Aplikacija za dizajn plana digitalne i poslovne transformacije

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UNIVERSITY OF ZAGREB
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VARAŽDIN

Benjamin Filip Šikač

APPLICATION FOR DESIGNING THE ROADMAP OF DIGITAL AND BUSINESS TRANSFORMATION

MASTER'S THESIS

Varaždin, 2023

UNIVERSITY OF ZAGREB

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APPLICATION FOR DESIGNING THE ROADMAP OF DIGITAL AND BUSINESS TRANSFORMATION

MASTER'S THESIS

Mentor:

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Varaždin, September 2023

Benjamin Filip Šikač

Statement of Authenticity

Hereby I state that this document, my Master's Thesis, is authentic, authored by me, and that, for the purposes of writing it, I have not used any sources other than those stated in this thesis. Ethically adequate and acceptable methods and techniques were used while preparing and writing this thesis.

The author acknowledges the above by accepting the statement in FOI Radovi online system.

Abstract

The thesis conducts research on the topic of digital transformation and proposes a framework for digital transformation and roadmaps for digital transformation. The framework is a combination of Design Thinking, Agile and other methods. After introducing the framework, the thesis proposes roadmaps for digital transformation. The roadmaps are a way to apply the framework in the real world while maintaining the ability to compare different digital transformation projects. The framework and roadmap concept were implemented in the form of an application.

Keywords: Digital Transformation; Roadmap; Framework; Design Thinking; Agile; Application

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1. Introduction

This masters thesis consists of three major parts distinct parts.

The first part is the literature analysis which is the foundation of the thesis. Through the literature analysis, a deep dive is taken into the field of digital transformation trens, digital transformation methods and strategies. The literature analysis also determines the current state of the field and the problems that are present in the field. Furthermore, the literature analysis defines the research questions that are answered in the thesis.

The second part of the thesis is the definition of a framework for digital transformation. The framework has to be able to solve the problems that are present in the field through the research questions. Through research, it was found that the best components that fit a framework which solves digital transformations' issues is a combination of Design Thinking and Agile with an expansion of methods. The framework is defined in detail in the thesis.

The third part is the definition of roadmaps and roadmaps for digital transformation. The roadmaps are defined in detail in the thesis. Together with the roadmap definition, an application was created to enable the creation of roadmaps in a digital form. The application is defined in detail in the thesis.

Future research should focus on the application of the framework and the roadmaps in the real world.

My motivation for writing this thesis is wanting to contribute to a field that is rapidly growing and is becoming more and more important. I believe that digital transformation is the future of business and that it is important to have a framework that can be used to create roadmaps for digital transformation which allows easier comparison.

2. Literature analysis

This chapter will provide an overview of Digital Transformation and the occurance of methodologies in Digital Transformation. The overview of Digital Transformation use and it's maturity will be provided through a bibliographic analysis. Furthermore, after the bibliographic analysis there will be a discussion on the findings. Next is the literature review in which, through analysis of selected literature, the research questions will be asserted. The Bibliographic review only serves the purpose of seeing where Digital Transformation stands from a numbers perspective. On the other hand, the literature review will provide a more in-depth analysis of the topic and yield a possible definition to Digital Transformation; together with providing a definition questions will be placed about methodologies used in Digital Transformation and their abstraction level.

The bibliographic analysis will be based on the data gathered from academic search engines such as Scopus and Web of Science. Each subsection will describe it's search criteria and the results of the search.

2.1. Bibliographic analysis

The Bibliographic analysis was conducted with the following search criteria on Scopus and Web of Science:

- Title, abstract and keywords
- Years 2018-2023
- Keywords: "Digital Transformation"

The following charts are showing the results of the bibliographic analysis gathered from Scopus and Web of Science. The charts are showing the number of documents published per year, the type of documents published and the research area of the documents published. Following the charts are two wordclouds together with tables of most common words in the abstracts of the documents published.

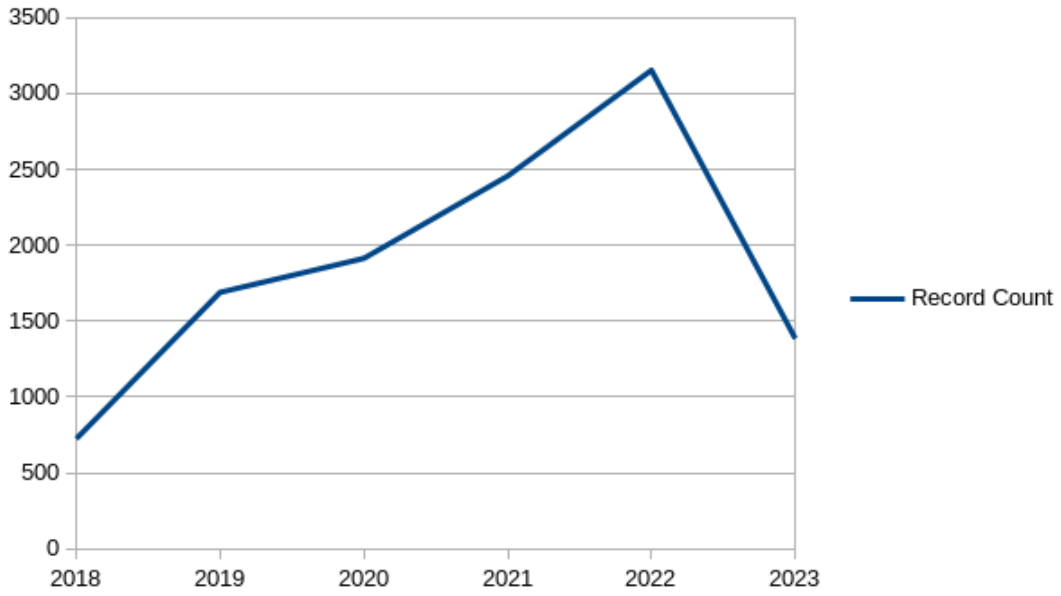

Figure 1: Records published per year on Web of Science

Data gathered from Web of Science shows that the number of documents published per year is increasing.

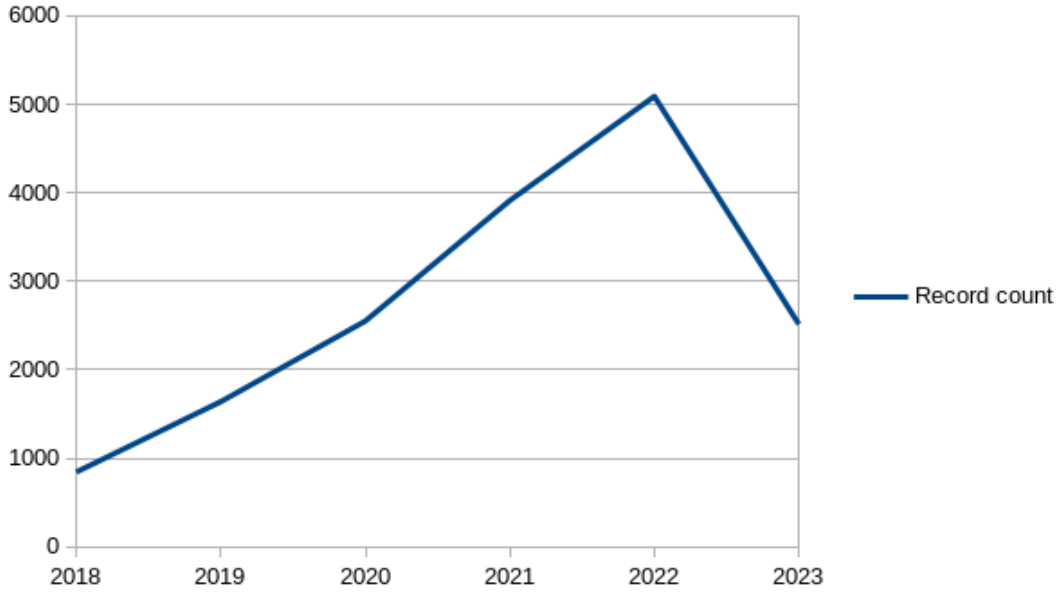

Figure 2: Records published per year on Scopus

The data from Scopus shows a similar trend to the data from Web of Science with more of a linear increase compared to the previous chart.

General interest in the topic of Digital Transformation can be seen from the charts that show the number of documents published per year; interest is increasing and the popularity of the subject could mean that the topic is entering the industry. However, one key aspect that can't be ignored is that there is an obvious decline in the papers published in 2023. That

could be explained by the fact that the year is still in progress and the data is incomplete. Meanwhile, the fact that the COVID pandemic ended in 2023 [1] could also be a reason for the decline in publications; at first glance, the end of the pandemic removes the need for digital transformation in most industries. There is no more need for tools like Zoom or Microsoft Teams because people can meet in person again and the existance of a webshop doesn't determin the life of a company anymore.

