SAMUEL PARRA FINIZIO ZANCRA

Design of a roadmapping framework and its application in the Brazilian Industries of Payments, Credit and Investment

São Paulo
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CATALOG FORM

Zancra, Samuel
Design of a roadmapping framework and its application in the Brazilian Industries of Payments, Credit and Investment / S. Zancra -- São Paulo, 2020.
115 p.

Trabalho de Formatura - Escola Politécnica da Universidade de São Paulo. Departamento de Engenharia de Produção.

1.ADMINISTRAÇÃO DE INOVAÇÕES TECNOLÓGICAS 2.PAGAMENTO (DIREITO DAS OBRIGAÇÕES) 3.INVESTIMENTOS 4.CRÉDITO I.Universidade de São Paulo. Escola Politécnica. Departamento de Engenharia de Produção II.t.

Acknowledgments

To my advisor Doctor André Leme Fleury, for all the long discussions, patience, and teachings transmitted during the orientation of this project.

To all the teachers in the Production Engineering Department, for making me able to graduate as a Production Engineer.

To my family, for their unconditional support during this work, this graduation and at all stages of my life.

To my girlfriend Luisa for all the love and support during these years.

To all friends from Colégio São Miguel Arcanjo, Colégio Bandeirantes, Escola Politécnica da USP and Polifinance, who were by my side during this journey.

To my team at GIC to all the learning, support, partnership and opportunities during the internship program.

Abstract

The roadmapping process is a powerful tool to help companies to survive in a competitive market environment. This paper analyses the creation of a roadmapping framework to be used by Private Equity investors and also the results of the application of this framework in three different Brazilian financial industries: payments, credit and investments. The method used in this research was composed by eight steps. Concerning the results, the paper presents the creation of a personalized roadmapping framework ("Z-plan"), customizing the roadmapping process to fit the needs and requirements of a Private Equity investor that has as its mission finding promising companies to invest and also to helping the invested portfolio. Finally, the paper presents the result of the application of the custom roadmapping process in the Brazilian financial industries of payments, credit and investments, in order to reach out to conclusions of market opportunities and create action plans.

Keywords: roadmapping, payments, credit, investments, private equity, personalized framework

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1. Introduction

1.1. Motivations

The first motivation for this research is professional, in order to explore the knowledge related to the internship realized by the author at the Private Equity division of GIC (Government Investment Corporation), the sovereign wealth fund of Singapore. The company was established in 1981 to manage Singapore's foreign reserves, being a global long-term investor with well over US$100 billion in assets in over 40 countries worldwide, working to secure Singapore's financial future by investing across a range of asset classes in the public and private markets. In Brazil, GIC opened an office in 2014, having investment professionals from Private Equity, Infrastructure and Real Estate. Throughout this years, GIC has invested in most varied brazilian sectors: Rede D'or São Luiz, the largest brazilian private hospital chain; Smart Fit, leading low cost gym; Cruzeiro do Sul, leading university chain; Algar Telecom, focused on B2B fiber; Somos Educação, leading k-12 school operator; and Hotmart, a leading educational platform for online courses.

The second motivation is a relevant curiosity to obtain a deeper understanding about the complex Brazilian financial market. This market is still concentrated in five big banks, including Itaú and Bradesco; however, due to technological evolutions, currently this market is now facing the disruption of digital banks, that provides better service quality with more reasonable prices. On the credit front, the country is now with the historic low basic interest rate of 2.25% (versus 14% in 2016), which enables many business opportunities and helps individuals to access cheaper credit lines. On the investment front, related to the reduction of interest rates, the country is facing a relevant movement of migration of invested money, from the fixed income to the stock markets: in 2018 the country had 700 thousand stock market individual investors registered, versus 2,000 thousand in the first quarter of 2020. Therefore, in this context of quick changes in the market, new business models are arising to provide better services to customers.

Finally, the third motivation for this research is to apply the roadmapping process to help the investment decision from Private Equity investors by selecting promising companies to receive investments and by generating value in the portfolio companies. There are many roadmapping processes detailed by the academic literature, related to the analysis of technologies, products and market.

1.2. The problem

The two problems that this paper tackles are related to the context of a Private Equity Investment Professional. The first one is, by having a relevant amount of money in a fund ready to be deployed, the following question arises: where should this money be invested in to maximize the returns in a 5 years horizon? These professionals have the challenge of finding promising companies that should be able to generate a great return for the capital allocated, mainly by increasing its profits. The second problem is related to the challenge of how to help invested companies, being able to provide relevant resources, capabilities and connections considering different perspectives that will generate value for it, for example, by implementing an agenda of improvements for the growth strategy or the product.

1.3. Goals

Based on the points mentioned above, the goals of this research are (i) development of a custom roadmapping framework ("Z-plan"), to be applied in the context of a Private Equity investment firm in order to help selecting new potential companies to be invested in and to help on the value creation for the portfolio companies; (ii) application of the framework in the brazilian financial market, more specifically in three segments: payments, credit and investments; (iii) analyze the roadmaps and propose action plans for the fund.

1.4. Sources of information

The research will be carried out based on a study of bibliographies on the subject of roadmapping, management tools to improve the roadmapping process and finally, market materials from the brazilian financial market. In fact, the study can be systematized in the reading and consultation of four different sources, as shown below:

- Books: there is an extensive range of publications about roadmapping. Such literature will be consulted and revised to carry out the present work;
- Academic papers: much of the relevant knowledge in the area of roadmapping was first published as papers, in the context of academia. When applicable, such knowledge will be translated into the context of this work;
- Sector-specific and company-specific reports: it is customary for consultant firms, banks, investment houses and research agencies to release reports about certain

sectors or companies. In fact, such reports will be studied and used to strengthen the understanding of the sector and the company;

- Systematic data sources: several portals are regularly used by financial market professionals to access systematic and historical data, such as interest rates, stock prices, previous transactions, among others. This includes portals such as Capital IQ, Mergermarket, Preqin, Central Bank, among others.

1.5. Structure of the document

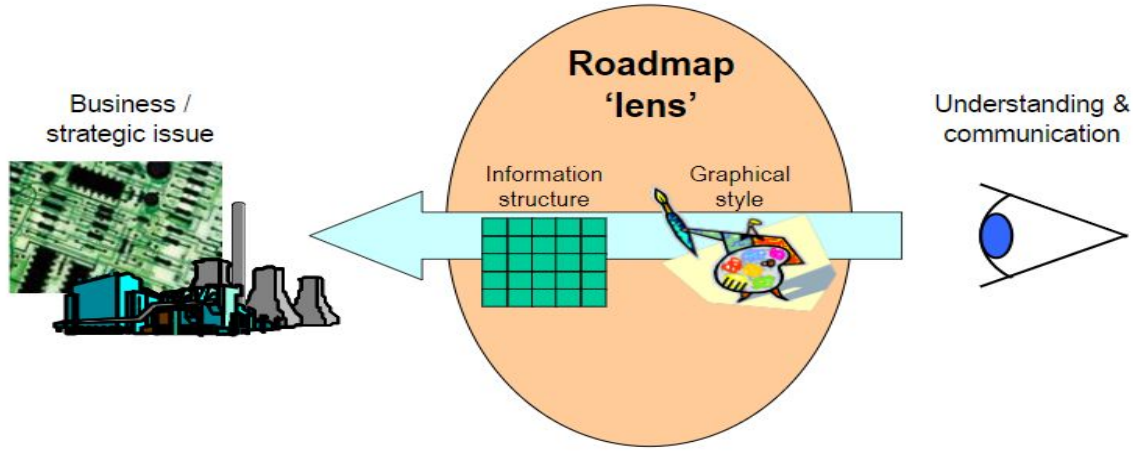
This document is divided in 7 chapters to present all the relevant points of this research. Chapter 1 presents the introduction of the research, the motivations, the problem, the goals and the source of information. Chapter 2 presents a literature review of roadmapping and roadmaps. Chapter 3 presents the method of this research, that was divided in eight sections: subject exploration and research project; first roadmapping exercise; literature review; first roadmapping validation with professionals; in-company workshops; validation with advisors; expert workshops; and consolidation. Chapter 4 presents the roadmapping framework developed by the author (Z-plan), in three sections: first Z-plan version; professionals' feedback and second Z-plan version; advisor feedback and final Z-plan framework. Chapter 5 presents the results of Z-plan execution in the Brazilian industries of payments, credit and investments, being divided in 5 sections: first roadmaps version; second roadmaps version (after validation with professionals); third roadmaps version (after in-company sessions); fourth roadmaps version (after experts validation); and results and action plan. Chapter 6 presents the conclusions of the research. Finally, Chapter 7 presents the references used in this research.

2. Literature review of roadmaps and roadmapping

2.1. Roadmaps overview

There are several definitions for roadmaps in the literature. According to Probert et al. (2003), roadmap is a powerful communication tool, both within the company to demonstrate why a particular course of action is necessary, and also to the outside world. Therefore, the process of roadmapping is applied to identify, define and map strategies, objectives and actions related to innovation in an organization or business. The main result is a map that integrates and aligns different visions (e.g. commercial and technical) of a certain company. Roadmaps should be understood as a powerful tool for strategic planning in order to (i) help companies to survive in a challenging market environment; (ii) help new entrants or investors to best position themselves in face of market disruptions. It is becoming even more important in light of the current globalized world, that is experiencing market changes at an incredible fast pace. Having said that, the layout and graphical design should be analyzed and defined carefully. This concept is shown in the Figure below.

Figure. 1. Generalized technology roadmap architecture



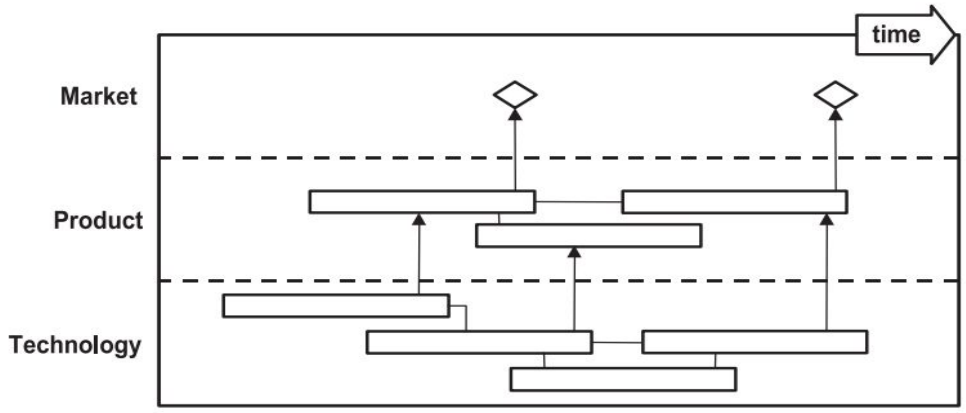
Source: Center for Technology Management (University of Cambridge, 2001)

The analysis presented by Phaal et al. (2004) evidences that, although having different standard processes to build roadmaps, these are usually customized to achieve specific goals of the organizations, being flexible to be adapted to different circumstances in terms of resources and objectives. The graphical part of it is extremely important because of its easy way to communicate key messages that arrive from the roadmapping process. Nevertheless,

the information is usually condensed to occupy a specific framework, being important, therefore, to have appropriate documentation of all steps of the process.

According to Carvalho et al. (2013), a technology roadmap, represented in Figure 2**,** is focused on analyzing the relations among markets, products and technologies. It's a way to assess potential threats and opportunities in the market, trying to anticipate the competition movement. The generic approach proposed by EIRMA (*European Industrial Research Management Association*) is a time based chart, that is composed by the evolution of circumstances in markets, products and technologies, also presenting linkage between all of their perspectives.

Figure. 2. Generic roadmap form proposed by EIRMA

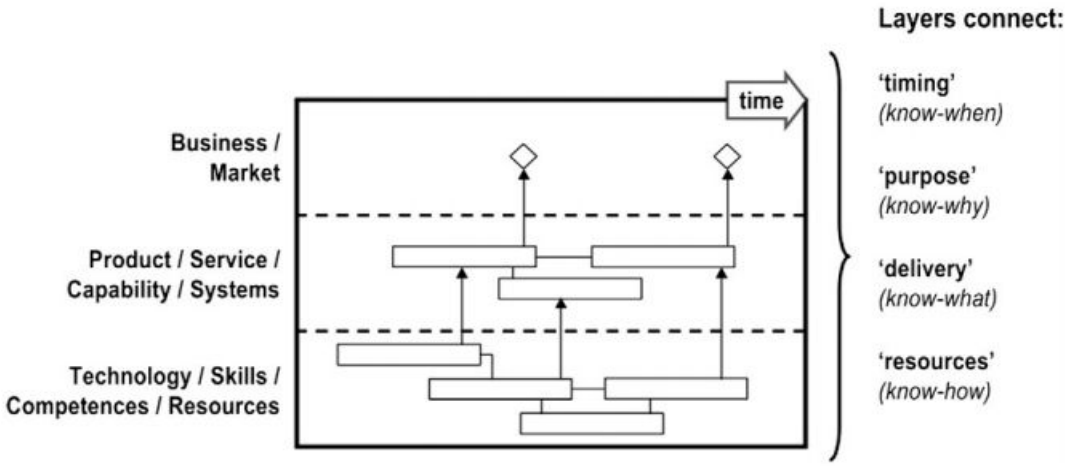


Source: R. Phaal et al. (2003)

According to Carvalho et al. (2013), the purposes of a technology roadmapping are detailed below:

1. Product planning: most common use, helping companies to use certain technologies into manufactured products.
2. Service / capability planning: focused on service companies, used to analyze the impact of technology on organizational capabilities.
3. Strategic planning: help organizations to support the analysis of opportunities or threats at the business level, trying to develop a vision of the future, identifying gaps versus the current situation in markets, technologies, products, culture, etc .

Figure. 3. Schematic technology roadmap



Source: Carvalho et al. (2013)

4. Long-range planning: help companies to identify potential technologies and markets disruption, being typically used at the sector or national level.
5. Knowledge asset planning: help companies to analyze their critical knowledge assets and compare it with technologies, skills and capabilities required in face of new future market conditions
6. Program planning: directly related to project planning (e.g. R&D), focus on helping companies to implement certain strategies.
7. Process planning: help companies to manage their knowledge, focusing on specific process areas.

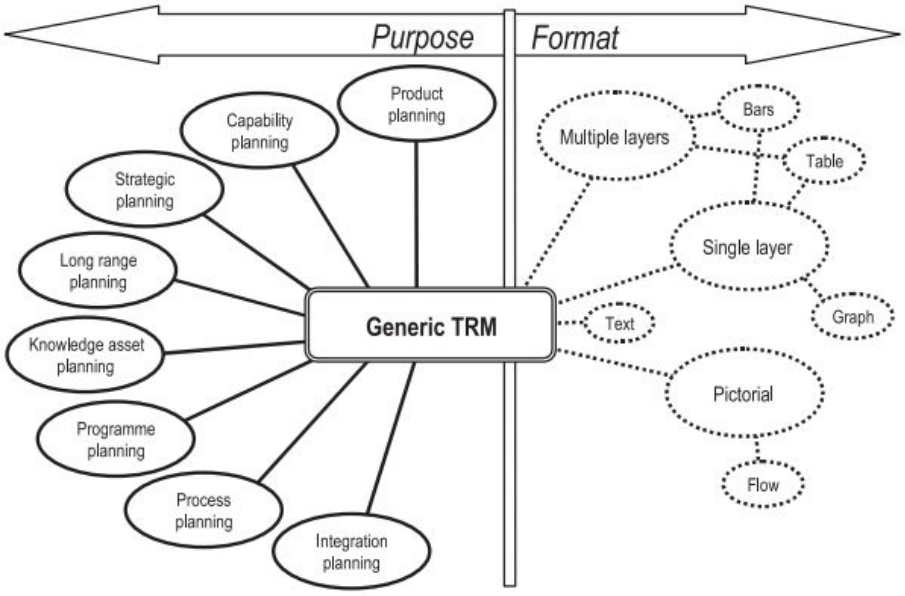
   Integration planning: focused on the evolution of technology, related to how it can be combined with products and systems in order to develop new technologies

According to Phaal et al. (2003), roadmaps can present different formats, based on its needs and how it will be communicated. The main formats are fully detailed below:

1. Multiple layers: most common format, including a number of layers such as technology, product and market, allowing the evolution of it layer and also exploring the relationships between them.
2. Bars: uses a set of bars for each layer, simplifying the required results and facilitating the communication of roadmaps.
3. Tables: some roadmaps also use tables (e.g. time vs. performance) that can be applied when the performance can be easily quantified.
4. Graphs: used when the performance of a product or technology can be quantified, being expressed in a graph or plot.

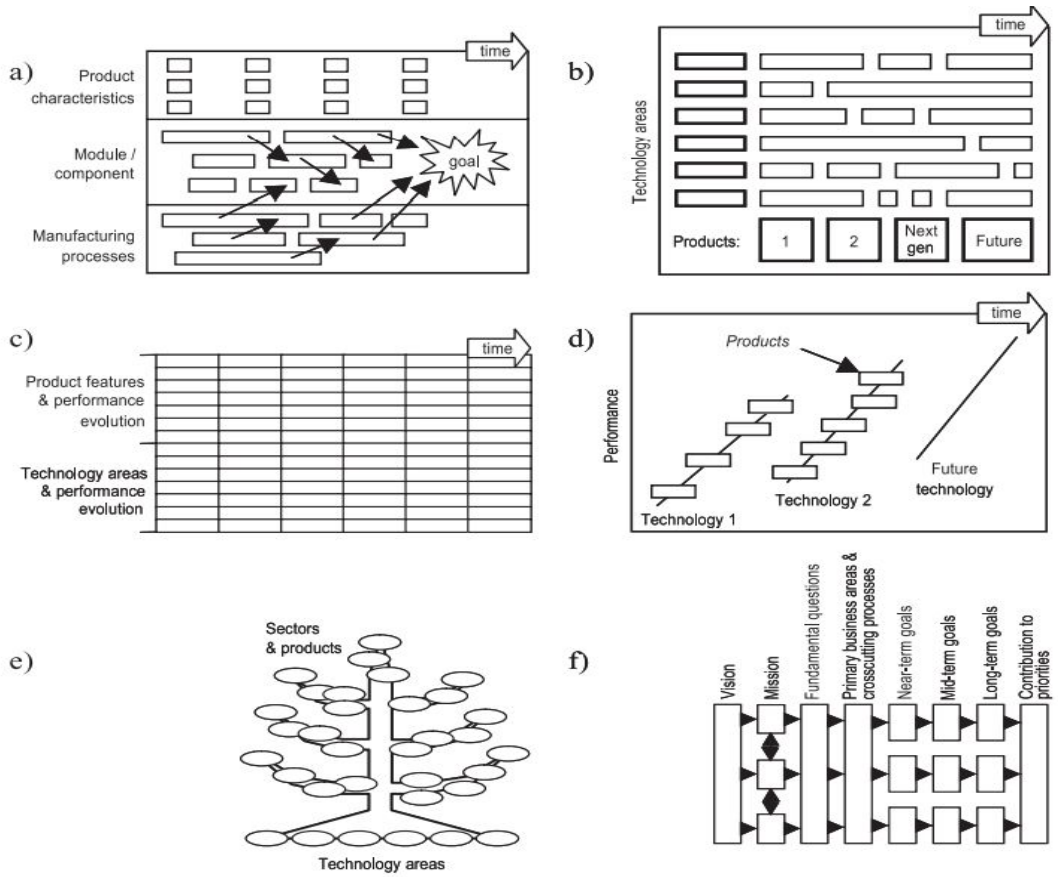
5. Pictorial representations: creative pictorial way to communicate technology integration and plans. For example, using a metaphor to help in the communication, such as a tree.
6. Flow charts: it's a particular type of pictorial representation, that can be applied to express objections, actions and outputs.
7. Single layer: usually a more simple roadmap that focuses on a single layer of the map, being more easy to understand. However, the negative point is related to the fact that the links between the layers are not generally shown.
8. Text: also there are roadmaps composed only by texts, describing the same aspects of the other formats. The disadvantage is that it is more difficult to read and requires more time to understand the messages and link.

Figure. 4. Characterization of roadmaps: purpose and format



Source: Phaal et al. (2003)

Figure. 5. Examples of technology roadmap types (format): (a) multiple layers; (b) bars; (c) tabular; (d) graphical; (e) pictorial; and (f) flow chart



Source: Phaal et al. (2003)

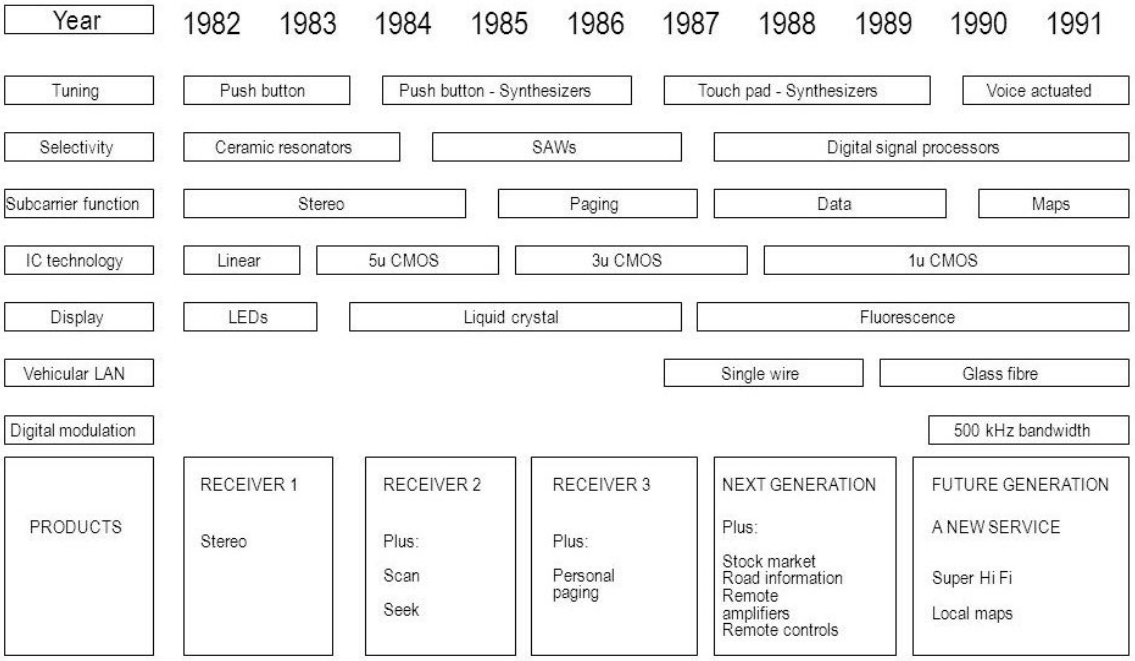
According to Phaal et al., (2003), historically, few processes have been developed to help companies to implement a successful roadmap that is suitable to their goals. The most important ones will be summarized and detailed below.

In Phaal et al., 2003, few roadmapping processes are detailed. The pioneer was the Motorola process, that stimulated the use by other companies, evidencing its power. Also, Philips introduced a roadmap including the main layers that are used commonly applied in the current roadmaps (technology, product and market) and also established differences between preparation and development activities. The roadmap developed by Lucent Technologies was relevant by evidencing different work sessions for each roadmap layer and the final result; and by reinforcing the importance of using other management tools such as the QFD *(quality function deployment)*. Finally, the T-Plan and S-Plan, developed at CTM (*Centre for Technology Management*) at Cambridge University are tools to help companies to start using roadmaps; the T-Plan is focused on planning new products and technologies, while the S-Plan supports the definition of innovation strategy in companies.

