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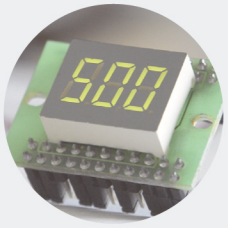


AGILE PROJECT MANAGEMENT METHODOLOGIES

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Resumo

A procura pela melhoria contínua, inspirada em métodos como o Lean e o Kaizen, é fundamental para que as organizações se destaquem no mercado. Ao implementar os princípios Lean, como a eliminação de desperdícios e a optimização de processos, as empresas podem maximizar a eficiência e a qualidade dos seus produtos e serviços. Nomeadamente, com o Kaizen e a sua filosofia de pequenas melhorias incrementais, promove uma cultura de constante aprendizagem e melhoria a todos os níveis da organização.

A presente tese, numa primeira fase, apresenta uma análise mais teórica dos pontos acima referidos, explicando também outras metodologias que se enquadram no âmbito do trabalho como as metodologias Kanban e SCRUM.

Posteriormente, foi feita a ligação destes temas à automatização de processos em RPA e como estão interligados, explicando o que é RPA e como implementar automatizações deste género.

De seguida, foram analisados dois projetos de automatização para otimizar dois os processos. O primeiro centrou-se na agilização do processo de tratamento de leads, eliminando a parte mais mecânica. A automatização poupou 70% do tempo dos gestores de leads, aumentando a produtividade e permitindo um melhor estabelecimento de contactos.

O segundo caso envolveu a atualização de ficheiros Voximplant, a extração de registos de chamadas e a criação de um PowerBI para análise do desempenho das chamadas telefónicas. A automatização foi inicialmente criada no UIPath, mas mais tarde foi alargada a várias campanhas utilizando o Power Automate. Esta automatização foi crucial para um lançamento mais rápido da campanha e relatórios mais atualizados.

Por fim, enumeram-se projetos futuros, que incluem melhorias no trabalho iniciado e a otimização dos processos atuais.

Palavras-Chave

Gestão de projetos ágeis, Ágil, Metodologias ágeis, SCRUM, Kanban, Gestão de projetos, RPA, Automatizar

Abstract

The search for continuous improvement, inspired by methods such as Lean and Kaizen, is fundamental for organisations to stand out in the market. By implementing Lean principles, such as eliminating waste and optimising processes, companies can maximise the efficiency and quality of their products and services. Namely, Kaizen, with its philosophy of small incremental improvements, promotes a culture of constant learning and improvement at all levels of the organisation.

The present thesis in a first phase presents a more theoretical analysis of the points mentioned above, also explaining other methodologies that fit into the scope of the work such as Kanban and SCRUM methodologies.

Subsequently, it was made the connection of these topics to the automation of processes in RPA and how they are interconnected, explaining what RPA is and how to implement automations of this kind.

Two automation projects were analysed to improve two processes. The first focused on streamlining the lead treatment process by eliminating the most mechanical part. The automation saved 70% of lead managers' time, increasing productivity and enabling better contact-making.

The second case involved updating Voximplant files, extracting call registers, and creating a PowerBI for analysis of phone call performance. The automation was initially built in UIPath but later expanded to several campaigns using Power Automate. This automation was crucial for faster campaign launch and more updated reports.

Finally, some improvements for future projects and for the optimization of the current processes are pointed out.

Keywords

Agile Project Management, Agility, Agile Methodologies, SCRUM, Kanban, Project Management, RPA, Automate.

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Acrónimos

RPA – Robotic Process Automation

APM - Agile Project Managment

DMAIC - Define, Measure, Analyze, Improve, Control

1. INTRODUCTION

In the scope of the Curricular Unit (CU) of Thesis/Dissertation (TEDI) of the Master's Degree in Industrial Systems and Planning at the Instituto Superior de Engenharia do Porto (ISEP), was proposed the development of a dissertation on the state-of-art of agile project management methodologies, including practical cases. In this sense, a detailed bibliometric research and analysis was developed. Throughout this chapter, we will describe the outline of the dissertation, contextualising the problem and referring to the proposed objectives. At the end there is a summary on the theme "Agile methodologies for project management".

1.1. BACKGROUND INFORMATION

SALVADOR CAETANO E CAETANO RETAIL

Salvador Caetano Group, with the commercial name Salvador Caetano Group, S.G.P.S., S.A. is a Portuguese public limited company. This company was responsible for the foundation of "Toyota Caetano Portugal, S.A.", which had Salvador Fernandes Caetano as its founder and promoter. [1]

In 1967, it was signed the first contract of exportation of buses to England. One year later, Salvador Caetano became exclusive representative of Toyota in Portugal. In 1971, it was built the first industrial unit of car assembly in Ovar, and in only ten years it reached the assembly of 100 thousand vehicles.

Salvador Caetano is currently responsible for the following companies:

- Caetano Auto
- Caetano City

- Caetano Colisão
- Caetano Components
- Caetano Drive
- Caetano Sport
- Caetano Urban
- Caetano Fórmula
- Caetano Lyrsa
- Caetano Motors
- Caetano Parts
- Caetano Power
- Caetano Renting
- Caetano Star
- Caetano Technik
- Caetano Squadra
- CaetanoBus
- Caetsu
- CarPlus
- ENP - Energias Renováveis Portugal, SA
- FINLOG - Gestão de Frotas
- Guerin Car Rental Solutions Lda
- Island Rent, SA.
- Lusilectra, SA
- Luso Assistência, SA

- MDS Auto – Mediação de Seguros, SA
- Portianga, SA
- Rigor - Consultoria e Gestão, SA
- Toyota Caetano Portugal SA

Salvador Caetano is an international group, present in three continents - Africa, South America and Europe, with more than 75 years dedicated to the automotive industry and sector. The company's strategy involves the reinvention of new business models and the development of services in line with the needs of the client, without ever forgetting its history, but also without ever compromising the strong imprint of innovation and modernity. [2]

Other business areas include mobility, where solutions and responses are added to customers' day-to-day travel needs.

Also, industrial and workshop equipment with a focus on profitability and responding to customers' needs. To achieve this, they have highly specialised professionals and advanced technology, with the aim of exceeding expectations. [3]

In addition, they are also in automotive assembly and production at Toyota Caetano Portugal's plant in Ovar. [4]

1.2. OBJECTIVES

This project has the following goals:

- To acquire knowledge about continuous improvement methodologies that can be applicable in various businesses and organisations.

- To do a literature review around this theme, covering a wide spectrum of knowledge in the area, namely, the countries where it is most applied and where more research is done.
- To analyse the application and development of two continuous improvement projects at Salvador Caetano Retail.

1.3. ORGANISATION OF THE REPORT

This project is divided into four parts: introduction, literature review, case study analysis and, finally, conclusions.

In the first chapter, the global framework of the work is presented, the objectives that will be worked on are outlined and the structure of the work is described.

Subsequently, in the second chapter, a theoretical approach to the theme is made, by writing the state-of-art of the methodologies of continuous improvement. After this analysis, various types of methodologies were described, focusing more on those used in the practical cases discussed below.

In the third chapter, are introduced two projects implemented at Salvador Caetano - Caetano Retail are presented, explaining their advantages and disadvantages that they may have brought to the organisation and how they fit into the general topic of this work.

Finally, in the fourth chapter, are presented the main conclusions of this work, focusing on the fulfilled goals, and on the difficulties in carrying it out. Possible improvements and future work are also proposed.

2. LITERATURE REVIEW

2.1 AGILE PROJECT MANAGEMENT

Agile project management is an iterative approach to completing a project throughout its life cycle.

Iterative or agile life cycles are made up of several iterations or incremental steps towards the completion of a project. Iterative approaches are often used in software development projects to promote speed and adaptability, since the advantage of iteration is that adjustments can be made as you go along, rather than following a linear path.

One of the goals of an agile or iterative approach is to unlock benefits throughout the process, not just at the end. At their core, agile projects should exhibit core values and behaviours of trust, flexibility, empowerment, and collaboration.

The reason why agile methods are so widely used is that they fill gaps that other methodologies, such as traditional or waterfall, cannot fill.

2.2 LEAN SCRUM AND KANBAN

There are many valid agile methodologies that can be applied to different projects and situations. This topic will focus more on the advantages and disadvantages of Lean, SCRUM and Kanban, and how they can be applied in real-life situations.

Lean

Lean methodology is a business approach that promotes the flow of value to customers by adopting a mindset of continuous improvement and respect for people.

There are two fundamental principles in the Lean methodology, which are continuous improvement and respect for workers.

When following this methodology, team leaders often follow applied improvement cycles such as PDSA (plan, do, study, act) or DMAIC (define, measure, analyse, control) to help their projects.

Another very important aspect is respect for the people in the company. Lean companies value their employees highly because it is from the people who are directly involved in the process that the best ideas for improving their products emerge. [5]

Principles of Lean methodology

There are five main principles that provide the framework for the application of the Lean methodology.

- **Value**

  Leaders applying Lean understand the value their customers place on their services or products, so they know that it is they who determine the overall value of what the company produces. If companies research their customers, they can gain this knowledge to minimise costs and eliminate waste.
- **The value stream**

  The value stream represents the sum of a product's entire life cycle. Companies that embrace Lean methodology examine every process that takes place throughout the product life cycle to examine what provides value and where there is room for improvement.
- **Flow**

  The flow refers to how efficiently the value stream operates. Companies that use Lean methodology continuously assess each process of the value stream to ensure every step is in sync.

- **Pull**

  In the Lean methodology, pull refers to the idea that companies only produce what their customers need when they need it. This method can increase a company's flexibility and reduce delivery cycle times.

- **Perfection**

  Companies that embrace Lean methodology also adopt continuous improvement. This pursuit of perfection leads companies to apply more rigorous measurements. It also encourages them to analyze the value stream and make incremental changes that enhance productivity.

Another big topic of the Lean Methodology is waste elimination as it was already referred previously. Companies assess eight main areas that should be analyzed to eliminate waste. [6]

- **Motion**

  The waste referred to as motion occurs any time the movement of materials, people or machines is more complicated or occurs more frequently than necessary.

- **Inventory**

  Inventory that is wasteful includes any products that are not immediately needed by a customer. Inventory can also lose value over time.

- **Waiting Time**

  Waiting is a costly inefficiency that occurs when processes become out of sync and the flow of the value stream is interrupted. This often results in idle people or equipment as they wait for new tasks to complete.

- **Defects**

  Companies that follow the Lean methodology framework are always looking to improve the quality of their products. This is because defects are a waste of materials, time and human effort.

- **Overproduction**

  When overproduction occurs, it often leads to other types of waste, such as wasteful inventory, motion and transportation. It disrupts the flow of the value stream, so it can be eliminated by embracing the idea of pull and only producing products their customers need when they need them.

- **Transportation**

  Lean companies assess their transportation methods to ensure they only move goods from one place to another when it benefits their customers.

- **Over-processing**

  It occurs when more work, features or costs are put into a product than into the customer values. Lean companies focus on providing customers only with what they need.

- **Human potential**

  Leaders of Lean organizations pay close attention to their employees to identify areas for increased potential.

A wide variety of industries have adopted the Lean methodology framework because it can be applied to any knowledge-based work that follows a process. The main industries who apply this method are the following. [7]

- **Manufacturing**

  Probably the most common industry who use this methodology. It benefits from identifying the value their customers assign to their products and eliminating waste in each of the eight areas defined by the Lean methodology framework. By improving their processes, they can create more value while decreasing production costs.

- **Software**

  In this area it is often used the framework known as the agile methodology. This helps developers focus on the key features of a software program, improves their decision-making capabilities and increases production.

- **Sales and marketing**

Sales and marketing companies may use the lead methodology framework to improve productivity and increase the value customers assign to their services.

- **Health care**

  Health care facilities can use the Lean methodology framework to minimize waste by continuously improving their processes to increase patient satisfaction and reduce overhead costs.

Mentioning all these subjects, we can now analyze the benefits of this framework. [8]

- **Decreased waste**

  When products are produced according to customer demand, companies only need to use the resources that are absolutely necessary for their production. With this framework, it can be identified better ways to allocate their resources so they can decrease waste, provide more value to their customers, and increase their revenue margins.

- **Increased productivity**

  This framework can improve the productivity and efficiency of a company by eliminating distractions and providing employees with guidelines that allow them to focus on the most important tasks.

- **Improved processes**

  By incorporating the idea of Pull and only producing products when and where it´s needed, companies ensure each phase of their value stream is operating effectively.

- **Enhanced focus**

  Incorporating Lean methodology can help improve the focus of an entire organization by reducing wasteful activities such as downtime, excess inventory and unnecessary tasks. With this, employees can focus on activities that bring more value to the company.

- **Reduced cost**

  The Lean methodology framework focuses on maximizing profits by reducing waste and understanding the maximum amount customers can justify paying for a product.

- **Improved quality**

  By focusing only on what provides value to customers, companies can improve the overall quality of their products.

SCRUM

SCRUM is a project management framework that facilitates team collaboration on complex product and software development projects. It emphasizes teamwork in project management. It stresses accountability and is iterative progress towards a well-defined goal. SCRUM is part of agile software development and teams practice agile.

The term SCRUM values actually refers to agile values applied to a SCRUM framework. They are simple statements that work as agile best practices, which are the following [9]:

- **Individuals and interactions over processes and tools**

  Processes and tools are important in software development, but individuals and how they interact with those processes and tools are more important.
- **Working software over comprehensive documentation**

  Before the application of the SCRUM framework, software developers focused heavily on documentation. This value states that while documentation is important, focusing on developing the software should be the primary goal of the SCRUM team.
- **Customer collaboration over contract negotiation**

  This value explains that collaborating with customers to create a high-quality product is much more important than drafting a rigid contract that limits product development, as it used to be done in the old software development days.
- **Responding to change over following a plan**

  This value states that agile is a project management methodology that seamlessly adapts to change based on an iterative product development cycle and not a rigid project plan.

SCRUM is a part of the agile process, but certainly not the only part. Agile is a large tent, but SCRUM is an important pillar. Agile does not have a set of steps to follow, therefore

SCRUM provides a means to apply agile to your project. SCRUM can also be used as an entry point to other agile practices. It's also not solely a framework for software but can benefit many other kinds of projects.

The SCRUM methodology needs people to be executed. For this to be done, there are three main roles under the SCRUM framework.

The SCRUM master is the one who is most familiar with the SCRUM framework. He guarantees that everybody in the SCRUM team understands how the framework works and helps them adapt to the agile environment. He leads SCRUM meetings.