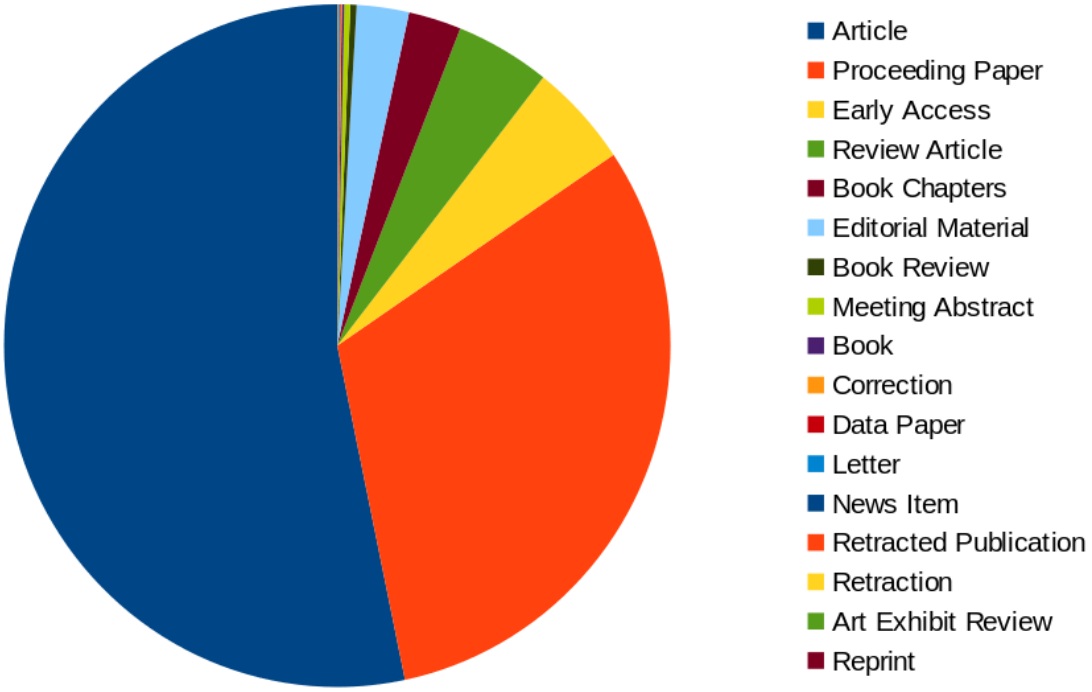

Figure 3: Records published by type on Web of Science

Analysing Web of Science data, the majority of the documents are articles with proceeding papers being the second most common type of document. This suggests that Digital Transformation is in the process of gathering mass to become a stable and well defined topic.

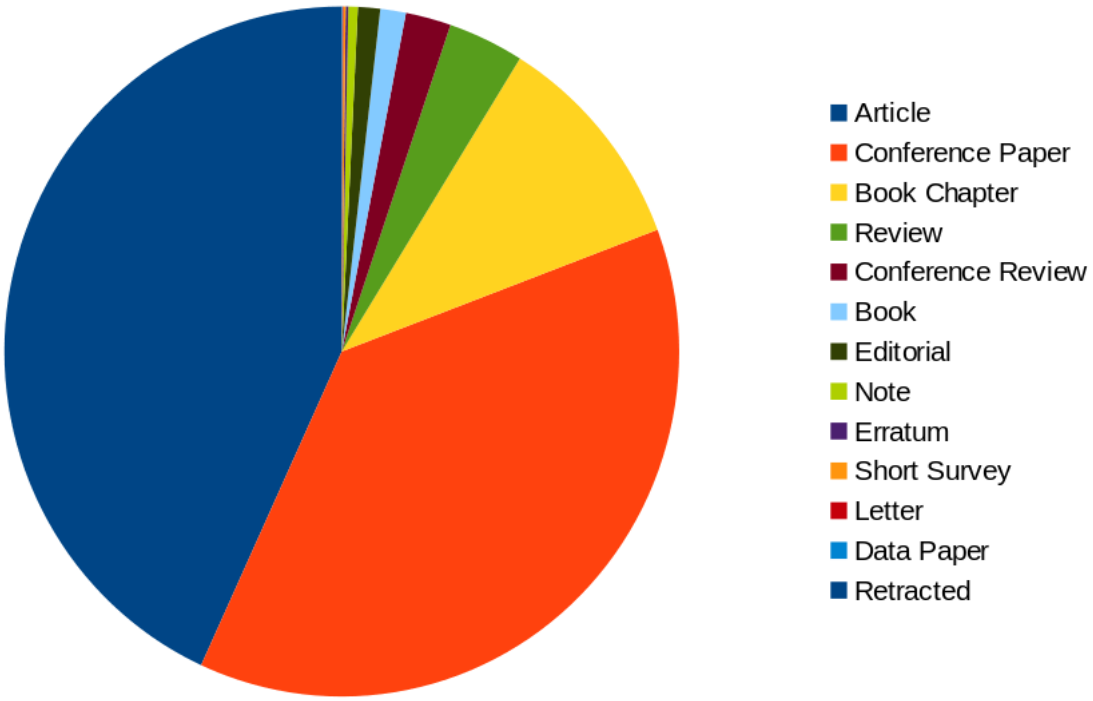

Figure 4: Records published by area on Scopus

Analysing Scopus data, the majority of the documents are articles with conference papers, however it can be seen from the chart that the article to conference paper ratio is lower than on Web of Science; there are less articles compared to conference papers. This supports the idea that mass is being gathered, however probably at a slower pace or with more care.

It can be seen from the charts that show the type of documents published, the majority of the documents are articles which supports the that digital transformation is becoming popular in the real sector. The lack of the gap could also mean that this topic different from the usual research topics because digital transformation doesn't have a clear definition either and it's nature makes it hard to define as well.

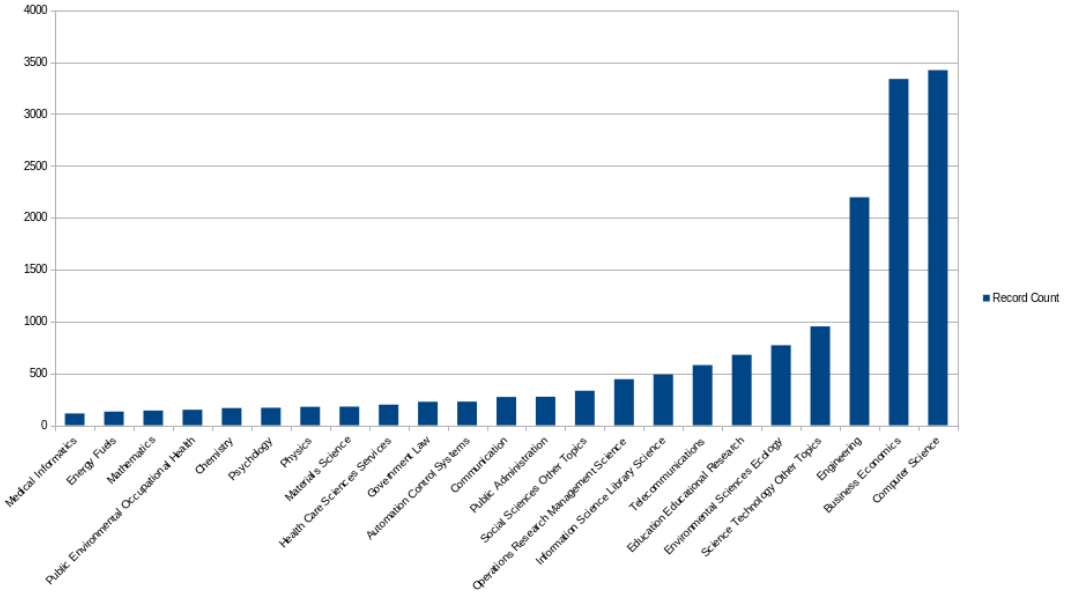

Figure 5: Records published per reasearch area on Web of Science

The charts show that the majority of the documents are published in the area of Computer Science, Business Economics, Engineering, respectively. There is a clear distinction between the other fields participating in publishing and the mentioned fields.