Phaal et al., 2003 also highlights the importance of describing the Motorola process, which will be detailed further. This roadmapping process was developed to analyze the plan of a production line from a specific business unit, on a time-frame related to past, present and future, to assess the technology requirements to future products launched. The result is shown in Figure 5**,** named originally as *Technology Roadmap Matrix.* As being a simple and pioneer version, it does not include a layer for the market, focusing only on products and technologies. The eight phases of the process implemented are detailed below (Phaal et al., 2003):

1. Business description: this step is focused on collecting all the information related to the product line, that is, product strategy, technology, market-share, competition assessment, historic sales and forecast.
2. Technology forecast: phase responsible to predict potential technology evolutions related to the product line.
3. Technology Roadmap Matrix: in this step, a matrix is prepared, summarizing the information collected regarding the product and product technology (matrix is shown in Figure 5.
4. Quality: phase responsible to analyze the potential quality impacts on products and production processes developed by new technologies.
5. Resources allocation: phase related to the analysis and planning of physical and human resources to execute the potential goals established for new products.
6. Patents portfolio: identify a list of all the patents organized by main technological areas and search data from potential competitors that are present in the same sector and may eventually register any patent.
7. Description of product, ongoing reports and summary-charts: elaborate a detailed report for each product contained in the roadmap, in a way that is easy to be updated according to the progress.
8. Detailed report: elaboration of a consolidated report that needs to be done periodically in order to analyse the products, technology and progress of the plans defined

Figure. 6. Motorola Technology Roadmap Matrix



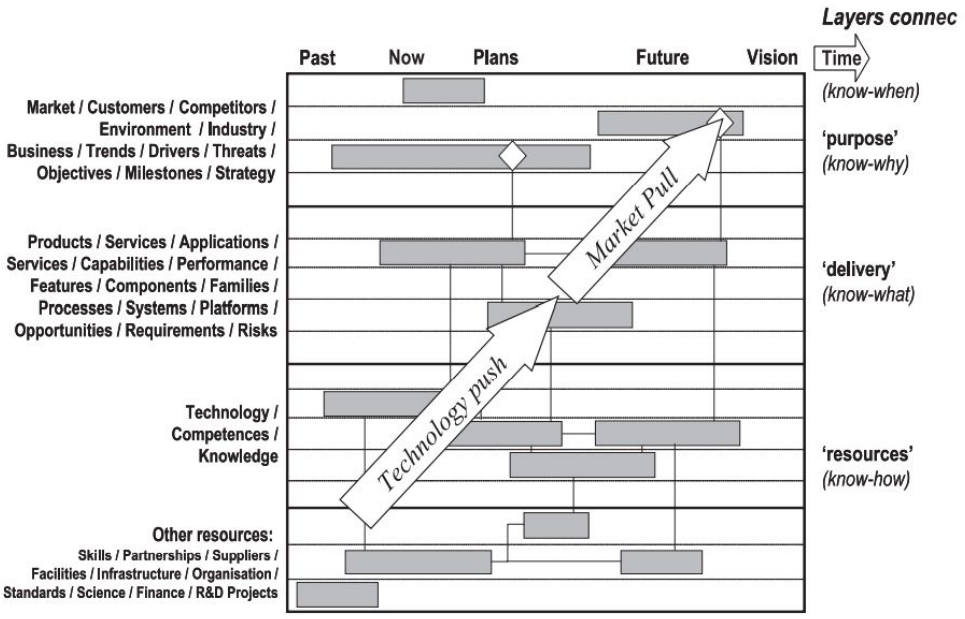
Source: Phaal et al. (2003)

However, according to Phaal et al. (2001), to achieve the full benefits of the T-Plan roadmap, it's important to customize it to be suitable to a specific situation.

1. Time: this attribute can be adapted to fit a participar purpose in terms of horizon, for example, using a short range for sectors that are changing fast (e.g. e-commerce, smartphones, etc.) and long range for more stable sectors (e.g. infrastructure, energy, etc.). Also, different scales can be used to give more space to one specific time, and the intervals can be variable.
2. Layers: different types of layers can be used in a roadmap, exemplifying the flexibility of it, as shown in Figure 9**.** The top layers are related to what is driving the roadmap (know-why), while the bottom layers are composed by the resources used to address the demand (know-how). Finally, the middle layers are responsible to connect the purpose and resources (know-what), usually focused on product development.
3. Notes: relates to additional information within the layers, including (i) linkage between objects; (ii) supplementary information, such as people involved and assumptions; and (iii) other graphic devices, such as color coding, critical paths, opportunities and threat.
4. Process: usually the steps required to build a roadmap will vary depending on the organization, because some factors may be considered, such as (i) resources (people.

time and budget); (ii) nature of issue being addressed; (iii) availability of information of market and technology.

Figure. 7. Generalized technology roadmap architecture



Source: Robert Phaal (2001)

2.2. Roadmapping overview

According to Phaal et al. (2004), the process of developing a roadmap is even more important than the output itself (the roadmap), because of the interactions that the participants have with all the stakeholders of a market, being an opportunity to share information and perspectives of problems, opportunities and ideas. In addition, the ability of developing a framework to think about strategic planning in businesses is relevant, because it can be used in many situations.

According to Gouvea et al., 2019, the roadmapping process can be associated with the science of translating a business or strategic issue related to the real world into an information structure using a graphical style. This way, the information should be communicated to the final receiver. The author also pointed out that the roadmapping process has no value if the final output is not communicated in an efficient way.

According to Phaal et al. (2003), the roadmap developed by Philips Electronics was important to the improvement of roadmapping technique: the process was used to support the initial phases in the product development. It was also composed of the layers technology, product and market. The process was composed of five phases divided in coordination

activities (done by the process owners) and workshops, where other members from the organization can join Phaal et al. (2003).

1. Phase 1: coordination - Definition of goals and data gathering related to the topic.
2. Phase 2: workshop - Composed by information sharing , building a common view and setting up groups for the roadmaps.
3. Phase 3: coordination - selection of roadmaps scenarios and definition of the fundamentals of the roadmap
4. Phase 4: workshop - Generating roadmaps by sharing information with teams, drawing roadmaps and evaluating the results.

   Phase 5: coordination - Definition and organization in order to promote the continuity of the roadmap

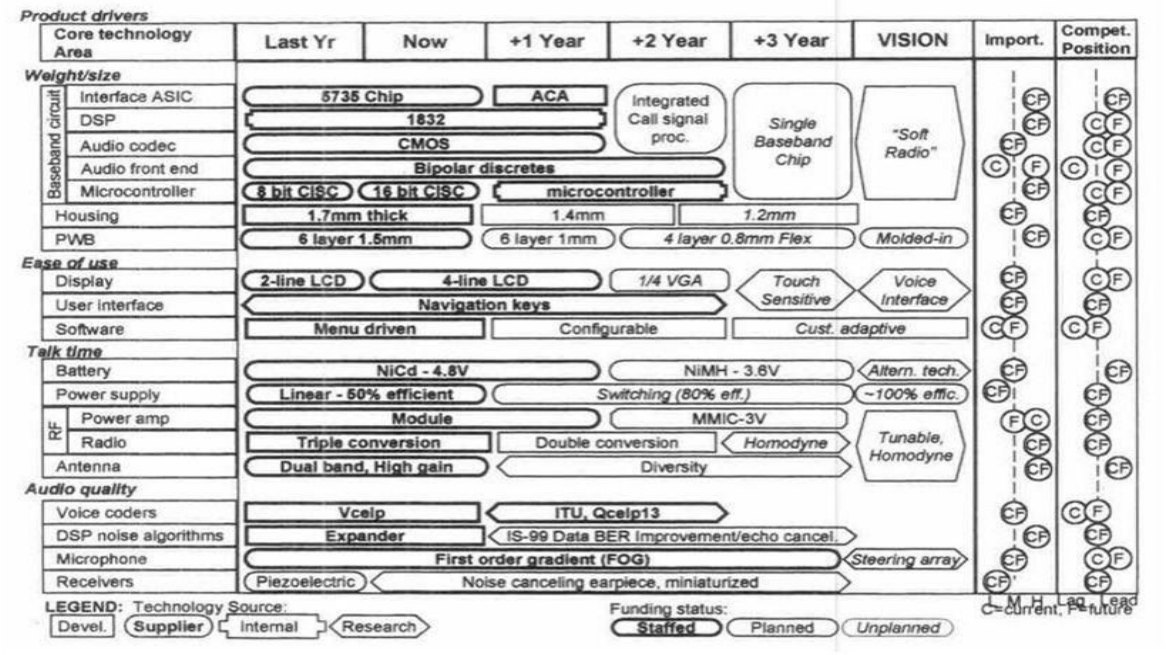
According to Gouvea et al. (2019), in order to boost the results of the Philips roadmapping process, some complementary management tools should be used, such as the QFD (Quality Function Deployment), the innovation matrix and the portfolio analysis. By using a QFD, it's possible to analyze the customers needs and relate it to product functionalities. By using an innovation matrix, it's possible to analyze the maturity of a technology in a certain moment that it will be required to fit a new product development project. By doing a portfolio analysis, it's possible to identify the potential investment in the short and long term, in order to weigh it with the expected financial results, also helping to identify potential gaps in a product portfolio.

According to Gouvea et al. (2019), the process of roadmapping developed by Lucent Technologies was also important for the improvement of the framework. The focus of it is also on technology and products, the difference is that the output is not just composed of one roadmap, but a set of roadmaps for products and technologies that will guide the decision making. The process was divided in four steps (Gouvea et al., 2019):

1. Step 1: market. In this phase, the market segments considered in the process are analyzed, together with the customers' needs in this segment and the competitiveness from the main players.
2. Step 2: product. In this phase, the product drivers are defined, that is, the most valuable attributes by the customers, together with the creation of a historic price evolution, a roadmap of product platforms and a plan of product development.

3. Step 3: technology. In this phase, the technology roadmap is built, consolidating the product and market information. Here, the current situation and the future expectations of the importance of some functionalities are analyzed. Also, the team is responsible to estimate the costs of the product development to explore potential cost cuts.
4. Step 4: planning. Finally, in this phase, all the information from the previous phases are analyzed in order to propose an unified action plan. Also, a risk roadmap is created to analyze risks related to the execution of the plan..

Figure. 8. Lucent Technologies technology roadmap



Source: Phaal (2009)

According to EIRMA (2007), the roadmapping process developed by the EIRMA (*European Industrial Research Management Association*) mentioned below was responsible for being the reference most of the recent roadmaps developed. The process was divided in eight phases that will be further detailed below (EIRMA, 2007):

1. Phase 1: pre-project. This phase is responsible to recognize the problem, define the unit of analysis, define the planning horizon, and responsible to lead the process and identify the information inputs.
2. Phase 2: team building. In this phase, the team responsible for developing the roadmap is formed, composed by multidisciplinary professionals from inside the organization and also with external experts to help in certain topics.

3. Phase 3: preliminar plan. In this phase, all the information required to develop the project is collected, including the technological requirements, the evolution of the market, evolution of the product, customer trends, competitive positioning analysis, intelligence competition, definition of the visions and scope of the roadmap.
4. Phase 4: inputs processing. This phase is responsible for data gathering using the roadmap framework as reference, targeting to create a first draft of the roadmap, highlighting the critical regions.
5. Phase 5: summary of the work in a document (roadmap). Phase composed by an improvement in the first roadmap draft developed in the previous phase, by reviewing the integrating the strategic path pulled by the market or pushed by technologies. Also, in this phase, a document describing all the information used is created,.
6. Phase 6: verification, consultation and communication planning. In this phase, the results are presented in order to validate the information and define the action plan that needs to be detailed to the managers responsible to implement it.
7. Phase 7: elaboration of a decision making report (optional). This phase is responsible to include an additional report with requirements needed to support the managers decision making process.
8. Phase 8: updating. The process owners need to guarantee the existence of a process to update the roadmap.

According to Phaal et al (2001), the standard T-Plan process was developed to help in the product and technology planning. It is composed by four workshops that are further detailed below (Phaal et al, 2001).

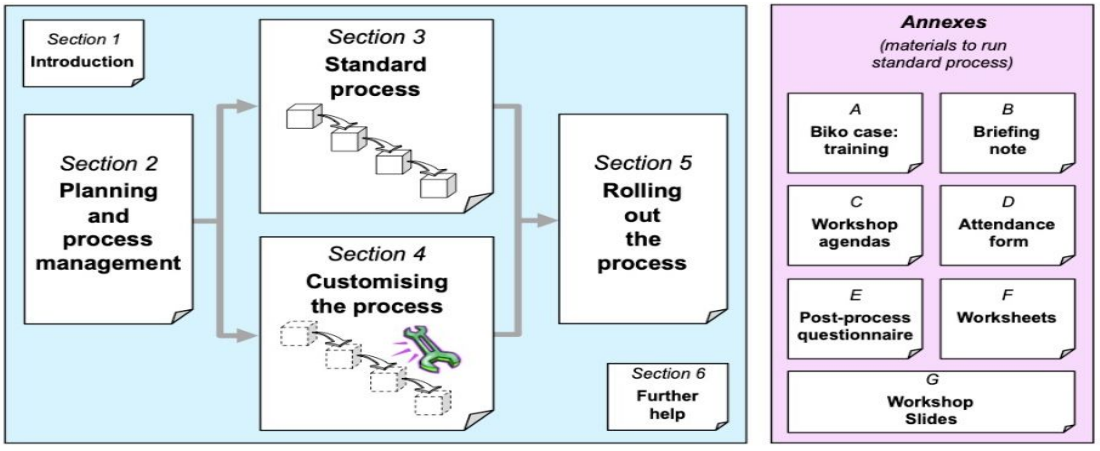
1. Market: analysing the performance and dimensions; market and business drivers; prioritization; SWOT analysis; and Gaps analysis.
2. Product: analysing product feature concepts; grouping; impact ranking; product strategy and; gaps analysis.
3. Technology: technology solutions; grouping; impact ranking; gaps analysis
4. Roadmapping: linking technology resources to future market opportunities; gaps analysis.

Figure. 9. S-plan workshops

Source: Robert Phaal (2001)

According to Phaal et al. (2004), the planning phase is the most important phase in order to customize the roadmap and the roadmapping process. In addition, the author explains that the ownership of the roadmap is critical, first by a single and determined person or group of people (committee), then by the ones that will participate in its creation and ultimately by the organization. In this way, it is important to designate a person to manage the process and coordinate all the workshops. In addition, it may be necessary to bring experts from market, product and technology in order to validate the assumptions designed by the organization. Finally, aligning the capabilities of the roadmapping method with business goals and context are key for the success

Figure. 10. T-Plan guide structure



Source: Robert Phaal (2001)

According to Phaal et al. (2004), research has continued to explore further the generalization and customization of the roadmapping approaches. In this way, the S-Plan roadmapping was developed to support the definition of innovation strategies. It starts with an exploratory focus and ends with a conclusive focus. The architecture of a S-Plan follows the main layers relating to “why”, “what” and “how”. The general process can be divided in three main steps described below (Phaal et al. 2004):

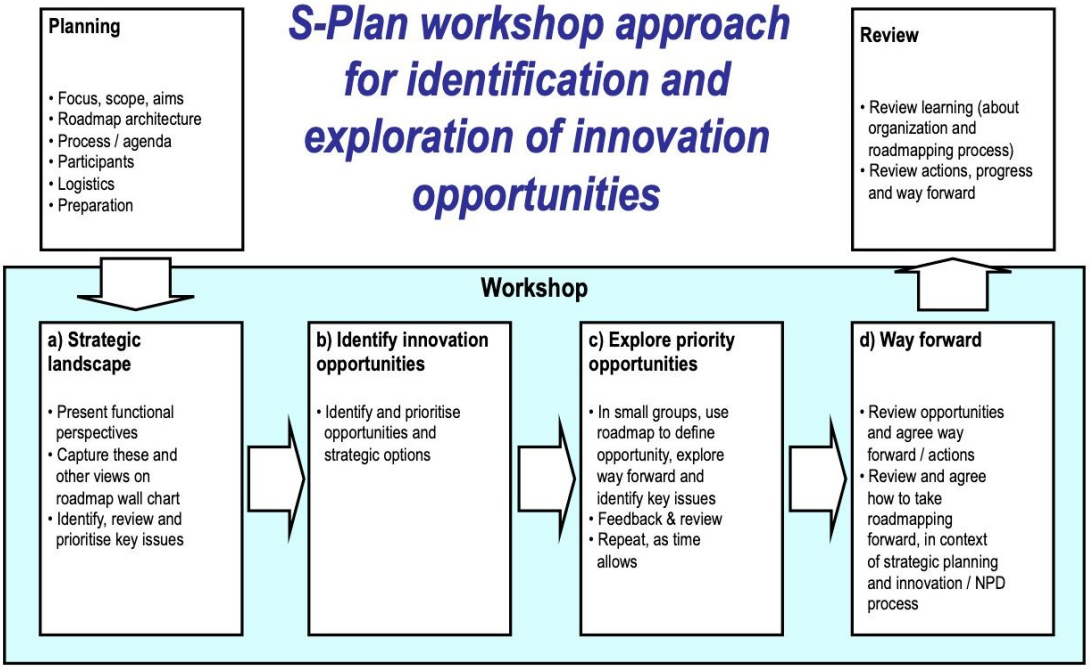
1. Strategic mapping: in this step, the context of analysis is considered, for example a business unit or one specific organization. The participants use a defined roadmap architecture to generate ideas and topics to be further investigated. Then, they present their first impression to the group; collect all the information and vote for the most promising topics.
2. Topics detailing: the group is divided into small groups, each will investigate (problems, solutions, risks and opportunities) one specific topic using concise roadmaps focused on the technology, product and markets, in order to define objectives, goals and actions.
3. Results review: the groups present their results for all participants, discussing for each topic potential improvements to reach a final proposal. Thus, the results obtained must focus on objectives and actions to be implemented.

Phaal et al. (2004) also presents the “S-plan” roadmapping process and its six key steps as represented below, considered a generic approach that can be used to successfully identify and tackle opportunities. The process can be flexible in terms of number of participants and timing, based on organization needs and resources available. The base case process is set up to be a one-day workshop and the process is self-sustainable, and the role of the facilitator is mainly time keeping. The success can be determined by the active involvement of those participating (Phaal et al. 2004).

1. Planning: collaborative design process involving the business and process owners in which the focus, scope and aims are defined together with the roadmap layout, participants, logistics and preparation.
2. Workshop stage (a): building up a strategic landscape based on presentations and brainstorming activity, using a roadmap template, being able to identify and share perspectives of the scope of interest, being also able to identify the key issues..
3. Workshop stage (b): identification and prioritization of strategic opportunities and using strategic landscape as a resource to provide context. Criteria should be defined by the author based on his organization.

4. Workshop stage (c): exploring priority opportunities in detail, using the same roadmap architecture from previous workshops, in sessions where the first roadmap draft is presented.
5. Workshop stage (d): workshop in which all the content is summarized after the workshops to reach to conclusion in order to define action plans and communicate the learning points. Owner should identify the amount of time necessary to do it.
6. Review: step to be done to guarantee that the action plan and learning points are taken forward by the organization. No specific date or duration needs to be defined here, being open to each owner to decide.

Figure. 11. S-plan workshop approach



Source: Phaal (2001)

According to Phaal et al. (2004), the usage of roadmapping in companies is limited. A survey of 2.000 UK firms indicated that around 10% of companies have applied a technology roadmapping approach. Key challenges reported were keeping the roadmapping process on an ongoing basis and starting or developing the technology roadmapping process. Some reasons why companies do not apply roadmapping are that there are many specific forms of roadmaps that need to be adjusted to the specific companies needs; and there is little practical support available in companies that typically reinvent their process. .Phaal et al (2004) also highlight that there are two key challenges to overcome in order to make it adopted in an

efficient way. The first, as mentioned before, is to keep the roadmap alive, that is, updating periodically (at least once a year) the roadmap and keeping it up to date as the events happen; this can be done in the budget period that most companies do annually. The second one is to spread the usage of roadmapping in other areas of the organization, and in order to do so, the requirements of roadmaps can be done by senior management (top-down) with format being specified or not; and by using the method where a potential fit with a business issue is identified. While some players choose to use roadmapping for a participar situation on a one-off basis, others have really incorporated it in the core of its business activities for planning and strategic processes.

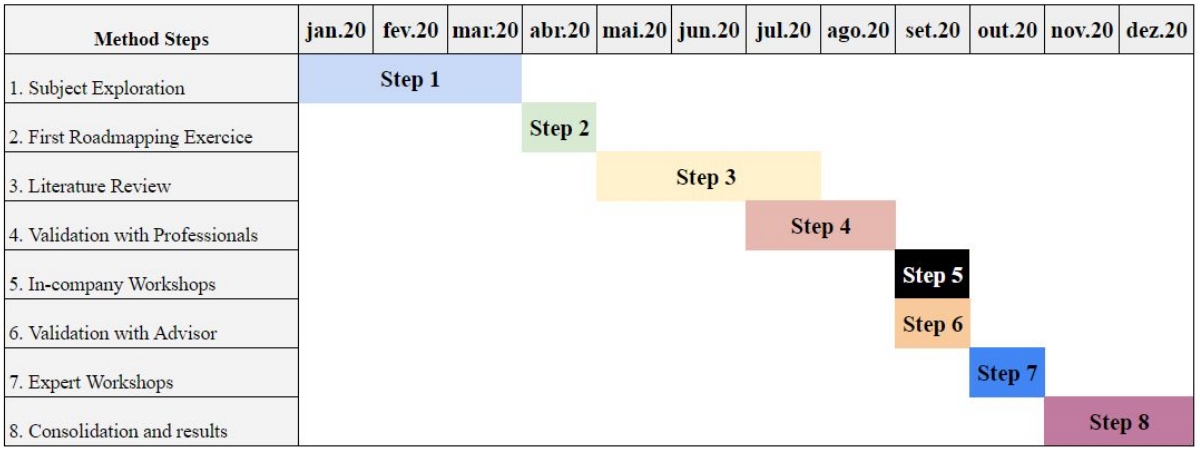
According to R. Phaal et al (2004), softwares have an important role in supporting the usage of roadmapping in companies. Nevertheless, their usage alone definitely can not deliver a successful roadmapping outcome, being necessary to integrate it with the human aspects of roadmapping. Therefore, one of the benefits of roadmapping is building up a common vision of where the organization is and what is the path to achieve the company's goals going forward, promoting a deep knowledge sharing inside the organization, with defined action plans.

Finally, the main points presented in this section and their contributions for the next steps of this research are detailed ahead. On the roadmap front, this section has presented a set of different types and formats of roadmaps (e.g. EIRMA, Motorola, etc.), that helped the author to create his own layout and roadmap format. The different formats and layers presented by R. Phaal et al were analyzed by the author. In addition, the communication part of the roadmap was an important aspect that was analyzed by the author when creating its roadmap layout. On the roadmapping front, the roadmapping processes and its steps described previously (e.g. T-plan and S-plan) developed by R. Phaal et al were used as inspiration for the author to produce his own roadmapping process (Z-plan) that are customized to its needs as an investor. Also, the planning phase of the roadmapping is key to build a successful roadmapping process. In addition, on the process, the challenges on maintaining a roadmap alive were considered in order to build an efficient roadmapping process with just necessary steps.

3. Method

The method used in this research will be fully detailed below. It was divided in nine steps, being executed from January 2020 to December 2020. The step 1 is the subject exploration and research project; step 2 is the first roadmapping exercise; step 3 is the literature review; step 4 is the first roadmapping validation with professionals; step 5 is the in-company workshops - internal roadmap; step 6 is the validation with advisor; step 7 is the expert workshops - external roadmap; step 8 is the consolidation, results and conclusion. The timeline of the steps executed is shown in the Figure below.