Other part which is very important is the SCRUM product owner. He manages the product log and oversees sprint planning and actively participates in SCRUM meetings. They lead backlog grooming and prioritize user stories to help the teamwork better.

The last one is the SCRUM development team. It is made up of all the team members who develop a software or product. They must work closely with the product owner and adhere to the SCRUM master's suggestions. [10]

In the SCRUM framework there are certain events that the team must attend to make sure the project is going according to plan. [11]

- **Sprint Planning**

  Using the product backlog, teams start with the highest priority items and determine how to achieve this objective. It is a short process, so it is usually done to work on meeting the objectives.
- **Daily SCRUM Meeting**

  These are 15-minute meetings where everybody in the SCRUM team talks about the tasks they'll be working on during the day and share any difficulties they're facing.
- **Sprint Review**

  This is used to look back on the sprint and see what worked and what didn't. The information can be applied on future sprints to replicate the positives and reduce the negatives.

- **Sprint Retrospective**

  The sprint retrospective meeting gives the SCRUM team a space to reflect on the last sprint and determine what went well and wrong. Stakeholder and customer feedback is also gathered in order to prioritize user stories and improve product performance.

- **Backlog Grooming**

  Once through this cycle, it starts over again by going back to the backlog and taking the next ready item at the top of the priority list. Backlog grooming consists in improving the SCRUM process through the prioritization of work based on prior experience and continuing to refine the work to make it as efficient as possible.

In the SCRUM methodology, there are artifacts that are used by the SCRUM team to develop products in an agile environment. The most critical ones are the product backlog, sprint backlog and product increment. [12]

- **Product backlog**

  A product backlog is a list of everything that needs to be achieved on a project, broken down into individual items. This is where the baseline requirements of every feature needed for the end product are prioritized by the product owner for the SCRUM team. It is not a list of unchangeable tasks, and it often evolves over time.

  The product backlog is made by User Stories, which are high-level descriptions of a feature, told from the perspective of the end-user of the product, Bugs, that are problems that arise that the product owner wants to be fixed, and the tasks, which are assigned to the SCRUM team to complete.

- **Sprint backlog**

  The sprint backlog can be simply defined as the set of user stories in which the SCRUM team will be working in a single sprint. It's important to make sure that the most critical user stories are always the ones that are being worked on and none of them fall through the cracks.

- **Product Increament**

  The term product increment refers to all the product backlog items that have been completed during a sprint and it can also be used to describe the sum of all the completed backlog items and user stories.

Kanban

Kanban is a popular framework used to implement agile software development. It requires real-time communication of capacity and full transparency of work. Work items are represented visually on a Kanban board, allowing team members to see the state of every piece of work at any time.

The work of all Kanban teams revolves around a Kanban board, a tool used to visualize work and optimize the flow of the work among the team. While physical boards are popular among some teams, virtual boards are a crucial feature in any agile software development tool for their traceability, easier collaboration, and accessibility from multiple locations. [13]

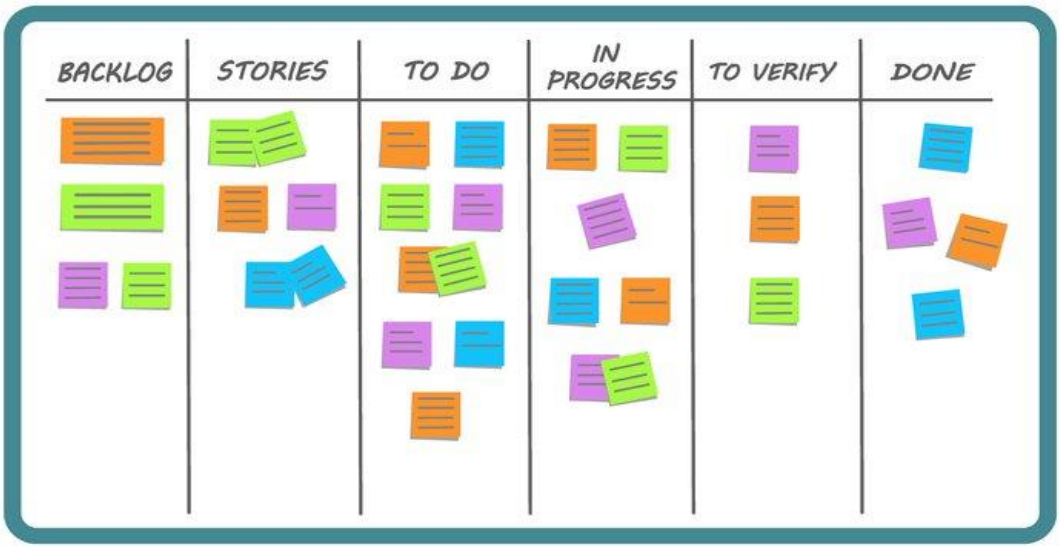


Figure 1 – Kanban Board [14]

The Kanban methodology relies upon full transparency of work and real-time communication of capacity. Therefore, the Kanban board should be seen as the single source of truth for the team's work.

Benefits of Kanban

Kanban offers several additional advantages for teams of all sizes, such as the following. [15]

- **Planning Flexibility**

  A Kanban team is only focused on the work that's actively in progress. Once the team completes a work item, they pluck the next work item off the top of the backlog. The product owner is free to reprioritize work in the backlog without disrupting the team, because any changes outside the current work items don't impact the team.

- **Shortned Time Cycles**

  Cycle time is a key metric for Kanban teams. Cycle time is the amount of time it takes for a unit of work to travel through the team's workflow, from the moment work starts to the moment it ships. By optimizing cycle time, the team can confidently forecast the delivery of future work. When only one person holds a skill set, that person becomes a bottleneck in the workflow. So, teams employ basic best practices like code review and mentoring help to spread knowledge. In a Kanban framework, it's the entire team's responsibility to ensure work is moving smoothly through the process.

- **Fewer Bottlenecks**

  The more work items in flight at any given time, the more context switching, which hinders their path to completion. A key topic of any Kanban strategy is the amount of work in progress (WIP), which highlight bottlenecks and backups in the team's process due to lack of focus, people, or skill sets.

- **Visual Metrics**

Charts provide a visual mechanism for teams to ensure they're continuing to improve. When the team can see data, it's easier to spot bottlenecks in the process (and remove them).

SCRUMBAN

Now knowing what the SCRUM and Kanban methodologies are, it can be explained that are hybrids of various methodologies, one of them being the Scrumban, a methodology that is a hybrid of SCRUM and Kanban.

Scrumban emerged to meet the needs of teams who wanted to minimize the batching of work and adopt a pull-based system. A hybrid of SCRUM and Kanban gives teams the flexibility to adapt to stakeholder and production needs without feeling overburdened by their project methodology. Scrumban provides the structure of SCRUM with the flexibility and visualization of Kanban, making it a highly versatile approach to workflow management. [16]

Scrumban can also be used as a steppingstone for teams seeking to transition from SCRUM to Kanban. For many software development teams, an immediate shift to Kanban would be too drastic. Scrumban offers teams a way of learning how to practice continuous improvement in Kanban without abandoning the familiar structure of SCRUM.

Scrumban combines the structure of SCRUM with the flow-based methods of Kanban. Some examples of SCRUM elements that are incorporated into the Scrumban method are Iteration planning at regular intervals, synchronized with reviews and retrospectives, deciding how much work they can pull into the sprint based on the complexity of the work and the length of the sprint, Prioritization on demand – provides team with the best thing to work on next, no more or less, assuring necessary levels of analysis before starting development, using “ready” queues (between Backlog and Doing) to organize.

Kanban adds process improvement, visualization, and more value metrics to the Scrumban method. Some elements of Kanban that are used by Scrumban teams can be the Pull system and continuous workflow, Pull items into Doing as the team has capacity, WIP limits,

explicit limits on how many items are in progress at any time, Individual roles not clearly specified, short lead times, by giving emphasis of just-in-time analysis and planning, rather than batch-processing for iteration planning estimations, using process buffers and flow diagrams to expose process weaknesses and identify opportunities for improvement, focusing more on cycle time than burndown, because if cycle time is predictable, burndown is predictable, and finally, using policies to make process step transitions clearer. [17]

Scrumban is a great solution for teams who need the structure of SCRUM with the flexibility of a flow-based method, or for teams who are looking to transition from SCRUM to Kanban. Many teams use Scrumban as a transition point between a less mature and more mature Agile practice. [18]

2.3 KAIZEN

Kaizen, or rapid improvement processes, is often considered to be the "building block" of all Lean production methods. *Kaizen* focuses on eliminating waste, improving productivity, and achieving sustained continual improvement in targeted activities and processes of an organization. [19]

Lean production is founded on the idea of or continual improvement. This philosophy implies that small, incremental changes routinely applied and sustained over a long period result in significant improvements.

The *Kaizen* strategy aims to involve workers from multiple functions and levels in the organization in working together to address a problem or improve a process. The team uses analytical techniques, such as value stream mapping and "the 5 whys", to identify opportunities quickly to eliminate waste in a targeted process or production area.

Rapid continual improvement processes typically require an organization to foster a culture where employees are empowered to identify and solve problems. Most organizations implementing *Kaizen*-type improvement processes have established methods and ground rules that are well communicated in the organization and reinforced through training. [20]

There are three important steps for implementing these methodologies, which are, planning and preparation, implementation, and the follow-up.

In the planning and preparation phase, first you must identify a target area for improvement. These areas can include areas with work-in-progress, areas where everything is wrong and the quality or performance does not meet customer expectations, and areas that have market or financial impact.

Once an area is selected, a more specific in that area is chosen for the focus of the Kaizen event. After this, it is selected a team with cross-functional employees.

In the second phase, the implementation phase, the team works to develop a clear understanding of the current state of the targeted process. There are two techniques that are usually used to define the current state and identify manufacturing wastes, the “five whys” and value stream mapping. [21]

When applying the 5 Whys technique, you want to get to the problem's essence and then fix it. The 5 Whys may show you that the source of the problem is quite unexpected. Often, issues that are considered a technical problem actually turn out to be human and process problems. This is why finding and eliminating the root cause is crucial if you want to avoid iteration of failures. [22]

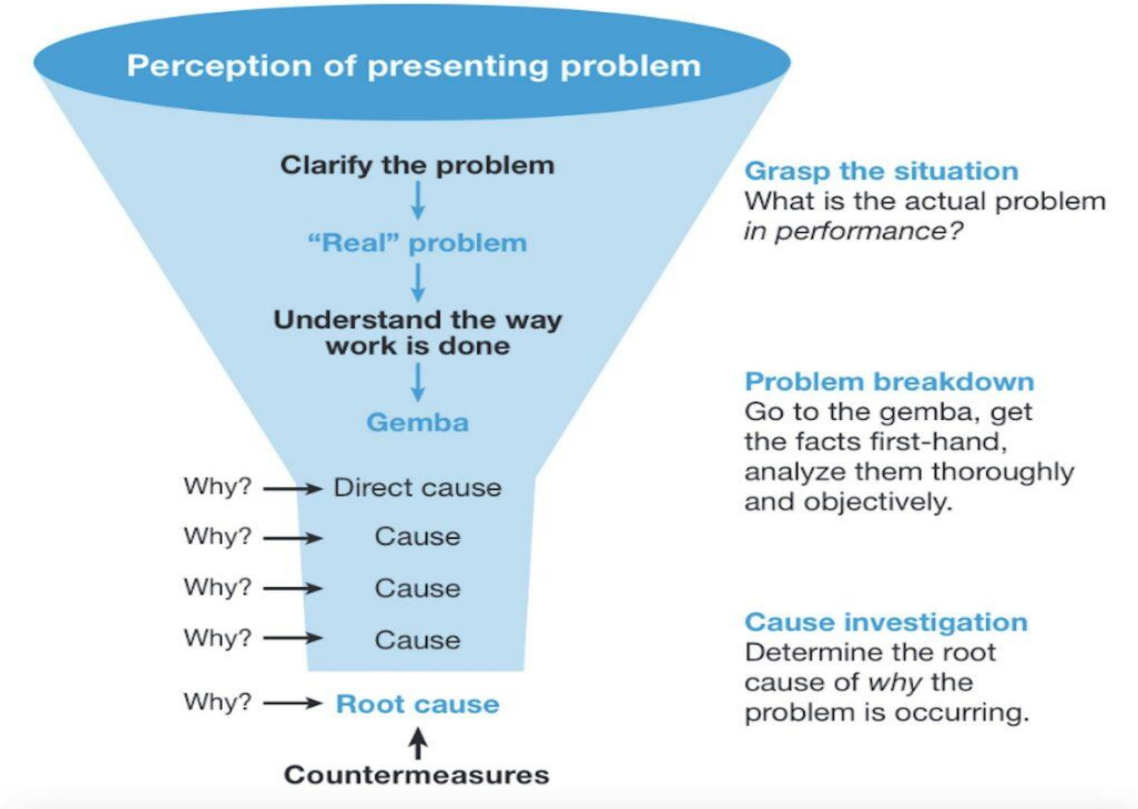


Figure 2 - Illustration of the Five Whys [22]

Here is an example more from an industry perspective:

1. *Why did the machine stop?*
   There was an overload, and the fuse blew.
2. *Why was there an overload?*
   The bearing was not sufficiently lubricated.
3. *Why was it not lubricated sufficiently?*
   The lubrication pump was not pumping sufficiently.
4. *Why was it not pumping sufficiently?*
   The shaft of the pump was worn and rattling.
5. *Why was the shaft worn out?*
   There was no strainer attached, and metal scrap got in.

Value stream mapping allows you to visualize your manufacturing process and information flows. It is often the first step in identifying waste and opportunities to streamline processes and reduce lead times.

Value stream mapping generally involves four steps:

1. Identify the product value stream to map;
2. Develop the current state map of materials, processes and flow of information;
3. Diagnose problems, identify opportunities for improvement and define a future state;
4. Implement improvements.