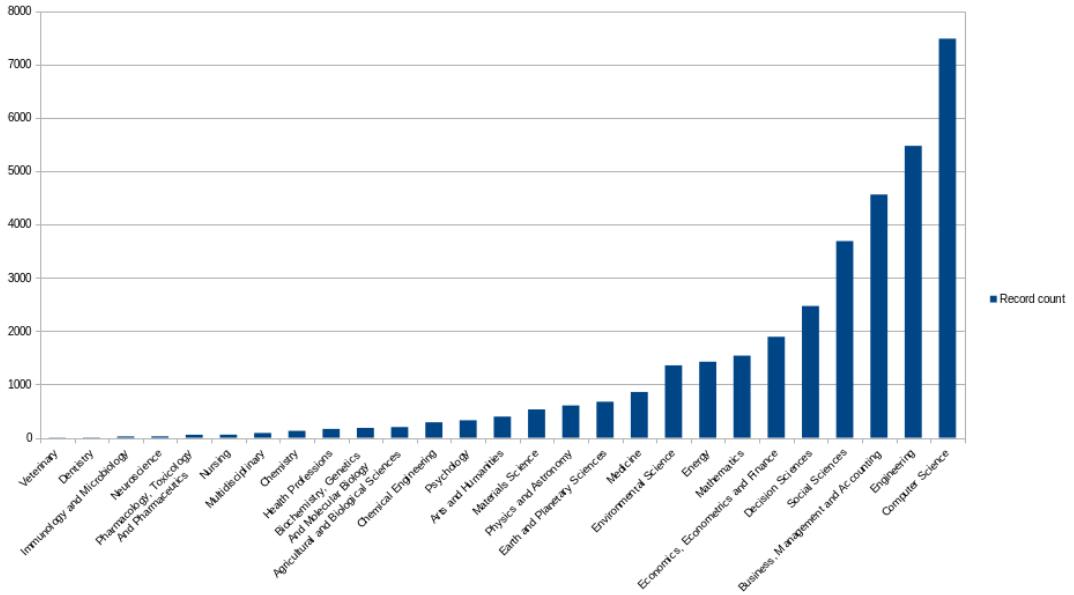

Figure 6: Records published per reasearch area on Scopus

Following a similar trend to the chart from Web of Science, the majority of the documents are published in the area of Computer Science, Engineering, Business Management and Accounting, respectively.

Considering the charts that show the research areas of the documents published, digital transformation is a topic that is being researched from different perspectives. Fields that are

most interested in digital transformation are Computer Science, Business Economics and Engineering. The study of digital transformation from various angles suggests its interdisciplinary nature, which in turn, renders it challenging to precisely define. Conversely, the predominant fields employing digital transformation, namely Computer Science, Business Economics, and Engineering, indicate it as a versatile industry tool. Its open-ended nature allows for its application across diverse fields, in tandem with expertise in these three major domains.

The wordcloud images were made from the most common words in the abstracts of the documents published. The search criteria is the same as for the charts, however it wasn't possible to download all the abstracts from Scopus and Web of Science, instead it was downloaded for 1000 publications.

Figure 7: Wordcloud of most common words in abstracts on Web of Science

The word cloud reveals that the most frequently occurring words in Web of Science abstracts are: digital, transformation, study, data, research, development, technology, based, new, technologies, innovation, model, business, management, analysis, enterprises, process, paper, companies. The exact numbers can be seen in Table 1.

Figure 8: Wordcloud of most common words in abstracts on Scopus

It can be seen from the wordcloud that the words with most appearances in Scopus abstracts are: digital, transformation, study, data, research, development, technology, based, new, technologies, innovation, industry, model, business, results, management, analysis, enterprises, process. The exact numbers can be seen in Table 1.

Word	Scopus	Web of Science
digital	3467	5649
transformation	1938	4286
study	1014	1000
data	941	539
research	840	972
development	693	563
technology	584	462
based	582	510
new	576	566
technologies	575	498
innovation	561	529
industry	529	-
model	528	530
business	497	744
results	483	-
management	478	529
analysis	474	471
enterprises	472	598
process	470	546
paper	-	616
companies	-	454

Table 1: Words with the Most Occurrences in the Abstracts

The most common words are quite similar on both platforms. Words such as study, research, data and development suggest that the topic is still in a research phase. However, words such as technology, innovation, industry, business, management, analysis, process suggest that the topic is being used in the industry as well. A middle ground between the two preceding statements would suggest that the topic is sufficiently defined for industrial application. Nonetheless, its implementation in industry requires further research and definition. This supports the notion that it finds utility across a wide spectrum of fields. For example, the words technologies, innovation, industry, model, business, management, analysis, process suggest that digital transformation is applied to improve processes with the help of technology and innovation in the industry.

2.2. Literature review

The Literature review was conducted with the following search criteria on Scopus and Web of Science:

- Title, abstract and keywords
- Years 2018-2023
- Keywords: "Digital Transformation" AND "Methods"
- Document type: Article, Conference paper

A staple which is repeated in the literature is that digital transformation implementations and projects don't have a specific implementation strategy. Even if the paper talks about strategies and methods, they are usually not defined or are defined in a way that is not applicable to other projects and fields. This makes it difficult to compare different projects and implementations and transition existing knowledge from one context to another. For example, Gurusamy, Srinivasaraghavan, and Adikari describe in their work a framework which connects Agile methods and Design Thinking which would be used in Digital Transformation projects. The framework describes the process of the project, using agile methodologies to keep the project flexible and design thinking to keep the project user-centric. On the other hand, it doesn't describe the methods used or suggestions which methods should be used in the process, some methods are mentioned but not elaborated further [2].

The paper "Leading digital transformation: three emerging approaches for managing the transition" describes the current situation of digital transformation through the success rate of projects labeled as digital transformation projects. According to the paper the success rate of digital transformation projects is less than 30%, similar information is found in other sources; articles on the web suggest that the general failure rate of information technology (IT) projects is 60% [4] furthermore projects which use the agile methodology are 3 times more sucessful than projects which use the waterfall methodology [5]. Yet, the remarkably low success rate of projects raises the possibility that the available data on digital transformation might be linked to overarching information technology statistics. This implies that a majority of projects in the information technology domain experience failure, surpassing a 66% failure rate. [4].

Considering the uniqueness of each project, many descriptions of strategies or methodologies in digital transformation lack concrete methods on the operational level that can be easily replicated with a similar level of success in other projects; as it can be seen from the analysis in the Table 2., many articles describe strategies, frameworks or methodologies which can be used for digital transformation implementation, however, most, if not all described methodolgies fail to provide operational level methods which can be replicated.

Furthermore, some authors such as Li propose that further research should take the following approaches: qualitative research, large-scale quantitative research and new research methods. He explains: "New methods are urgently required to identify, conceptualize and vali-

date emerging phenomena as and when they emerge, long before they become quantitatively significant in the real world." [3, page 815]

The following table describes the analysis of articles which talk about digital transformation; more precisely the articles and papers are examined for their mentiones of methodologies, strategies and frameworks and also the mentiones of concrete methods used or developed in the papers. It should be noted that the methodologies, strategies and frameworks that are taken into account are the ones that describe any kind of process or framework which would be used in digital transformation projects; there is no bias in regards to operational level frameworks. The table is sorted by year of publishing in ascending order which means that the first entry is the oldest and the last entry is the newest.

Article	**Methodologies Described**	**Concrete Methods Mentioned**
"An integrated framework for design thinking and agile methods for digital transformation"[2]	Design Thinking, Agile	For some steps
"Digital transformation in maritime ports: analysis and a game theoretic framework"[6]	Cooperative game theoretic framework	No
"Industrie 4.0 roadmap: Framework for digital transformation based on the concepts of capability maturity and alignment"[7]	Custom Framework	No
"Digital transformation."[8]	Agile	No
"Enterprise architectures for the digital transformation in small and medium-sized enterprises"[9]	Agile enterprise architecture for digital transformation	No
"Digital transformation insights and trends"[10]	Digital Maturity Methodologies	No
"Defining digital transformation: Results from expert interviews"[11]	None	No
"Digital transformation method for value mapping in public management"[12]	None	No
"Smart city initiatives in the context of digital transformation–scope, services and technologies"[13]	None	No

Continued on next page

Table 2 – *Continued from previous page*

Article	**Methodologies Described**	**Concrete Methods Mentioned**
“Digital transformation playground-literature review and framework of concepts”[14]	Digital Transformation Playground	No
“Digital Transformation Playground Operationalization-How to Select Appropriate Technologies for Business Improvement Initiatives.”[15]	Digital Transformation Playground (DTP)	Yes, describing the use of the DTP
“A strategic map for digital transformation”[16]	Digital Balance Scorecard	No
“Roadmap for digital transformation: A literature review”[17]	None	No
“Developing digital transformation strategy for manufacturing”[18]	Digital Maturity Levels	No
“Leading digital transformation: three emerging approaches for managing the transition”[3]	None	No
“Understanding digital transformation initiatives: Case studies analysis”[19]	None	No
“Disruptive Business Model Innovation and Digital Transformation”[20]	Readiness assessment framework	Yes, with the lack of operational implementation concepts
“The impact of COVID-19 on sustainable business models in SMEs”[21]	None	No
“Digital transformation: A multidisciplinary reflection and research agenda”[22]	None	No