Figure. 12. Method timeline



Source: elaborated by the author

3.1. Subject exploration and research project

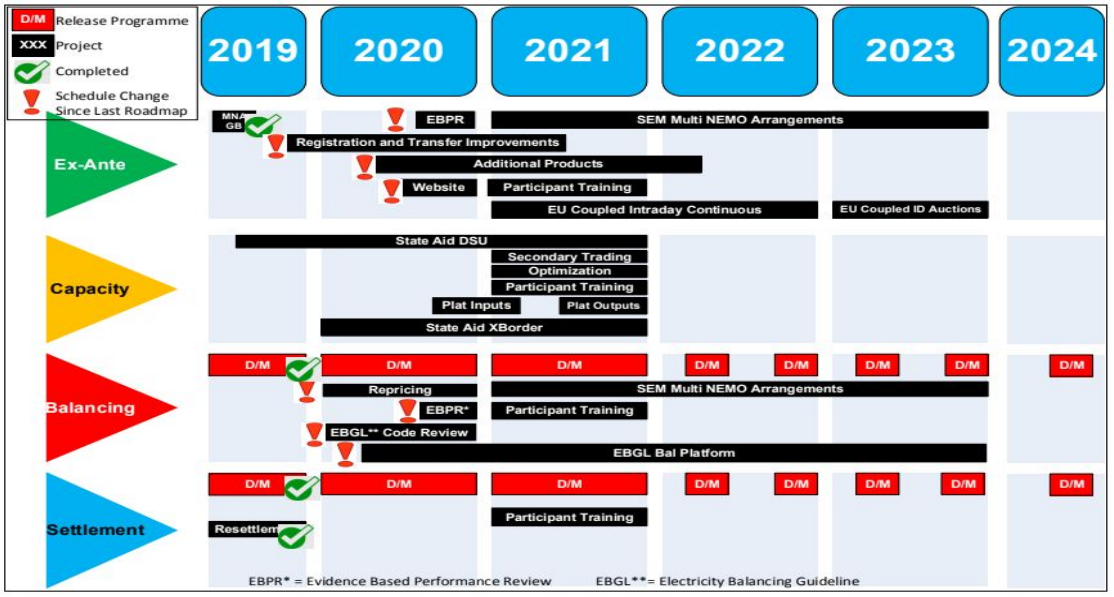
The first step in the method was to better understand the subject of roadmapping and start exploring this powerful tool for managing innovation. In order to do so, the author has created some roadmaps to be used as benchmarks117 of expected results. In addition, the author has done a preliminary research about roadmapping and its characteristics, by reading some of the most relevant references. The author also has done a research on internet to find companies roadmaps, such as the one developed by EirGrid plc and SONI Limited, two companies in Ireland, and the one developed in Brazil for FINEP, a public entity created to stimulate science, technology and innovation, both represented below.

Table. 1. 5W1H - Subject Exploration

What	This step was composed by three activities: the first one is to research about roadmapping tool to get acquainted with the subject; the second one was to analyze roadmap examples to understand potential outputs; finally, the third one was to elaborate the research project to be executed in this report.
Why	The goal of this step is to gain comfort with the subject being studied in this research, roadmapping process, in order to better understand its characteristics, and to propose a research project for this report.
When	Step execute from to February 2020 to March 2020 (60 days).
Where	Given the COVID-19 pandemic, this step happened in the authors residence, with meetings with advisor using Zoom Video Conferencing.
Who	The roadmap author (owner) has executed the research alone with guidance from its project advisor.
How	The author's advisor has provided a book about roadmapping for the author to read; some roadmap examples on the internet and in documents; and also indicated websites for the author to research roadmapping examples. Then, the author had 60 days to work on the preliminary research to get acquainted with the subject and to propose a research project.

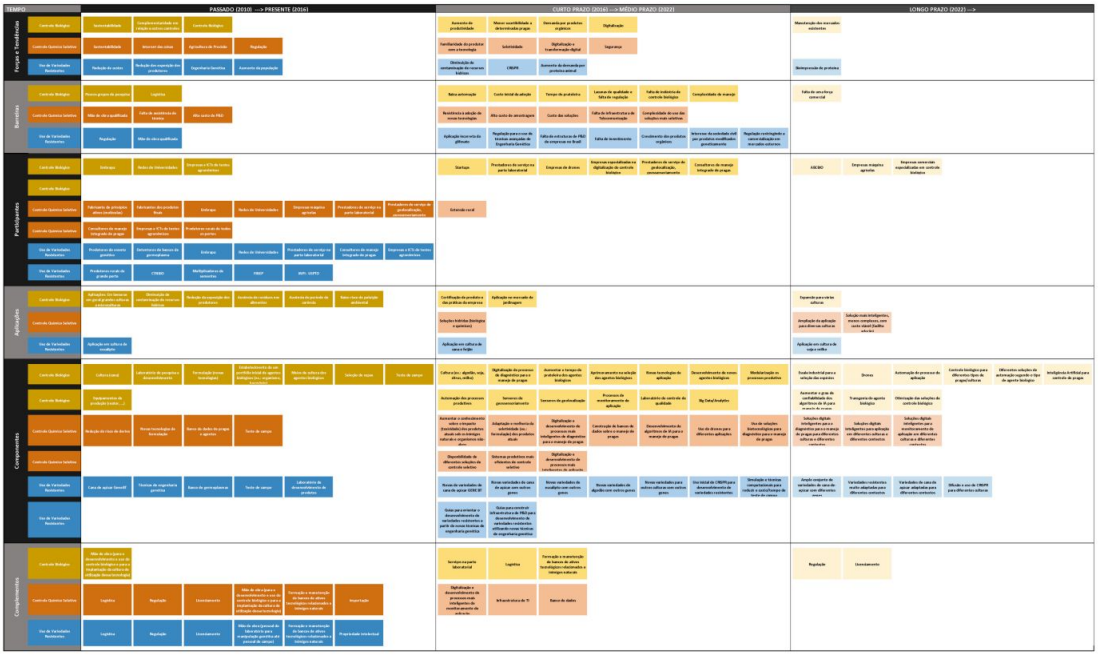
Source: elaborated by the author

Figure. 13. EirGrid plc and SONI Limited market development roadmap



Source: EirGrid plc and SONI Limited (2019)

Figure. 14. Roadmap for Innovation in Integrated Pest Management



Source: Project FINEP - UNESCO - Manejo Integrado de Pragas (2018)

The key learning from this step was to have contact with different roadmaps, showing that the tool can be used in many circumstances and markets. The layout is another aspect that can be developed in different ways, depending on the audience that the roadmap is going to address. The content is also defined by the author based on its needs, being the same for

the time period. Another learning was regarding the process of roadmapping, that can be executed in many ways, for example the process created by the EIRMA (*European Industrial Research Management Association*) with 8 steps, the T-plan and S-plan created by R.Phaal in the CTM (*Centre for Technology Management*).

3.2. First roadmapping exercise (Pilot Version)

After analyzing roadmapping examples, researching about the subject and proposing a project for this research, the author has moved to the second step, which is to execute a preliminary roadmap ("first roadmapping exercise"), as described below.

Table. 2. 5W1H - First Roadmapping Exercise

What	The second step was composed by sessions in which the author has developed the first version of the roadmaps for payment, credit and investment industries.
Why	The goal of this step is to produce the first version of the roadmap, using only the author's previous knowledge about the specific industries. This version will be used as a base for the next steps.
When	Elaborated in April-2020 in approximately 30 days.
Where	Given the COVID-19 pandemic, this step happened at the author's home-office, with meetings using Zoom Video Conferencing.
Who	The roadmap author (owner) is fully responsible for this step, receiving guidance from its advisor.
How	The author has defined a timeline of 30 days to produce three first version roadmaps (payment, credit and investment). First, the author has chosen the content of the map (technology, market, products and opportunities) and the layout. For each map, the author has done three different brainstorming: one for current technologies and potential new ones; one for current products and potential new ones; one for market and opportunities. After that, the author has done sessions for each map to consolidate the information in the roadmap layout.

Source: elaborated by the author

3.3. Literature review

After producing the first version of the roadmaps, the author started to study the literature available about roadmapping, by analyzing papers and books about the subject. The process is described below. The result is detailed in section 2 of this report.

Table. 3. 5W1H - Literature Review

What	The third step was composed by a complete literature review about the roadmapping process.
Why	The goal of this step was to learn more about roadmapping and understand what kind of methodologies were already developed by specialists in the segment.
When	Elaborated from May-2020 to July-2020 in approximately 90 days.
Where	Given the COVID-19 pandemic, this step happened at the author's home-office.
Who	The roadmap author (owner) is fully responsible for this step, receiving guidance from its advisor.
How	The advisor has provided a set of relevant published articles about roadmapping for the author to review. In addition, the author has also searched for new articles about the topic. After that, the author has summarized all articles in a document, and later has consolidated all the relevant information in a report.

Source: elaborated by the author

3.4. First roadmapping validation with professionals

During and after reviewing the literature available about roadmapping, the author started to collect feedback from its first version of roadmaps and roadmapping process with selected professionals with minimal experience in the industries target of the roadmaps. The process was detailed below and the results are detailed in section 4 of this report.

Table. 4. 5W1H - First roadmapping validation with professionals

What	The fourth step was composed by two activities: the first one was a feedback session, in which the author has invited two professionals (not experts in the industry) to provide feedback in the roadmap segments of technology, products, markets and opportunities; and also on the roadmapping process; the second activity is to adjust the process and the first roadmaps developed (pilot versions).
Why	The goal of this step was to improve the first roadmap version produced by the author alone and the process. The second version was used as a base for the next steps.
When	The fourth step was done between July and August 2020, with a session with professionals in July 9th.
Where	Given the COVID-19 pandemic, this step happened on author's home-office, using the platform Zoom Video Conferencing.
Who	The roadmap author (owner) and two selected professionals.
How	The author has guideded a 60 minutes session with two professionals (classmates at the university) to validate the content of the first roadmap version (pilot), regarding technology, products, market and opportunities. In addition, the author presented the "z-plan" roadmapping framework and collected feedback. Finally, the author has done sessions to adjust the three roadmaps (payment, credit and investment) based on their feedback and also adjusting the process.

Source: elaborated by the author

3.5. In-company workshops - internal roadmap

After finishing the validation and adjusting the first roadmapping exercise, the author has planned and executed in-company workshop sessions with GIC Brazil professionals, author's coworkers in order to build an organization view about the Brazilian industries of payments, credit and investment. The process was detailed below and the results are detailed in section 4 of this report.

Table. 5. 5W1H - In-company workshops

What	The fifth step was composed of workshops done with members of the author's organization, in which professionals provided their opinions and future visions about the roadmap contents. After that, the author will have adjusted roadmaps with the organization view.
Why	The goal of this step was to build a common final view from the author's organization about the roadmaps of payment, credit and investment.
When	All in-company workshops happened on September 23rd from 6pm to 9pm. The consolidation of all the information happend after that in the following days of September.
Where	Given the COVID-19 pandemic, this step should happen on author's home-office, using the platform Zoom Video Conferencing and the MURAL tool for building the roadmaps online.
Who	The roadmap author (owner) was responsible to guide the discussion with the author's organization professionals. A total of five professionals joined the session (a Senior Vice President; a Vice President; another Vice President; an Assistant Vice President and an Associate).
How	The author has scheduled a 3 hour slot from 6-9pm to do all workshops together with organization professionals using Zoom Video Conferencing System and MURAL application. Before that, the workshops, the author has uploaded the last version of the three roadmaps in the MURAL application. The first hour was used for the payment roadmap (approximately 20 minutes to discuss technology, 20 minutes about products and 20 minutes about market and opportunities). The second hour was used for the credit roadmap (approximately 20 minutes to discuss technology, 20 minutes about products and 20 minutes about market and opportunities). The third hour was used for the credit roadmap (approximately 20 minutes to discuss technology, 20 minutes about products and 20 minutes about market and opportunities. The author acted as a moderator and adjusted the map while professionals discussed. After that, the author has done sessions alone in the following days to adjust the map.

Source: elaborated by the author

3.6. Validation with advisor

After finishing the in-company workshops and adjusting the roadmap, the author has validated the roadmap and roadmapping process with the advisor. The process was detailed below and the results are detailed in section 4 of this report.

Table. 6. 5W1H - Validation with advisor

What	The sixth step was the validation with the author's advisor about the current roadmaps and the roadmapping process after having done in-company workshops.
Why	The goal of this step was to reflect about the roadmapping process and to confirm with the author's advisor if the implementation was being successful.
When	The advisor's validation happened on September 26th.
Where	Given the COVID-19 pandemic, this step should happen on author's home-office, using the platform Zoom Video Conferencing and WhatsApp tool for exchanging messages and documents.
Who	The roadmap author (owner) and his advisor have participated.
How	The author has sent documentation materials and has settled up a meeting with its advisor in order to present the outcome of the in-company sessions and to recap the "z-plan" roadmapping framework. The author has also presented the list of experts confirmed to validate the roadmap in the next phase.

Source: elaborated by the author

3.7. Expert workshops - external roadmap

After validating the roadmaps and the z-plan framework with the advisor, the author has conducted workshops with industry experts in order to validate the content from the three roadmaps (payment, credit and investment) done after the in-company workshops. The process was detailed below and the results are detailed in section 4 of this report.

Table. 7. 5W1H - Expert Workshops

What	The seventh step was composed of workshops done with industry experts, in which the author presented the last roadmap version produced in the previous workshop and had collected feedback from all elements. The participants had a deep knowledge in the specific industry from the roadmap.
Why	The goal of this step was to validate and enhance the elements inserted in the roadmap developed after in-company workshops, by collecting feedback and new inputs from the interviewed.
When	A total of 10 workshops (each one with a different expert) were developed during the October-2020 month.
Where	Given the COVID-19 pandemic, the workshops happened using the platform Zoom Video Conferencing.
Who	The roadmap author (owner) was responsible to interview 10 industry experts, 4 of them for the payment roadmap (Head of Relationship at Blu Pagamentos; Product Director and Board Member at Acesso Digital; Partner at Oliver Wyman; and Associate Partner at Bain & Company); 3 of them for the credit roadmap (Co-founder & CEO of a55; Fixed Income / Credit Director at Credit Suisse; Partner & CEO at Paketá Crédito) ; and 3 of them for the investment roadmap (CTO & Founder at Toro Investimentos; Chief Strategist at Avenue; Partner at Oliver Wyman) . Complete biographies and backgrounds are described in section 4.
How	First, the author has built a list of potential experts with experience in the industries from the roadmaps, using his personal networking and the LinkedIn social media. After that, the author has invited 22 experts to be part of the study and was able to confirm interviews with 10 of them. After that, the author has prepared a list of questions to guide the discussion for each roadmap (payment, credit and investments. Finally, the author has conducted workshops with each of them, that is, a zoom meeting with approximately 30 to 45 minutes, in which the author has shown the last version of the roadmap for the expert, collecting his feedback and suggestions in each topic.

Source: elaborated by the author

3.8. Consolidation, results and conclusion

Finally, after conducting all workshops with experts, the author adjusted the roadmaps using the information, inputs and feedback from the sessions, resulting in three final roadmaps (payment, credit and investment). Lastly, the author has analyzed the results of the roadmaps, and has defined action plans based on the project goals of the roadmapping process. The process was detailed below and results are detailed in section 4 of this report.

Table. 8. 5W1H - Consolidation, results and conclusion

What	The eighth step was composed of fourth activities: the firs was to consolidate the information from the expert sessions and adjust the roadmaps; the second one was to analyze the results of the roadmapping and reach to conclusions; the third one was to create action plans based on the conclusions; finally, the fourth activity was to use the roadmap to communicate the messages in the author's organization.
Why	The goal of this step is to analyze the results of the roadmap in order to have conclusions of potential areas to focus from an investment standpoint. In addition, another goal is to propose an action plan for the author's organization and also to present the results.
When	This step happened from November 2020 to December 2020.
Where	Given the COVID-19 pandemic, this step happened on author’s home-office, using the platform Zoom Video Conferencing.
Who	The author was responsible to analyze the results and propose the action plan. In addition, the author should discuss the action plan with the author's organization members and decide the best way to present the roadmap internally.
How	The author has done sessions alone to organize the feedbacks from the expert sessions and to build the final roadmaps of payment, credit and investment. After that, the author has done a few sessions alone to analyze the results from the roadmap according to its goals, and then define action plans based on that. Finally, the author has discussed the action plans in a session with his coworkers and has scheduled a slot to present the conclusions of the research for them.

Source: elaborated by the author

4. Z-Plan roadmapping framework

After having explored the subject of roadmapping and analyzed examples of roadmaps executed, the author has built a roadmapping framework that is described ahead. The goal of this specific research was to create a roadmapping framework ("Z-plan") and apply it for the Brazilian industries of payments, credit and investment, in order to build action plan for a Private Equity fund to solve the problems of (i) finding promising companies to receive investment; and (ii) better positioning its portfolio companies in face of innovations in these markets.

The Z-plan is a generic roadmapping framework that could be used by anyone in every organization. The key person responsible to execute and lead the roadmapping process will be called roadmap leader or mediator.

The justifications of this research project are related to creating a process that should help any professional in its job as an investor in a fund manager in face of the innovations that are happening recently.

The literature to be reviewed was the one related to roadmapping process creation related to innovation in product development and market assessment. The author plans to analyze the roadmapping frameworks in the literature in order to create its own framework that would be suitable to its needs.

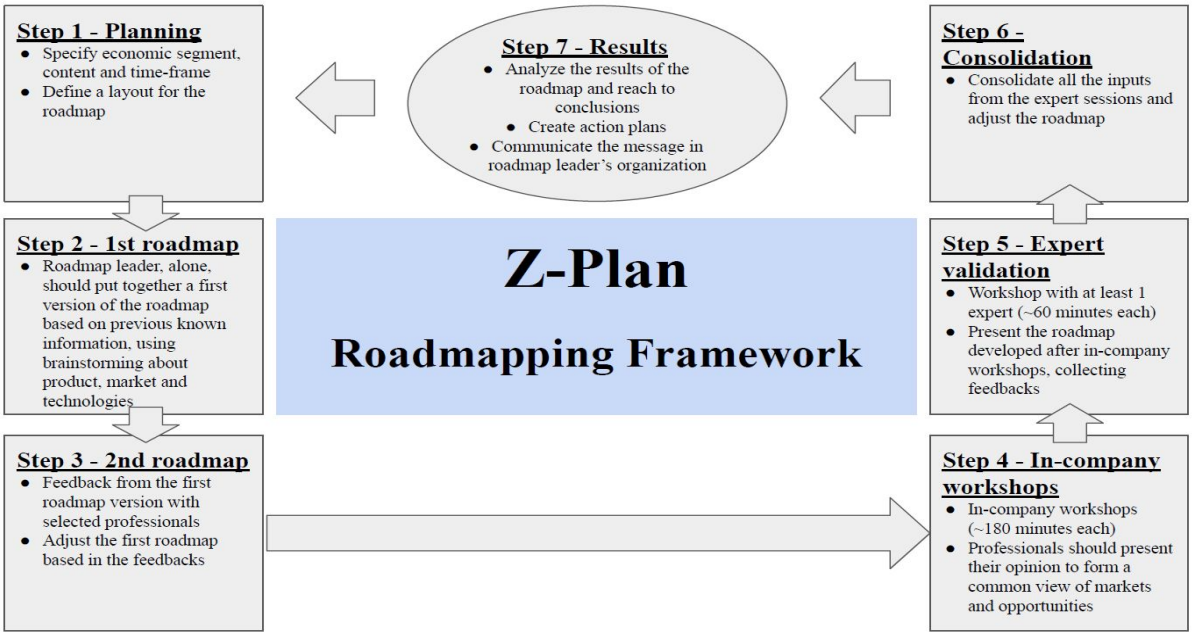
The difference of the "Z-plan" from the other availables roadmapping process is related with the timeline, number of resources needed and content. Regarding timeline, the idea of the roadmap is to be able to execute it in approximately one to three months, therefore being more agile than the typical ones, as a characteristic of the investment industry where opportunities are analyzed in this time interval. Regarding the number of resources and time spent with organization members, as being focused in an investment team of seven individuals, the idea is to use a low number of organization members, in a way that the roadmap author is empowered to execute all the activities alone or with experts. Finally, the content should focus on the investment topics, such as market opportunities.

4.1. First version of Z-plan framework

After having a deep understanding of the many different roadmapping methods described in the previous section and also having practised how to build a roadmap, the author has propose a custom roadmapping framework that is suitable to the needs of a Private Equity manager: (i) find promising companies in specific segment to receive investments;

and (ii) help in the value creation process for current portfolio companies. The "Z-plan" framework is illustrated in below:

Figure. 15. First Z-Plan framework overview (7 steps)



Source: elaborated by the author

1. In the Planning step, the roadmap leader should define what will be the economic segment of the roadmap, the content should be technology, products, markets and opportunities; and the timeframe to be analyzed. In addition, the leader should also define a layout to be used.
2. In the First roadmap version (pilot) step, the roadmap leader should produce a first version (pilot) of the roadmap with the content defined previously. To do so, the leader should do a 30 minutes brainstorming for each category (technology, product, market / opportunities) and also a 30 minutes session to consolidate all the information relevant in the roadmap layout.
3. In the Feedback and Second Roadmap Version step, the roadmap leader should invite professionals with no necessary expertise in the segment and collect feedback in roadmap segments of technology, products, markets and opportunities. Thus, the leader should arrange a 60 minutes session to show the roadmap and collect feedbacks.
4. In the In-company Workshops step, the roadmap leader should arrange an in-company workshop with organization members in order to create a common view of technology, product and market for the roadmap industry. This workshop should last

180 minutes, composed by 60 minutes of discussion about the current situation, 60 minutes about the second time interval, and 60 minutes for the last time interval and future trends.

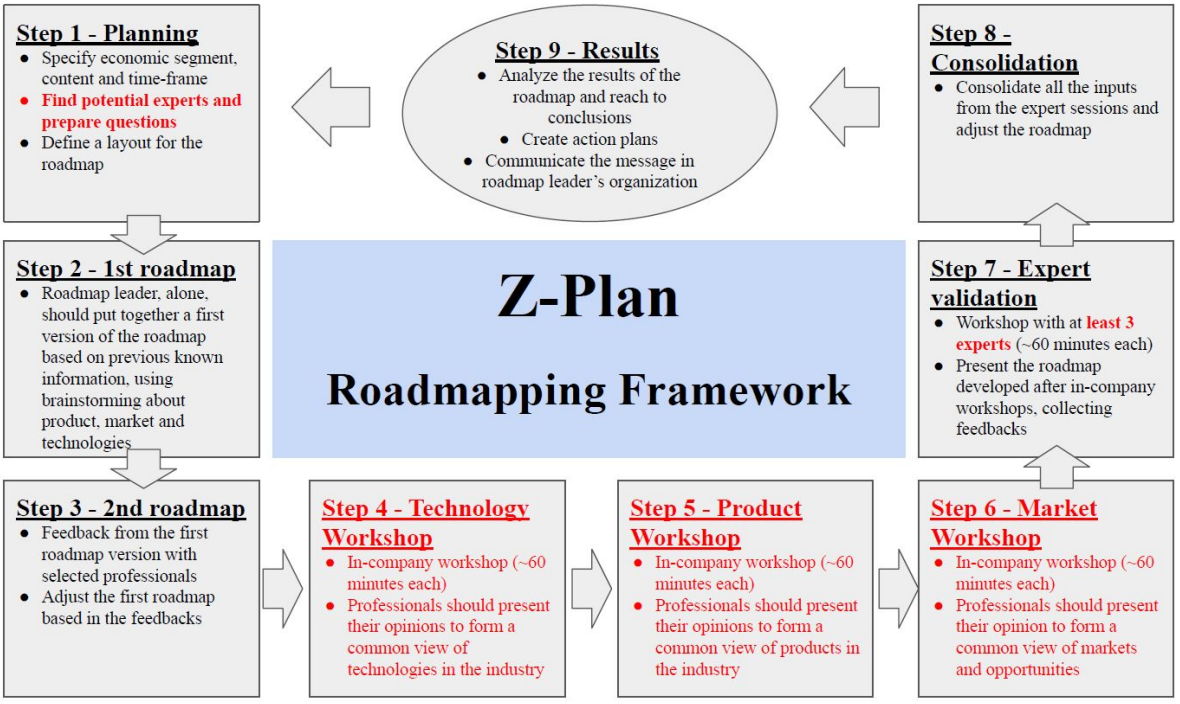
5. In the Expert Validation Workshop step, the roadmap leader should find 1 potential expert to validate the roadmap content. Before the session, the leader should prepare a list of questions to guide the discussion. Finally, the leader should arrange a meeting (virtual or physical) of 60 minutes in which the leader should present the last roadmap version and collect feedback.
6. In the Consolidation Workshop step, the roadmap leader should consolidate feedback received from the expert in a final roadmap. To do so, the leader should do a session of 60 minutes.
7. In the Results, Action Plan and Communication step, the roadmap leader should analyze the results from the final roadmap version, in order to reach to conclusions about the industry. In addition, the leader should prepare action plans based on the conclusions and then communicate to its organization. To do so, a session of around 120 minutes should be enough to analyze results and propose action plans. Furthermore, a session of 30 minutes should be done to discuss action plans with the organization; and another session of 30 minutes to communicate the results and conclusions.

