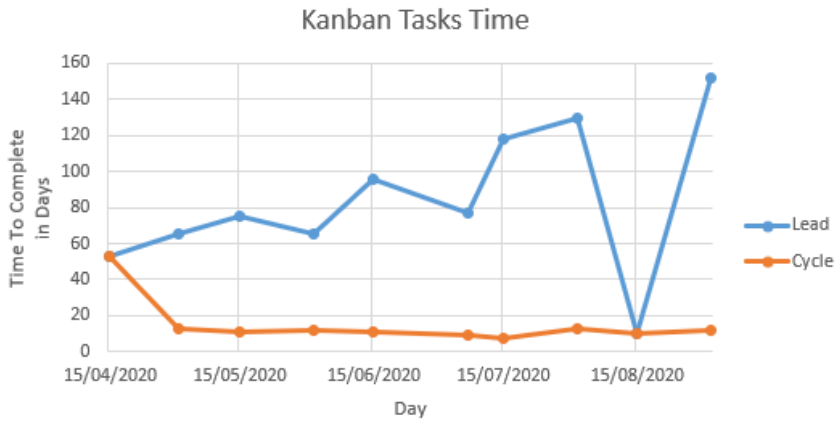
Appendix C – MSc Thesis Project on PSL/Agile-v.2020




Backlog Items by Story Points
Items
Completed
Not Completed
6
4
2
0
1
2
3
4
5
6
7
8
9
10
Story Points


Backlog Items by Combined Priority
Items
Completed
Not Completed
5
4
3
2
1
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49
Combined Priority


Kanban Tasks History
12
10
8
6
4
2
0
N
15/04/2020
15/05/2020
15/06/2020
15/07/2020
15/08/2020
Day
Tasks Completed
Cumulative Tasks


Kanban Tasks Time
160
140
120
100
80
60
40
20
0
Time To Complete in Days
15/04/2020
15/05/2020
15/06/2020
15/07/2020
15/08/2020
Day
Lead
Cycle

Agile >Project :: Integration

Project Identification			
Project Acronym	Project Name	Project Progress	Version
Agile	PSL/Agile-v.2020	On Develop	15

Types		
Project Type	Nationality Type	Application Domai
System Development	National	Education

Entities Involved			
Type	Organization	Sponsor	Project Manager
Performing	IST	Prof. Alberto Silva	Pedro Baptista

Time	Planned	Actual	Variance (WorkDay
Start	01/02/2020	01/02/2020	1
End	01/09/2020	31/10/2020	38
Nº Days	**152**	**195**	**-43 Days**

Cost	Planned	Actual	Variance
Total Cost	0,00 €	0,00 €	0,00 €
Income Tax	0,00%	0,00%	0,00%
Suggested Price	0,00 €	0,00 €	0,00 €
Profit	**0,00 €**	**0,00 €**	**0,00 €**

Agile > Product :: Backlog

Current Sprint: 15

			Effort		Priority		Sprint		Dates		
ID	Story / Feature	Description	Story Points	Actual (h)	Priority	Combined with Story Points	Initial	Final	Created	Last Updated	Status
us_1	Learn Excel		1	105	5	5	1	3	01/02/2020	15/04/2020	Completed
us_2	Learn VBA		1	105	5	5	2	3	01/02/2020	15/04/2020	Completed
us_3	Deep comprehesion of PSL Excel Template-v.2019		1	105	5	5	3	3	01/02/2020	15/04/2020	Completed
us_4	Seperate tool in PSL/Traditional and PSL/Agile		3	80	4	12	4	4	01/02/2020	01/05/2020	Completed
us_5	PSL/Traditional improvements		2	80	3	6	5	5	01/02/2020	15/05/2020	Completed
us_6	Create Stakeholders and Contracts sheets		3	80	2	6	6	6	03/03/2020	01/06/2020	Completed
us_7	Gantt Chart and other Charts improvements		4	80	2	8	7	8	01/02/2020	15/06/2020	Completed
us_8	Implement List box features		4	120	1	4	8	10	11/05/2020	07/07/2020	Completed
us_9	Settings, Clean and View sheets		4	120	3	12	9	10	01/02/2020	07/07/2020	Completed
us_10	Scrum revision and improvements		3	40	5	15	10	11	01/02/2020	15/07/2020	Completed
us_11	Kanban implementation		5	120	5	25	11	13	01/02/2020	01/08/2020	Completed
us_12	Dashboard and Integration on Agile		3	80	2	6	12	13	01/08/2020	15/08/2020	Completed
us_13	Update tutorial and export PDF		4	80	3	12	13	13	01/02/2020	01/09/2020	Completed
us_14	Testing and fixing problems		3	>160	4	12	14		01/02/2020	01/10/2020	Not Completed
us_15	Wirting Thesis		5	>160	5	25	15		01/02/2020	01/10/2020	Not Completed

Agile > Kanban :: Kanban Board

Defined WIP	1

Current WIP	2

Backlog				
ID	Task	D	Created	Move >

In Progress					
		Dates			
ID	Task	Created	Started	Assigned To	Move >
ta_14	Testing and	02/01/2020	01/09/2020	Pedro Baptista	
ta_15	Wirting Thesis	02/01/2020	01/09/2020	Pedro Baptista	

Calculated WIP	1

Done							
		Dates			Times (d)		
ID	Task	Created	Started	Finished	Lead	Cycle	Assigned To
ta_1	Learn Excel	01/02/2020	02/02/2020	15/04/2020	53	53	Pedro Baptista
ta_2	Learn VBA	01/02/2020	02/02/2020	15/04/2020	53	53	Pedro Baptista
ta_3	Deep	01/02/2020	02/02/2020	15/04/2020	53	53	Pedro Baptista
ta_4	Seperate	01/02/2020	15/04/2020	01/05/2020	65	13	Pedro Baptista
ta_5	PSL/Traditio	01/02/2020	01/05/2020	15/05/2020	75	11	Pedro Baptista
ta_6	Create	03/03/2020	15/05/2020	01/06/2020	65	12	Pedro Baptista
ta_7	Gantt Chart	01/02/2020	01/06/2020	15/06/2020	96	11	Pedro Baptista
ta_8	Implement	11/05/2020	15/06/2020	07/07/2020	42	17	Pedro Baptista
ta_9	Settings,	01/02/2020	07/07/2020	07/07/2020	112	1	Pedro Baptista
ta_10	Scrum	01/02/2020	07/07/2020	15/07/2020	118	7	Pedro Baptista
ta_11	Kanban	01/02/2020	15/07/2020	01/08/2020	130	13	Pedro Baptista
ta_12	Dashboard	01/08/2020	01/08/2020	15/08/2020	10	10	Pedro Baptista
ta_13	Update	01/02/2020	15/08/2020	01/09/2020	152	12	Pedro Baptista

Agile > Kanban :: Kanban Analyzer

			Average Times (d)	
Day	Tasks Completed	Cumulative Tasks	Lead	Cycle
15/04/2020	3		53	53,00
01/05/2020	1	1	65	13,00
15/05/2020	1	2	75	11,00
01/06/2020	1	3	65	12,00
15/06/2020	1	4	96	11,00
07/07/2020	2	6	77	9,00
15/07/2020	1	7	118	7,00
01/08/2020	1	8	130	13,00
15/08/2020	1	9	10	10,00
01/09/2020	1	10	152	12,00
	13		**68**	**15,10**