Continued on next page

Table 2 – *Continued from previous page*

Article	**Methodologies Described**	**Concrete Methods Mentioned**
"Methods of Digital Transformation of Management Systems"[23]	Lean Manufacturing, Total Quality Management, Theory of Constraints, Enterprise Resource Planning, Quick Response Manufacturing, Business Process Management Notation	No
"Digitization, digital twins, blockchain, and industry 4.0 as elements of management process in enterprises in the energy sector"[24]	None	No
"Digital transformation in business and management research: An overview of the current status quo"[25]	Custom framework	No
"Surviving the Digital Transformation: A Method for Lawyers to Approach Legal Tech"[26]	Agile Scrum	No
"Choosing the type of business model to implement the digital transformation strategy of a network enterprise"[27]	None	No
"Digital Transformation Strategy and Environmental Performance: A Case Study"[28]	None	No
"Understanding industry 4.0 digital transformation"[29]	None	No

Table 2: Analysis of Articles on Methodologies and Concrete Methods

Upon closer examination of the paper analysis results, it can be seen that most of the papers don't describe any methodologies or strategies. Furthermore, even if there is mention of a methodology, strategy or framework, there is no mention of concrete methods used or developed in the papers. One of the reocurring themes is the mention of the need for an operational level framework. The paper "Disruptive Business Model Innovation and Digital Transformation" notes the following in regards to it's concreate methods and framework: "Further research around this conceptual framework should be oriented on making the framework easier-to-use

and contributing to the operational translation of proposed concepts from the organizational governance level into operational inputs." [20, page 17]

On top of the lack of methods and strategies, the literature also suggests that there is a list of challenges which are common in digital transformation projects. Albukhitan mentions the following challenges that are faced while implementing digital transformation projects in manufacturing [18]:

- Traditional Processes
- Resistance to Change
- Legacy Business Mode
- Limited Automation
- Budget restrictions
- Absence of relevant knowledge
- Inflexible company structure
- Security

The paper "Defining digital transformation: Results from expert interviews" mentiones that digital transformation isn't more than a cultural change. Furthemore, the paper points out that there is a lack of knowledge and documentation about transformational change which can be seen from the following sentence: "However, even if expectations are high, digital transformation is seen mostly as a cultural change that has to happen inside the organization and the literature so far has not provided many details on how to orchestrate this transformational change." [11, page 3]

Previously mentioned information found in the literature suggests that there is a need for a methodology/framework which would help with the implementation of digital transformation projects. Strong points are made for the success of agile methodology in IT projects which suggests that the methodology could be used in or along side the provided framework [5]. The framework should be abstract enough to be capable of diffrenet arrangement for different contexts and projects, yet it shouldn't be too abstract to prevent complete freedom in the implementation. As it was mentioned, the methodology should be flexible enough to be used in different contexts and projects, it should be able to help with the challenges that are faced in digital transformation projects and it should be able to help with their success rate.

After considering the proposed ideas, the following research questions were formed:

- What level of abstraction would be appropriate for the suggested framework?
- How could the suggested framework contribute to addressing challenges in digital transformation?
- What specific methods might be incorporated into the suggested framework?

- Will the suggested framework be influenced by existing frameworks?
- What are the reasons for adopting the suggested framework?

3. Digital transformation

Digital Transformation (DT) is a relatively new interdisciplinary approach to rethinking, transforming and implementing business processes to bring new value to customers with the use of relevant and present-day information and communication technologies (ICT) [19]. DT is not a one-time process, rather it is a ongoing process; the paper “Leading digital transformation: three emerging approaches for managing the transition” summarizes that very well in the following sentence: “Digital transformation is a perpetual, never-ending process. Even with each successful digital transformation, the long-term prospect of any organization cannot be guaranteed.” [3, page 813]

Mergel, Edelmann, and Haug made an empirical study through expert interviews on DT in the public sector to develop a definition, it sounds as follows:

> “Digital transformation is a holistic effort to revise core processes and services of government beyond the traditional digitization efforts. It evolves along a continuum of transition from analog to digital to a full stack review of policies, current processes, and user needs and results in a complete revision of the existing and the creation of new digital services. The outcome of digital transformation efforts focuses among others on the satisfaction of user needs, new forms of service delivery, and the expansion of the user base.” [11, page 12]

Considering that the paradigm contains digital in its name it doesn’t surprise that it leans heavily on concurrent technologies. A term that can be connected to DT is Industry 4.0, which is a term that is used to describe the fourth industrial revolution. Industry 4.0 covers technologies ranging from internet of things (IoT) to cloud computing and artificial intelligence (AI) [10], [24], [29].

A key aspect in regards to technology and DT is that the new and emerging technologies enable transformation. They aren’t the product or result, most of the time, they are the starting point. However, it is important to note that technologies aren’t steps for DT, they are enablers. For example, cloud computing is not a step in DT, it is a technology that enables DT [6], [10], [19], [22].

4. Proposing a Framework

The following chapter will cover the proposed framework that can be used in planning and executing digital transformation projects. It will contain a description of the framework, its components, and the process of using it. The framework is based on the literature analysis and the results of the survey conducted in the previous chapters. It is a combination of two parts: the first part is the agile methodology, the second part is the design thinking methodology; the end result of the process of using the framework is a roadmap for digital transformation.

4.1. Agile

The Agile methodology is a framework designed for customer centered project management. It is a fast iterative approach that focuses on delivering value and adopting to change as fast as possible. It has many derivatives, such as Scrum, Kanban, Extreme Programming, and others which define their own set of rules on how to approach a project, however, since everything is derived from Agile the core principals stay the same. The core principals of Agile, derived from the official Agile manifesto, are [30], [31]:

- Prioritize customer satisfaction through early and continuous delivery of valuable software.
- Embrace changing requirements, even late in development, for the customer's competitive advantage.
- Frequently deliver working software within short timescales, from weeks to months.
- Foster daily collaboration between business people and developers throughout the project.
- Construct projects around motivated individuals, providing necessary support and trust.
- Opt for face-to-face conversation as the most efficient method of conveying information.
- Measure progress primarily by the development of working software.
- Promote sustainable development through Agile processes for sponsors, developers, and users.
- Emphasize technical excellence and good design to enhance agility.
- Value simplicity as a means of maximizing productivity.
- Self-organizing teams produce the best architectures, requirements, and designs.
- Regularly reflect on team effectiveness and adjust behavior for improvement.

As it was mentioned before, the derivatives of Agile define their own set of rules on how to approach a project while still following the core principals of Agile. For example one of the derivatives of Agile, Scrum, is made from the following parts [31]–[35]:

- Backlog - a list of tasks with priorities that need to be completed.
- Sprints - short periods of time, usually 1-4 weeks, where the team works on a set of tasks from the backlog.
- Stand-up meetings - short meetings that are held daily to discuss the progress of the project and any problems that the team is facing.
- Retrospectives - meetings that are held at the end of each sprint to discuss what went well and what went wrong.

As it can be seen from the core principals of Agile, the methodology is priorizing working software over documentation; that can cause long term maintainability problem if the project manages extend for a long enough period of time, however, due to the short sprints and the constant feedback from the customer it's usually a good enough trade-off. One of the main advantages of Agile is that it is very flexible and can be adapted to any project, that can be seen from the reports that compare traditional software development methodologies with agile in regards to success rates. As it was mentioned before, the success rate of Agile projects is three times higher than the success rate of traditional projects [4], [5].

The fundamental insight from Agile methodology is its customer-centric approach, emphasizing swift value delivery. This aspect can be harnessed in digital transformation endeavors to expedite value delivery to the customer, particularly given the methodology's adaptability, which aligns effectively with DT's reliance on emerging technology.

4.2. Design Thinking

Design Thinking is a human-centered design based problem solving methodology which has stakeholders in the center of attention and it's best used for problems that are unique, uncommon, ill-defined and open to creativity.

Human-centered design (HCD) is a process and set of techniques which are used to create solutions that are specificaly tailored for the people who will use them. [36], [37] Much like HCD, design thinking is used for solving problems while keeping the users and stakeholders in the center of attention, however, design thinking broadens the scope of the problem by including business and technology aspects of the problem, it isn't fixated solely on the user experience. Liedtka, Eldridge, and Hold explain that design thinking is best used for problems that are ill-defined, unknown and with a lot of space for creative problem-solving. On the other hand, it is not suitable for problems that are of an analytical nature, or problems that are clear and well-defined.

Figure 9 shows the structure of the design process and elaborates the previously mentioned purpose of design thinking [38], [39].