4.2. Professionals feedback and second Z-plan framework

After executing the feedback session of the first roadmap version with two professionals, the author has adjusted the "z-plan" framework in order to make it more efficient. The contributions and adjustments are described ahead. The first adjustment was done in the first step (planning), in which the roadmap leader should increase the activity of starting finding potential experts since it may take a lot of time to find availability in their agenda. The second adjustment was also in the planning step, that the leader should also create a list of questions to be used in the expert validation section. The third adjustment was in the expert validation workshops, in which the roadmap leader should find at least 3 experts instead of just one, given that only one view about the roadmap could be biased. The fourth adjustment was to split the step of in-company workshops in three different steps (one for technology, other for product and other for market) that could be executed in different days

and sessions. The adjusted Z-plan framework is represented below, with red items representing the adjustments versus the first version.

Figure. 16. Adjusted Z-Plan framework overview (9 steps)



Source: elaborated by the author

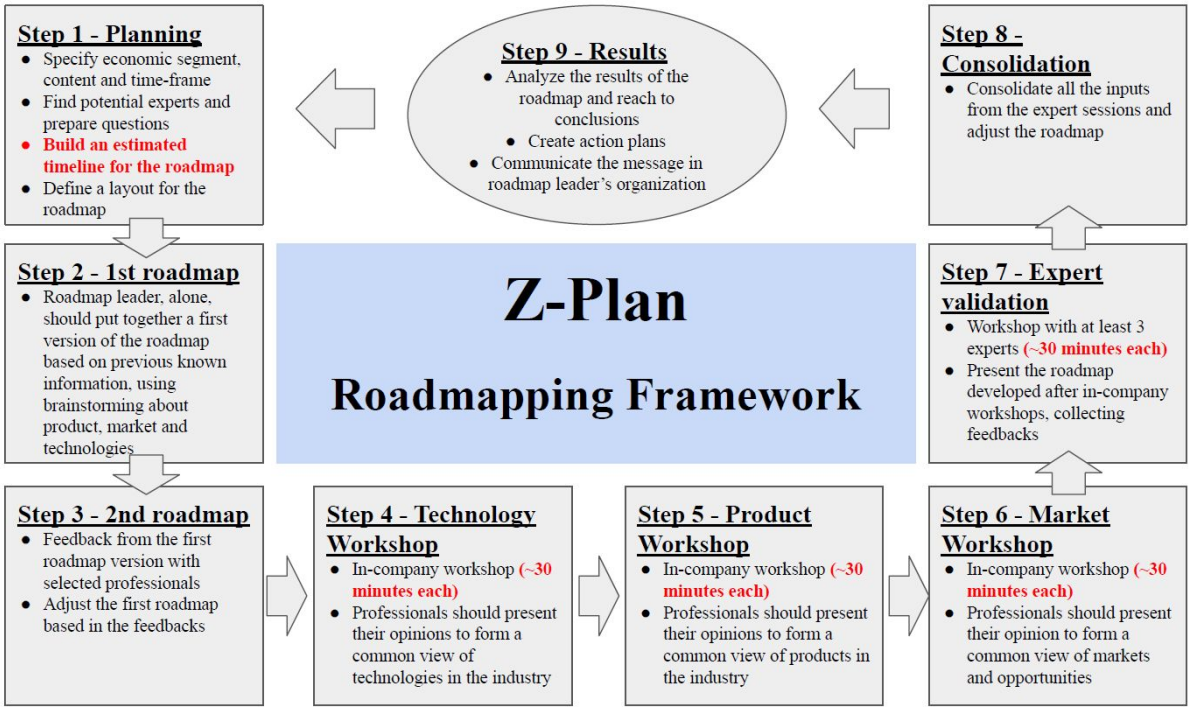
1. In the Planning step, the roadmap leader should define what will be the economic segment of the roadmap, the content should be technology, products, markets and opportunities; and the timeframe to be analyzed. In addition, the leader should also define a layout to be used.
2. In the First Roadmap Version (pilot) step, the roadmap leader should produce a first version (pilot) of the roadmap with the content defined previously. To do so, the roadmap leader should do a 30 minutes brainstorming for each category (technology, product, market / opportunities) and also a 30 minutes session to consolidate all the information relevant in the roadmap layout.
3. In the Feedback and Second Roadmap Version step, the roadmap leader should invite professionals with no necessary expertise in the segment and collect feedback in roadmap segments of technology, products, markets and opportunities. Thus, the leader should arrange a 60 minutes session to show the roadmap and collect feedbacks.

4. In the Technology In-Company Workshop step, the roadmap leader should arrange an in-company workshop with organization members in order to create a common view of technology for the roadmap industry. This workshop should last 60 minutes, composed by 20 minutes of discussion about current situation, 20 minutes about second time interval, and 20 minutes for last time interval and future trends.
5. In the Product In-Company Workshop step, the roadmap leader should arrange an in-company workshop with organization members in order to create a common view of products for the roadmap industry. This workshop should last 60 minutes, composed by 20 minutes of discussion about current situation, 20 minutes about second time interval, and 20 minutes for last time interval and future trends.
6. In the Market In-Company Workshop step, the roadmap leader should arrange an in-company workshop with organization members in order to create a common view of technology for the roadmap industry. This workshop should last 60 minutes, composed by 20 minutes of discussion about the current situation, 20 minutes about second time interval, and 20 minutes for the last time interval and future trends.
7. In the Expert Validation Workshops step, the roadmap leader should find one expert to validate the roadmap content. Before the session, the roadmap leader should prepare a list of questions to guide the discussion. Finally, the leader should arrange a meeting (virtual or physical) of 60 minutes in which the author should present the last roadmap version and collect feedback.
8. In the Consolidation Workshop step, the roadmap leader should consolidate feedback received from the expert in a final roadmap. To do so, the leader should do a session of 60 minutes.
9. In the Results, action plan and communication step, the roadmap leader should analyze the results from the final roadmap version, in order to reach to conclusions about the industry. In addition, the leader should prepare action plans based on the conclusions and then communicate to its organization. To do so, a session of around 120 minutes should be enough to analyze results and propose action plans. Furthermore, a session of 30 minutes should be done to discuss action plans with the organization; and another session of 30 minutes to communicate the results and conclusions.

4.3. Advisor feedback and final Z-plan framework

After collecting feedback from the author's advisor, the "z-plan" roadmapping framework was adjusted and the final version is fully detailed below. The first adjustment was to incorporate an estimated timeline for the roadmap, in order to estimate the exact period to discuss results. The second adjustment was done in the in-company sessions (step 4, 5 and 6), in which the roadmap leader should do a 30 minutes session for each of them, instead of the previous 60 minutes, to make it more efficient and less costly for organization members. Finally, the third adjustment was done in the expert validation step, in which the roadmap leader suggested to reduce the session from 60 minutes to 30 minutes in order to ease the expert acceptance in the project. The changes are represented in red below.

Figure. 17. Final. Z-Plan framework overview (9 steps)



Source: elaborated by the author

Figure. 18. Z-Plan framework overview with participants (9 steps)

Z-Plan	Step 1 Planning	Step 2 First Roadmap Version	Step 3 Feedback / Second Version
Description	1. Specify the roadmap economic segment and content 2. Find at least 3 experts for each roadmap 3. Estimated schedule for next activities 4. Define a layout	1. Brainstorming for each category: technology, product, market and opportunities 2. Elaborate first roadmap version in the specific layout	1. Collect feedback in the first roadmap version with at least one professional 2. Consolidate the inputs and adjust in a new version of the roadmap
Participants	Roadmap Leader (owner) Organization members	Roadmap Leader (owner)	Roadmap Leader (owner) Volunteer Professionals

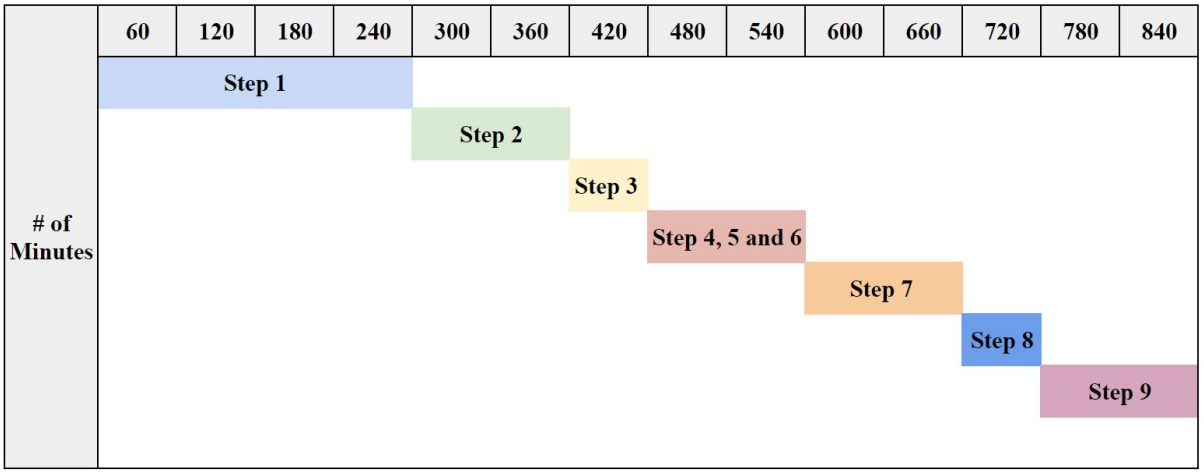
Z-Plan	Step 4 Technology Workshop	Step 5 Product Workshop	Step 6 Market Workshop
Description	1. Session of around 30 minutes with organization members to validate the technology segment of the roadmap	1. Session of around 30 minutes with organization members to validate the product segment of the roadmap	1. Session of around 30 minutes with organization members to validate the technology segment of the roadmap
Participants	Roadmap Leader (owner) Organization members	Roadmap Leader (owner) Organization members	Roadmap Leader (owner) Organization members

Z-Plan	Step 7 Expert Validation	Step 8 Consolidation Workshop	Step 9 Results and Communication
Description	1. Session with industry experts to validate the technology view 2. Session with industry experts to validate the product view 3. Session with industry experts to validate the market and opportunities view	1. Session to consolidate in a final roadmap all views of technology, products, market and opportunities	1. Analyze the results, discuss conclusions and action plans 2. Present the results to organization leaders
Participants	Roadmap Leader (owner) Industry Experts	Roadmap Leader (owner)	Roadmap Leader (owner) Organization members

Source: elaborated by the author

The chart below represents an estimated timeline of the amount of time needed to complete the "Z-plan" roadmapping process, which is approximately 840 minutes or 14 hours. The roadmap leader should be free to choose which days it should execute each step, varying accordingly to stakeholder's availability.

Figure. 19. Z-Plan Estimated Timeline in Minutes (9 steps)



Source: elaborated by the author

The method and steps defined by the author as "Z-plan" will be explained below:

1. In the Planning step, four main activities should be addressed by the roadmap leader. The first one, is to specify the economic segment and the content that will be approached in the roadmap, that is, defining the group of activities present in this market, also highlighting some companies that are part of it; in addition also define the time-frame to be used. The second activity is to gather potential experts on this economic segment that will help to validate the data discussed in the next steps, and also professionals to provide feedback for the first roadmap version. The idea is to find at least one expert for each category inside the roadmap: market; product and technology. In order to filter the best experts, the author will use many alternatives, such as personal networking and LinkedIn. In addition, the roadmap leader should prepare and send a list of key topics and questions for discussion. The third activity is to build an estimated time schedule for the workshops, varying according to the availability of the stakeholders (author, organization members and experts). The fourth activity is to define and build the layout that should be used to summarize the messages from the roadmap, in order to communicate it in an efficient way.
    a. Content: the roadmap must contain four important characteristics that investors need to analyze before executing an investment: (i) market

participants: analyze the sustainability of current market participants and try to predict new potential markets, (ii) product: analyze what are the successful products today and which of them tend to remain important for customers in the long term; and (iii) technology: analyze what are the current technologies that sustain the products and how new technologies can disrupt the current market; (iv) opportunity: given the current technologies, products and market dynamics, there some opportunity that can be explored by competitors in order to gain more relevance.

b. Time-frame: is important for the roadmap to be in line with the time horizon that investors look at, being usually 5 years ahead. Thus, the roadmap should have three time intervals: (i) Current year: representing the current situation; (ii) Year 2 to Year 3 to Dez-2022: representing the medium term view; and finally (iii) Year to Year 5: representing the long term view.

Table. 9. Instructions - Step 1 - Planning

What	The planning step is composed by four key activities to be completed: (1) Specify the economic segment, content and time-frame; (2) Find potential experts to validate the roadmap and professionals, also building up questions; (3) Build an estimated schedule for the workshops; and (4) Define a layout to be used.
Why	The goal of this step is to organize and plan the content of the roadmapping, in order to have a holistic view of the process, the stakeholders, the estimated output and timeline.
When	First step of the "Z-plan" roadmapping process done in a suitable date decided by the roadmap leader
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction among participants.
Who	The roadmap leader should be fully responsible for this step.
How	The roadmap leader should do sessions of 30-60 minutes for each activity. For

	session (1), leader should specify which industry to focus on based on their goals; for session (2) should use LinkedIn platform and personal networking to select potential experts from the industry choosed and also professionals to validate the first version; for session (3) should use the Excel tool to build an estimated timeline for the execution of all steps; for session (4) should use PowerPoint and Mural tools to build a roadmap layout.

Source: elaborated by the author

2. In the First Roadmap Version (pilot) step, the roadmap leader alone should put together a first view of the roadmap in the three-time intervals described above. The leader should use his personal knowledge about the topics, and also use internet research if needed. The process is described as follows, for each roadmap:

Table. 10. Instructions - Step 2 - First Roadmap Version (pilot)

What	The second step is composed by a session in which the roadmap leader should produce a first version of the roadmap. Is expected for this version to be much more simple than the final one.
Why	The goal of this step is to produce the first version of the roadmap, using only the roadmap leader's previous knowledge about the specific industries. This version should be used as a base for the next steps.
When	Second step of the "Z-plan" roadmapping process, done after first step, in a suitable date decided by the roadmap leader
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction among participants.
Who	The roadmap leader should be fully responsible for this step.
How	The roadmap leader should do a 120 minutes session composed by (i) 30 minutes brainstorming about current technologies and potential new ones; (ii) 30 minutes brainstorming about current products and potential new ones; (iii) 30 minutes brainstorming about market and opportunities; (iv) 30 minutes to organize the valid information into a clean sheet with a desired layout.

Source: elaborated by the author

3. In the Feedbacks and Second Roadmap Version step, , the roadmap leader should collect feedback in a session with at least one professional as follows.

Table. 11. Instructions - Step 3 - Feedbacks and Second Roadmap Version

What	The third step is composed by a feedback session, in which the roadmap leader should invite professionals (no needed to be from the industry) to provide feedback in the roadmap segments of technology, products, markets and opportunities.
Why	The goal of this step is to improve the first roadmap version produced by the leader alone. This second version should be used as a base for the next steps.
When	Third step of the "Z-plan" roadmapping process, to be done after the second step, , in a suitable date decided by the roadmap leader
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction among participants.
Who	The roadmap author (owner) and selected professionals.
How	The author should guide a 60 minutes session composed of (i) 20 minutes to discuss technology; (ii) 20 minutes to discuss products; (iii) and 20 minutes to discuss market and opportunities. In this session, the questions to guide the discussion are: In our view, do you agree with the current technologies, products, market participants and opportunities? Is there anything missing? How do you think they will evolve in the next 2-5 years?. Finally, the leader should redo the roadmap (second version of the roadmap).

Source: elaborated by the author

4. In the Technology In-Company Workshop step, one activity will be developed in order to create a final view of the technologies that supports the market approach in the roadmap. The activity is to validate and adjust the first roadmap version, by interacting with members of the organization, that is, collecting inputs and feedback from different professionals.

Table. 12. Instructions - Step 4 - Technology In-Company Workshop

What	The fourth step is composed of workshops done with members of the roadmap leader's organization, in which professionals should provide their opinions and future visions about the technology part of the roadmap.
Why	The goal of this step is to build a common final view from the leader's organization about the current technology and future perspectives.
When	Fourth step of the "Z-plan" roadmapping process, to be done after the third step, in a suitable date decided by the roadmap leader
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction among participants.
Who	The roadmap leader should be responsible to guide the discussion with author's organization professionals.
How	The roadmap leader should guide a meeting of around 30 minutes with team members of leader's organization to be completed as follows: (i) 10 minutes discussing the current (until 2020) technology scenario; (ii) 10 minutes discussing the technology scenario from 2020-2022; and (iii) 10 minutes discussing the the technology scenario from 2022-2025. Finally, the leader should adjust the roadmap using these inputs.

Source: elaborated by the author

5. In the Product In-Company Workshop step, one activity will be developed in order to create a final view of the products approached in the roadmap. The activity is to validate and adjust the first version, by interacting with members of the organization, that is, collecting inputs and feedback from different professionals.

Table. 13. Instructions - Step 5 - Product In-Company Workshop

What	The fifth step is composed by workshop done with members of the roadmap leader's organization, in which professionals should provide their opinions and future visions about the product part of the roadmap.

Why	The goal of this step is to build a common final view from the leader's organization about the current technology and future perspectives.
When	Fifth step of the "Z-plan" roadmapping process, to be done after fourth step, in a suitable date decided by the roadmap leader
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction among participants.
Who	The roadmap leader should be responsible to guide the discussion with author's organization professionals.
How	The roadmap leader should guide a meeting of around 30 minutes with team members of author's organization to be completed as follows: (i) 10 minutes discussing the current (until 2020) product scenario; (ii) 10 minutes discussing the product scenario from 2020-2022; and (iii) 10 minutes discussing the the product scenario from 2022-2025. Finally, the leader should adjust the roadmap using these inputs.

Source: elaborated by the author

6. In the Market Workshop step, one activity will be developed in order to create a final view of the specific market approached in the roadmap. The activity is to validate and adjust the first version, by interacting with members of the organization, that is, collecting inputs and feedback from different professionals. In order to help in the data gathering process, the roadmap leader will also discuss opportunities and trends in this market.

Table. 14. Instructions - Step 6 - Market Workshop

What	The sixth step is composed of workshops done with members of the roadmap leader's organization, in which professionals will provide their opinions and future visions about the market and opportunities part of the roadmap.
Why	The goal of this step is to build a common final view from the roadmap leader's organization about the current market participants and opportunities and also to discuss future perspectives.

When	Sixth step of the "Z-plan" roadmapping process, to be done after fifth step, in a suitable date decided by the roadmap leader
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction among participants.
Who	The roadmap leader should be responsible to guide the discussion with author's organization professionals.
How	The roadmap leader should guide a meeting of around 30 minutes with team members of author's organization to be completed as follows: (i) 10 minutes discussing the current (until 2020) market scenario; (ii) 10 minutes discussing the market scenario from 2020-2022; and (iii) 10 minutes discussing the market scenario from 2022-2025. Finally, the leader should adjust the roadmap using these inputs.

Source: elaborated by the author

7. In the Expert Validation Workshop step, the activity to be done is to talk to at least 3 experts from the planning section (ideally one for each category: technology, product and market) in order to validate and have a final view of after having their inputs. The roadmap leader should prepare a list of questions to guide the discussion (detailed in the planning section) and schedule a meeting of around 30-45 minutes to cover it.

Table. 15. Instructions - Step 7 - Expert Validation Workshops

What	The seventh step is composed of workshops done with industry experts, in which the roadmap leader should present the last roadmap version produced in the previous workshop and also ask questions about market, products and technology trends.
Why	The goal of this step is to validate and enhance the elements inserted in the roadmap developed after in-company workshops, by collecting feedback and new inputs from the interviewed. The participant should have a deep knowledge in the specific industry from the roadmap.
When	Seventh step of the "Z-plan" roadmapping process, to be done after sixth step, in

	a suitable date decided by the roadmap leader
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction among participants.
Who	The roadmap leader should be responsible to guide the interview with a selected industry expert.
How	In a session of 30-45 minutes with each expert, the roadmap leader should show the last version of the roadmap for the expert, collecting his feedback and suggestions in each topic. In addition, the leader should use the list of questions and topics from the "Step 1 - Planning" to go deeper in specific points.

Source: elaborated by the author

8. In the Consolidation Workshop step, the roadmap leader should consolidate all the learnings from the previous step from the views of market, product and technology into the roadmap structure, synthesizing all the information in a visual format in the final roadmap.

Table. 16. Instructions - Step 8 - Consolidation Workshop

What	The eighth step is composed of a session to consolidate all the inputs from the interviews with experts and adjust the roadmap in a final version.
Why	The goal of this step is to produce a final version of the roadmap in order to have a final view of the industry.
When	Eighth step of the "Z-plan" roadmapping process, to be done after seventh step, in a suitable date decided by the roadmap leader
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction among participants.
Who	The roadmap leader should be fully responsible to consolidate the information and produce the final version.

How	In a session of approximately 60 minutes, the roadmap leader should collect the information registered in step 7 regarding technology, products, market and opportunity and select the most important ones to be adjusted in the previous version of the roadmap.

Source: elaborated by the author

9. In the Results, Action Plan and Communication step, the roadmap leader and group should analyze all the results and the final roadmap in order to have conclusions. Then, based on the conclusions, the author should create action plans.

Table. 17. Instructions - Step 9 - Results, Action Plan and Communication

What	The ninth step is composed of three activities: the first one is to analyze the results of the roadmapping and reach to conclusions; the second one is to create action plans based on the conclusions; finally, the third activity is to use the roadmap to communicate the messages in the roadmap leader's organization.
Why	The goal of this step is to analyze the results of the roadmap in order to have conclusions of potential areas to focus from an investment standpoint. In addition, another goal is to propose an action plan for the leader's organization and also to present the results.
When	Ninth step of the "Z-plan" roadmapping process, to be done after Eighth step, in a suitable date decided by the roadmap leader.
Where	This step should happen in a quiet and peaceful place recommended by the roadmap leader, with enough space to promote an effective interaction.
Who	The roadmap leader should be fully responsible to analyze the results and propose the action plan. In addition, the leader should discuss the action plan with the author's organization members and decide the best way to present it..
How	In a session of approximately 120 minutes, the roadmap leader should analyze the final roadmap to have conclusions and propose an action plan. After that, the leader should discuss in approximately 30 minutes the results and action plan with organization members and schedule 30 minutes to present the results internally.

Source: elaborated by the author

5. Results of Z-plan implementation in the Brazilian industries of payments, credit and investments

In this Chapter, after creating and adjusting the Z-plan roadmapping, the author presents the results of its application in the Brazilian industries of payments, credit and investments. These sectors were chosen because of their importance for the author's investment fund that usually analyzes various investment opportunities in this sector as the country is experiencing a disruption in these segments.

This Chapter is divided in five sections: first roadmaps version; second roadmaps version (after validation with professionals); third roadmaps version (after in-company sessions); fourth roadmaps version (after experts validation); and results and action plan.

5.1. Outputs - first roadmap version

By analysing the literature of roadmapping and after researching for benchmarks in the industry, the author decided that it was worth exploring it and developing a first draft of its roadmap, in order to practise the learnings from the previous section. Therefore, the author has chosen the financial segment market to build the roadmap.

The author has completed this step in three days, one day for workshop for each roadmap (payments, credit and investment). For each day, the author has done four steps in approximately 120 minutes: brainstorming about current technologies and future ones; brainstorming about current products and future ones; brainstorming about current market opportunities and future ones; and summary of key points in the roadmap format. The output of three roadmaps (credit, payments and investment segments) is shown below:

The first roadmap is the Credit segment. This segment of the financial sector is responsible for providing various types of credit to end customers:

- Example of modalities: (i) payroll loans, (ii) mortgage loans, (iii) unsecured loans, (iv) automotive loans, among other types.
- Example of players: traditional banks (Itaú, Bradesco, etc.) and credit fintechs (Geru, etc.).