Value stream mapping also becomes the basis for applying other Lean tools and concepts like continuous flow, Kanban, and setup reduction that can be used to generate process improvements in the future state. It offers a shared roadmap across the organization that aligns your team around a common plan for process improvement. [23]

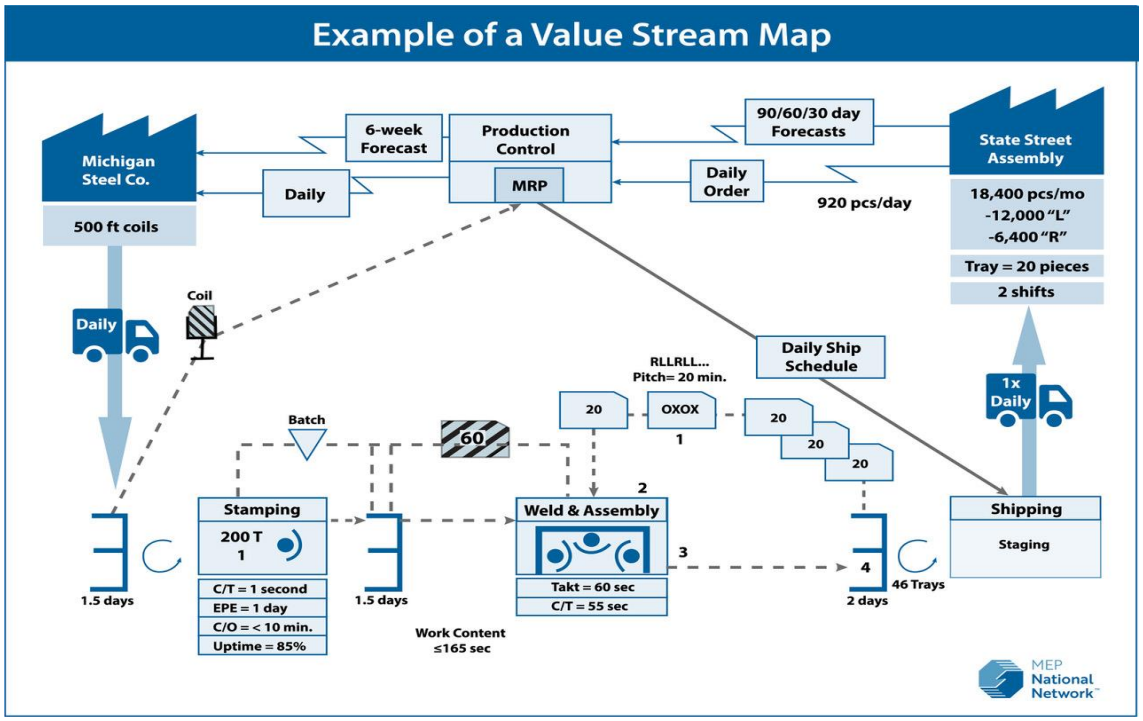


Figure 3 - Example of a value stream map [23]

During the *Kaizen* event, it is typically necessary to collect information on the targeted process, such as measurements of overall product quality; scrap rate and source of scrap;

a routing of products; total product distance traveled; total square feet occupied by necessary equipment; number and frequency of changeovers; source of bottlenecks; amount of work-in-progress; and amount of staffing for specific tasks. Team members are assigned specific roles for research and analysis. As more information is gathered, team members add detail to value stream maps of the process and conduct time studies of relevant operations (e.g., takt time, lead-time). [24]

Once data is gathered, it is analyzed and assessed to find areas for improvement. Team members identify and record all observed waste, by asking what the goal of the process is and whether each step or element adds value towards meeting this goal. Once waste, or non-value-added activity, is identified and measured, team members then brainstorm improvement options. Ideas are often tested on the shopfloor or in process "mock-ups". Ideas deemed most promising are selected and implemented. After the implementation, is advised that the team observes the new process, to record new cycle times or overall savings from eliminated waste.

The last phase, the follow up, aims to ensure that improvements are sustained, and not just temporary. Following the event, the team tracks key performance measures to document the improvement gains. Follow-up events are sometimes scheduled at 30 and 90-days following the initial *Kaizen* event to assess performance and identify follow-up modifications that may be necessary to sustain the improvements. [23]

2.4 Other Methodologies

Besides the methodologies referenced before, there are many more agile plans that are being used and are on the come up, such as Extreme Programming (XP).

Extreme Programming improves a software project in five essential ways: communication, simplicity, feedback, respect, and courage. Extreme Programmers constantly communicate with their customers and fellow programmers. They keep their design simple and clean. They get feedback by testing their software starting on day one. They deliver the system to the customers as early as possible and implement changes as suggested. Every small success deepens their respect for the unique contributions of each and every team member. With this foundation Extreme Programmers can courageously respond to changing requirements and technology. [25]

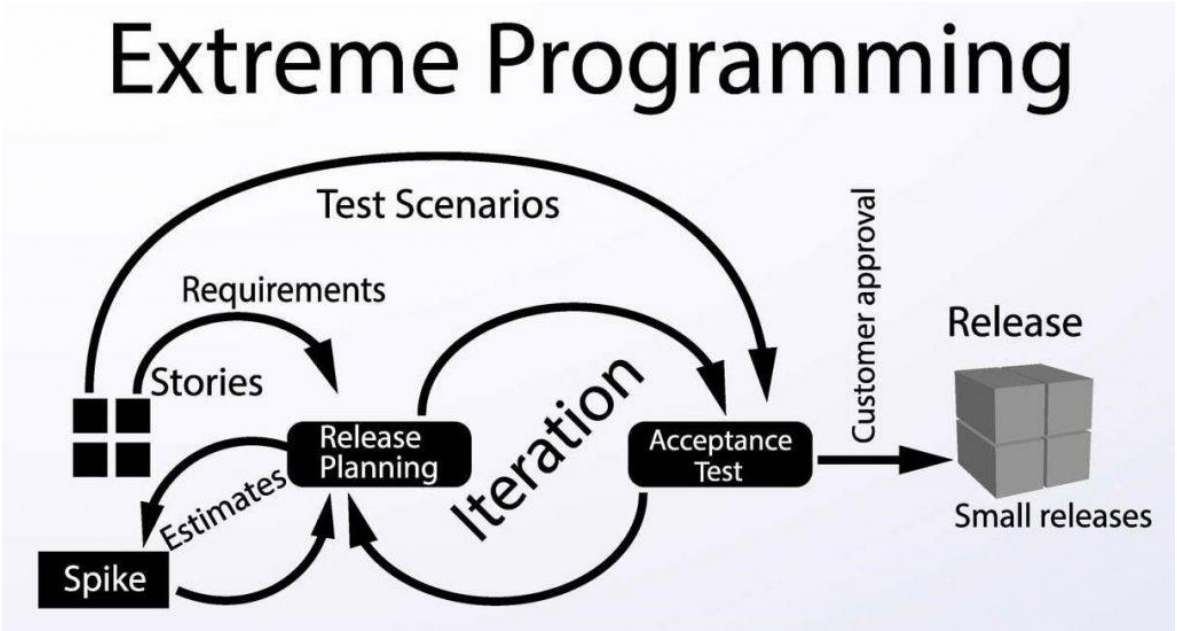


Figure 4 - Extreme Programming diagram [26]

6 SIGMA

Six Sigma is a data-driven, disciplined approach to quality improvement that was first introduced by Motorola in the 1980s. It is a methodology that aims to identify and eliminate defects, errors, or any variations that may lead to a reduction in quality or efficiency. The

term "six sigma" refers to a level of quality that is 99.99966% defect-free, or only 3.4 defects per million opportunities.

The Six Sigma methodology consists of five phases: Define, Measure, Analyze, Improve, and Control (DMAIC). Each phase has its own set of tools and techniques that help organizations improve their processes and reduce defects.

The define phase is the first stage of the Six Sigma methodology. It aims to identify the problem, define the project goals and objectives, and establish the scope of the project. During this phase, the project team defines the customer's requirements and expectations, establishes the project charter, and identifies the key stakeholders. The define phase also involves developing a high-level process map, which provides a broad overview of the process and helps to identify the areas that need improvement. The measure phase involves collecting data to determine the current level of performance and establishing a baseline for improvement. [27]

The measure phase is the second stage of the Six Sigma methodology. It aims to collect data to establish a baseline and measure the current level of performance. During this phase, the project team identifies the key performance indicators (KPIs) and develops a data collection plan. The measure phase also involves validating the measurement system and establishing a baseline for improvement. [28]

The analyze phase is the third stage of the Six Sigma methodology. It aims to identify the root cause of the problem and determine the factors that are contributing to the defects. During this phase, the project team analyzes the data collected in the measure phase and uses various statistical tools to identify the sources of variation. The Improve phase involves developing and implementing solutions to eliminate the root causes of the problem and improve the process. [27]

The improve phase is the fourth stage of the Six Sigma methodology. It aims to develop and implement solutions to eliminate the root causes of the problem and improve the process. During this phase, the project team generates and evaluates possible solutions, selects the best solution, and implements it. [29]

The control phase is the final stage of the Six Sigma methodology. It aims to monitor and control the process to ensure that the improvements are sustained, and the process remains stable. During this phase, the project team develops a plan to monitor the process and implement corrective actions if necessary. [28]

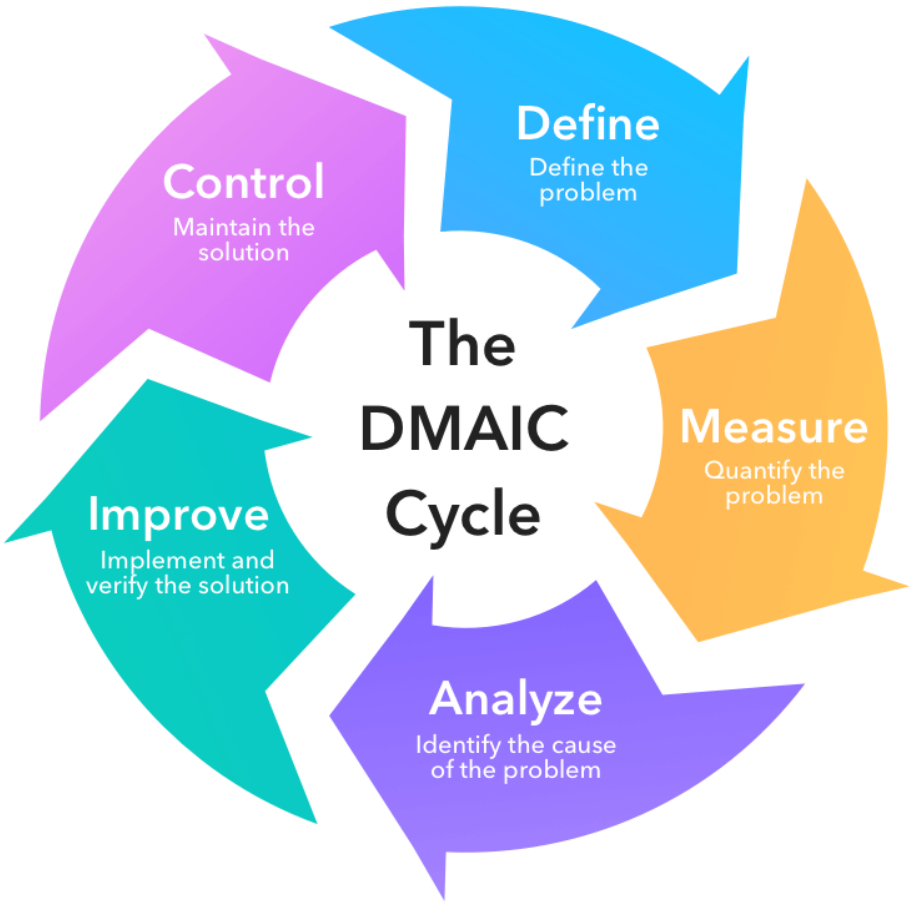


Figure 5 - Illustration of the DMAIC cycle [30]

Six Sigma has been widely adopted by many organizations in various industries, including manufacturing, healthcare, finance, and services. It has been proven to be an effective methodology in improving quality, reducing costs, increasing efficiency, and improving customer satisfaction. [28]

2.5 RPA LINKED TO AGILE METHODOLOGIES

RPA, or robotic process automation, is the technology that enables any person to configure software or a "robot" to imitate and integrate the actions of a human being, interacting in digital systems to execute a business process. It also enables automation with much lower costs and times. RPA is non-invasive in nature and takes advantage of existing infrastructure, without causing interference in structural systems [31].

Requirements for implementing RPAs

One of the advantages of implementing RPAs is the replacement or elimination of repetitive processes. Since these processes are very repetitive, the person doing them is liable to cause more errors, as they are more tired and saturated. [32]

To evaluate if such processes are possible to replicate with RPA, the process must have the following characteristics:

- Be too repetitive
- Consume a lot of time
- Require access to several systems
- Be prone to human error
- Require little decision power
- Once started, needs little human action
- Does not have many exceptions during the process

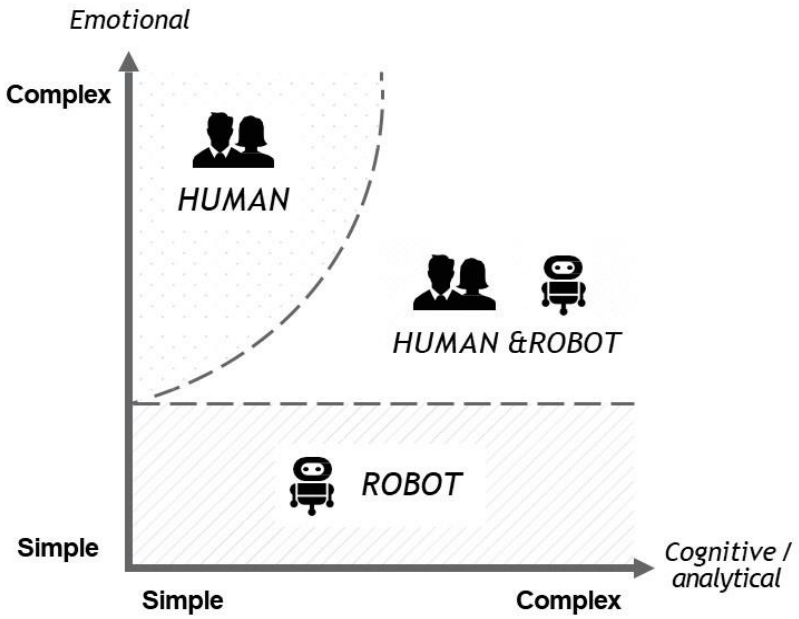


Figure 6 - Robot applicability analysis chart [33]

Advantages in implementing RPA

The advantages that RPA can bring are numerous, as every day new solutions are found for areas and problems that there were no solutions for. With RPA it is possible to:

- Save resources and money, as a bot replaces the work of a human.
- Increase worker productivity as their work is more valuable.
- Reduction of errors.
- Standardisation of processes that previously would not have been defined.
- Increase in the frequency with which results are obtained.
- Possibility of scheduling processes, so that when information is needed, it is ready.
- Easier to monitor processes.