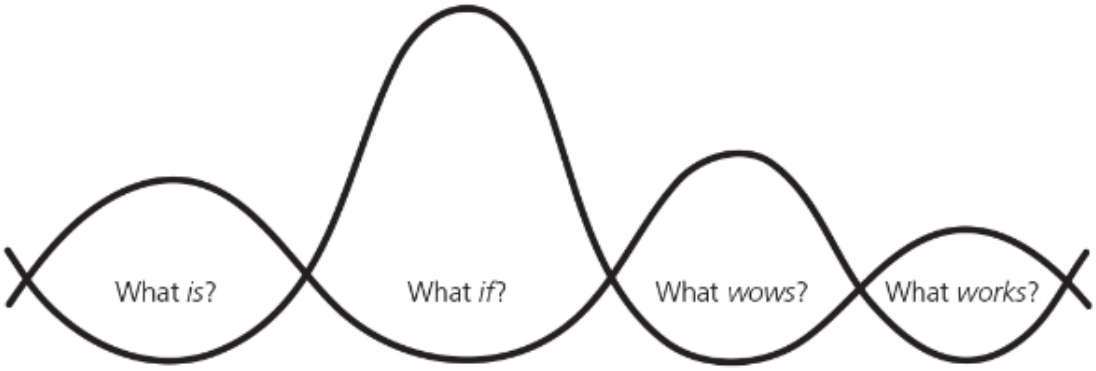

Figure 9: Design Thinking process structure [38]

As it can be seen from the figure (Figure 9), the design thinking process consists of four phases. The four phases are accompanied by documents that aid the project managment and by multiple methods which should be used in each step.

The documents are [38], [39]:

- Design Brief - The projects "North Star" which consists of definitions of goals, resources, timelines, etc.
- Design Criteria - Derived from users needs and business requiremnts, it's used for evaluation of alternate designs.
- Napkin pitch - Defines a common ground for solution comparison. There are often more than one napkin pitch.
- Learning Guide - Describes resources that can be spent on learning about the feasability of the top 2-3 concepts.

The methods are [38], [39]:

- **What is?**
  - Visualization
  - Journey Mapping
  - Value Chain Analysis
  - Mind Mapping
- **What if?**
  - Visualization
  - Brainstorming
  - Concept Development
- **What wows?**
  - Visualization

  - Assumption Testing
  - Rapid Prototyping

- **What works?**
  - Visualization
  - Customer Co-creation
  - Learning Launch

By examining the methods closer, it can be seen that the methods emphasise the importance of visualization. Furthermore, it makes it clear that having customers involved in the process is key [38], [39].

Design thinking's pace can be described by the following two sencences [38], [39]:

- "Fail early to succeed sooner."
- “Fail fast to succeed sooner.”

As it can be seen, the design thinking process is iterative and it's not linear; it is expected that the process will be repeated multiple times before the final solution is found. The authors Liedtka and Ogilvie explain that it's better to fail more often when the failing cost is more affordable, which is early on in the project, rather than later when it could be expensive and time consuming to switch paths.

In conclusion, design thinking is a methodology that is used for solving problems that are open-ended and chart unknown territory. It is human-centered and it's iterative. Considering the nature of digital transformation projects and the fact that all of them are unique and different, design thinking looks like a good fit for the proposed framework. It is also important to put an emphasis on the fact that it's iterative nature makes it a good match for agile methodologies.

4.3. Framework

This chapter will be dedicated to answering the research question; through the answers a framework for digital transformation will be established.

4.3.1. What level of abstraction would be appropriate for the framework?

The Literature review underscores the necessity for a framework capable of managing operational-level processes. Nonetheless, it is imperative that the framework strikes a balance, avoiding excessive detail which could constrain its applicability across a wide range of projects. With that in mind, using design thinking as a basis or inspiration for the framework makes sense because of it's open-ended nature which allows for a wide range of projects to be executed using it. Furthermore, the agile methodology is a good inclusion into the framework because of it's

proven effectiveness and wide variety of use cases, however, it isn't a key factor because design thinking, by itself, is similar (iterative, simply documented, stakeholder centered) in regards to the agile methodology.

To conclude, the abstraction level of the framework should be similar to the design thinking methodology.

4.3.2. How could the suggested framework contribute to addressing challenges in digital transformation?

Fighting the existing challenges in digital transformation is difficult and it is unlikely that a single framework would be able to solve all of them. However, the suggested framework can impact some of them and help mitigate their effects. For example, resistance to change can be mitigated by the stakeholder centered approach of the design thinking methodology. By extension, the framework is bound to bring change to existing processes and systems because it will be employed in digital transformation scenarios which, as it was mentioned before, try to create new value through enablers. Budget restrictions are also taken into account by design thinking's pace which encourages to fail early and cheap. Starting with a small project and scaling it up is a good way to mitigate the absence of relevant knowledge because through the process of scaling up the knowledge will be gained.

The only issue that aren't addressed by the framework directly are security and limited automation.

4.3.3. What specific methods might be incorporated into the suggested framework?

The methods that will be incorporated into the framework are the following:

- Design Thinking
  - Visualization
  - Journey Mapping
  - Value Chain Analysis
  - Mind Mapping
  - Brainstorming
  - Concept Development
  - Assumption Testing
  - Rapid Prototyping
  - Customer Co-creation
  - Learning Launch
- Lego Serious Play

- Job-to-be-done
- Context Canvas
- Persona Canvas
- Value Proposition Canvas

The methods will follow a 4 stage process which is the same as in the design thinking methodology, the only difference will be an expansion of methods mentioned in design thinking for diversity purposes. As it was mentioned before, the process is iterative and it is possible to go back to previous stages. The exact process is displayed in the Chapter 4.5 Process.

4.3.4. What are the reasons for adopting the suggested framework?

The reason to use the suggested framework is structure and guidance in digital transformation projects which is currently lacking. Additionally, it is based on design thinking which is a proven methodology for innovation and problem solving as well as on agile which has proven itself in project management.

4.4. Methods

Selected methods for the framework will be elaborated further in the following section.

4.4.1. Visualization

Visualization is the most important method of the framework because everything can be visualized. It can be used in every step of the process and it is the main way of communicating ideas and concepts. Using images is a part of everyday life and it is a natural way of communicating ideas, emotions and concepts. It can be a good way to research the market and the competition, to understand the customer, to create a prototype, to test the prototype, and to present the results. Presenting results in numbers is abstract, however a chart which shows the same results is much easier to understand. Furthermore, a description of a prototype can be interpreted in many ways, however a picture displaying the prototype is far clearer and easier to understand [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted and shortened for simplicity purposes.

1. "**Keep it simple**"[38], [39] - keep the visuals simple, stick figures do the trick; art isn't the point, except if the project is about art.[38], [39]

2. "**Break your problem down into components**"[38], [39] - break the problem into multiple components according to the following questions: who, what, how much, where, when, how and why. Let each team memeber draw one component for a better group vision.[38], [39]

3. "**Think in metaphores and analogies**"[38], [39] - metaphores are used for showing connectiono between two seemingly unrelated concepts; the purpose is to communicate and connect on a deeper level and open new possibilities.[38], [39]

4. "**Use photographs**"[38], [39] - photographs send a better message than words; often times it's easier to take a picture of something than to describe it or draw it.[38], [39]

5. "**Experiment with storyboarding**"[38], [39] - a series sketchet that tell a story; it can be used to show a process, a customer journey, a prototype, etc. However, the most important actor doesn't take too long to draw because it's a stick figure.[38], [39]

6. "**Create personas**"[38], [39] - a persona is a fictional character which was made based on the research of the target audience; it is used to make the customer human and personal for empathy's sake.[38], [39]

7. "**Tell stories**"[38], [39] - it's important to connect the dots and tell a story; it's easier to understand and remember a story than a list of facts.[38], [39]

8. "**Practice guided imagery**"[38], [39] - a specific kind of story is told with guided imagery, it is used to help the listener visualize the story narated by the author while the author draws, sketches or displays it in some way [38], [39]. A good example of this is any video from the The School of Life [40]

Following the previously mentioned steps it's possible to create visuals that are effective, simple, easy to understand and get the point across.

4.4.2. Journey Mapping

Journey mapping is a flow of how the customer interacts with a company's product or service. It can be a flowchart or any other graphic format. The depiction of the journey can be the real one or the ideal one, either way it forces the team to focus on the customer and his feelings. This method is employed in the first step of designing a new product or service and because of its significance it will be used in every step that comes after. A journey map allows the team to see what the customer sees and to feel how he feels; it shouldn't be used to see selling points but to explore ideas and innovation [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted, shortened for

simplicity purposes [39]; the only thing that was added is the mention of Maslow's hierarchy of needs [41]–[43] in the step "Study the themes you have uncovered".