The second roadmap is the Payment segment. This segment of the financial sector responsible for processing payments made by cards or wallets.

- Example of modalities: (i) buyers, (ii) sub-buyers, (iii) flags and (iv) card issuers; (v) wallets; (vi) foreign exchange.
- Example of players: stone, cielo, mastercard, allele, VR, Nubank, Picpay, etc.

The third roadmap is the Investment segment. This segment of the financial sector is responsible for allocating client capital in order to guarantee a financial gain.

- Example of modalities: (i) independent brokers; (ii) traditional banks
- Example of players: XP Investimentos, BTG Pactual Digital, etc.

Also, another important aspect of the roadmap is the time-horizon. The author decided that for a long term investment horizon the most suitable framework would be to look at a five year horizon with two divisions:

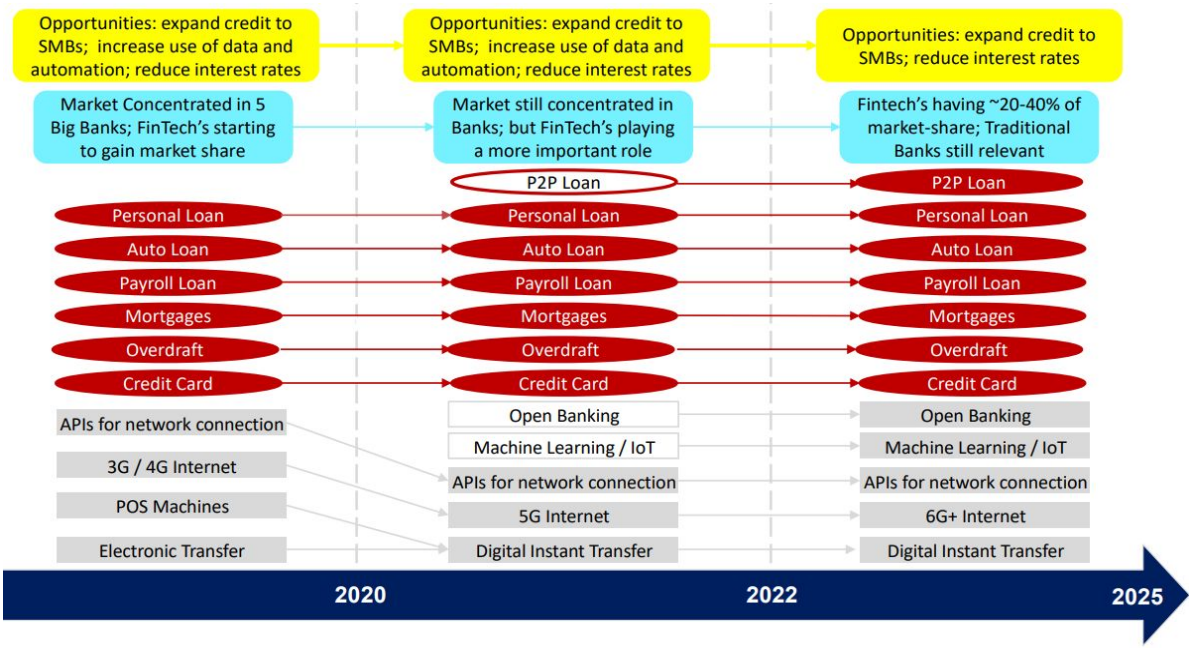
- Today (end of 2020): understanding today's market movements.
- 2 years ahead: medium term view.
- 5 years ahead: long term view.

The author also specified the decisions that would be made with the roadmap:

- Assist investment professionals in the Private Equity industry in the search for promising companies in the financial sector, anticipating market trends. In order to do so, few items should be considered: company size (revenue), company growth (revenue); size of the segment in which the company operates (Large, Medium, Small); growth of the market segment in which the company operates (define range of growth values); company profit margin; customer feedback (users).
- Assist the strategic positioning of companies in the portfolio of a Private Equity fund by development of new products / services and entering or exiting in some markets. The author also has specified which criteria will be used for each decision making. In order to do so, few items should be considered: what segment size does this product fit into; number of companies offering the product and service; profitability of similar products in companies that have adopted this product / service (define range of values); customer satisfaction of companies that use the service (define values).

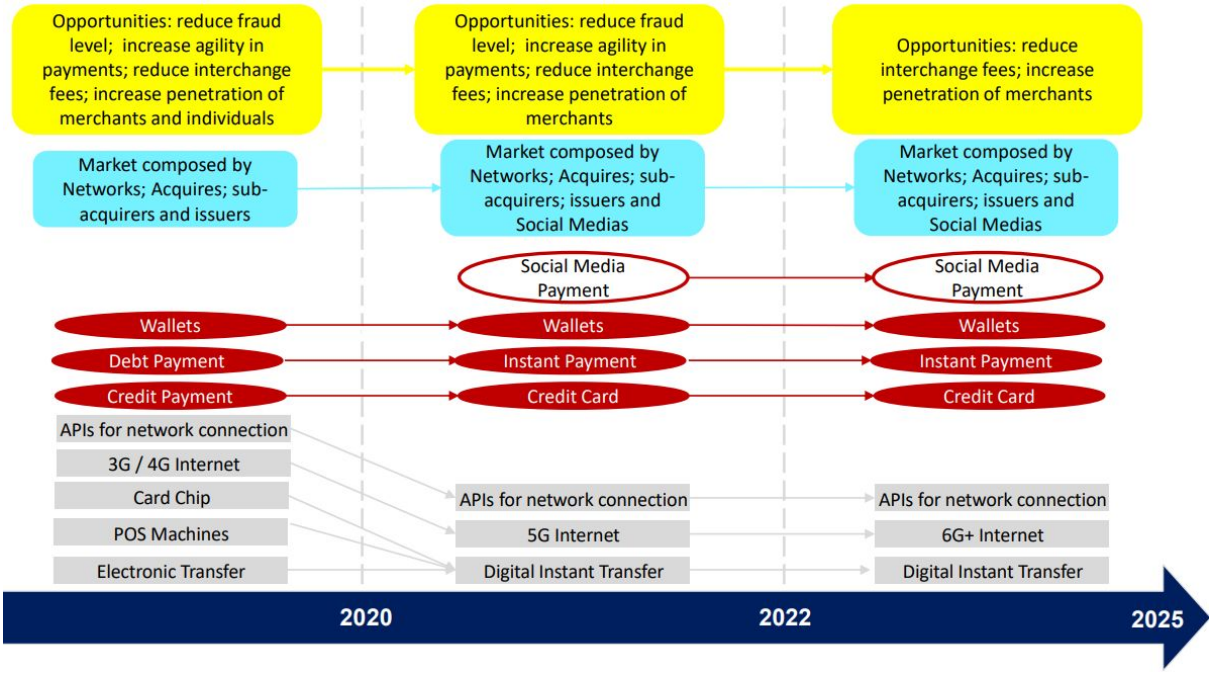
Finally, the author has developed a personalized visual layout that was simple to analyze the outputs of, following the structure of a technological roadmap with evolution of technologies, products and markets. Then, to execute the roadmaps, the author developed three different workshops of approximately 2 hour each to collect all the important information from each segment and insert it in the maps. The final results will be showed below:

Figure. 20. First credit roadmap - Brazilian financial market



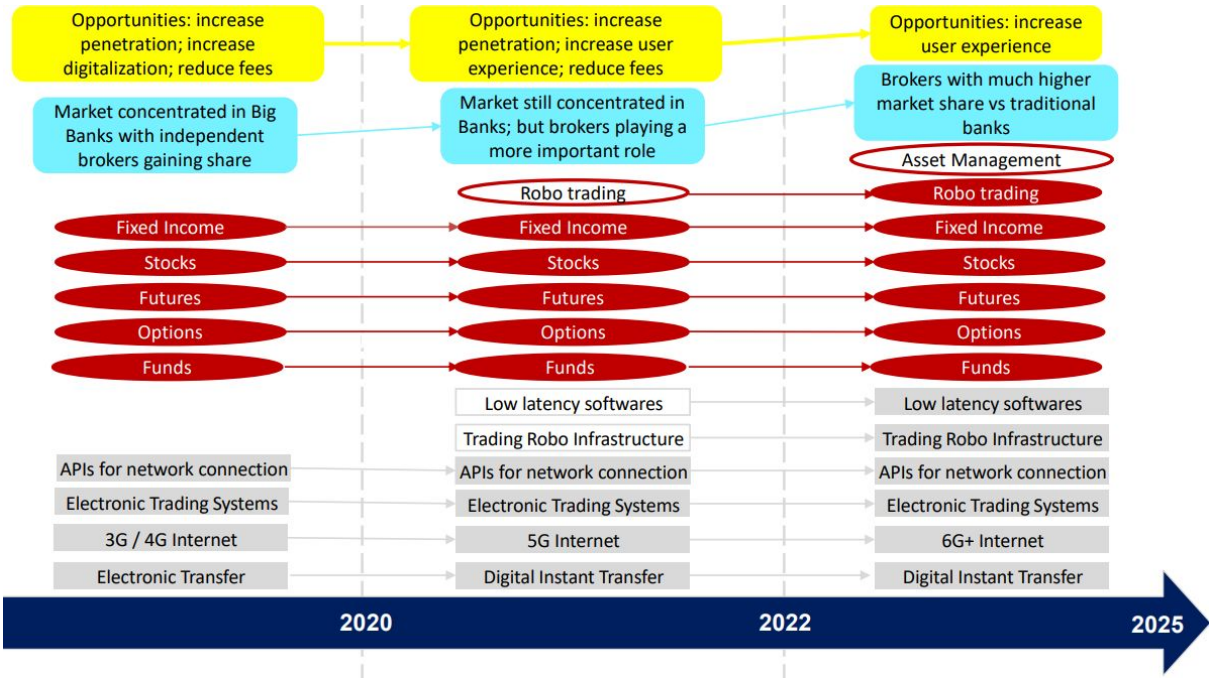
Source: elaborated by the author

Figure. 21. First payment roadmap - Brazilian financial market



Source: elaborated by the author

Figure. 22. First investment roadmap - Brazilian financial market



Source: elaborated by the author

In addition, as part of this step, the author has put together a list of key topics to be discussed with selected experts for a ~30 minutes meeting. In order to do so, the roadmap author has done a brainstorming of approximately 60 minutes for all the sections (technology, products and market) The questions for the payment expert is shown below:

- Technology discussion:
    - What are the current technologies that support the Brazilian payment industry? What are the most important ones?
    - In your view, how will they evolve in the next 2 years? And in the next 5 years?
    - What are potential new technologies for the next 2 years. And in the next 5 years? How will they impact the industry? What is missing for these technologies to exist?
- Product discussion:
    - What are the current products in the Brazilian payment industry? Which ones are you most familiar with?
    - In your view, how will their profit pool evolve in the next 2 years in all this segments? And in the next 5 years?

    - Are there products that tend not to exist anymore? Which ones?
    - What are potential new products for the next 2 years. And in the next 5 years? How will they impact the industry? What is missing for these products to exist?
    - What is the potential impact from Central Bank's Pix system in the existing products?
- Market discussion:
    - How is the current market concentration in these segments? What is the trend for the next 2-5 years? Are there players that tend not to exist anymore? Who should win more market-share?
    - What are the opportunities to disrupt this market? How will they evolve in the next 2-5 years?

List of key topics to be discussed with selected credit experts for a ~30 minutes meeting:

- Technology discussion:
    - What are the current technologies that support the Brazilian credit industry? What are the most important ones?
    - In your view, how will they evolve in the next 2 years? And in the next 5 years?
    - What are potential new technologies for the next 2 years. And in the next 5 years? How will they impact the industry? What is missing for these technologies to exist?
- Product discussion:
    - What are the current products in the Brazilian credit industry? Which ones are you most familiar with?
    - In your view, how will their profit pool evolve in the next 2 years in all these segments? And in the next 5 years?
    - Are there products that tend not to exist anymore? Which ones?
    - What are potential new products for the next 2 years. And in the next 5 years? How will they impact the industry? What is missing for these products to exist?
    - What is the potential impact from the Open Banking system in the existing products?

- Market discussion:
    - How is the current market concentration in these segments? What is the trend for the next 2-5 years? Are there players that tend not to exist anymore? Who should win more market-share?
    - What are the opportunities to disrupt this market? How will they evolve in the next 2-5 years?

List of key topics to be discussed with selected investment experts for a ~30 minutes meeting:

- Technology discussion:
    - What are the current technologies that support the Brazilian investment industry? What are the most important ones?
    - In your view, how will their profit pool evolve in the next 2 years in all these segments? And in the next 5 years?
    - What are potential new technologies for the next 2 years. And in the next 5 years? How will they impact the industry? What is missing for these technologies to exist?
- Product discussion:
    - What are the current products in the Brazilian credit industry? Which ones are you most familiar with?
    - In your view, how will they evolve in the next 2 years? And in the next 5 years?
    - Are there products that tend not to exist anymore? Which ones?
    - What are potential new products for the next 2 years. And in the next 5 years? How will they impact the industry? What is missing for these products to exist?
- Market discussion:
    - How is the current market concentration in these segments? What is the trend for the next 2-5 years? Are there players that tend not to exist anymore? Who should win more market-share?
    - What are the opportunities to disrupt this market? How will they evolve in the next 2-5 years?

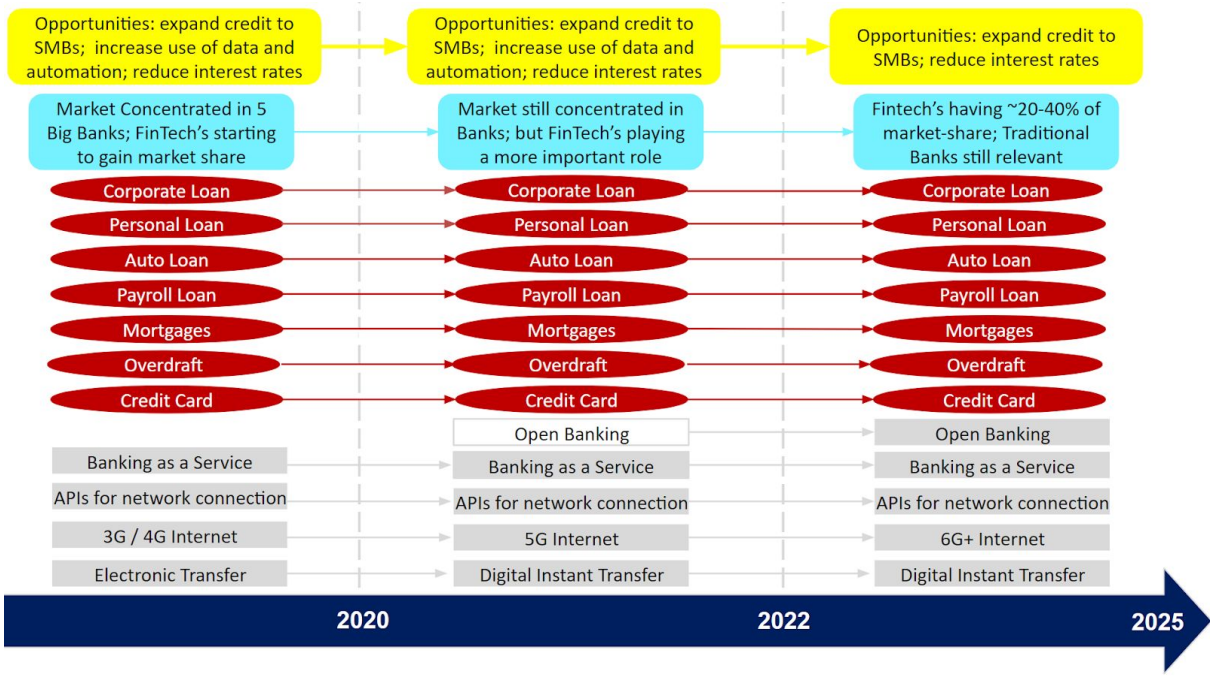
5.2. Outputs - second roadmap version (after validation with professionals)

The author has conducted two sections of around 30 minutes each in order to present the first roadmapping output and collect feedback from professionals with different backgrounds. The first one, with experience in the Brazilian Private Equity industry, and the second, with consulting and startup experience. The feedbacks will be further detailed below:

- Credit Roadmap: in the products category, one key important item to include is Agro Credit; Receivables Anticipation and Corporate Credit.
- Payment Roadmap: change the instant transference from technology to product; include "boleto" as a current payment method; include block chain and tokenization as technologies; and also include voice payment.
- Investment Roadmap: on products, robo trading is something that currently exist, some experts sell on a recurrent fee basis; also includes CDB (banking certificate) inside fixed income, debentures and cryptocurrencies as products. Also remove the technologies that already exist of robo trading and high speed software; and remove the product off asset management that already exist.
- Structure and layout: both professionals were ok with the roadmap structure and layout, being able to help on investment decisions.

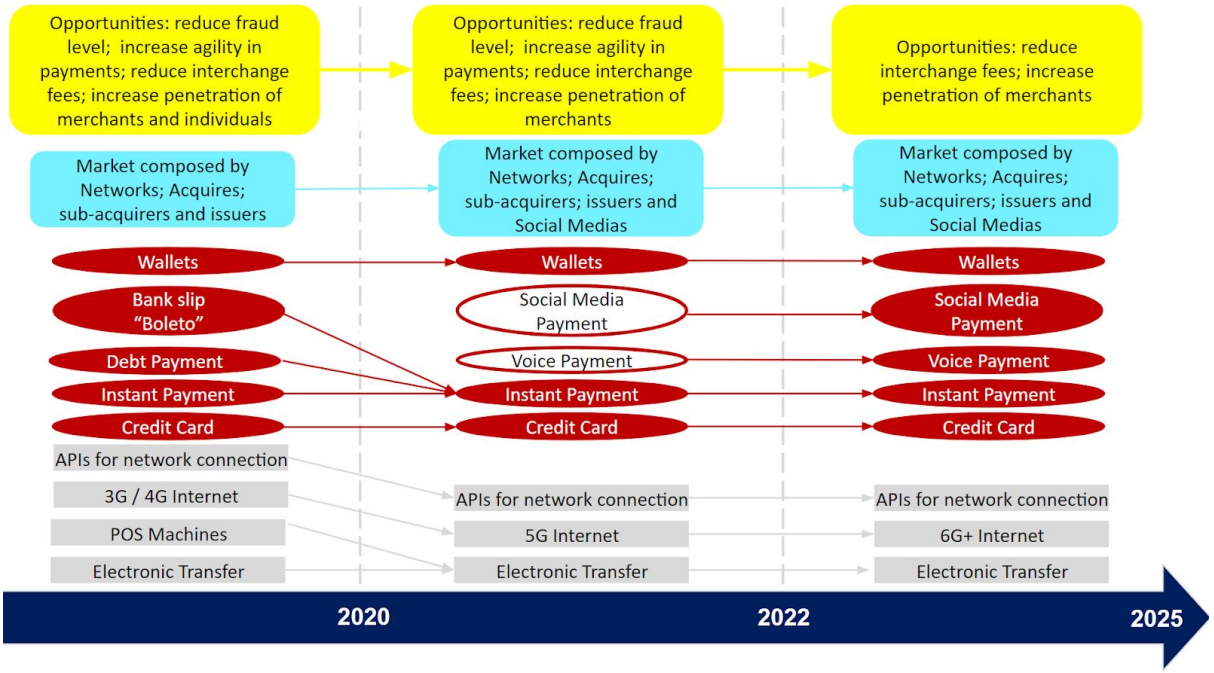
After collecting the feedback mentioned above, the autor adjusted the roadmaps. The results will be showed below:

Figure. 23. Second credit roadmap - Brazilian financial market



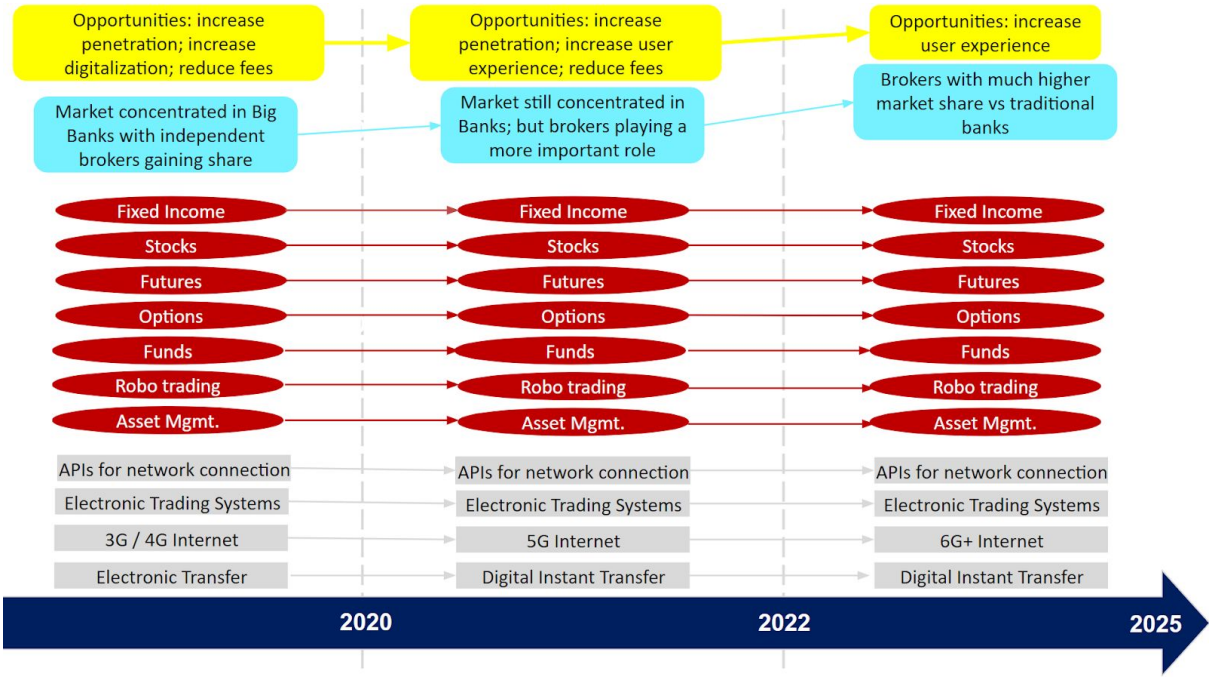
Source: elaborated by the author

Figure. 24. Second payment roadmap - Brazilian financial market



Source: elaborated by the author

Figure. 25. Second investment roadmap - Brazilian financial market



Source: elaborated by the author

5.3. Outputs - third roadmap version (after in-company sessions)

5.3.1. Payment roadmap

On September 23, 2020, a workshop was held with the author's coworkers to discuss the payment technology roadmap. Besides the author, a total of five professionals joined the discussion: a Senior Vice President; a Vice President; another Vice President; an Assistant Vice President and an Associate. Given the pandemic of COVID-19, the discussion happened using the Zoom Video Conferencing system. A total of approximately 20 minutes were used for this discussion focused on technology. The author has acted as a moderator and has used the platform Mural, a digital workspace for visual collaboration, to guide the discussion based on the previous roadmap developed.