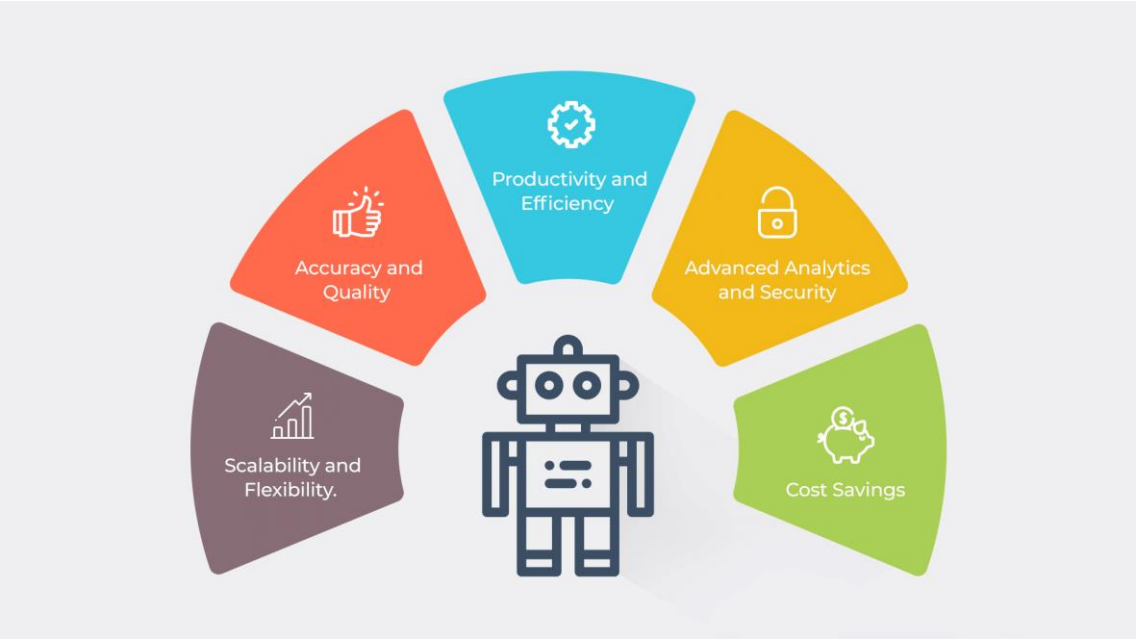


Figure 7 - Benefits of implementing a Robot [34]

Risks and challenges of implementing RPA

Knowing that RPA is a technology of innovation, service improvement and competence maximization, all implementations have their associated risks and challenges.

One of the biggest mistakes in RPA implementations, is the misallocation of this service, being used for isolated areas or for spontaneous services.

Another mistake is to see RPA as only a reduction of time and money, when it should be seen as a tool to maximize potential. [35]

All this can lead to frustration for workers who are taking advantage of the bots, frustration for those who are implementing RPAs, because they are not being able to maximize their work and ultimately, it brings bad reputation to the company.
To sum up this phase, poorly applied RPA can be a result of:

- Lack of a clear implementation strategy.
- Isolated implementations.
- Lack of objectivity.

2.6 USED PLATAFORMS

Uipath

UiPath is a Low Code platform used in RPA that allows you to scientifically plan the implementation of RPA with AI technology, develop workflows and manage various automations through the orchestrator, being able to monitor all automations.

UiPath offers a secure and scalable platform for automation solutions. It is made up of three major segments: UiPath Studio, UiPath Orchestrator and the robots themselves generated by the platform.

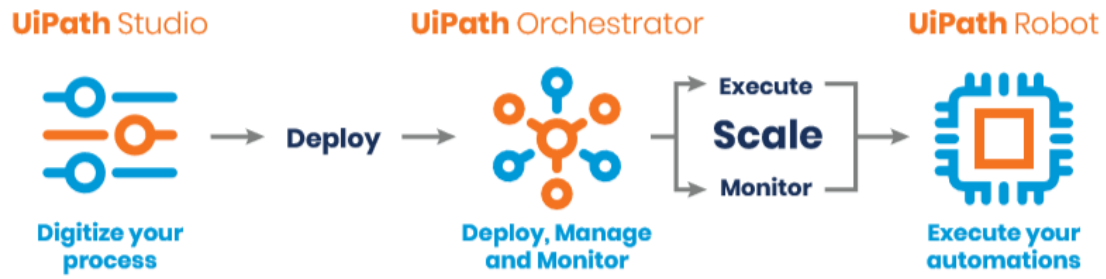


Figure 8 - UIPath segments [36]

• UiPath Studio enables the creation of automations in an accessible and intuitive way. Studio can automate any process of any size for any area, regardless of difficulty.

• UiPath Orchestrator provides the ability to trigger, monitor, measure, and track both attended and unattended bot work, so that the entire digital workforce is secure and productive. [37]

•The robots themselves, which are the result of the automations made, can be classified in three ways. The attended ones that are triggered by the user himself, the unattended ones, which run automatically in the background of the computer or in the cloud, are usually scheduled with the desired frequency. Finally, there are the hybrids, which use components of the two previously mentioned, thus enabling the user to intervene in parts of the process. [38]

POWER AUTOMATE

Microsoft Power Automate (formerly Microsoft Flow) is a cloud-based service for automating workflows and integrating different applications and services. It allows users to create automated workflows between applications, such as SharePoint, OneDrive, Microsoft Teams, and others, to streamline tasks and processes.

Some main uses of Power Automate are:

- File and data management: Automating tasks such as file transfers, data backups, and data processing.
- Email management: Automating tasks such as sending automated emails, responding to emails, and organizing emails into specific folders.
- Business processes: Automating tasks such as generating reports, updating databases, and managing approvals.
- Social media management: Automating tasks such as posting updates to social media, tracking mentions, and monitoring social media accounts.
- Integration with other applications: Integrating Power Automate with other applications and services, such as SharePoint, OneDrive, and Microsoft Teams, to streamline workflows and processes.

Microsoft Power Automate Desktop is a Windows-based client application that allows users to automate tasks and processes on their local computers. It provides the same automation capabilities as the cloud-based version of Power Automate but runs on the user's desktop rather than in the cloud.

With Power Automate Desktop, users can automate tasks such as data entry, data processing, and report generation, among others. It provides a visual, drag-and-drop interface for building automated workflows, making it easy to use for both technical and non-technical users. Additionally, Power Automate Desktop can also be used to automate tasks on other Windows-based systems, such as servers, by using Windows PowerShell commands. [39]

ADVANTAGES AND DISADVANTAGES OF UIPATH AND POWER AUTOMATE

Pros of UiPath:

- Advanced automation capabilities: UiPath offers a range of features for automating complex tasks and processes, such as computer vision and natural language processing.
- Wide range of integration options: UiPath integrates with a variety of applications, databases, and technologies, including legacy systems.
- Robust platform: UiPath is a highly robust platform that is suitable for large-scale automation projects.
- Strong developer community: UiPath has a large, active developer community that provides support and resources for users.

Cons of UiPath:

- Steep learning curve: UiPath has a complex interface and requires a certain level of technical expertise to use effectively.
- Cost: UiPath can be more expensive than some other automation platforms, especially for smaller organizations.

Pros of Power Automate:

- User-friendly interface: Power Automate has a simple, intuitive interface that makes it easy to use for non-technical users.
- Affordable: Power Automate is generally more affordable than other automation platforms, especially for organizations that already use Microsoft services.
- Strong integration with Microsoft services: Power Automate has strong integration with other Microsoft services, such as Office 365 and Dynamics 365.
- Low barrier to entry: Power Automate requires minimal technical expertise to get started with automation, making it accessible to a wide range of users.

Cons of Power Automate:

- Limited automation capabilities: Power Automate has limited automation capabilities compared to some other platforms, such as UiPath.

- Dependence on Microsoft services: Power Automate is closely tied to other Microsoft services, so users may need to invest in additional Microsoft products to get the most out of it.

How are RPA and agile methodologies connected?

Since the main goal of RPA is to improve the work experience by eliminating repetitive and low value tasks, the implementation must be followed up with the end customer of the bot. This is also one of the great aspects of agile methodologies, which promote collaboration between the various parts of a project.

As also mentioned before, RPA does not respond well to change, meaning you need constant improvement of these processes as well, which with an agile strategy, gives room for this to happen, unlike more traditional methodologies. This lets improvements take place even after the completion of a project.

Finally, an agile methodology allows you to scale the use of RPA and intelligent automation across the enterprise. In several cases, companies take already used RPAs in previous processes and reuse them in other similar processes, thus taking advantage of components, workflows, standardisations, and tools.

This approach not only reduces labour and expenses, but also enhances the security, stability, and overall quality of RPA applications. [40]

2.7 ANALYSIS OF THE LITERATURE

For this research, it was firstly proposed to the author to evaluate the importance Agile Project Management methodologies and their benefits to companies. Knowing this, the author analyzed information available from different platforms like Google Scholar, Dimensions, Web of Science, and various others that constitute sources of different types of research. It was also used the VOSviewer platform to perform a complementary analysis.

All these searching platforms have their advantages and disadvantages, so in order to maximize this research, the author did various analysis with the data base each platform provided.

- **Dimensions Data Base**

  Dimensions is an integrated database that allows researchers to search and analyze grants, patents, clinical trials, policy documents, and publications. It has features such as, mapping out and analyze the research landscape, see relationships between researchers, publications, patents, grants, and policy documents, allowing users to see the whole research lifecycle as well as examine any one point in great detail. [41]

  With the Dimensions Data Base, we can finally analyze these documents using the VOSviewer platform.

- **VOSviewer**

  VOSviewer is a software tool for constructing and visualizing bibliometric networks. These networks may for instance include journals, researchers, or individual publications, and they can be constructed based on citation, bibliographic coupling, co-citation, or co-authorship relations. VOSviewer also offers text mining functionality that can be used to construct and visualize co-occurrence networks of important terms extracted from a body of scientific literature. [42]

With both the help of the Dimensions Data Base and VOSviewer, the author limited his search by publication year, choosing to search publications from 2015 to 2023, and by topic, being this one “Agile project management methodologies”. With these filters, were obtained 107,736 publications in Dimensions Data Base, the type of research categories and number of publications by year.

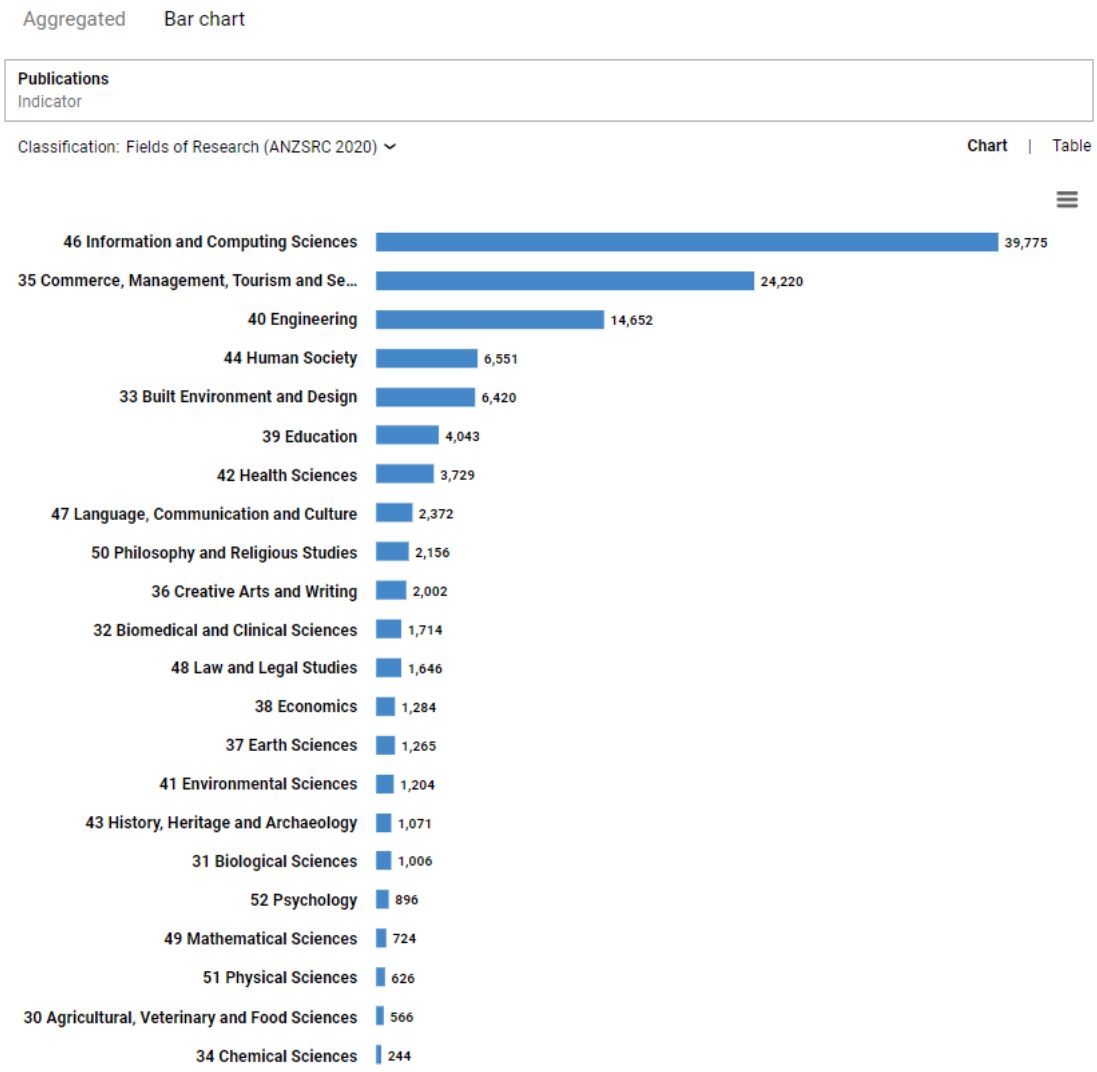


Figure 9 - Number of publications on agile methodologies by area [43]

Information and Computing Sciences, Commerce, Management, Tourism and Services, and Engineering are the topics that contain more information about Agile project management methodologies.