1. "**Select the customers whose experience you want to understand more fully**"[38], [39] - investigate the context in which the customer interacts with the product or service while noting the feelings he goes through.[38], [39]
2. "**Lay out your hypothetical view of what the customer's journey looks like from beginning to end**"[38], [39] - include all the steps of the journey, even if they don't seem important and even if they aren't connected to the product or service.[38], [39]
3. "**Identify a small group of customers (12-20)**"[38], [39] - the group should represent the target audience and it should be diverse.[38], [39]
4. "**Conduct a few pilot interviews.s**"[38], [39] - ask the customer to walk you through the journey in case you missed something. May require multiple attempts.[38], [39]
5. "**Finalize the questionnaire**"[38], [39] - focus on the emotional highs and lows of the journey. The interview should be conducted by at least 2 people; one is talking to the customer while the other is taking notes and looking at non-verbal communication. [38], [39]
6. "**Identify the essential moments of truth and other themes from the interviews**"[38], [39] - extract the most important emotions from each interview onto a paper with the customer's name on it. Then, group the papers into themes and identify the most important ones.[38], [39]
7. "**Study the themes you have uncovered**"[38], [39] - studying the uncovered themes and finding connections is easier when a sheet of human needs is present. The one used in the book *Designing for growth: A design thinking tool kit for managers* is compiled by the Center of Nonviolent Communication, it will be displayed below; on the other hand, any other sheet of human needs can be used, a good recommendation is Maslow's hierarchy of needs [41]–[43].[38], [39]
8. "**Select the two dimensions that you feel are most revealing**"[38], [39] - make a matrix from the dimensions and annotate each quadrant with an archetype.[38], [39]
9. "**Position each interviewee into one of the quadrants**"[38], [39] - place the interviewees into the quadrants based on their needs, emotions and descriptions.[38], [39]
10. "**Map the journey of each persona**"[38], [39] - by mapping the journey for each person it's possible to see the differences and similarities between them. Through that, it's possible to determine the most prevailing pain points which are targets for innovation.[38], [39]

By adhering to the aforementioned steps, it becomes feasible to construct one or multiple customer journeys. These journeys serve as a means to identify the crucial pain points and pinpoint the most significant needs of the customer.

4.4.3. Value Chain Analysis

A business side of the customer journey is the value chain. It is a close examination of the company's interactions with partners and suppliers with the goal of finding opportunities and vulnerabilities. A value chain analysis is a key requirement for examining existing as well as new business models and evaluating their effectiveness. The analysis is also capable of showing the view of the company from partners' and suppliers' perspectives which is good for discovering potential partnerships and rivalries [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted, shortened and modified for simplicity purposes [39].

1. "**Draw the value chain for your business**"[38], [39] - create nodes starting from the end of the chain, the point where the customer gets the product or service, and work your way back to the beginning. Include all the steps and interactions with partners and suppliers. It is better to make a too detailed chain and regress than to have too little.[38], [39]
2. "**Analyze the competitive environment**"[38], [39] - identify key players and their market share for each node.[38], [39]
3. "**Identify the core strategic capabilities**"[38], [39] - how does everyone included contribute to generating value in each node.[38], [39]
4. "**Evaluate the bargaining power and influence of each player**"[38], [39] - find out who drives performance, how easy it is to substitute a player/partner and how much of their efforts is percieved by the customer.[38], [39]
5. "**Determine the possibilities**"[38], [39] - with the analysis of power and position from the previous step, it is possible to find improvements and opportunities for power and profitability.[38], [39]
6. "**Assess your vulnerabilities**"[38], [39] - examin the value chains for vulnerabilities that could stem from other players changing their footprints.[38], [39]
7. "**Identify themes**"[38], [39] - identify patterns related to power, profitability, defense and more across value chains.[38], [39]

By following the steps outlined earlier, you can generate one or more value chains. These can then be employed to assess current strategies and unearth potential areas for enhancement.

4.4.4. Mind Mapping

Mind mapping is used to determin patterns and draw conclusions from the data collected in the **What is?** phase of the process. It is usually a step that is forced by time constraints of a project; drawing connections between data points grants a new way of looking at things and it can be used to find new opportunities. Something which could generate a lot of value is to use fresh eyes when doing mind maps, that is, to have someone who is not familiar or is barely familiar with the project give his insights and connect ideas [38], [39]. A good mindset for the activity is the 5 Whys method which, summarized, is a method of asking why 5 times to get to the root of the problem [44].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted, shortened and modified for simplicity purposes [39].

1. "**Hold a yard sale**"[38], [39] - lay out all the collected data (value chains, interviews, customer journey maps, ...) in a visually appealing fashion for everyone to see. [38], [39]

2. "**Invite shoppers**"[38], [39] - the amount of shoppers (thoughtful people) should be anywhere from 10 to 50 people. Assign them to small teams and give them markers, two stacks of medium-sized Post-it notes in two different colors, one stack of large Post-its and a clipboard. [38], [39]

3. "**Offer tours**"[38], [39] - begin by having participants tour the "yard sale" or visual displays of the gathered information. If required provide brief explanations of what each visual represents. [38], [39]

4. "**Pick out the good stuff**"[38], [39] - ask the attendees to browse individually and note any learnings or insights on medium-sized Post-it notes. If necessary, allow attendees to add missing data on different colored Post-it notes. [38], [39]

5. "**Cluster the good stuff**"[38], [39] - have participants return to their teams and privately sort and cluster their Post-it notes into themes. After that teams should combine Post-it notes into shared patterns and themes on a large foam-core board. [38], [39]

6. "**Identify the insights**"[38], [39] - find insights from each cluster and try to relate them to each other. Write these insights on large Post-its and place them on the relevant cluster. [38], [39]

7. "**Translate insights and connections into design criteria**"[38], [39] - teams should translate the insights and connections into design criteria via the sentence "Based on what you have learned, if anything were possible our design would...". [38], [39]

8. "**Create a common criteria list**"[38], [39] - let the teams browse each other's charts and discuss the criteria. Collaboratively create a "master list" of criteria that an ideal design should meet. [38], [39]

Following the previously mentioned steps it's possible to define design criteria through the process of mind mapping, which, if you read through the steps, is quite different than the usual mind mapping process.

4.4.5. Brainstorming

Brainstorming is a method for generating ideas. It is a group activity where everyone is encouraged to share their ideas and to build on the ideas of others. However, as a fairly popular method it is often used ineffectively just because of the phrase "Think outside the box". In contrast to the "Think outside the box" phrase, it is better to frame people into a box, which in this case will be the research and design criteria done before the brainstorming session Moving to this step usually marks progress into the next phase of the process, the **What if?** phase [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted, shortened and modified for simplicity purposes [39].

1. "**Right People**"[38], [39] - brainstorming depends on the people that are involved, it is important to have a diverse group of people; that can mean customers or even non-involved third parties. Multiple short sessions are better than a single long one.[38], [39]

2. "**Right Challenge**"[38], [39] - it's important for the team to focus on a clearly stated challenge, for example the design criteria.[38], [39]

3. "**Right Mind-Set**"[38], [39] - the required mindset is the creator not critic mindset, that is, the focus should be on adding on top of existing ideas, not tearing them down.[38], [39]

4. "**Right Empathy**"[38], [39] - a successful brainstorming session requires empathy; participants need to see the human side of the challenge to be able to understand it and to be able to come up with better ideas.[38], [39]

5. "**Right Stimulus**"[38], [39] - each brainstorming session is made or broken by one or more stimuly. Most often, the stimulus is a question which triggers the participants to think in a certain way. An example of a stimulus would be "How would you make x if you had infinite time?". Good guidelines for thinking of trigger questions are questioning assumptions, exploring extremes, changing who does which job, exploring technological scenarios, pretend to be someone else and finally place yourself into the future and look back.[38], [39]

6. "**Right Facilitation**"[38], [39] - the facilitator should be a neutral party who is able to keep the session on track and to keep the participants focused on the challenge, a good example of doing so is doing brainwriting; the process of writing ideas onto a paper individually when presented with a trigger question.[38], [39]

7. "**Right Follow-Up**"[38], [39] - gathering ideas from a brainstorm session is only part of the process, it is important to weigh the ideas at the end of the session in regards to available resources and possibilities. It should be noted that brainstorming yields ideas, not concepts, concepts are created after thorough research and testing.[38], [39]

Following the previously mentioned steps it's possible to define ideas through the process of brainstorming.

4.4.6. Concept Development

Concept development is a method which uses the ideas generated in the brainstorming session and turns them into concepts. Oppositely to brainstorming, concept development requires the core team which knows the project in depth. Creating multiple concepts is important because it allows the team to explore multiple possibilities from which a small number will get to the stage of customer testing and even a smaller number to actual deployment. This method goes hand in hand with brainstorming so it is best used directly after brainstorming; essentialy, in this step. the ideas that were created in brainstorming get to meet the design criteria that was determined beforehand in the phase **What is?** [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted, shortened and modified for simplicity purposes [39].

1. "**Gather your Legos**"[38], [39] - the ingredients you will need for concept development are a core team of people, the design criteria from **What is?** and the ideas from brainstorming.[38], [39]

2. "**Spread out your Legos**"[38], [39] - it's important to be able to see everything, spreading everything out onto walls is a good way to do so. After placing the items, sort them by: removing duplicates, grouping similar ideas, identifying and adding missing ones, listing emerging topics (e.g. self-service, pay-as-you-go, personalization), setting priorities based on the previously defined design criteria, and annotating ideas that sound the most interesting.[38], [39]

3. "**Choose some anchors**"[38], [39] - choose five to twelve themes that were uncovered as anchors for different concepts.[38], [39]

4. "**Form initial concepts (make some chili)**"[38], [39] - this step is all about combining different elements from brainstorming while respecting the rules of combinatory

play. That means that combining concepts should be done when they can be thematically connected, balanced, proportional and distinctive.[38], [39]

Following the previously mentioned steps it's possible to define concepts through the process of concept development.