The results are shown below and the topics are detailed in the tables below:

Table. 18. 2020 payment technologies after in-company workshops

Present until 2020	
Technologies	**Description**
Internet connection	All forms of connection to the internet that exist today with different speed levels: wireless (radio frequency); cable (coax cable); and cellular (many generations 3G, 4G and 5G).
Chip cards (EMV technology)	Type of card chips (smartcards) for payment transactions. EMV stands for Europay, MasterCard, and Visa, the name of a consortium that focus on the credit card sector and developed a global standard for chip-based security.
POS (Point of Sale) machines	Electronic payment terminal used in the point of sale to complete card transactions.
QR Code (static and dynamic)	Quick Response Code is a type of two dimensional barcode machine-readable that contains information. Static QR codes can’t be changed once they are created; and Dynamic QR codes can be editable and customizable after creation.
NFC (Near Field Communication)	Near Field Communication is a wireless technology that enables short-range communication between compatible devices (passive

	or active). Passive NFC devices include tags, and other small transmitters, that can send information without the need for a power source of their own.
Brazilian Payment System (SPB)	According to the Brazilian Central Bank, the Brazilian Payment System (SPB) comprises entities, systems and procedures related to the processing and settlement of fund transfer transactions, transactions with foreign currency or with financial assets and securities, collectively called operating entities for Financial Market Infrastructure (IMF). In addition to the MFIs, payment institutions and arrangements are also part of the SPB.
Instant Payment System	According to the Brazilian Central Bank, is an arrangement to be launched in November 2020, allowing quick transfers using specific keys (e.g. mobile phone) available 24 hours a day.
SWIFT network / code	According to SWIFT society, Society for Worldwide Interbank Financial Telecommunication (SWIFT) code is a 8-11 characters code used to identify international banks and agencies in a secure network that allows electronic messaging transfers.
APIs (Application Programming Interface)	Application programming interface is a computing interface that defines interactions between multiple software intermediaries, indicating the type of calls and requests that can be made.
Database (cloud or on premise)	A database is an organized collection of structured information, or data, typically stored electronically in a computer system.
Artificial Intelligence	Artificial intelligence refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The goals of AI are learning, reasoning and perception.

Source: elaborated by the author

The conclusion in the workshop was that the core technologies will remain the same from 2021 to 2022, with few improvements such as a fastest internet connectivity. However,

from 2022-2025, few technologies tend not be used anymore, such as Chip cards (EMV technology) and POS machines, as described below:

Table. 19. 2022-2025 payment technologies after in-company workshops - reasons for not using

2022-2025	
Technologies	**Reason why will not be used**
Chip cards (EMV technology)	According to coworkers' perception, physical cards tend not to exist anymore, as more efficient new payment solutions such as QR code and NFC in smartphones become more common.
POS (Point of Sale) machines	Likewise, as physical cards tend to be replaced, POS machines will no longer be needed as payments could be completed from a mobile application.

Source: elaborated by the author

On September 23, 2020, a workshop was held with the author's coworkers to discuss the payment product roadmap with the same coworkers and using the same technologies as mentioned above. A total of approximately 20 minutes were used for this discussion focused on products. The author has acted as a moderator to guide the discussion based on the previous roadmap developed.

The results are shown below and the topics are detailed below:

Table. 20. 2020 payment product after in-company workshops

Present until 2020	
Products	**Description**
Credit Card	Payment card (usually plastic) with a chip issued by a bank or financial services company that allows cardholders to borrow funds to pay for goods and services with merchants, as long as cardholders pay back the borrowed money plus any applicable interest or fees.
Debit Card	Payment card (usually plastic) with a chip issued by a bank or financial services company that deducts money directly from a consumer’s checking account to pay for a purchase, eliminating

	the need to carry cash.
Prepaid Card / Benefits Card	Payment card (usually plastic) with a chip issued by a financial services company that is pre-loaded with a certain amount of cash and can be used the same way as a credit card. It is commonly used as a benefits or gift card.
Bank slip (Brazilian "Boleto")	It's an official Brazilian payment method that works as a prefilled form with an amount to be paid for a service or product (push payment system).
Banking Transfer (Brazilian "TED" and "DOC")	In Brazil, interbank credit transfers include TED (Express Wire Transfer) and DOC (Credit Transfer Document). By using a TED, the related funds are made available at the beneficiary's account on the same day that the payer's account is debited. In a DOC, funds are made available on the following day.
Instant Payment (Brazilian "Pix")	Electronic money transfers in which the transmission of the payment order and the availability of funds to the receiving user occurs in real time and whose service is available 24 hours a day, every day of the year.
Wearable / Contactless / Face Id Payment	Payment method where machines capture customers payment information from NFC tags in cards, wearables or with face id scanning.
Social Media Payment	Used in association with instant payment, is a type of payment that can be initialized inside a social media application (e.g. Facebook).

Source: elaborated by the author

From 2021 to 2022, the workshop conclusion was that two products will no longer exist or the profit pool and use will reduce significantly: (i) bank slip (Brazilian "boleto"); and (ii) banking transfers (Brazilian "TED" and "DOC"), as detailed in the table below:

Table. 21. 2021-2022 payment product after in-company workshops - reasons for not using

2021-2022	
Products	**Reason why will not be used**
Bank slip (Brazilian "boleto")	According to coworkers' perception, bank slip is unlikely to remain a strong payment option after the increase in use of the Brazilian instant payment (PIX), as it is a costless solution with liquidation on the same day.
Banking transfers	Likewise, as instant payment increases penetration, other less efficient banking transfers (e.g. Brazilian "TED" and "DOC") tend to suffer a high decrease in population usage.

Source: elaborated by the author

In addition, from 2022-2025, the workshop members concluded that the product debit card is also likely to significantly reduce their market participation, as detailed in the table below:

Table. 22. 2022-2025 payment product after in-company workshops - reasons for not using

2022-2025	
Products	**Reason why will not be used**
Debit Card	According to coworkers' perception, debit card is unlikely to remain a strong payment option given that merchants should prefer to use instant payment as being a costless and fast solution.

Source: elaborated by the author

On September 23, 2020, a workshop was held with the author's coworkers to discuss the payment market roadmap with the same coworkers and using the same technologies as mentioned above. A total of approximately 20 minutes were used for this discussion focused on market and opportunities. The author has acted as a moderator to guide the discussion based on the previous roadmap developed.

The results are shown below and the topics are detailed below:

Table. 23. 2020 payment opportunities after in-company workshops

Present until 2020	
Opportunities	**Description according to coworkers**
Reduce fraud level in online purchases	Brazil has one of the highest fraud levels in online purchases globally and the losses of a fraud transaction are assumed by merchants, creating an good environment for anti fraud service providers to grow (e.g. Clearsale and Konduto).
Improve user experience in specific market verticals	There is an opportunity to increase user experience in payments by providing a (i) much faster checkout method (e.g. contactless); (ii) much more friendly interface; and (iii) tools for specific verticals (e.g. installment calculation for auto industry).
Reduce interchange fees for credit and debit card	There is an opportunity of card issuers and networks to offer a lower interchange fee for merchants and therefore be able to increase market-share.
Reduce acquiring / sub acquiring fees for credit and debit card	There is an opportunity of acquirers and sub acquirers to offer a lower processing fee for merchants and therefore be able to increase market-share.
Increase penetration of merchants and individuals (unbanked)	Cash payments are still relevant in Brazil. There is an opportunity of increasing penetration of POS machines in merchants that currently not accept cards and also to increase card penetration in individuals that typically use cash or not have a bank account.
Increase Integration with supplier base	There is an opportunity for acquirers to help merchants to buy products from their suppliers using a balance of receivables, without the need of anticipating it at high costs.
Increase penetration and experience in cross border payments	There is an opportunity to reduce cost and bureaucracy in cross border payments, helping customers to easily purchase goods from international sellers and also to transfer money from other countries.

Increase integration with management softwares	There is an opportunity for acquirers to offer management solutions for merchants in order to increase stickiness, avoiding price reductions to keep merchants in their base.
Increase penetration of prepaid cards	There is an opportunity for increasing penetration of prepaid cards in the customer base that uses cash and are unbanked. In addition, benefits card companies can increase penetration in small and medium companies.
Increase penetration of cryptocurrency payments	There is an opportunity for acquirers and card issuers to offer solutions for customers to pay their purchases using cryptocurrencies.
Increase penetration of banking as a service / whitelabel products	Retailers and non financial companies are willing to offer financial services products, such as prepaid card, wallets and credit cards. In this context, there is an opportunity for infrastructure players to offer outsourced banking solutions.

Source: elaborated by the author

From 2020 to 2022, the workshop conclusion was the same opportunities mentioned above will still be valid, however, from 2022-2025, three of them should no longer be relevant from a market perspective: (i) reduce fraud level in online purchases; (ii) improve user experience in specific verticals; and (iii) increase penetration of merchants and individuals.

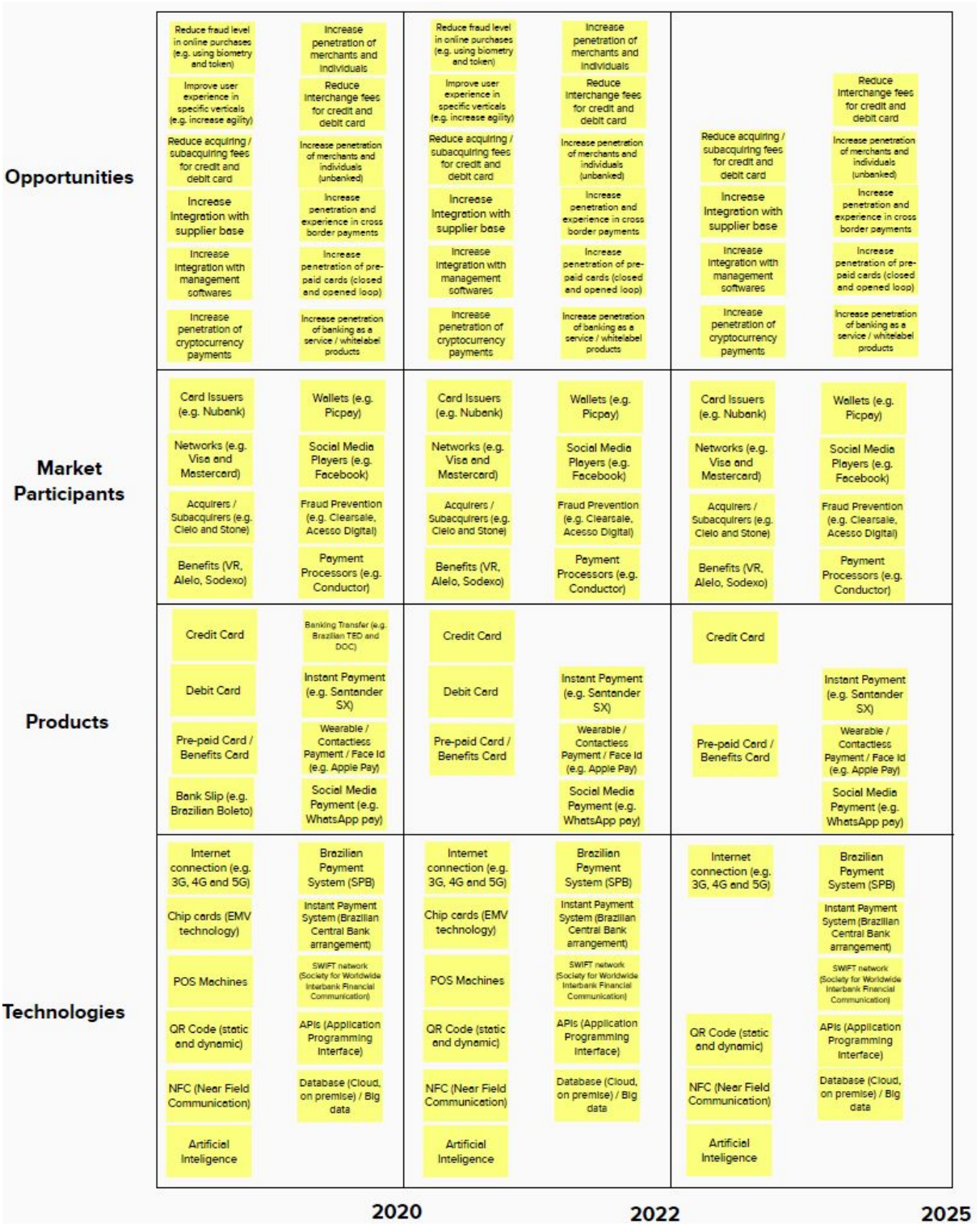
Table. 24. 2022-2025 payment opportunities after in-company workshops - reasons for no longer exist

2022-2025	
Opportunities	**Reason why will no longer exist**
Reduce fraud level in online purchases	According to coworkers' perception, fraud levels are reducing worldwide as new technologies gain traction, such as face id recognition and new security protocols, reducing the value proposition of anti fraud service providers.

Improve user experience in specific verticals	According to coworkers' perception, the user experience in payments is already good and should increase significantly in the next 2-5 years, reducing space for improvements going forward.
Increase penetration of merchants and individuals	According to coworkers' perception, the use of cash as payment option should reduce significantly as penetration of cards and wallets increases.

Source: elaborated by the author

Figure. 26. Payment roadmap after in-company workshops



Source: elaborated by the author

5.3.2. Credit roadmap

On September 23, 2020, a workshop was held with the author's coworkers to discuss the credit technology roadmap with the same coworkers and using the same technologies as mentioned in the payment roadmap above. A total of approximately 20 minutes were used for this discussion focused on technologies. The author has acted as a moderator to guide the discussion based on the previous roadmap developed.

The results are shown below and the topics are detailed below:

Table. 25. 2020 credit technologies after in-company workshops

Present until 2020	
Technologies	**Description**
Internet connection	Similar description from the Technology section in the Payment Roadmap.
APIs (Application Programming Interface)	
Database (Cloud, on premise) / Big data	
Artificial Intelligence	
Risk rating modeling	In order to evaluate the risk of providing credit for a company or individual, financial institutions use models built on different type of softwares (e.g. microsoft excel).
Positive credit score history	Use of data from historic transactions of individuals in order to provide a better risk assessment.

Source: elaborated by the author

The conclusion in the workshop according to coworkers was that the core technologies will remain the same from 2020 to 2025, with few improvements such as a fastest internet connectivity and more precise risk rating modeling.

On September 23, 2020, a workshop was held with the author's coworkers to discuss the credit product roadmap with the same coworkers and using the same technologies as mentioned in the payment roadmap above. A total of approximately 20 minutes were used for

this discussion focused on products. The author has acted as a moderator to guide the discussion based on the previous roadmap developed.

The results are shown below and the topics are detailed below:

Table. 26. 2020 credit products after in-company workshops

Present until 2020	
Products	**Description**
Credit Card Revolving	Credit associated with credit card product described in the payment roadmap, in which the user has a defined limit of money to borrow with a certain interest rate to pay.
Personal Loan / Overdraft	Loan granted to an individual by a financial institution without any specific reason to use or any collateral to guarantee the payment. Overdraft is a type of personal loan that is used when a bank account reaches zero balance, allowing customers to continue withdrawing money without having funds.
Car Loan	Loan granted to an individual by a financial institution with the specific use of buying a car. If customers default, the credit provider can use the car as a collateral.
Payroll loan	Loan granted to an individual by a financial institution without a specific use in which the collateral is the individual's salary.
Mortgages / Home Equity	Loan granted to an individual by a financial institution with the specific use of buying a house or real estate property. If customers default, the credit provider can use the property as a collateral.
Corporate Loan	Loan granted to a company by a financial institution without a specific use.
Debêntures	Type of debt instrument issued by a company or government that is not backed by any collateral and usually has a long term of five to ten years.

Peer-to-peer lending	Type of personal loan without collateral in which the counterparty instead of being a financial institution as another individual.

Source: elaborated by the author

The conclusion in the workshop according to coworkers was that the current products will remain the same from 2020 to 2025, not having relevant innovations, but changes in the current ones, such as reduction of interest rates and spread in all products.

On September 23, 2020, a workshop was held with the author's coworkers to discuss the credit market roadmap with the same coworkers and using the same technologies as mentioned in the payment roadmap above. A total of approximately 20 minutes were used for this discussion focused on market and opportunities. The author has acted as a moderator to guide the discussion based on the previous roadmap developed.

The results are shown below and the topics are detailed below:

Table. 27. 2020 credit opportunities after in-company workshops

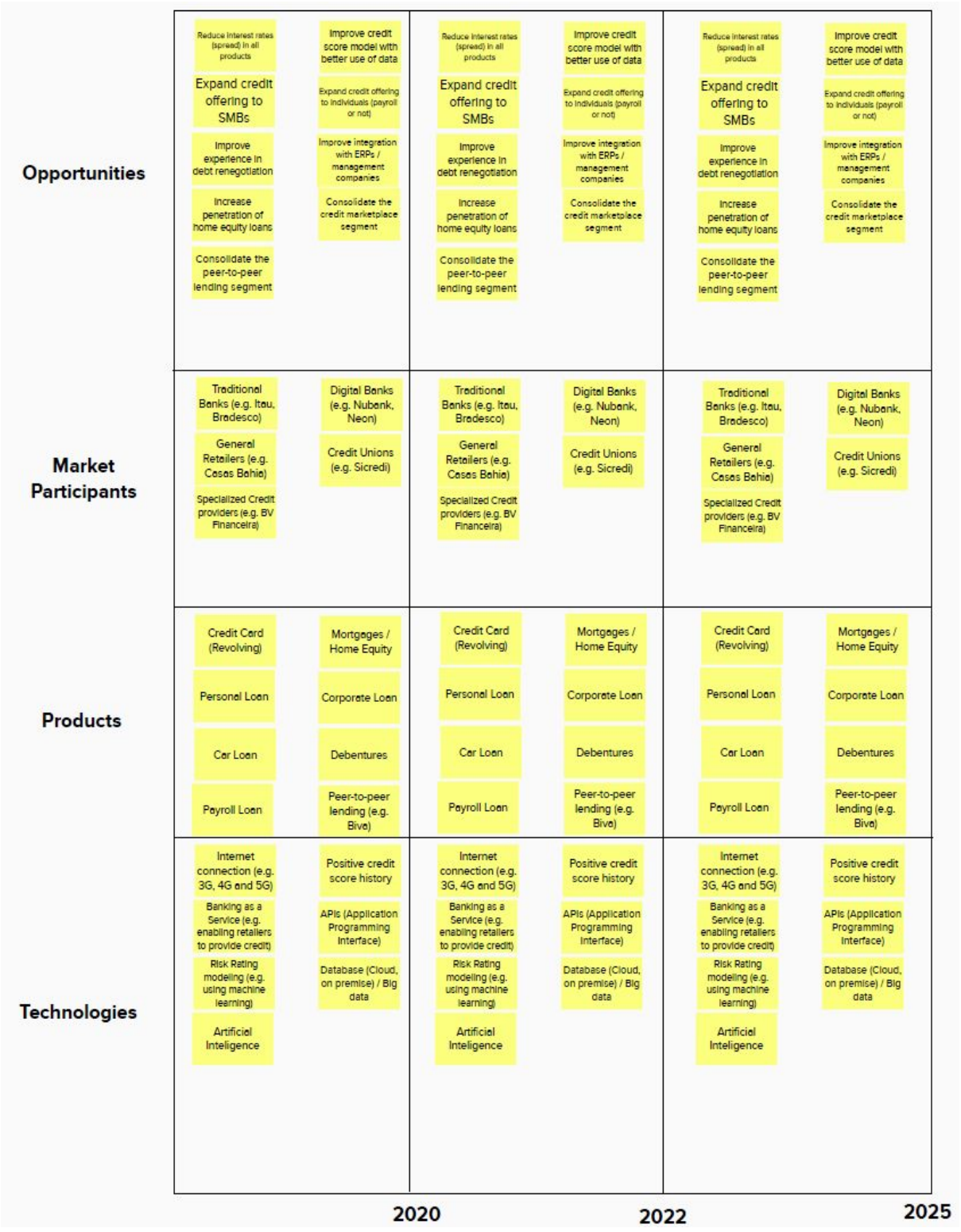
Present until 2020	
Opportunities	**Description according to coworkers**
Reduce interest rates (spread) in all products	There is an opportunity for financial institutions to offer lower interest rates, being more affordable for clients that can't get expensive loans.
Improve credit score model with better use of data	There is an opportunity to approve more loans that are currently denied by improving the current credit score data with better use of data.
Expand credit offering to SMBs	There is an opportunity to increase the credit offering for small and medium businesses that currently struggle to get affordable credit lines with traditional banks.
Expand credit offering to individuals (payroll or not)	There is an opportunity to increase the credit offering for individuals that currently struggles to get affordable credit lines with traditional banks.
Improve experience in debt renegotiation	There is an opportunity to offer better alternatives to customers to

	renegotiate their debt, avoiding losses related to unpayable debt.
Improve integration with management companies	There is an opportunity for Enterprise Resource Planning (ERP) companies and financial services providers to partner in order to offer personalized credit solutions for end users using the data stored in the ERP.
Increase penetration of home equity loans	There is an opportunity of increased penetration of home equity loans as the interest rate in Brazil has reduced and is now at a more affordable level for end customers to finance their houses.
Consolidate the credit marketplace segment	There is an opportunity to consolidate the marketplace segment by creating a relevant player with scale in which customers can find the best credit options.
Consolidate the peer-to-peer lending segment	There is an opportunity to create a relevant player in the peer-to-peer lending market in brazil, by being a marketplace where individuals can lend money to companies and individuals.

Source: elaborated by the author

The conclusion in the workshop according to coworkers was that the current opportunities should remain the same from 2020 to 2025.

Figure. 27. Credit roadmap after in-company workshops



Source: elaborated by the author

5.3.3. Investment roadmap

On September 23, 2020, a workshop was held with the author's coworkers to discuss the investment technology roadmap with the same coworkers and using the same technologies as mentioned in the payment roadmap above. A total of approximately 20 minutes were used for this discussion focused on technologies. The author has acted as a moderator to guide the discussion based on the previous roadmap developed.

The results are shown below and the topics are detailed in the tables below:

Table. 28. 2020 investment technologies after in-company workshops

Present until 2020	
Technologies	**Description**
Internet connection	Similar description from the Technology section in the Payment Roadmap.
APIs (Application Programming Interface)	
Instant Payment System	
Brazilian Payment System (SPB)	
Database (Cloud, on premise) / Big data	
Artificial Intelligence	
Retail Liquidity Provider (RLP)	Retail Liquidity Provider a type of offer made available by market intermediaries (brokers and banks). This model allows the intermediary to be a counterparty to his clients' orders, increasing liquidity.
Electronic trading system	Refers to a method of trading all types of securities. electronically, using the internet to connect to the exchange system.

Source: elaborated by the author

The conclusion of the workshop was that these technologies present today should remain present in the next years, with few improvements, such as fastest internet connectivity.

On September 23, 2020, a workshop was held with the author's coworkers to discuss the investment products roadmap.

Table. 29. 2020 investment products after in-company workshops

Present until 2020	
Opportunities	**Description / Importance**
Fixed Income (treasury and company bonds)	According to the United States Central Bank, fixed income certificates are certificates issued by private or public institutions that are used to capture funds and have the obligation to return the capital with a specific return rate after a certain period.
Stocks	According to Investopedia, stocks are a security that represents the ownership of a fraction of a corporation, public or private.
Derivatives (future contracts and options)	According to Investopedia, derivatives are instruments that allow investors to buy or sell an option on a security. The investors do not own the underlying asset. Instruments can be options, swaps, futures and forward contracts.
Funds (various categories)	According to Investopedia, a fund is a type of financial vehicle made up of a pool of money collected from many investors to invest in securities like stocks, bonds, etc.
Asset Management	According to Investopedia, asset management is a type of career in the financial markets in which the professionals are responsible to manage investors funds.
Robo-trading	According to Investopedia, robo trading is a type of product offered by some exchange brokers that allow customers to

	use algorithms to trade securities.
Currencies and cryptocurrencies	According to Investopedia, currencies are different types of money used by countries that can be exchanged for goods. Similarly, cryptocurrencies are digital coins used on the blockchain that are not regulated by any government.
Private Pension	According to OECD, private pensions are types of fund that uses employees' salary to invest and are available after the employee stops working.

Source: elaborated by the author

On September 23, 2020, a workshop was held with the author's coworkers to discuss the investment market roadmap.