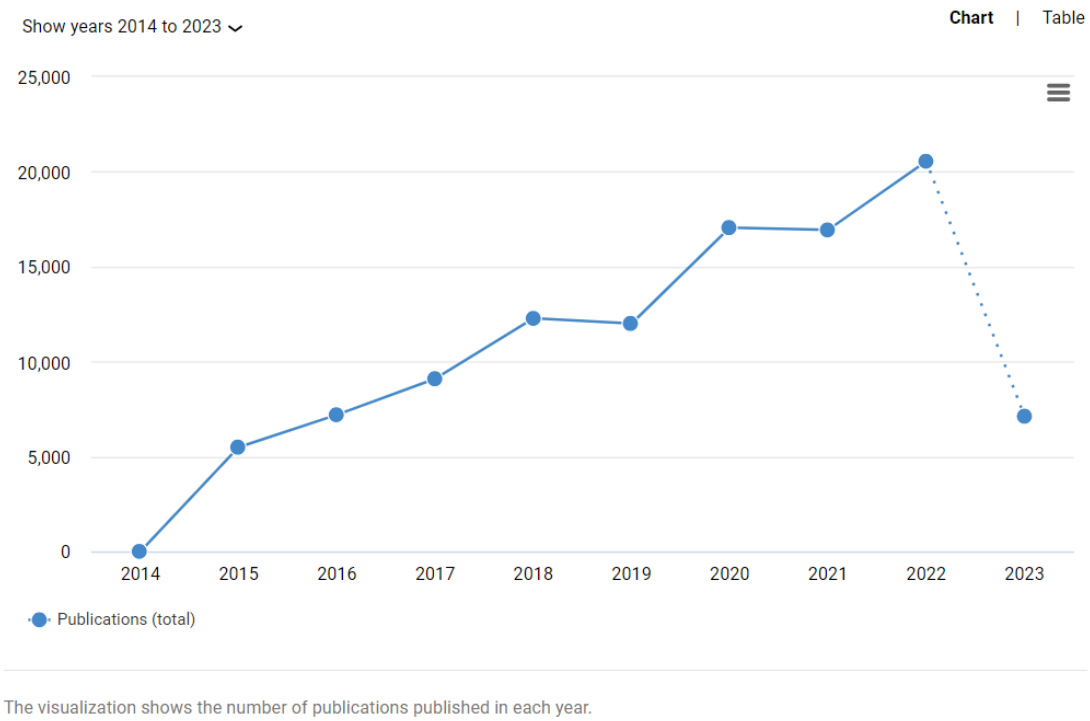


Figure 10 - Number of publications on Agile methodologies per year [44]

Now, analyzing the number of publications by year, this is a topic of growing interest, that reached its peak by 2020, slowing down in 2021 due to the pandemic.

Now using the help of VOSviewer, one can see the network of authors considering their number of publications and citations. Unfortunately, VOSviewer has a limit of 25000 articles it can use, so had to limit his search for the years 2021 to 2022. 2023 wasn't included so two full years can be studied.

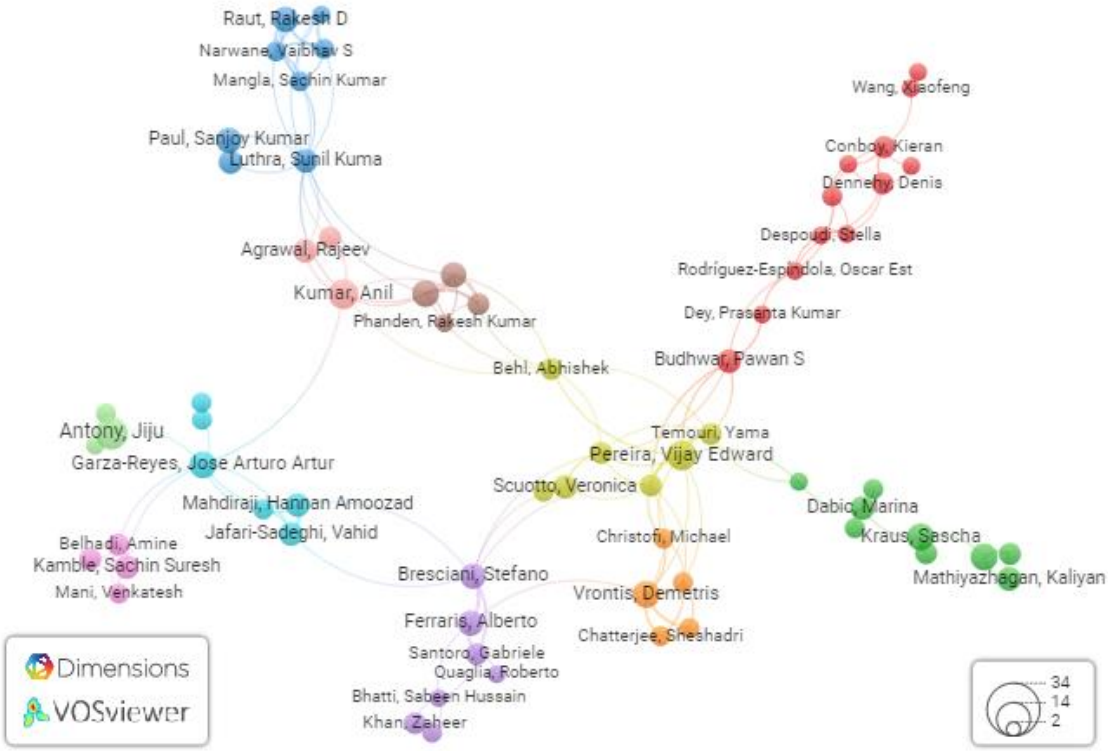


Figure 11 - Researchers network corresponding to the years 2015 - 2022

This first network is a Co-authorship analysis, that show up to 500 researchers and ignores publications with more than 25 authors.

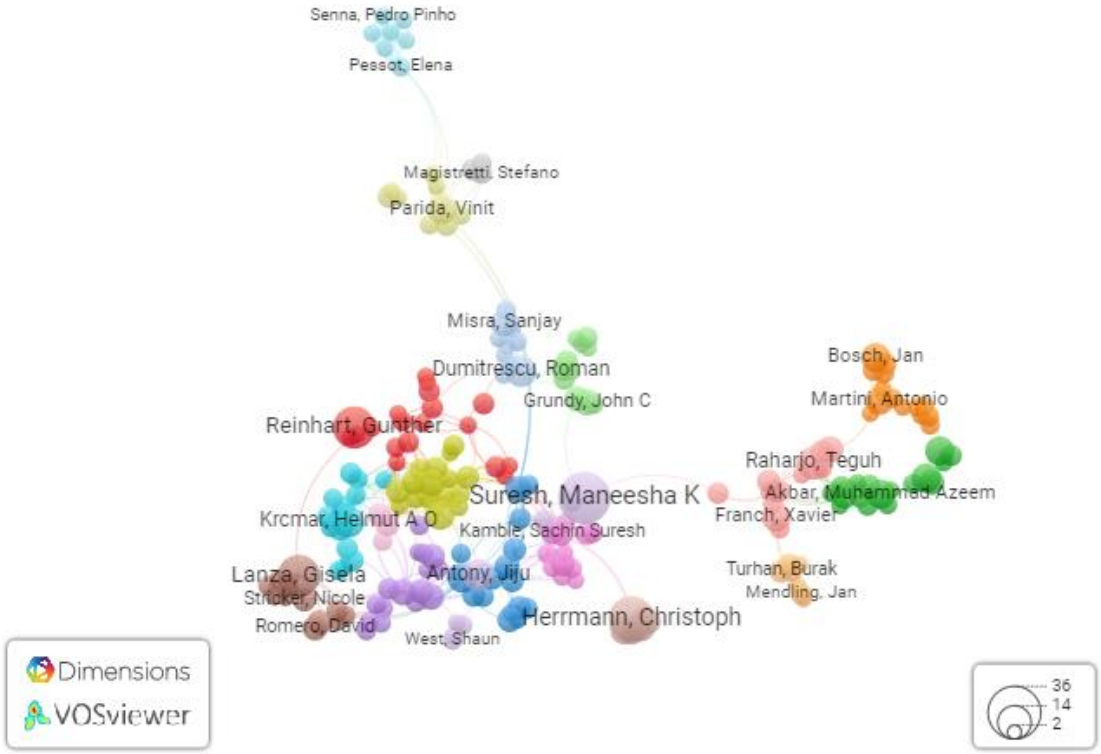


Figure 12 - Citation network corresponding to the years 2015 - 2022

This network is a Citation analysis, that show up to 500 researchers and ignores publications with more than 25 authors.

Using VOSviewer one can still make three different types of analysis such as seeing what type of Keywords the articles contain, which countries are making more articles about the subject and what institutions are doing the same.

Despite only manage to handle 25000 results, one can still make some interesting networks with that data base.

Here, it can be seen a network around keywords found on the articles from the data base. As the results were condensed to the years 2021 and 2022, we can see that Covid has a massive influence on the works from those years, linking that with the medical area and the PM area too.

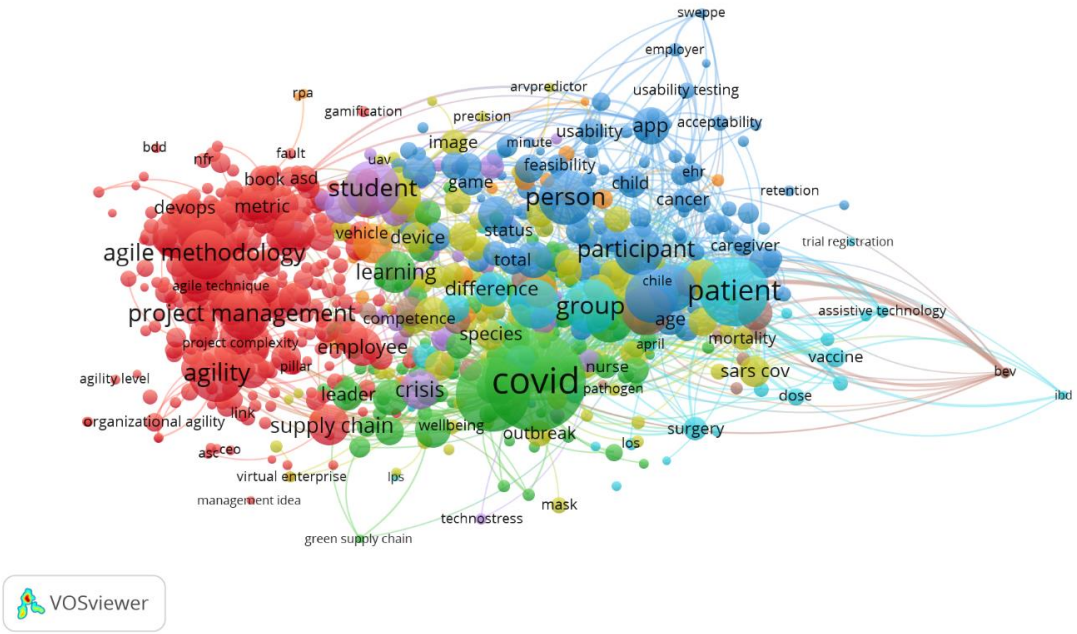


Figure 13 - Keywords Network corresponding to papers from the years 2015 - 2022

Next, it was made a network around on what countries develop more articles and are more invested in the area.

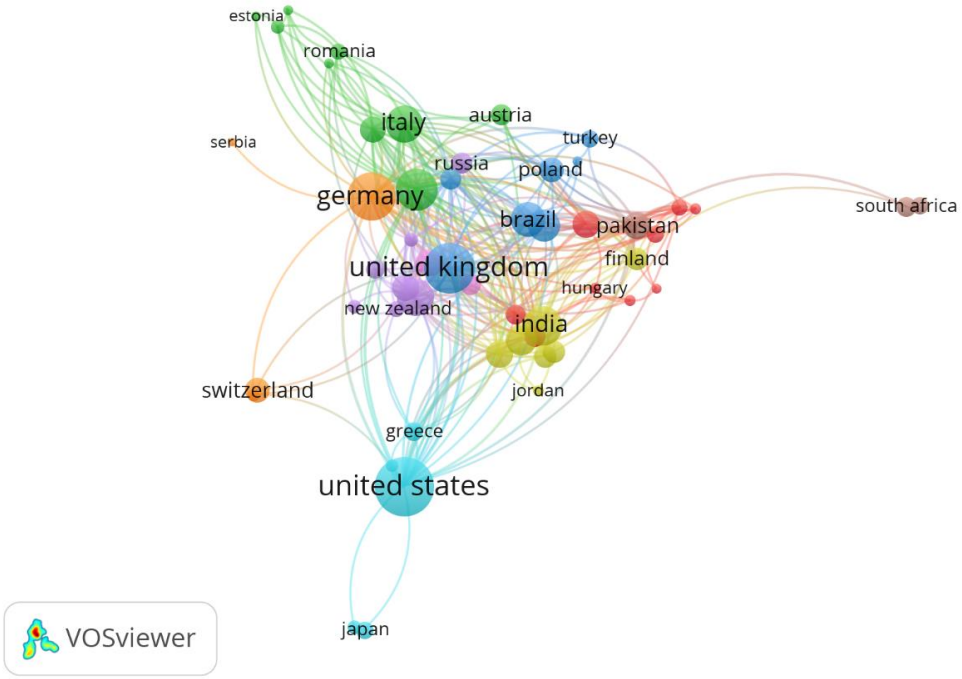


Figure 14 - Network of involved countries to papers from the years 2015 - 2022

The United States, United Kingdom and Germany are the countries which have invested more in this topic and the ones who have the most recognition amongst their peers.

The final network was based around which institutions had more relevancy on this topic and made more investigation on the theme.