4.4.7. Assumption Testing

Assumption testing is used for assess the likelihood of success of a concept. It determines whether assumptions made in the **What if?** phase are valid or not. This method is mostly used in the **What wows?** phase of the process, however it can show up in any part of the process [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted and shortened for simplicity purposes; steps listed in "Lay out the generic business tests your new concept must "pass" in order to move forward" and in "Sort the data" were directly cited from the book [39].

1. "**Lay out the generic business tests your new concept must "pass" in order to move forward**"[38], [39] - as the first step in testing a concept it is important to try and pass the generic tests a product or service should pass. Those tests include [38], [39]:
    - "The value test: Customers will buy it—at a price that works"[38], [39]
    - "The execution test: You can create and deliver it—at a cost that works"[38], [39]
    - "The scale test: If you pass 1 and 2, eventually (the sooner the better) you can build a level of volume that makes it worthwhile"[38], [39]
    - "The defensibility test: After you do all the work involved in steps 1 through 3, competitors can't easily copy you"[38], [39]
2. "**Lay out the specific business tests your new concept must "pass" in order to move forward**"[38], [39] - look at the previously stated requirements from phase **What is?** and **What if?** and see if the product meets them.[38], [39]
3. "**Make sure that your assumptions relating to each individual test (value, execution, defensibility, and scalability) are as explicit aspossible**"[38], [39] - the assumptions made about each test should be as explicit as possible. [38], [39]
4. "**Determine which assumptions are most critical to the attractiveness of your new concept**"[38], [39] - by determining most critical assumptions for each concept it is possible to divide the assumptions which are more attractive than others; that in turn, makes the concept more plausible to succeed.[38], [39]

5. "**Having narrowed the assumptions down to a manageable number, you now must identify the data you need to test them**"[38], [39] - this step requires the team to gather data which will be used to test an assumption. By doing so it is possible to either disprove or prove the assumption. A key part for the method is searching for flaws in the logic of the assumption.[38], [39]

6. "**Sort the data you need into one of the following three categories**"[38], [39] - this sorting is of a special kind, the sorting should yield three piles of data: [38], [39]

    - "What you know"[38], [39]
    - "What you don't know and can't find out"[38], [39]
    - "What you don't know but can find out"[38], [39]

7. "**Figure out how you could quickly get data in category 3**"[38], [39] - finding data that is missing is important; the path to finding it, however, is open ended. Something can be deducted from other data, something can be found online, something can be found by asking customers, etc.[38], [39]

8. "**Design your thought experiment, paying special attention to the data that could prove you wrong**"[38], [39] - while designing the thought experiment which is the sum of the previous parts, it is important to stay on the lookout for data that can prove the assumption wrong or, as it was previously stated, logic flaws.[38], [39]

Following the previously mentioned steps it's possible to test assumptions that were developed in prior steps.

4.4.8. Rapid Prototyping

Rapid prototyping is a method used to create a visual or experiental representation of a concept. It is a fast iterative process which is used to find flaws in the concept, fix them and opmtimize it. The starting prototypes should look like rough pieces of work in progress while the high-fidelity prototypes should be more developed and should have some form of business model attached to them. The method is used in the **What wows?** phase of the process. It shouls be used as early as possible to clean up misconceptions and give more space for understanding of the concept [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted and shortened for simplicity purposes [39].

1. "**Start small and simple**"[38], [39] - the first step is to figure out what the prototype should be like with enough room left for it to be modified.

2. "**Figure out the story that you want to tell**"[38], [39] - by visualizing the concept it is possible to find the story that the concept is trying to tell. The story should be simple and easy to understand.

3. "**Show, don't tell**"[38], [39] - instead of telling the story, it is better to show it. The prototypes story should invoke empathy and understanding with the focus to details of how it works and how people will interact with it.

4. "**Visualize multiple options**"[38], [39] - there should be some alternatives to choose from while prototyping.

5. "**Play with your prototypes, don't defend them**"[38], [39] - the prototypes should be played with, they aren't finished products and they shouldn't be defended as such. The goal is for others to give feedback regarding the prototype, even if it's negative.

Following the previously mentioned steps it's possible to define design criteria through the process of mind mapping, which, if you read through the steps, is quite different than the usual mind mapping process.

4.4.9. Customer Co-creation

Customer co-creation is a method that involves the customer in the process of creating a product or service by giving them access to the rough prototypes that were created before. This step should be considered mandatory if the product or services aims to be customer-centered. By involving the customer in the process, it is possible to get direct feedback on the prototypes and improve them; the co-creation should be done in multiple round, each round should be done with an improved prototype [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted and shortened for simplicity purposes [39].

1. "**Enroll customers who care about you**"[38], [39] - it is important to get customer who want to be involved with the product or company, however, they should be able to speak their mind and be honest about how they feel. A key part is the fact that the chosen customers can be trusted; they are playing with a prototype, it would be bad if they leaked it to the competition.

2. "**Diversity = security**"[38], [39] - choosing a diverse group is an important step. Sometimes having the bravery to choose a group that is a mix of a target audience and a non-target audience is a great path to success.

3. "**Create a no-selling zone**"[38], [39] - the point of co-creation is not to sell the prototype but to get recommendations from the customer.

4. "**Engage one customer at a time**"[38], [39] - removing the pressure of public speaking can be done by engaging the customers one by one; it could prove a better way to get real and honest feedback about the prototype.

5. "**Offer a small menu of choices**"[38], [39] - presenting multiple prototypes can enable customers to choose the one they like the most. By doing so the customer can choose a product that isn't the teams favorite but will steer the team in the right direction. A good idea is to also include prototypes that were thought no one will select.

6. "**Provide visual stimulus, but leave it rough**"[38], [39] - visualization is important for the customer to understand the prototype. The visuals shouldn't be to polished, that gives more courage to customers to give feedback and, in case of feedback, less work for adjustments of the prototype.

7. "**Help customers communicate visually**"[38], [39] - let the customers communicate their preferences in a visual way, for example, let them put green stickers and red stickers onto prototypes on next to them to show their preferences.

8. "**Leave time for discussion**"[38], [39] - time for discussion is important because it usually reveals customers true feelings which they might not be aware of. It is also a possibility to hear their opinion on the topic they have questions about (e.g. Question: "How would private information be handled?", reply: "How would you recommend it be handled?".)

9. "**Provide timely feedback**"[38], [39] - customers want to know whether their input was used in changing the prototype or not. It is important to give them feedback in a timely manner.

Following the previously mentioned steps it's possible to find out which product or service a customer wants and exactly how he wants it.

4.4.10. Learning Launch

Learning launch is a method used to test the prototype and its assumptions in the real world. It is constrained by time and resources. A timeframe for a small business would be a month, however larger companies can afford longer learning launches, for example, a three months. Through that time, the customer who uses the product should be monitored and his feedback should be collected. It is important to learn from the feedback and to adjust the prototype accordingly. If there are some assumptions that weren't tested before, now is the time to test them, if possible [38], [39].

How to Do It?

The following steps' names were directly taken from the book *Designing for growth: A design thinking tool kit for managers* while the descriptions were interpreted and shortened for simplicity purposes [39].

1. "**Set tight boundaries**"[38], [39] - set precise limits on important variables like time, geography, number of customers involved, features and partner cdesign criterompanies.

2. "**Design with a sharp focus on key assumptions**"[38], [39] - testing key assumptions that weren't tested before is important in this step, if they can be tested at all.

3. "**Build a team that is both disciplined and adaptive**"[38], [39] - having people from different backgrounds helps in avoiding creating tests that you already have the answers to or the answer you want.

4. "**Work in fast feedback cycles**"[38], [39] - expect surprises and be prepared to respond quickly. Doing a check-in on a weekly basis is a good start.

5. "**Make it feel real**"[38], [39] - customers, partners and the team shouldn't think of the learning launch as a game. Thinking of it as such will yield data that might not be true. The product should have a clear list of features and with that, a clear price.

6. "**Have back-up plans for everything**"[38], [39] - having in mind everything that could go wrong with the product or service and having a plan B for that case saves a lot of time and effort for the team in case such problems occur.

Following the previously mentioned steps it's possible to refine the existing prototype to the level of a product which is ready to be deployed.

4.4.11. Lego Serious Play

Lego serious play is a method which takes Legos out of a childrens playroom and into a business meeting. It was developed by LEGO in the 1990s and it is used to solve problems and to explore ideas. It doesn't have clear boundaries on where the methods reach stops and because of that it can be implemented in every phase of the process.[45]

How to Do It?