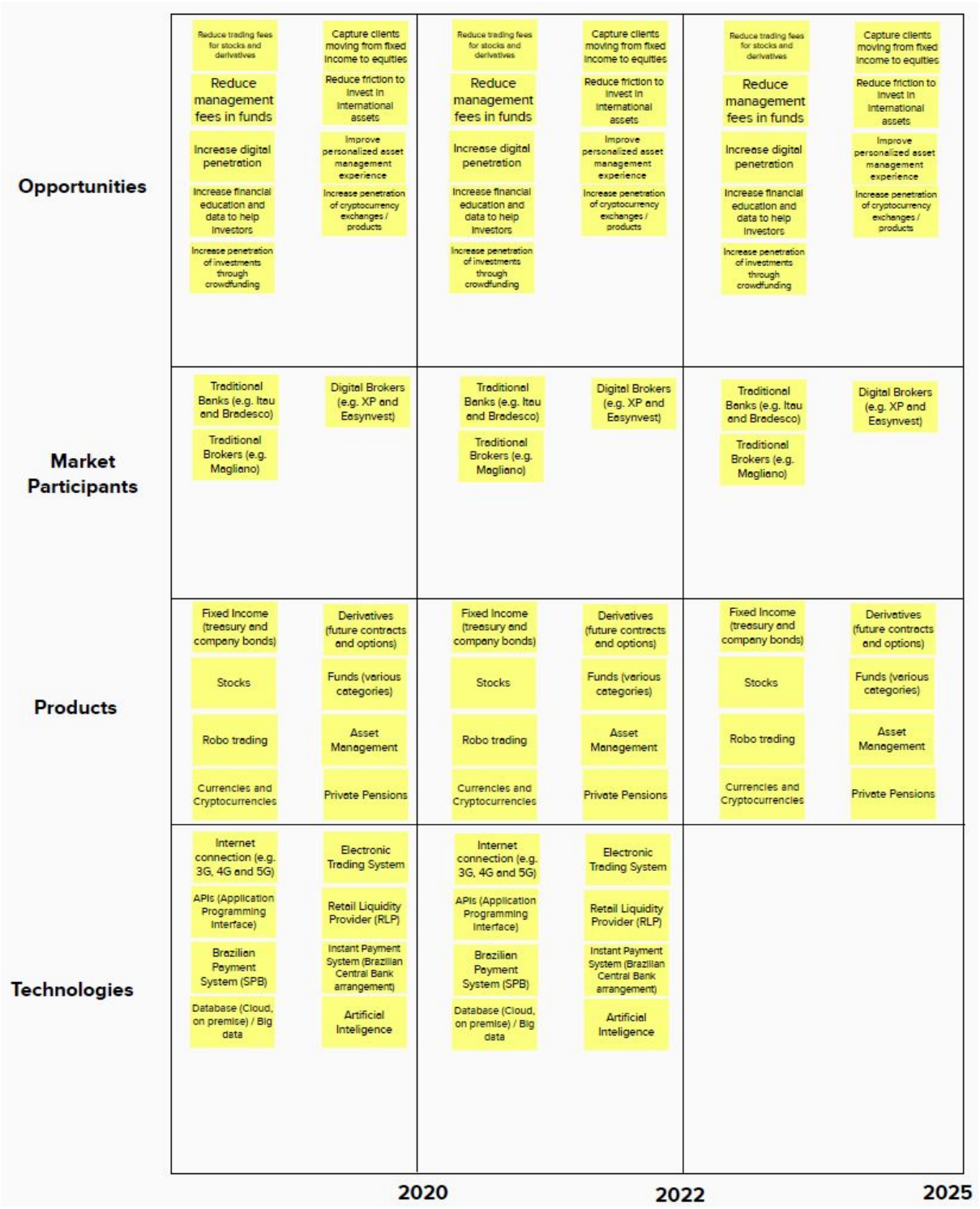
Table. 30. 2020 investment opportunities after in-company workshops

Present until 2020	
Opportunities	**Description / Importance**
Reduce trading fees for stocks and derivatives	Trading fees have reduced significantly in the past years in Brazil as digital financial brokers are trying to attract customers. This is still an opportunity as there are some players that charge high fees.
Capture clients moving from fixed income to equities	As basic interest rate in Brazil significantly decreased from 14% in 2015 to 2% in 2020, individuals are willing to invest in riskier assets such as stocks in order to seek for better returns than fixed income.
Reduce management fees in funds	There are still funds typically managed by the largest banks that charge high management fees. There is still opportunity for fund manager with lower fees to attract investors seeking for better returns.
Reduce friction to invest in international assets	Historically it has always been difficult for Brazilians to invest money abroad. There is an opportunity of offering

	frictionless ways for customers to invest in assets outside Brazil, such as stocks and bonds.
Increase digital penetration	There is an opportunity of capturing clients that still does not have an account in digital banks and brokers.
Improve personalized asset management experience	There is an opportunity to build a personalized experience for customers that do not want to choose their own assets by paying a management fee.
Increase financial education and data to help investors	Brazilian Central Bank arrangement to be launched in November 2020, allowing quick transfers using specific keys (e.g. mobile phone) available 24 hours a day.
Increase penetration of cryptocurrency exchanges / products	There is an opportunity of increase penetration of cryptocurrency exchanges as individuals increase their willingness to invest in cryptocurrencies and government works to regulate the market.
Increase penetration of investments through crowdfunding	The crowdfunding market in Brazil according to coworkers are limited, having space for creating large platforms to consolidate the market and provide financing to startups by using retail money.

Source: elaborated by the author

Figure. 28. Investment roadmap after in-company workshops



Source: elaborated by the author

5.4. Outputs - fourth roadmap version (after validation with experts)

5.4.1. Payment roadmap

In this section, the contributions from industry experts will be detailed. The author was able to interview a total of four experts in order to validate the assumptions from the roadmap built in the previous workshops. The expert relation is detailed in the table below:

Table. 31. Payments experts Background

Experts current Position	Experts Previous Experience
Expert 1 - Head of Relationship at Blu Pagamentos	Business Administration Bachelor; 4 years of experience in Private Equity and Investment Banking.
Expert 2 - Product Director and Board Member at Acesso Digital	Computer Science Bachelor; 16 years of experience in system development, management, venture capital, strategy and product development.
Expert 3 - Partner at Oliver Wyman (Financial Services Segment)	Economics Bachelor; 20 years of experience in consulting focused on financial institutions in Europe and South America.
Expert 4 - Associate Partner at Bain & Company	Mechatronics Engineering Bachelor; 10 years of experience in consulting focused on financial services (especially payments) and retail in Brazil and North America.

Source: elaborated by the author

Figure. 29. Companies Logos from Experts Current Positions

Source: Companies website

The first expert interviewed was the current Head of Relationship at Blu Pagamentos, a leading Brazilian fintech focused on acquiring and supply chain integration with around 500 employees. The expert manages a team of 22 resources that are responsible to deal with the sales representatives. Previously, the expert has worked 4 years in the financial market as analysts for a Private Equity manager and for an Investment Banking firm. The main contributions from the first expert are detailed below:

- Brazil tends to face a relevant disruption in the acquiring segment related to receivables anticipation, being an opportunity for acquirers. Currently, each acquirer monopolizes their clients' receivables, charging high fees for discounting it. Regulation is likely to change in november 3rd, every customer will be able to register receivables at receivables registers entities (e.g. CERC or CIP). Thus, every acquirer will be able to anticipate other acquirers' receivables after having clients registry. Blu pagamentos tends to be helped by it, as it offers the chance of customers to join a base of suppliers and use their balance to anticipate with no cost.
- Include receivables register entities in market participants
- Endless aisle as an opportunity related to supplier and payment integration. By having a 5m² store with a tablet, would be able to sell all the industry inventory. Still facing technical problems to implement due to systems complexity.
- Opportunity to increase penetration of wallets (separate from prepaid cards). Driving more sales to retailers by bringing volume from wallets' clients. Players are being aggressive in marketing to attract a relevant customer base.
- Blockchain as a technology that will enable companies to to reduce information processing costs
- Products profit pool evolution: (i) credit card: profitability will drop but there is an increasing number of users that tends to compensate; (ii) debit card: usage tends to decrease as new technologies arise; (iii) wallets similar to credit card dynamic; (iv) bank slip ("boleto") continue in B2B but decrease in B2C

The second expert interviewed was the current Product Director at Acesso Digital, the largest Brazilian IDTech company focused on identity solutions, such as face id biometry, for financial services, retail and other industries. The company is focused on onboarding but is expanding its solution for fraud prevention and payments. The main contributions from the second expert are detailed below:

- For Brazilian retailers, where most of the transactions happen using their own private label card, there is an opportunity to provide solutions to reduce the need of using the

physical card, that is, by using the face identification as the payment mechanism. There is a challenge of executing it in a fast and scalable way, as it currently requires a relevant time to implement. The service provider would charge a small fee of 1 reais cent per transaction

- Other types of biometry to identify individuals in the checkout (physical or online) should gain traction, such as the usage of the palm by Amazon One payment system
- QR code used for physical payments is not likely to become relevant as currently the friction of using cards is relatively low. The expert believes that contactless cards should be used as a tool to increase the usage of credit cards as it reduces even more the friction

The third expert interviewed was a current Partner at Oliver Wyman, one of the largest strategic consulting firms globally. The expert has a deep experience in financial services, having worked in depth with over 10 major financial institutions in Europe and South America on over 20 strategy and risk engagements. The main contributions from the third expert are detailed below:

- 3DS to be add as a future technology in Brazil in order to reduce the lack of data between the card issuer and the retailer
- IoT of things as a payment enabler - personal assistant will be used as a way of buying things only with voice commands.
- Worldpay Fizer - big processors to try to reduce the cost - Whatsapp price of P&M - from 4.99% - 2.5% to pay for Cielo to process - 1% service and 1% of whatsapp fraud - reduce with scale - has a limit.
- Penetration of cash is still high in Brazil at ~55%, there is still a relevant opportunity to increase banking services for unbanked clients. There will always be a limit of cash usage due to tax evasion
- ERP integration with payments is a relevant opportunity indeed. Currently, players like Linx through the use of TEF technology (to be added) can route the client to the best acquirer to process the transaction.
- Use of blockchain (e.g. Ripple) as a technology to reduce processing costs. Currently, Santander Bank already uses Ripple to be able to transfer in few minutes.
- Cross border opportunity for companies to provide payment in any desired local currency. For example, a Brazilian client traveling in the US could pay in reais.
- On social media wallets, there is an opportunity of creating the own coin, such as Facebook's Libra.

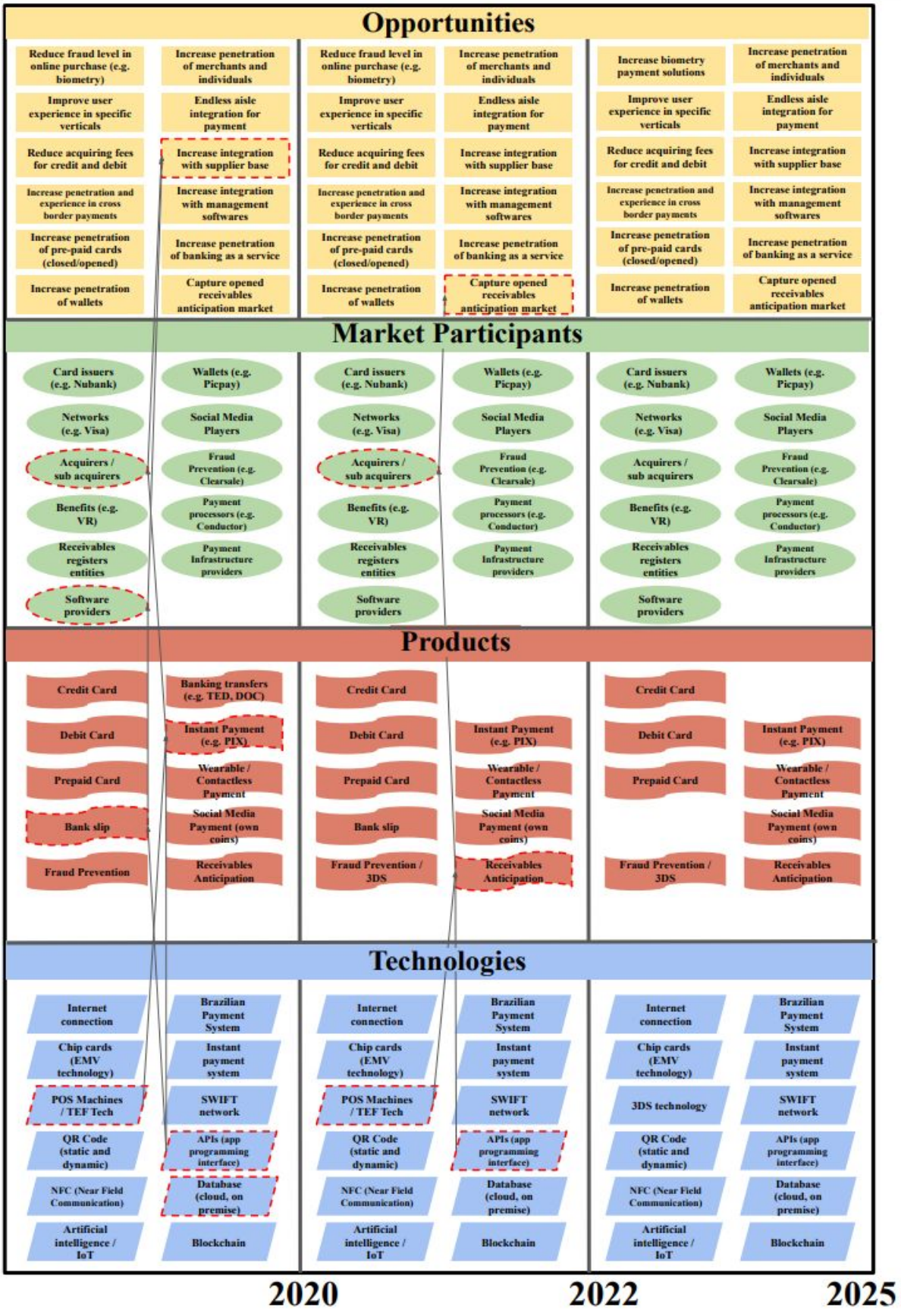
- Banking as a service as a relevant trend going forward as non financial institutions, such as retailers, are willing to increase their margins by creating their own banking products.
- Regarding PIX, the instant payment platform launched by the Brazilian Central Bank, should naturally replace the traditional banking transfers of TED and DOC, having also an impact in debit cards and Boletos. Credit cards should remain strong as an easy way of paying through installments. Regarding fraud, PIX should face several issues with integration as it won't act as a dispute resolution between issuers and acquirers like the networks do
- PIX can suffer resistence as it does not have a defined use case - you can use it for anything and eventually other wallets, such as Picpay, can do the same.
- Social media transactions should be very relevant based on the huge number of users (120 millions of users in Brazil). Central Bank is worried that it could compete with PIX as it is a frictionless payment.

The fourth expert interviewed was a current Associate Partner at Bain & Company, one of the largest strategic consulting firms globally. The expert has a deep experience in financial services (especially payment methods and insurance), retail, loyalty programs, chemical companies, for-profit education, infrastructure, among others. The main contributions from the fourth expert are detailed below:

- Players providers of payment Infrastructure should be added in the market participants category, gaining strength as banking as a service provider. Currently, there are players acting as payment connectors, offering integration for retailers to acquiers using the TEF technology for example, and also QR code integration for different wallets.
- The expert reinforced the opportunity in the POS lending space, product that already exists with some retailers in the physical space, but should gain more traction and usability in the digital space.
- In the fraud prevention space, the 3DS protocol should be available in Brazil, allowing merchants to execute double validation to approve transactions, reducing significantly the fraud potential.
- Vertically focused merchant acquirers should continue to gain share by offering specific functionalities.

- Cross border payments should increase penetration the global economy tends to be more connected, however, the market is relatively small as a low percentage of individuals currently send money abroad for any purposes.
- Increase unbanked penetration is a relevant opportunity as approximately 45 million individuals still do not have access to banking services and there is a relevant amount of merchants that do not accept card payments.
- Reduction in interchange fees is not considered an opportunity as it's usually related to government pressures, not a natural movement. In the other side, reduce interchange fees and anticipation fees can be a strategy for players to gain market share by being more efficient in costs.
- Regarding Pix, the Brazilian instant payment method, the expert believes that it will not affect the debit card as strongly as others believe, given the current low friction that cards are in Brazil. The usage can be boosted if players provide cash back incentives for customers. In addition, the penetration should be high in micro merchants as a way to avoid paying acquiring fees.

Figure. 30. Final payment roadmap after expert validation



Source: Elaborated by the author

5.4.2. Credit roadmap

In this section, the contributions from industry experts will be detailed. The author was able to interview a total of three experts in order to validate the assumptions from the roadmap built in the previous workshops. The expert relation is detailed in the table below:

Table. 32. Credit experts background

Experts current Position	Experts Previous Experience
Expert 1 - Co-founder & CEO of a55	Business Administration Bachelor; 9 years of experience in the financial market in Credit, Asset management and Special Situations
Expert 2 - Fixed Income / Credit Director at Credit Suisse	Business Administration Bachelor; 16 years of experience in the Credit segment, having working for 5 large banking institutions
Expert 3 - Partner & CEO at Paketá Crédito	Computer Science Bachelor; 15 years of experience in Business Development, Innovation and Credit segments

Source: elaborated by the author

Figure. 31. Companies Logos from Experts Current Positions

Source: Companies website

The first expert interviewed was the current Co-founder & CEO of a55, a leading Brazilian fintech that provides credit for digital companies, especially for the ones with recurrent revenue. The total amount of credit provided by a55 is 120 million reais for over 100 companies in Brazil and México. Previously, the expert had experience in credit, asset management and special situations. The main contributions from the first expert are detailed below:

- The expert believes in a thesis of integration of financial services and software providers, given the availability of data for better pricing credit (vertical software as a

service). In addition, the better use of data should be a key driver of competitive advantages in the credit space.

- Hard for fintechs to compete with large banks by reducing interest rates, it's more natural for them to present similar levels of rates but being more efficient to provide credit for some clients that banks usually deny. However, the large number of new entrants in the space given lower barriers to entry (new regulations) should drive credit spreads down.
- Large banks are focused on the corporate and small individuals clients, having a space of underserved customers in the small and medium enterprise segment.
- Personal loan, especially payroll loan should increase penetration as more fintechs are targeting it, given the fact that banks are focused on home equity and auto loans.
- Home equity is not so easy to be disrupted as it requires a huge amount of capital or an efficient way of securitization. The natural players to dominate this market are the large banks.
- Credit market place segment has an opportunity to be disrupted with the creation of a large provider.
- The expert is skeptical about peer-to-peer lending as it has failed in all countries given that is hard to scale without being disrupted by hedge funds.
- Debt renegotiation should grow with the use of technology, allowing players to buy loans with discount using data analytics.
- Regarding product profit pool evolution, credit cards should grow on the back of increased penetration in the large Brazilian unbanked population, although the interest rates charged tend to decrease. Similarly, personal loan and payroll should also grow significantly. Home equity and auto loan should also growth in base scenario of low interest rates for the next years, given the installments gets more affordable for customers.
- The expert suggested to add FIDC as a new product (“Fundo de Investimento em Direitos Creditórios”) is a type of fixed-income investment widely used in Brazilian credit markets. The funds are backed by receivables, including car loans, credit cards and trade asset.
- Regarding technologies, Open Banking should significantly increase the amount of data available for companies, while Machine Learning / Artificial Intelligence are likely to improve the assertiveness of credit models.

The second expert interviewed was a current Director of Fixed Income and Credit of Credit Suisse in Brazil. Previously, the expert had more than 10 years experience in 4 large institutions in the Brazilian credit market. The main contributions from the second expert are detailed below:

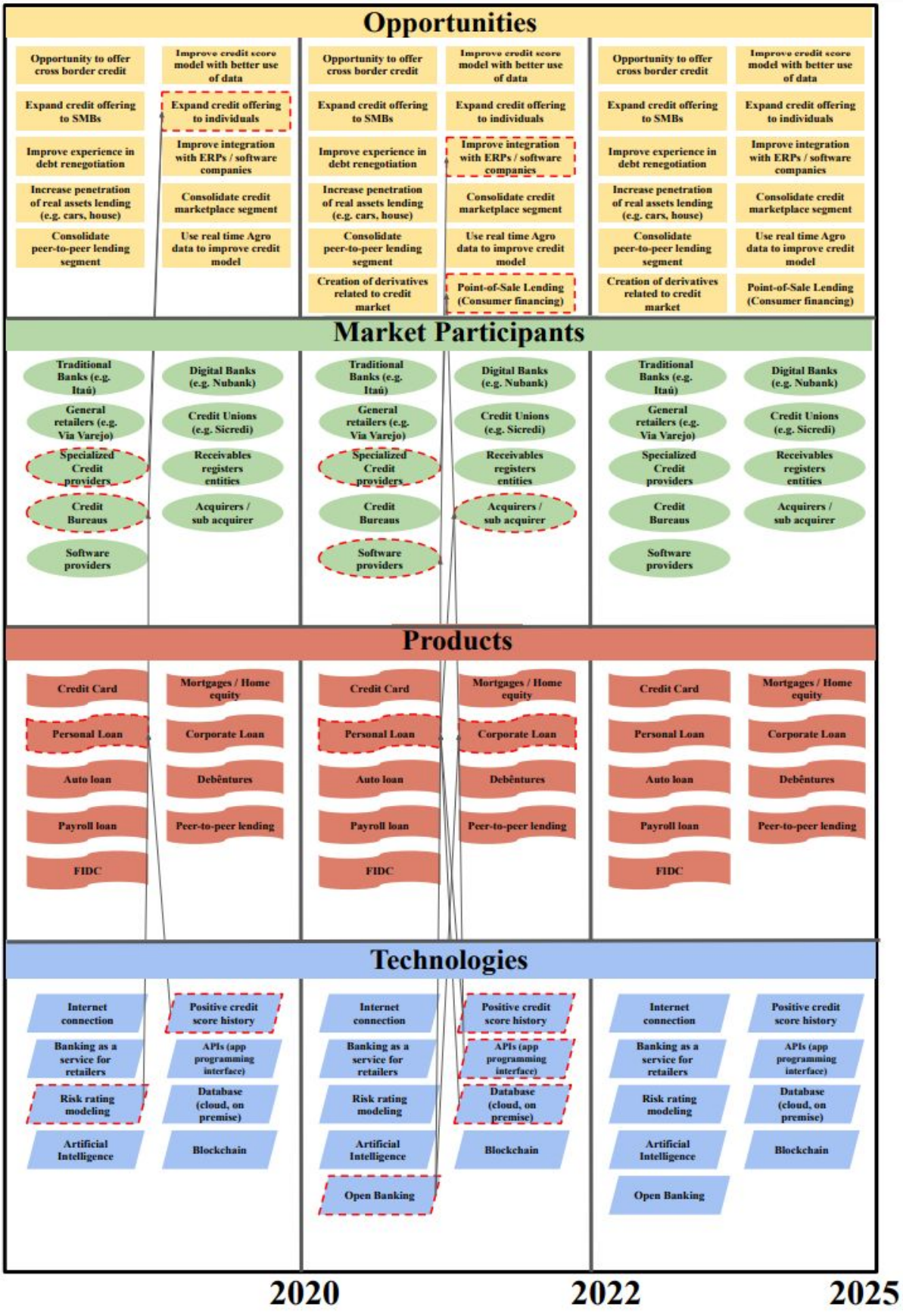
- The expert mentioned the opportunity to improve models using real time data for production. For example, in the agriculture space, the harvest productivity should be used as a decision criteria for credit score.
- The expert also believes that is not sustainable for fintechs to compete in pricing with large banks, they should disrupt the market in a different way in order to gain from the banks.
- The segment of small and medium business is still underpenetrated and large banks enjoy a high spread due to the lack of credit availability, representing a great opportunity for fintechs.
- Real asset lending (e.g. houses, cars, motorcycle, jewels) in Brazil should gain traction as the mechanisms of asset recovery are getting more transparent and efficient
- Credit for individuals it's also an opportunity as currently customers are dependent on the large banks. However, is not a simple task to measure risk of this credit, being easy to admit non performing loans and crash the business.
- The expert does not believe that credit renegotiation and recovery are a relevant opportunity given that a business based on it is not sustainable in the long term, as it's hard to scale and demands high level of funding.
- Integration of financial services institutions with software providers, especially ERPs, is a relevant opportunity to use data to provide credit.
- Opportunity to create a regulated market of credit derivatives in order to create options and insurance instruments based on credit bonds.
- The receivables anticipation market tends to be disrupted with the change in regulation expected for 2021, with new players entering in the market and potentially driving prices down.
- Regarding product profit pool evolution, credit cards should reduce on the back of low interest rates environment and eventually government intervention; home equity and car loan should increase as guarantees get easier to execute; corporate lending should continue to grow; payroll loan should continue growing as more employees get formal jobs; capital markets products such as debentures and FIDC are likely to

continue growing; hybrid equity debt instruments such as mezzanine should also grow.