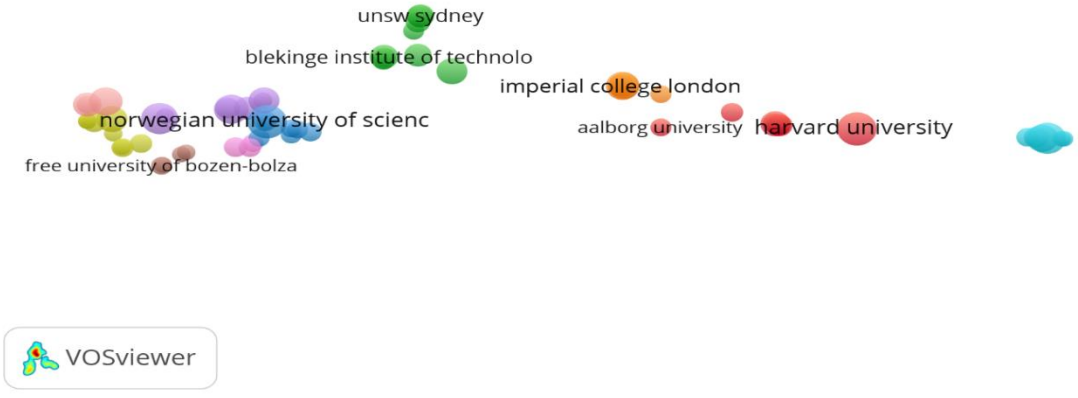


Figure 15 - Network of colleges involved in papers from the years 2015 - 2022

- Google Scholar

Google Scholar provides a simple way to broadly search for scholarly literature. From one place, you can search across many disciplines and sources: articles, theses, books, abstracts, and court opinions, from academic publishers, professional societies, online repositories, universities and other web sites. It has features such as searching all scholarly literature from one convenient place, exploring related works, citations, authors, and publications, locating the complete document through your library or on the web and keeping up with recent developments in any area of research. [45]

- SCImago Journal & Country Rank

  Another resource the author used was the SCImago Journal & Country Rank. This is a freely accessible portal providing journal and country scientific indicators derived from the information contained in Elsevier's Scopus database. These indicators can be used to assess and analyze scientific domains. The platform takes its name from the SCImago Journal Rank (SJR) indicator developed by SCImago, a research group from Consejo Superior de Investigaciones Científicas (CSIC), University of Granada, Extremadura, Carlos III (Madrid) and Alcalá de Henares. [46]

  The indicators provide data on the visibility (impact and citation rankings) of titles in the Scopus database from 1996 to the present day. A wide range of scientific and social science subjects are covered. Content may be searched via journal title, keyword, subject and country.

  This was used to know if the articles or journals were reliable, being that if they were, it would be a Q1 or Q2 on their rankings.

  It can be seen too that most journals who study this subject are the following.

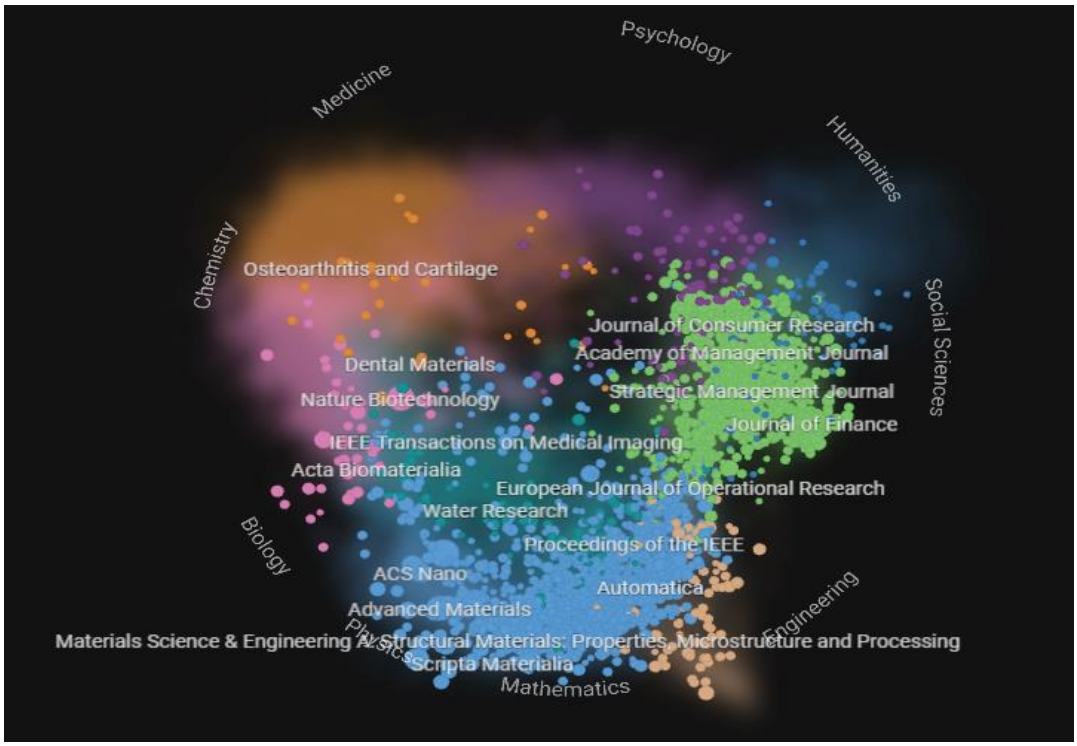


Figure 16 - Network of scientific journals from the years 2015 - 2022

These journals translate to the following subjects.

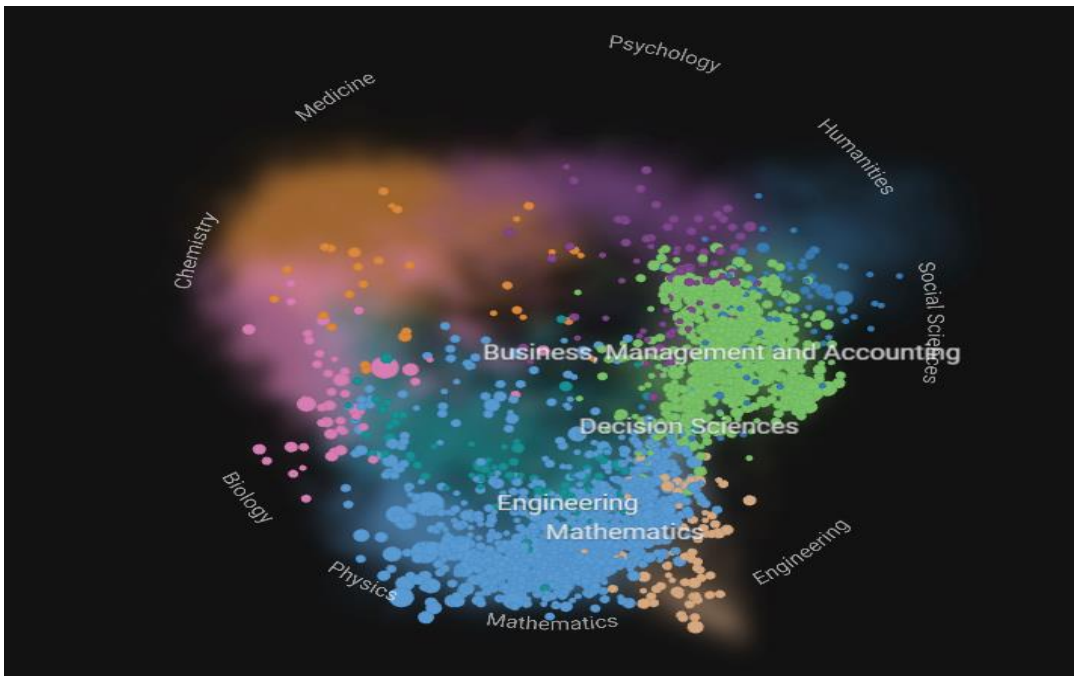


Figure 17 - Study area network to papers from the years 2015 - 2022

3. RESULTS

In this chapter, a brief approach is made to the main issues related to the implementation of methodologies of continuous improvement at Salvador Caetano. We also describe the implementation of two RPA projects at Caetano Retail, which are, in themselves, part of continuous improvement, according to Lean and Kaizen methodologies, highlighting the existing problems and the benefits arising from their application. The information contained in this chapter comes from internal documents inherent and belonging to the organisation.

3.1 CONTINUOUS IMPROVEMENT AT SALVADOR CAETANO

At Salvador Caetano a great importance is given to continuous improvement, supported by the Kaizen philosophy, which helps productivity every day.

Kaizen was one of the foundations in the creation of Salvador Caetano and is still applied today in all business areas.

One of the main objectives of the Kaizen philosophy is to increase productivity. This productivity results in great benefits to the company. For this reason, some companies have adopted this philosophy over the years.

The Kaizen philosophy is part of a company's DNA and means "change for the better". With it, the possibility of improving various aspects on a daily basis is immense. And this is the commitment of each employee who is part of Salvador Caetano. All employees are committed to contribute to continuous improvement and growth, thinking about key values of Ser Caetano culture, such as demand and ambition. [47]

3.2 FIRST CASE STUDY - LEAD EXTRACTION

At Caetano Retail, when a customer is interested in a vehicle, a "lead" is created. A lead is a contact which is identified through marketing actions. Generally, any contact which has the name and number can be considered a lead. On the other hand, an "opportunity" is a lead that has already been qualified by the lead management team and started to be handled by the lead managers.

With a lead, the data of that interested party is assigned to a lead management team, which works with that data to later assess whether the interested party wants to make a purchase. The lead data is introduced in a lead management platform, which serves as a database for all leads.

Finally, the lead manager contacts the interested party, updating the information in the lead management centre.

The contact management hub is Zoho. Zoho is a cloud-based software company that offers web-based business tools and applications for various business needs such as customer relationship management, email marketing, accounting, project management, human resources and more. Zoho software is used by more than 50 million users worldwide, including small businesses, large enterprises, non-profit and government organizations. Zoho products are designed to be easy to use and affordable, making them accessible to businesses of all sizes. Zoho was founded in 1996 and is headquartered in Chennai, India, with offices in the United States, China, Japan, and other countries. [48]

The lead extraction process before automation was as follows:

1. Lead manager accessed the brand's platform to check if there were any untreated leads.
2. If there were untreated leads, the lead manager manually passed all the information (name, mobile phone, email, dealer, brand, model, type of request (if it is a new or used vehicle), comments that the interested party could make) to the lead management platform.

3. After the lead is with the correct data, it's contacted to know if it can really become an opportunity.

It should be noted that, lead managers have a limited time, between one and two hours, defined by each brand, to deal with each lead. Another relevant reason to automate this process.

The aim of this initiative was to automate the process of creating leads from the brand portals onto the lead management platform, which at the time was manual and occupied a substantial part of the lead managers' working time. As a result, the capacity of the Lead Management team to handle these leads would grow substantially.

To this end, a robot was created in UIPath with the following objectives:

- Access the various portals that do not have notification.
- Copy data and transform them (standard format) to import them into the lead management centre. These data are name, mobile phone, email, dealer, brand, model, type of request (whether it is a new or used vehicle), comments and additional information that may be requested.
- Online monitoring of new leads (in order to comply with brand timings).
- Not to repeat leads already treated.
- Notify the existence of new leads.

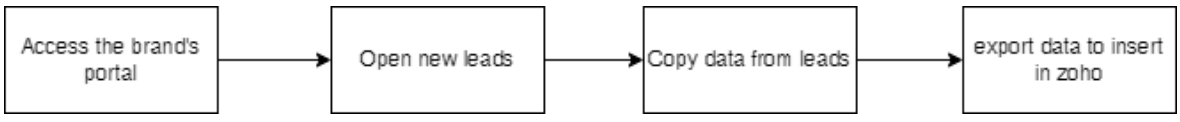


Figure 18 - Process Diagram

The programming structure allows the bot to run continuously with the lead extraction sub-processes being called periodically. It is possible to parameterize the start and end time of

the execution. Outside this schedule, the bot can remain running in 'pause' mode, that is, the platforms' processes won't be called.

In order not to stop the continuous execution, all the exceptions found originate the stop of the subprocess, the sending of a notification and the restart of the subprocess (or move on to the next lead).

Finally, all the leads are stored in an Excel, to have a better monitoring of the process. This Excel has two sheets, one with the login successes and failures to the brand platform and if there were new leads or not. In the other sheet, there is the information extracted from each lead, with the extraction time. This sheet is important because it is from here that the bot checks if a lead was already read or not.

BOT STRUCTURE

The bot now under analysis has two phases. The first phase is the platform login stage, and the second phase is the information extraction stage.

In the first phase, with the flow shown in figure 19, the bot logs into the brand platform in 7 different logins. It must do this because each login represents a different sales centre, being these the following:

- Gondomar
- Vila Nova de Gaia
- Maia
- Almada
- Boavista
- Gondomar
- Barreiro

After the login in one of the centres, it checks if there are pending leads to treat, if there are leads it passes to the second phase of the process, if the opposite happens, it closes the page and logs in the following centre.

This first phase also presents an error management piece, where it sends an email to the owner of the process, advising that there was an error on the login of a specific centre.

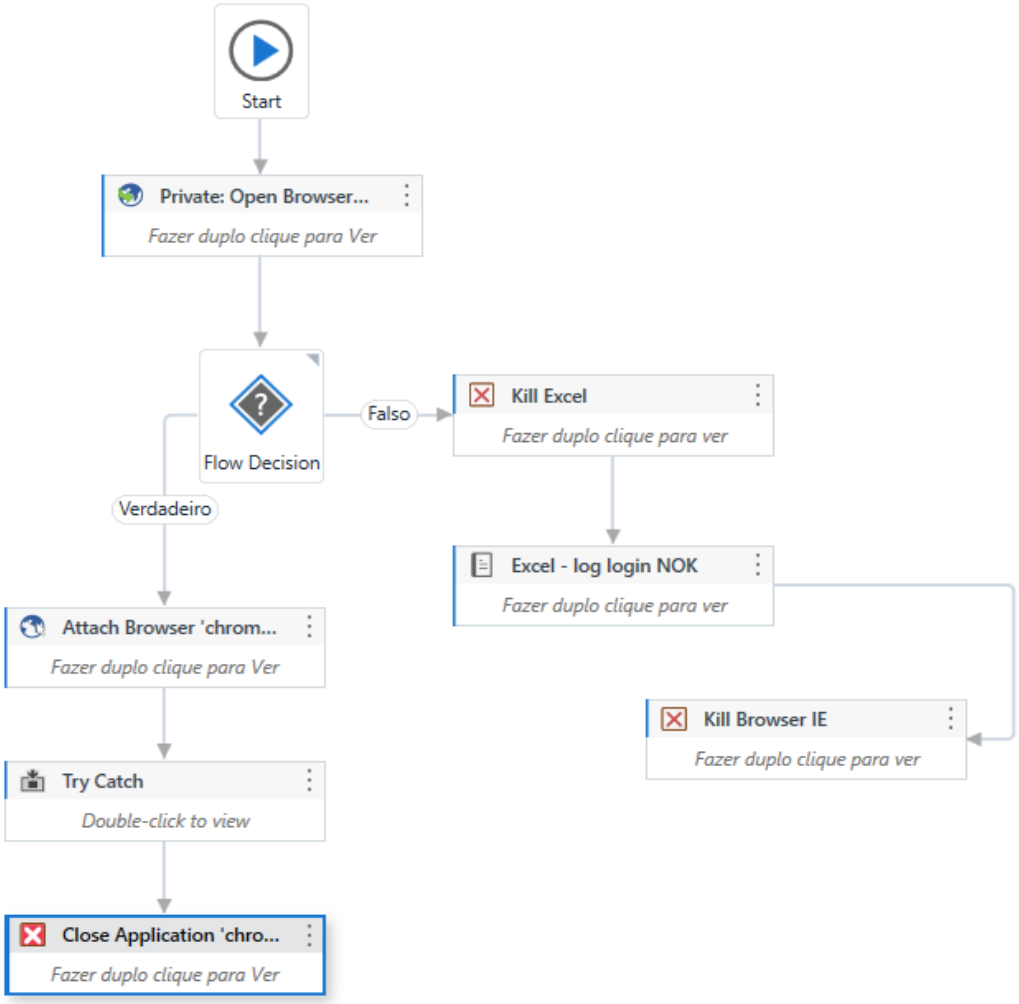


Figure 19 - Flowchart of the lead extraction process

In the second phase of the process, it extracts the leads' data. With the flow presented in figure 22, the bot accepts the pending leads in the brand platform, sending them to a "negotiation" state. Once in this state, the bot analyses the table of existing leads in that state (figure 20).