The third expert interviewed was the current CEO of Paketá credit, a leading fintech focused on payroll credit for formal employees in Brazil. The company currently has 660 companies registered, being founded in 2018. Previously, the expert had more than 15 years experience in Innovation, Business Development and Credit. The main contributions from the third expert are detailed below:

- For the software integration, the expert believed that this could be a questioned model, as there is a conflict of interest when the ERP provider use his client's information to build a financial product or sold its data to a third party partner.
- The expert suggested to segregate personal loan from payroll as they are competitors, with different market dynamics.
- Opportunity to provide frictionless credit using different types of guarantees, such as receivables. Opportunity to provide credit from one country to another (cross border credit). The expert also believes that the current interest rate spread should remain high given the risk of the transactions.
- Point of Sale (POS) Lending as a relevant opportunity for financial institutions integrate payments and credit to allow customers to finance high ticket goods without using credit card limit.
- Regarding product profit pool evolution, the expert believes that the credit card interest rate levels are outrages (15% per month) and should probably reduce significantly with some cap defined by the Central Bank; personal loan should grow as interest rate remains at low level (more affordable installments) but is usually the last option for customers; payroll should grow significantly as companies penetration and formal jobs increase; on the auto loan, should remain stable as interest reduces but there is also a long term trend of not owning the car; on the home equity, profit pool should increase.
- Regarding technologies, the expert believes that banking as a service won't be a disruptive solution in the long term as clients will realize that it is hard to sustain a banking operation without too much scale and focus. Availability of mobile devices as an important technology to be added. Quantum computing should also be added as a future technology that could help on credit modeling. Artificial intelligence should play an important role in both modeling and predictive analysis, but also on the customer experience, with chat bots for example.

Figure. 32. Final credit roadmap after expert validation



Source: Elaborated by the author

5.4.3. Investment roadmap

In this section, the contributions from industry experts will be detailed. The author was able to interview a total of three experts in order to validate the assumptions from the roadmap built in the previous workshops. The expert relation is detailed in the table below:

Table. 33. Investment experts background

Experts current Position	Experts Previous Experience
Expert 1 - CTO & Founder at Toro Investimentos	Bachelor of Laws and Business Administration Bachelor; 11 years of experience in the financial brokerage space in Brazil.
Expert 2 - Chief Strategist at Avenue	Bachelor in Economics; 14 years of experience in the financial market, working in segments such as M&A, equity research and credit.
Expert 3 - Partner at Oliver Wyman	Master of Engineering; 35 years of experience in consulting focused on infrastructure, telecom, public sector, financial services and business management.

Source: elaborated by the author

Figure. 33. Companies Logos from Experts Current Positions

Source: Companies website

The first expert interviewed was the current CTO and Founder at Toro Investimentos, a leading fintech in the investment and financial education space, being founded in 2010, offering an easy way for individuals to invest in the stock market. The main contributions from the first expert are detailed below:

- There is an opportunity of increasing the number of ETFs (Exchange Traded Fund) offered in the Brazilian market - to be more in line with the US market, providing an opportunity to get good returns without paying relevant fees, by buying a basket of securities that tracks an underlying index.

- The expert believes that securities trading fees are likely to tend to zero following international changes, and most of brokers, including Toro has already move brokerage fees to zero.
- New products related to education and research should gain more relevance, as clients are more willing to pay to get access to research reports.
- On the technology side, blockchain is likely to be a powerful tool to reduce processing costs and create high standards of data security.
- Regarding products, the expert expects a high increase in volume and margin expansion in almost all of them. On fixed income bonds, the spread for the financial broker tends to reduce as interest rates remain low; on funds, cash back mechanisms should gain more traction.
- The expert believe that there are some challenges before creating a new stock exchange to compete with B3, such as change in regulation to allow brokers to close transactions inside their companies.
- The opportunity of offshore investment is relevant. There are still challenges to be overcome to allow an efficient transfer of funds for outside the country, but there are players already exploring this space, such as Avenue. In this sense, Brazilian capital markets regulator entity (CVM) has changed the regulation for BDRs (Brazilian Depositary Receipts), allowing individuals to buy this receipts, not only institutional investors.

The second expert interviewed was the current Chief Strategist at Avenue, a leading financial broker offering a solution for Brazilian individuals to easily invest directly in the US equities market. Previously, the expert had experience in M&A, credit and equity research in several financial institutions. The main contributions from the second expert are detailed below:

- The expert believes that brokerage fees tend to zero in every country given automation and low processing costs, being required for a successful broker.
- International currency exchange spread is likely to be one of the main sources of revenue for brokers focused on international assets, although the current spread of 5-10% tends to reduce going forward as new entrants come to this market. In addition, this segment is not key for the large banks given the low ticket transactions.
- Equities and fund investments tend to continue to grow significantly. Is reasonable to assume that the current 3 million equities investors could double in the next few years as Brazil has 50 million investors. However, fees in funds tend to decrease as ETFs

(Exchange Traded Fund) increase penetration, being a cheap solution for investors to follow indexes. In this way, the current boom of funds charging high fees (e.g. 2.0% management fee and 20% carried interest) should reduce significantly.

- Regarding international investors, is definitely a trend to reduce the friction, but the current regulator movement of allowing BDRs (Brazilian Depositary Receipts) can impose a relevant competition from the Brazilian stock exchange, although individuals do not get the same benefits as buying the underlying asset directly. Large financial brokers still did not focused on scale a retail international operation, but they could do by doing legal and technology efforts.
- Personalized asset management is indeed a trend to be explored, but is quite hard for Brazilian players to offer it as the country lacks of diversified easy instruments such as ETFs, being much more easy to produce a specific wallet in US with more variety of assets.
- Digital presence of brokers should continue increasing penetration. In addition, research and educational platform have experience a boom in the past years and are likely to continue growing.
- Regarding cryptocurrencies, they still face regulatory issues worldwide and not represent a stable reserve of value, therefore it should grow but probably reach certain limit.
- The expert suggested to add insurance and pension instruments as relevant products to gain traction in the following years as new startups offer more affordable and better customer experience solutions.

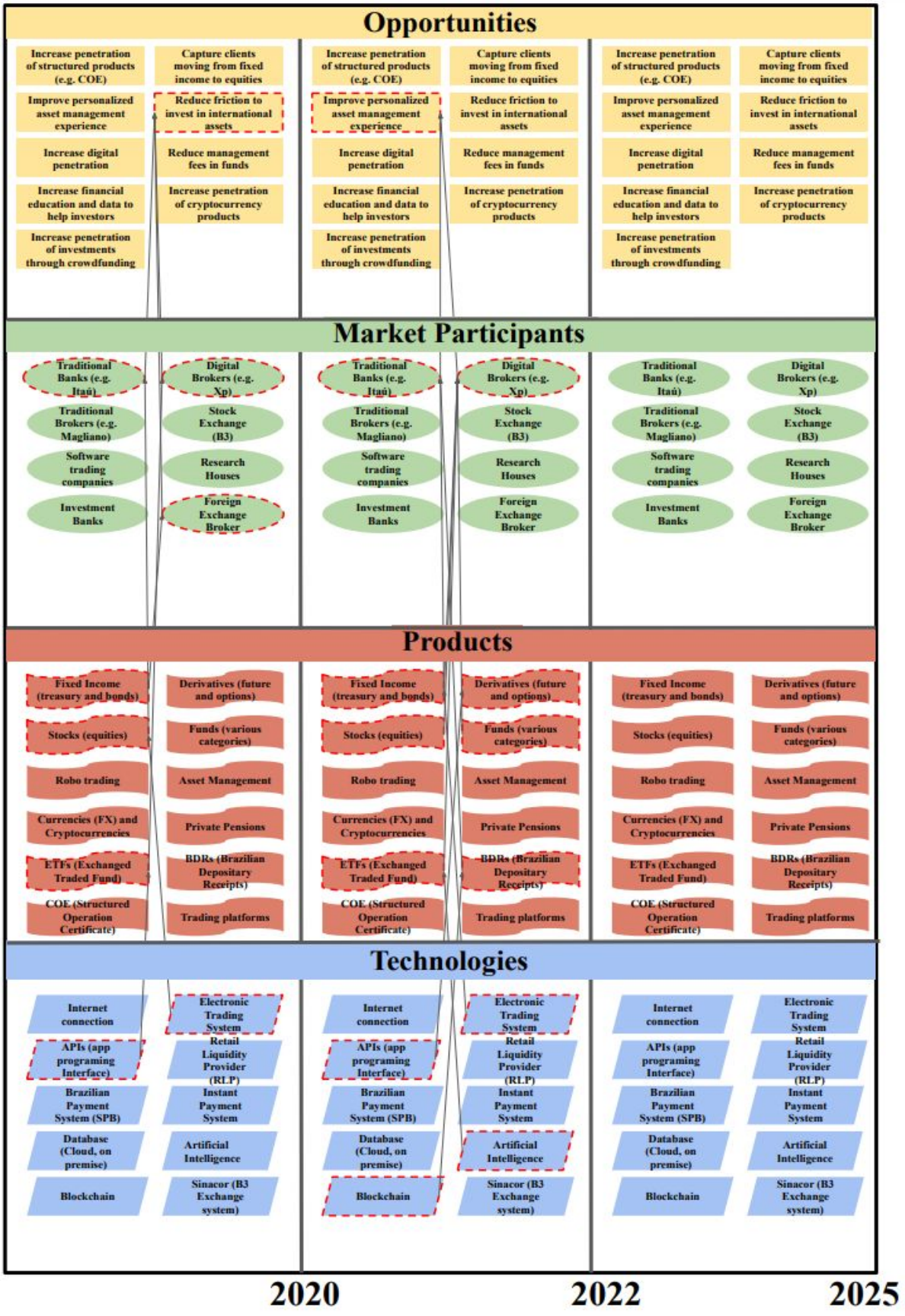
The third expert interviewed was a current partner of Oliver Wyman, a leading consulting firm focused on financial services. Previously, the expert had 35 years of experience in consulting, being focused on infrastructure, telecom and financial services. The main contributions from the second expert are detailed below:

- Regarding products, the expert believes that the market of funds of funds is likely to increase their volume as an interesting way of diversification. In addition, structured products such as COE (Structured Operation Certificate) are likely to increase penetration. Experts also suggested including trading platforms as products used by investors that buy stocks; funds anticipated withdrawal as a product that is likely to grow. Asset management should not be classified as a product.
- Each financial broker should be able to continue specializing in some asset classes, for example, Toro investimentos focused on equities. Functionalities of showing the

accumulated and consolidated return in all asset classes are important to attract customers.

- On technology, suggested to add Sinacor as a relevant technology in the Brazilian stock exchange and also that biometry solutions should be key to increase security and reduce fraud level.
- Creation of alternatives of a single stock exchange is valid, but hard to do given low liquidity.
- Equitization should remain a strong trend, current number of 3 millions of equity investors is likely to multiple by 4 in the next 5 years.
- Trading fees should continue to decrease significantly towards zero in line with the global trend, being almost required for a successful company.

Figure. 34. Final investment roadmap after expert validation



Source: Elaborated by the author

5.5. Results and action plan

5.5.1. Payment roadmap

After consolidating all the inputs from the experts, the author has completed the elaboration of the payment roadmap. The author has identified 12 opportunities to be explored from 2020, according to the roadmap, however, it was important to prioritize the ones that are more actionable and relevant for an investment standpoint. The criteria used for that was the estimated total addressable market for this opportunity and a qualitative perception of opportunities that are already overcrowded with too many players. In this sense, two opportunities were selected by the author and were used to build an action plan.

The selected opportunities that will be addressed in the action plan are detailed below:

Table. 34. Key opportunities description in the payment industry

Opportunity	Description
Capture Opened receivables anticipation market	There is an opportunity for acquiring companies to gain relevant market share in the receivables anticipation market after the market experiencing a change in regulation expected for early 2021, allowing that a certain entity process the anticipation of a transaction done through another acquiring - currently the entity that process the transaction has the exclusive right to anticipate it - resulting in high fees for end customers. According to the Brazilian Central Bank, R$1.8 trillion is the size of the receivables market. In the new format, after Resolution No. 4,734 and Circular 3,952 / 2019 from Central Bank, every transaction will need to be enrolled into a registered entity (“registradoras”), and customers will be allowed to use them as collateral to debt in any other financial institution. In this context, potential companies to receive investment are the entities responsible to register the receivables and fintechs that could disrupt this market by offering more competitive taxes.
Increase integration with supplier base	Currently, merchants that typically sell through installments suffer with high interest rates in the brazilian receivables anticipation market (approximately 3% per month). There is an opportunity for financial institutions to act as intermediary between merchants and

	their suppliers, allowing merchants to use these receivables to pay directly their supplier, without any discount. The benefit for the supplier is the guarantee of certainty that will receive the payment, given that today the market has a delinquency rate of approximately 4%.

Source: Elaborated by the author

The action plan is composed of finding companies that are exploring these opportunities and starting conversations to understand their financials in order to potentially invest in them if they are open to it and have enough size. A list of companies (non exhaustive) is detailed below. The criteria used to select them was estimated gross revenue above 50 million reais or having received investment from an institutional investor (e.g. Private Equity fund).

Table. 35. Companies exploring the opened receivables market

Company	Description / Profile
CERC	According to company's website, Cerc Central de Recebíveis is a non operating Brazilian private entity and the first credit receivable register authorized by the Central Bank of Brazil, and as a financial market infrastructure it has the important role of providing more security in transactions involving financial assets, in addition to increasing the supply of credit. In 2018, the company has obtained the license from Central Bank So far, the company has received a total of 97million reais in total investments from Parallax fund and Valor Capital and GP Investments.
Adiante Recebíveis	According to the company's website, Adiante Recebiveis is a Brazilian that is disrupting the receivables anticipating market. Adiante offers an easy way (~1 minute score rating) for companies to anticipate their receivables. Currently it focuses on receivables out of the credit card chain, but with the potential change in regulation, the company can open a new growth avenue. In 2019, Adiante has completed 40 million reais in transactions.
Infinity Pay	According to the company's website, Infinity Pay is a merchant

infinitepay	acquirer that has a value proposition of offering the lowest transaction fees for receivables anticipating (7,5% take rate, meaning a 80% decrease versus competition for a 12 installments transaction). The company has an efficient transaction cost based on blockchain that allows it to offer a lower price. To compensate that, Infinity charges the highest price on selling the POS machine. The company could be well positioned to capture the opened receivables market for credit cards.

Source: Elaborated by the author

Table. 36. Company exploring the supplier base integration

Company	Description / Profile
Blu Pagamentos	According to the company's website, Blu is a merchant acquiring that is promoting the integration between merchants and its suppliers. The solution enables merchants to use 100% of their receivables funds without anticipating it to buy goods from its suppliers. On the other side, Blu offers a guaranteed source of receivables to suppliers, that typically struggles with a high default rate. Blu charges a merchant discount rate, regular anticipation fee (if not using to buy goods) and insurance fee paid by the supplier.

Source: Elaborated by the author

5.5.2. Credit roadmap

After consolidating all the inputs from the experts, the author has completed the elaboration of the credit roadmap. The author has identified 12 opportunities to be explored from 2020, according to the roadmap, however, it was important to prioritize the ones that are more actionable and relevant for an investment standpoint. The criteria used for that was the estimated total addressable market for this opportunity and a qualitative perception of opportunities that are already overcrowded with too many players. In this sense, three opportunities were selected by the author and were used to build an action plan.

The selected opportunities that will be addressed in the action plan are detailed below:

Table. 37. Key opportunities description in the credit industry

Opportunity	Description
Improve integration with ERPs / software companies	Today there is a situation in the brazilian market that small and medium companies suffer from a shortage of credit lines, due to lack of relevant balance sheet and scale to negotiate with large banks. Some of these companies use ERPs (Enterprise Resource Planning), management softwares to help on their operations, which collect their business and financial data, being able to provide it to financial institutions. This way, there could be an opportunity to provide credit for an unserved demand using data in a more efficient way.
Increase penetration in Point-of-Sale Lending (Consumer Financing)	Brazil still lacks financing alternatives for the end customers, that currently only have the credit card as a product to allow them to pay certain goods in installments. However, this credit is limited and a relevant amount of individuals (approximately 55 million) do not have access to bank accounts or credit cards. By using customers data, now more precisely with the positive score credit, there is an opportunity to offer credit at the point of sale to finance certain customers to buy goods without any guarantee. Acquirers, card issuers and retailers are the most natural players to provide this service, however, there is room for new fintechs to disrupt this market.
Expand credit offering to individuals	The current unbanked population in Brazil is relevant, with approximately 55 million individuals. Using more efficient data, especially with the advent of positive scores, there is room to improve credit offering for individuals and also manage delinquency rates with more precision.

Source: Elaborated by the author

The action plan is composed of finding companies that are exploring these opportunities and starting conversations to understand their financials in order to potentially invest in them if they are open to it and have enough size. A list of companies (non exhaustive) is detailed below. The criteria used to select them was estimated gross revenue

above 50 million reais or having received investment from an institutional investor (e.g. Private Equity fund).

Table. 38. Company exploring the credit integration with ERPs

Company	Description / Profile
Biz Capital	According to the company's website, Biz Capital is a brazilian fintech focused on providing credit (up to 200 thousand reais) to small and medium enterprises. The company uses technology to better price its products and has a great fit with ERP clients, being able to use their data to improve their pricing. Founded in 2016, the company has raised a total of 120 million reais with Oikocredit, Monashees, Chromo Invest, Quona Capital and KFW DEG.

Source: Elaborated by the author

Table. 39. Company exploring the POS lending market

Company	Description / Profile
Rebel	According to the company's website, Rebel is a brazilian fintech focused on providing accessible credit for individuals without any collateral using data technologies. In 2020, the company expects to launch a POS lending product for the medical, dentistry and education sectors. The company has raised a total of 62 million dollars through debt and equity.

Source: Elaborated by the author

Table. 40. Company exploring the expansion of credit to individuals

Company	Description / Profile
Bom Pra Crédito	According to the company's website, Bom Pra Credito is a brazilian fintech company that operates as a credit marketplace focused on individuals. The company connects individuals with more than 30 credit providers. Founded in 2013, the company has provided over 700 million reais in credit for over 7 million users. Bom Pra Crédito has received a total of 63 million of investments from Astella, Innova Capital and Grupo Globo.

Source: Elaborated by the author

5.5.3. Investment roadmap

After consolidating all the inputs from the experts, the author has completed the elaboration of the payment roadmap. The author has identified 9 opportunities to be explored from 2020, according to the roadmap, however, it was important to prioritize the ones that are more actionable and relevant for an investment standpoint. The criteria used for that was the estimated total addressable market for this opportunity and a qualitative perception of opportunities that are already overcrowded with too many players. In this sense, two opportunities were selected by the author and were used to build an action plan.

The selected opportunities that will be addressed in the action plan are detailed below:

Table. 41. Key opportunities description in the investment industry

Opportunity	Description
Reduce friction to invest in international assets	Brazil is experiencing a relevant increase in the number of investors in the stock exchange, with 3 million investors (growing approximately 5 times since 2017), out of a total of approximately 50 million potential investors, according to Central Banking. As a consequence, investors are increasingly wanting to diversify their investments, by having positions in international assets, such as stocks, bonds and ETFs. However, the process of sending money abroad has always been bureaucratic and expenses, resulting in a service only for the richest ones that could afford it. Recently, few brokers started to offer a more affordable and frictionless solution for retail investors, and are successfully capturing a relevant number of investors. In addition, Brazilian Securities and Exchange Commission (CVM) has changed the regulation for retail investors to invest in BDRs (Brazilian Depositary Receipts), enabling brazilian investors in the stock exchange to invest in certificates that follow the international asset price.
Improve personalized asset management	As a result of the increase in the number of investors, financial brokers are offering different types of products, but usually the

experience	investor does not have sufficient time and willingness to study about it. Some of them would be willing to hire a personalized asset management solution, paying a percentage of the invested capital to have professionals taking care of their holdings in order to maximize the returns. Technologies such as blockchain and artificial intelligence are definitely catalysts for this trend.

Source: Elaborated by the author

The action plan is composed of finding companies that are exploring these opportunities and starting conversations to understand their financials in order to potentially invest in them if they are open to it and have enough size. A list of companies (non exhaustive) is detailed below. The criteria used to select them was estimated gross revenue above 50 million reais or having received investment from an institutional investor (e.g. Private Equity fund).

Table. 42. Company exploring the international assets market

Company	Description / Profile
Avenue Securities	According to the company's website, Avenue is a Brazilian financial broker that is disrupting the market by offering an easier way for Brazilians to invest in the United States stock market. Founded in 2017, the company allows funds to be transferred to the US in a few minutes through an exchange broker. Avenue has received investment from Igah Ventures. As of October 2020, Avenue had 175 thousand accounts with 500 million dollars of assets in custody.

Table. 43. Company exploring the personalized asset management experience

Company	Description / Profile
Warren	According to the company's website, Warren is a Brazilian financial broker that not only offers typical digital services (e.g. free home broker, bonds, etc.), but also offers a personalized asset management experience based on customers' risk profile and goals. The system charges a management fee to suggest and adjust over time a portfolio of bonds, funds and stocks. As of October 2020, Warren had 150 thousand accounts with 2.5 billion reais of assets under custody.

6. Conclusion

The purpose of this research was to create a personalized roadmapping framework to be used by Private Equity investors and also to apply this framework in three different Brazilian industries: payments, credit and investments. After executing all the steps, the author was able to note the power of roadmapping applied for strategic cases when used to analyse markets and opportunities.

The method used in this research was composed by eight steps. The step 1 was the subject exploration and research project; the step 2 was the first roadmapping exercise; the step 3 was the literature review; the step 4 was the first roadmapping validation with professionals; the step 5 was the in-company workshops - internal roadmap; the step 6 was the validation with advisor; the step 7 was is the expert workshops - external roadmap; and the step 8 was the consolidation, results and conclusion.

On the results front, the author was able to build a personalized roadmapping framework called "Z-plan", adjusting the roadmapping process to its needs and resources as a Private Equity investor that needs to find promising companies to receive investment and also to help portfolio companies strategically. The final "Z-plan" was achieved after three interactions with stakeholders (author, professionals and advisor).

Analyzing the Z-plan after its implementation by the author, it was possible to note some positives aspect and a negative one. On the positive side, having a robust planning step was important to define with precision the roadmapping topics to be addressed, to find potential experts and estimate the timeline based on the organization's needs. In addition, another positive point was to use previous versions of the roadmap to be validated with organization professionals and with experts, avoiding a waste of time when thinking about topics to be added in the roadmap. Also, doing the In-Company Workshop in a format of only one big session to execute all the workshops (technology, product and market) was productive. On the negative side, in the Expert Validation step, given the limited time of 30 minutes for each expert, the list of key questions was sometimes broad and was not possible to go deeper in the expert experiences. In order to solve it, a new step for preparing specific questions for each expert could help the discussion to be more productive.

In addition, the author was able to apply its personalized roadmapping process in the Brazilian industries of payments, credit and investment - areas of high importance for private equity investors. The outputs are three final / intermediary roadmaps and conclusions about its segment. For the payment industry, the two key opportunities to be focused on are (i)

capture the opened receivables anticipation market; and (ii) increase integration with the supplier base. For the credit industry, the three key opportunities to be focused on are (i) improve integration with ERPs / software companies; (ii) increase penetration in POS Lending (Consumer Financing); and (iii) expand credit offering to individuals. For the investment industry, the two key opportunities are to (i) reduce friction to invest in international assets; and (ii) improve personalized asset management experience. Finally, the author has mapped current companies that are exploring these opportunities and as an action plan, the author and team will reach out to them to analyze potential investments.

Finally, the results of this research should help the author and its organization in two ways: the first one is by using the outputs and action plans of the three roadmaps developed for the industries of credit, payments and investments; the second way is by replicating the Z-plan roadmapping framework in other selected industries that a Private Equity fund may eventually want to invest in Brazil.

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