Figure 20 - Table of platform leads

In this table, it takes the name (blank for confidentiality reasons), date and model of the car. With this information, it checks in Excel if it already has this information. If it doesn't, it clicks on the lead and extracts the data it needs. At the end of the extraction, it goes back to this table and reads the following line and analyses excel again. If it already has the information, it moves on.

After extracting the data, the bot sends the information to Zoho through an HTTP request with the required information.

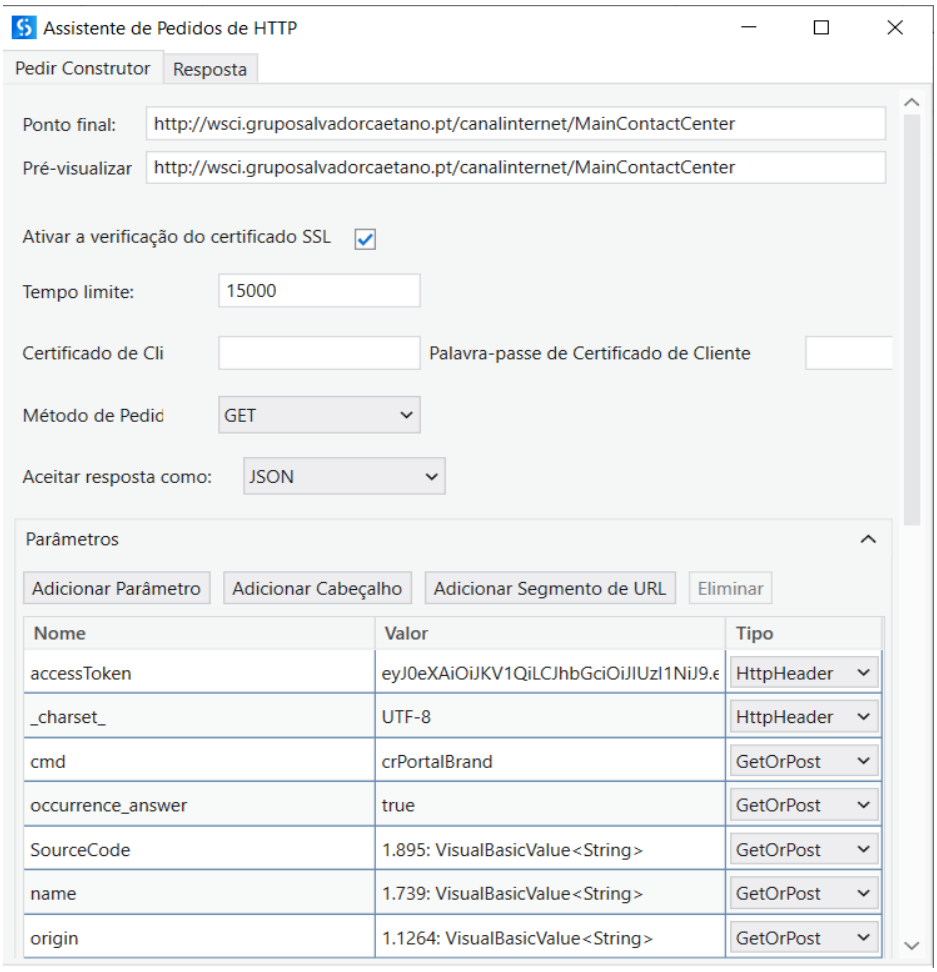


Figure 21 - Sending of information by HTTP Request

Once the information is sent to Zoho, an email is sent notifying that a lead has been read at the centre in question.

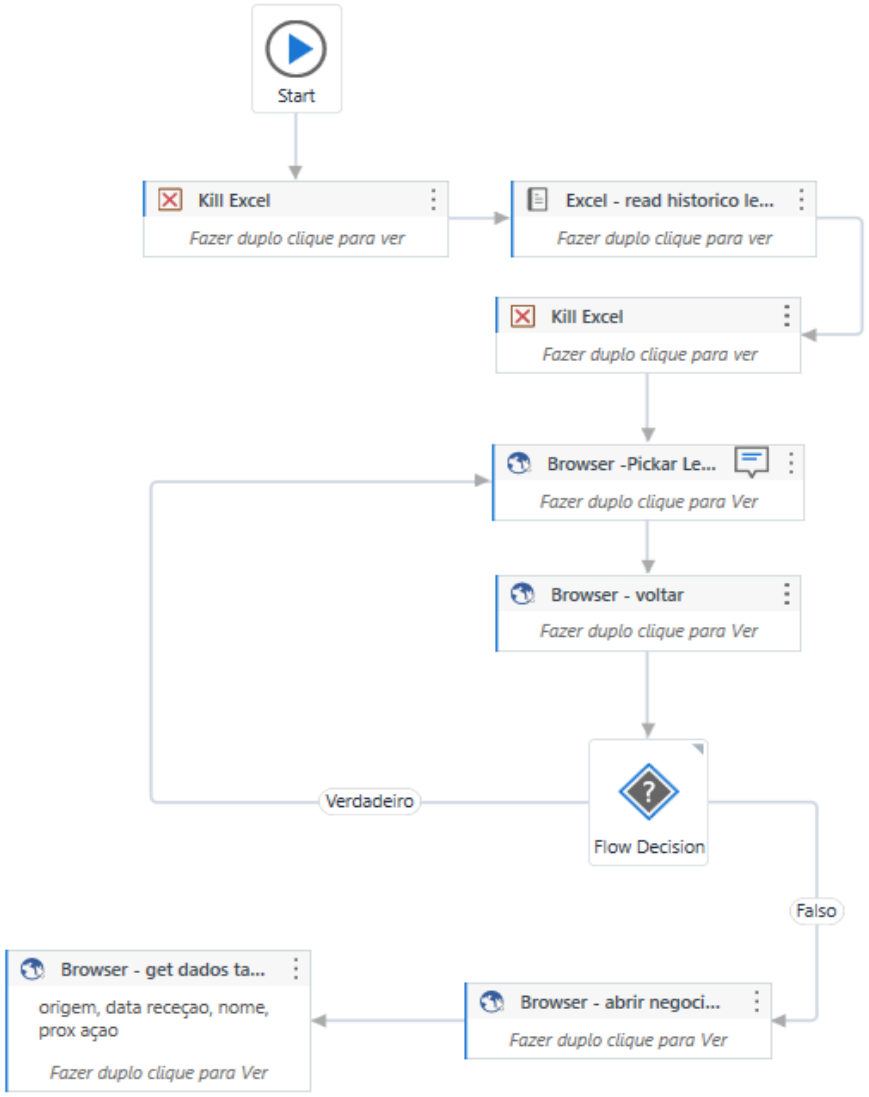


Figure 22 - Sub-flowchart of the lead extraction process

RESULTS

The implementation of this bot has brought benefits to the lead management team mainly in terms of freeing up time to do other more important tasks.

Having the leads already in Zoho, the lead manager can immediately focus on getting in touch with the customer, without worrying about the time limits for dealing with the lead. This allows an increase of the lead manager productivity as well as a significant increase of the number of clients they can contact.

In the following table it is possible to analyse the times gained per lead with the implementation of this bot.

	With Bot (Min)	Without Bot (Min)	Variation (Min)	Time Gained (%)
Lead Reading	2	10	8	80%
Checking the existence of Lead by centre	0,17	0,75	0,58	75%

Table 1 - Table comparing time gains before and after automation of the lead extraction process.

These values were first obtained through the analysis of the manual work that the lead managers did, which together with the developer, explained the process and all the details that were included.

The time values of the bots were obtained through multiple analyses of observation of the bots' execution, where it was possible to make an estimated average of how long it took to run the process. These values are provided by the program itself, which at the end of each execution shows the time it took to run. Through these analyses, it was possible to obtain this data.

As we can see, the time gained by using the bot is very significant. As the bot is working for 24 hours and on the weekend, as opposed to the 8 hours that a lead manager would work, it also eliminates the time that the lead manager would have to spend in the morning dealing with the leads that appeared overnight, or the weekend leads that the lead manager must deal with on Monday.

OBSTACLES

Despite the wide advantages this automation presents, there can be some drawbacks associated with it.

When the bot, for some reason, does not extract the correct information, or does not extract the pending lead at all, the lead manager must move on to Zoho anyway manually. This can happen for some reasons like:

- Failure in the sending to Zoho, i.e., the bot registers in the associated Excel the lead data, but as there was a sending failure, the lead is never sent to the platform afterwards.
- The bot doesn't check correctly if one of the leads was already read or not, thus repeating the reading of a single lead, leaving the others to be treated.

Apart from these reasons related to the automation itself, there may be constraints of external origin, such as failures in access to the brand platform where the leads are, which will make it impossible for the bot to read them, or failures related to the computer where the bot acts, with these problems being mostly unexpected updates.

These constraints are assigned and treated by the RPA Manager, which to improve the bot's performance, solves these problems as the bots enter production. Apart from fixing errors, the RPA Manager also makes improvements to mitigate possible errors that may appear in the future.

3.3 SECOND CASE STUDY - VOXIMPLANT CAMPAIGN UPDATE

The second RPA developed has the purpose to access the VoxImplant website and extract the most updated call report, to later update a PowerBI file where you can see all the previous calls, if they were successful or not.

In the company's case, Voximplant serves as an additional way to acquire leads for different campaigns, be it for warranty extensions, new car purchase or workshop inspections.

Voximplant is a cloud communication platform that provides a variety of tools and APIs for building voice and video communication applications. It enables enterprises to create and manage multiple communication scenarios, including voice and video calls, chatbots and messaging apps, using an intuitive drag-and-drop visual interface. [49]

With Voximplant, developers can create communication applications that work across multiple devices and platforms, including web browsers, mobile devices, and even IoT devices. The platform provides a variety of features, including call recording, real-time analytics, and speech recognition, that enable enterprises to create advanced communication scenarios that meet their specific needs.

Voximplant is popular among companies that require a scalable, reliable, and flexible communication platform to support their customer engagement and communication needs. It is used in a variety of industries, including e-commerce, healthcare, finance, and customer service. [50]

This is a daily process, which is used for lead managers to know if in made calls, there were interested parties for the campaigns in question.

The main goal of this automation is to be able to have, not only one bot, but to scale the use of bots to daily update all the campaigns that are running now.

Right now, UIPath is used to automate this process, as it is still only being used for one campaign. As the plan is to scale up to use more bots, even though UIPath is a good option, it was sought to use a different alternative to have a better scheduling of the bots. For that reason, it has already been tested in Power Automate.

With this tool, with the available licenses, you can schedule a high quantity of bots to run in the morning, so that the lead managers already have the information available when they start their service.

Bots Structure

The bot that is now being used, is run on demand, in UIpath, which means that in the morning, the person responsible for the process must activate the bot, unlike the first case mentioned above, which is always active.

In figure 23, it is possible to verify the bot structure in UIPath.

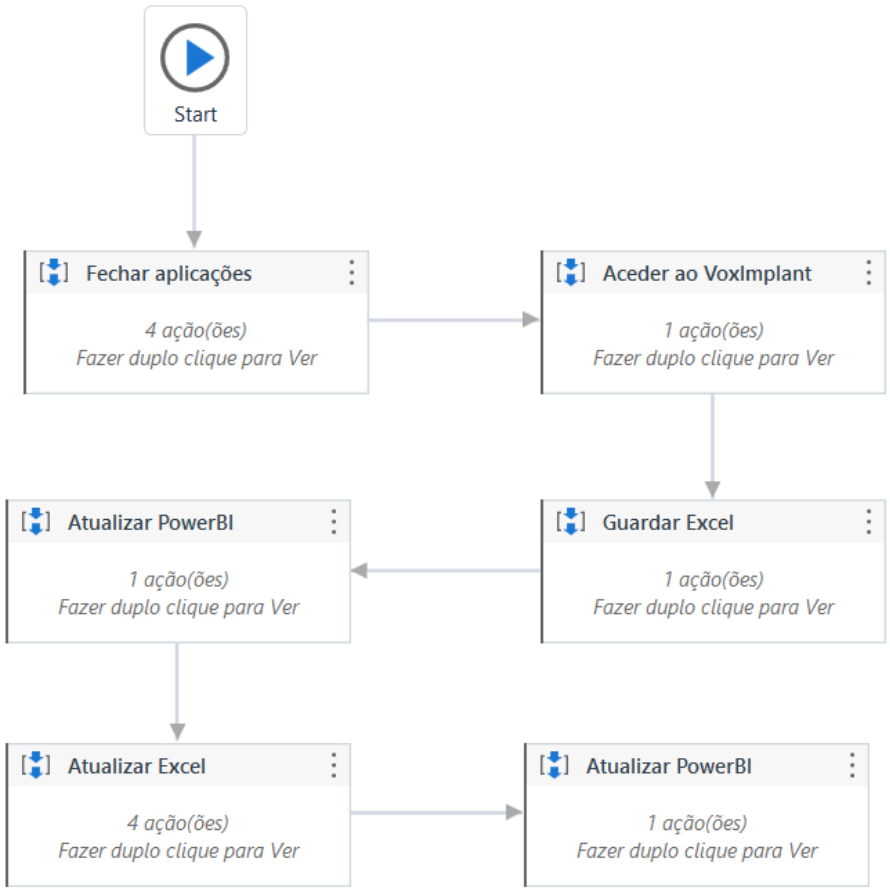


Figure 23 - Flowchart of the Voximplant updating process in UIPath

The structure being tested in Power Automate was parameterised so that it is possible to change it for different campaigns. You can analyse the structure in figure 24.

Figure 24 - Voximplant update process workflow on Power Automate

In Power Automate, processes can be divided into subflows. In this case we have three subflows.

The first one, where you access the Voximplant platform to extract the report of the desired campaign.

In the second sub-flow, you save the extracted Voximplant file under the right name in the right folder. This step is important because it's from this folder that PowerBI updates its dashboards.

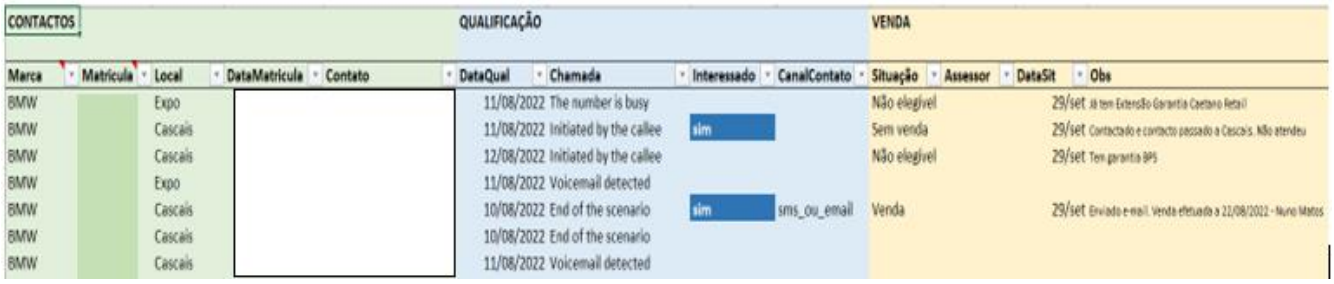
Excel contains the following information:

Session ID	Date of ca	Is incomin	Phone A	Agent A	Call durati	Phone B	Agent B	Call cost	Scenario II	Scenario n	Deleted sc	Record url	Campaign	Campaign	Deleted ca	Call result	Call result	Attempt n
2,92E+09	2022-11-0	no	3,51E+11		0	3,52E+11		0,001672	36601	Extensão (	no		34651	Campanha	no	603	The call de	2
2,92E+09	2022-11-0	no	3,51E+11		0	3,52E+11		0,001672	36601	Extensão (	no		34651	Campanha	no	486	The numbe	2
2,92E+09	2022-11-0	no	3,51E+11		0	3,52E+11		0,001672	36601	Extensão (	no		34651	Campanha	no	1	Voicemail	2
2,92E+09	2022-11-0	no	3,51E+11		69	3,52E+11		0,1011540	36601	Extensão (	no	https://stc	34651	Campanha	no	3	End of the	2
2,92E+09	2022-11-0	no	3,51E+11		54	3,52E+11		0,0648200	36601	Extensão (	no	https://stc	34651	Campanha	no	3	End of the	5
2,92E+09	2022-11-0	no	3,51E+11		12	3,52E+11		0,033891	36601	Extensão (	no	https://stc	34651	Campanha	no	2	Initiated b	2
2,92E+09	2022-11-0	no	3,51E+11		0	3,52E+11		0,001672	36601	Extensão (	no		34651	Campanha	no	408	The callee	5

Figure 25 - Excel which is extracted from the Voximplant platform

Finally, it updates the Excel file where the new leads generated by the phone calls are recorded.

This Excel contains the following information:



CONTACTOS					QUALIFICAÇÃO				VENDA			
Marca	Matricula	Local	DataMatricula	Contato	DataQual	Chamada	Interessado	CanalContato	Situação	Assessor	DataSit	Obs
BMW		Expo			11/08/2022	The number is busy			Não elegível		Z9/set	Já tem Extensão Garantia Caetano Retail
BMW		Cascais			11/08/2022	Initiated by the callee	sim		Sem venda		Z9/set	Contactado e contacto passado a Cascais. Não atendeu
BMW		Cascais			12/08/2022	Initiated by the callee			Não elegível		Z9/set	Tem garantia BPS
BMW		Expo			11/08/2022	Voicemail detected						
BMW		Cascais			10/08/2022	End of the scenario	sim	sms_ou_email	Venda		Z9/set	Enviado e-mail. Venda efetuada a 22/08/2022 - Nuno Matos
BMW		Cascais			10/08/2022	End of the scenario						
BMW		Cascais			11/08/2022	Voicemail detected						

Figure 26 - Excel where call information is updated

The big difference between robotization in UIPath and in Power Automate is that, in the former, the required PowerBI update associated with it is required, since this process is not yet scheduled.

As in Power Automate, the goal is to scale to multiple bots, the PowerBI update process will no longer be a process linked to this automation, so there is no need to include in this automation.

Results

In this section there will be presented the different times of execution of the process made by a human without the help of the bots, the process executed from UIPath and the process with resource to Power Automate. Later, the conclusions of their different uses will be drawn. We can observe the average times that the process takes to be carried out, from the table 2.

	Manually	UIPath	Power Automate
Process Execution (Min)	16	8	3
Time Gained	0	8	13
% Time Gained	-	50%	81,25%

Table 2 - Table comparing the time gains before and after automation of the Voximplant report updating process.

As in the first case study, the same method of obtaining times was applied for this process. First it was analysed how long it took to do the process manually with the process owner. Afterwards, the execution times of the process were obtained for each platform (UIPath and Power Automate) to make a comparison between the two alternatives.

After an analysis of average times, we can see that automation brings significant gains, thus freeing the process owner from doing the task and getting the results faster.

From here one can also analyse why Power Automate was chosen to scale this process to more bots, since it takes significantly less time and, as mentioned before, involves fewer steps, which leads to a mitigation of possible errors occurring while performing the process.

With Power Automate, it is also possible to perform a general analysis of the bots' performance. This analysis gives a broad overview of which bots are causing the most problems, making it easier to improve the automation environment.

In the following graphs you can see the executions and error rate of workflows, completion status of workflows and execution status by trends.

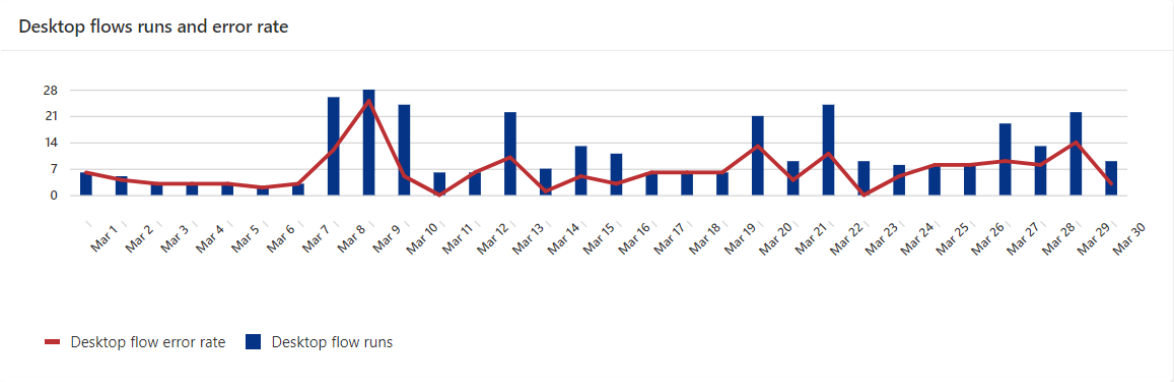


Figure 27 - Execution and error rate of Power Automate workflows

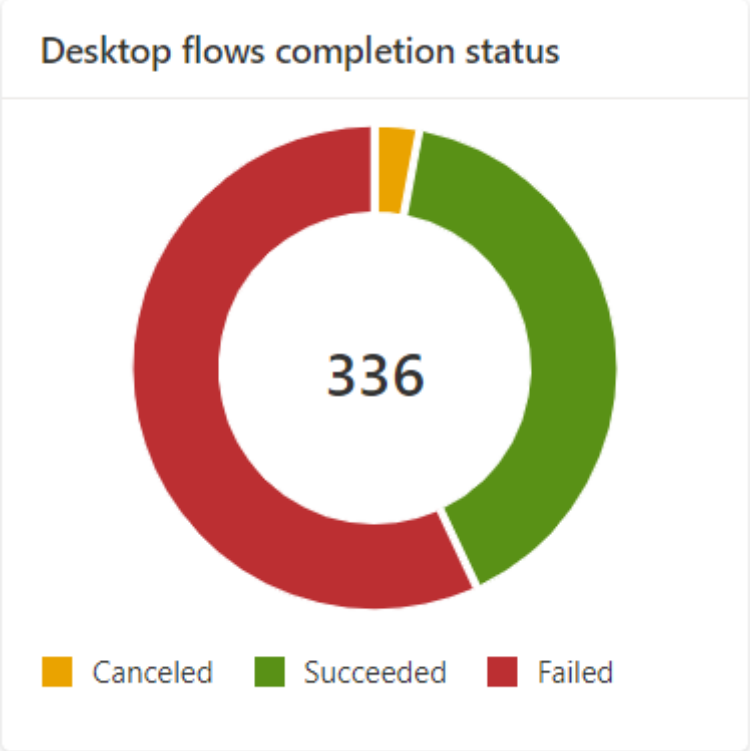


Figure 28 - Completion status of Power Automate workflows

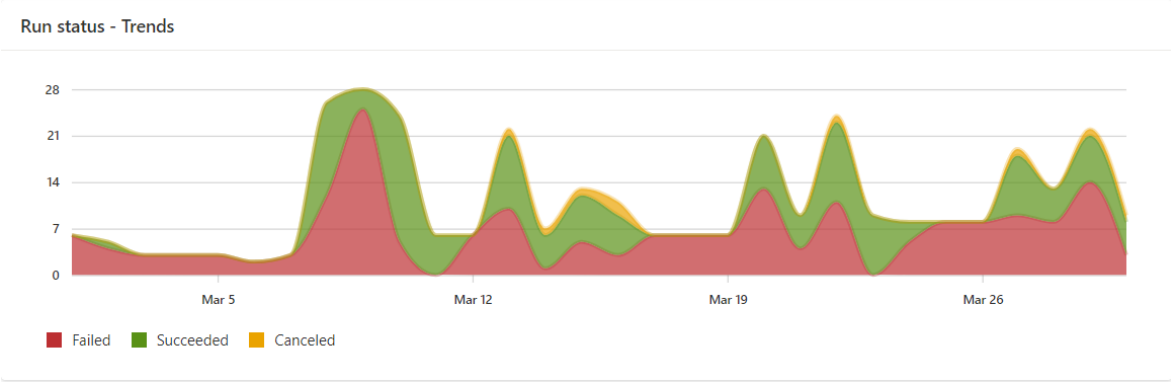


Figure 29 - Power Automate workflow execution status trends

Constraints

One of the biggest constraints in this automation was the challenge to scale the process from different Voximplant campaigns to more bots. This hurdle was overcome with the beginning of the implementation of the automation in Power Automate which will allow scaling this process.

Another constraint it may cause, regarding the process execution itself, is that in case of error, the PowerBI report that will be updated afterwards will not have the most updated data. This mishap can be solved manually, and the owner of the process will have to handle it manually without the bot's help. However, an alternative is being studied so that in case of an error, the process can be run again.

This automation has plenty of room for improvement and error mitigation, as it is a relatively new process. And the way it is structured, it is easily modified to the needs that may be required.

4. CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORK

In this chapter, all the work described in the document is analysed, exploring possible improvements, and ascertaining difficulties and limitations encountered in carrying out this work.

4.1 CONCLUSIONS

In an increasingly competitive business context, every opportunity for improvement and optimisation is welcomed, and as such, the use of methodologies, tools and platforms that make this possible must be implemented in a precise manner so that your products or services are delivered with customer satisfaction.

One of the positive aspects of implementing these methodologies is that they generally bring high benefits at relatively low cost, as the aim is to eliminate parts of processes that are in excess or to rework a process that already exists in the company.

The objectives proposed at the beginning of this thesis, were fulfilled, being that the primary objective was to do a literature review about agile methodologies of continuous improvement. Afterwards, were described two practical cases of implementation of methodologies of continuous improvement at Salvador Caetano.

Regarding the literature review, first there was a search for articles related to the subject, to get a more general idea of the type of topics most covered, where these subjects are most studied the corresponding chronology. After this analysis, various types of methodologies were studied, focusing more on Lean, SCRUM and Kanban, and the Kaizen

methodology, which is widely used in the practical cases studied later. Further in the literature review, the topic of RPA was addressed, focusing on how it can be implemented and its relation to agile methodologies.

Concerning the practical part, we analysed two automation projects that aimed at improving two processes. The first one aims at facilitating the work of the lead management team, thus eliminating the most mechanical part of the lead treatment process. This process consists in checking the brands' platforms to see if there are any leads. Once the lead is identified, the desired data must be extracted, such as the name, mobile phone number, brand and model of the car. Only after this treatment, it is possible to contact the customer to see if it is possible to transform the lead into an opportunity.

To improve the lead treatment process, it was created an automation that consists in constantly checking the brand's platform. When there are pending leads, the Bot analyses the lead, sends all the intended data to the lead management team and also inserts the data in the contact management platform so that the lead managers have the information accessible to contact the customer later.

With this automation, on average 70% of a lead manager's time is freed up, thus giving more freedom to the employee and increasing his productivity, being able to make more and better contacts.

Addressing the second practical case, it was made an Voximplant file update process, in which a document with the record of calls made is extracted, and then feeds an excel to support the lead management team, so they have more information about new customers. Finally, a PowerBI was created that is refreshed with the information that was extracted to have an analysis of the performance of the phone calls.

Firstly, this automation was built in UIPath, but later, to expand this automation to several Voximplant campaigns, the automation was built in Power Automate.

As this is a daily process, for different campaigns, the automation of this process was very important to expedite the launch and analysis of future and different campaigns.

Finally, it should be noted that process automation at Caetano Retail is a growing work that gives itself freedom to analyse new projects and opportunities to implement new automations.

4.2 PROPOSALS FOR FUTURE WORK AND IMPROVEMENTS

With the implementation of the projects described above, there are still many possibilities for improvement and opportunities for automation and optimisation of various processes at all levels of the company.

Such improvements can be:

- Optimise existing processes so that they can be scaled up easily.
- Analyse areas where a lot of time is lost in easily automated processes, in order to free up that area of work.
- Invest in the standardisation of processes and documents so that future projects have a similar basis as others, and it is possible to use parts of other projects in future projects.

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