The following steps' names were directly taken from the guide *LEGO Serious Play Open-source* while the descriptions were interpreted and shortened for simplicity purposes. Furthermore, the last step in the process was added because it provides value to the process and it isn't mentioned in the official rules of LEGO serious play [45].

1. "**The Challenge**"*LEGO Serious Play Open-source* - the facilitator introduces the topic and gives a challenge to the participants.

2. "**Building**"*LEGO Serious Play Open-source* - the participants should build their explanation of the problem out of LEGO. It is important to keep the participants "talking" with their hands, even if they don't know what to build, encouraging them to start building anything will lead to a solution.

3. "**Sharing**"*LEGO Serious Play Open-source* - participants show and share their work and, most importantly, the meaning and narative behind it.

4. "**Reflection**"*LEGO Serious Play Open-source* - this step is not included in the official rules of LEGO serious play, however it provides value to the process. The participants reflect on the experience and the insights they gained from it which can reflected on the product or service.

Following the previously mentioned steps it's possible to use LEGO serious play to solve problems and explore ideas.

4.4.12. Job-to-be-done

The "Job-to-be-done" approach involves discerning the customer's underlying objective, essentially asking what task the product or service is enlisted to perform. This question unveils the fundamental motivations of the customer. Delving into these core motivations enables a deeper understanding of the customer's true desires and what they are willing to invest in. This method can be used in the **What is?** phase of the process to find out what the customer is trying to accomplish and in the **What wows?** phase to find out what the customer wants. It can even be used in the **What if?** phase [46]–[48].

How to Do It?

The following steps were created by combining information gained from the articles *Jobs To Be Done: Definition, Examples, and Framework for Your Business*, *Jobs-To-Be-Done Framework* and information from the video *Innovation Summit '09, Clayton Christensen (Clip #4, TechPoint)* [46]–[48].

1. "**Identify the customer job**"[46]–[48] - identify the underlying need or want the customer is trying to accomplish.

2. "**Describe the job episode**"[46]–[48] - find out when and where does the customer job occur. What are the different steps involved in getting the job done?

3. "**Write a jobs-to-be-done statement**"[46]–[48] - This should provide a succinct outline of the customer's task, encompassing their objective, the context in which it occurs, and the intended result.

4. "**Identify the customer's pain points**"[46]–[48] - find what the challenges are that the customer is facing in getting the job done.

5. "**Find ways to solve the customer's pain points**"[46]–[48] - this involves developing new products or services, or improving existing ones.

6. "**Test and iterate**"[46]–[48] - once you have a solution, test it with customers to see if it meets their needs. Be prepared to iterate on your solution based on customer feedback.

Following the previously mentioned steps it's possible to define customers wants, needs and what he is trying to accomplish. Furthermore, it is possible to use this method for validating ideas and concepts.

4.4.13. Context Canvas

Context canvas is a method that helps in understanding the suroundings of a company and their effect on the company. It takes into account the company's customers, competitors and even regulations, economy and technological trends. Most value can be gathered from it after it has been iterated multiple times; in the first iteration usually superficial information comes up, however, each further iteration brings more depth to the topic and therefore more value [49].

Canvas description

The canvas is divided into 8 sections, each section is described below [49]. The names of the sections were directly taken from the page *Design Thinking Tools* as well as the descriptions [49].

1. "**Your company.**"[49] - "Your own company or organization stands in the center of the image."[49]
2. "**Demographic trends.**"[49] - "Look for data on the demographics, education level, employment situation. What are the big changes in these areas?"[49]
3. "**Rules & Regulations.**"[49] - "What policies, rules, and regulations do you think will be applied in the (near) future? What is the government up to? Any new taxes?"[49]
4. "**Economy & Environment.**"[49] - "What is happening in the economy? And what is going on in the larger environment? Are there economic trends that will impact your business? Do you think climate change will have an impact?"[49]
5. "**Competition.**"[49] - "What about the competition? Take the time to find the unexpected competition. Are there new entries? Competition coming from unexpected sources?"[49]
6. "**Technology trends.**"[49] - "What new technological trends do you see emerging that will impact your business?"[49]
7. "**Customer needs.**"[49] - "How will the customer needs change in the future? Do you see new trends? Do you see any big shifts in customer behavior? Are there new trends going mainstream?"[49]
8. "**Uncertainties.**"[49] - "Do you see any important uncertainties? Things that potentially have a huge impact but it is unclear how or when?"[49]

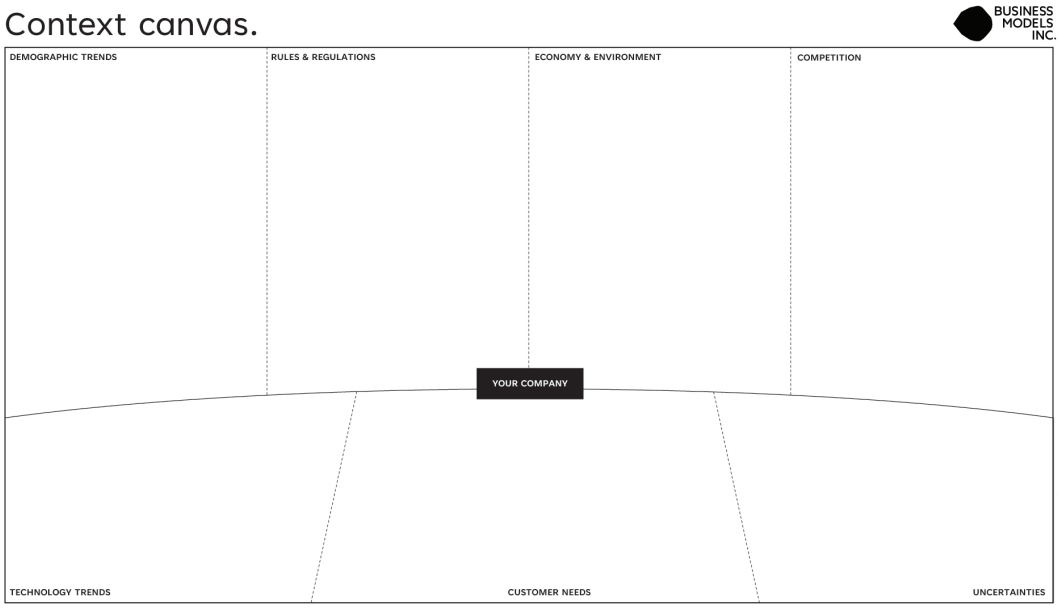

Figure 10: Context canvas [49]

How to Do It?

The names of the steps were directly taken from the page *Design Thinking Tools* while the descriptions were interpreted [49].

1. "**Divide and conquer**"[49] - divide the team into multiple teams and give each team one or more section to complete.[49]
2. "**Warm up**"[49] - have deep discussions about what is going on in the world related to the assigned section of each team. The drivers should be written onto sticky notes and the discussion should be limited to 30 minutes at most.[49]
3. "**Add content to the canvas**"[49] - when everyone is finished, let a representative from each team, one by one, add their notes (drivers) to the canvas.[49]
4. "**Review**"[49] - take a look at the whole canvas and discuss the findings. Some things to look out for are reoccurring assumptions between sections, missing spaces and surprising assumptions.[49]
5. "**Identify key drivers**"[49] - use a dot voting system to identify the key assumptions, assumptions that have the biggest positive and negative impact on the company now and in the near future.[49]

Following the previously mentioned steps it's possible to define the context in which the company is working. This method can be applied as an alternative to, or in addition to, the value chain analysis.

4.4.14. Persona Canvas

Persona canvas is a method that is used to characterize a customer as a person. Doing so enables the team to empathize with the customer and hence better understand his needs and wants. It is a method that is used in the **What is?** phase of the process to define the customer [49].

Canvas description

The canvas is divided into 9 sections, each section is described below [49]. The names of the sections were directly taken from the page *Design Thinking Tools* as well as the descriptions [49].

1. "**Name, role/occupation**"[49] - "Giving your persona a real name and role helps anchor them in reality. Using a real person is even better."[49]
2. "**Outlines**"[49] - "The canvas is designed to make it easy for you to draw what your customer looks like on top of it. Is it a man? A woman? Is he or she happy? Or sad? Do they wear specific clothes? Make a rich picture."[49]
3. "**Need**"[49] - "In the end, we want to try to identify needs for the persona. What do they really want? What decisions will they take? The rest of the canvas helps to zoom in."[49]
4. "**Positive trends**"[49] - "What are positive trends the persona experiences in their life?"[49]
5. "**Opportunities**"[49] - "What are positive opportunities the persona experiences in their life? These could be in work, or private life."[49]
6. "**Hopes**"[49] - "What hopes does the persona have for the future?"[49]
7. "**Negative trends**"[49] - "What are negative trends the persona experiences in their life?"[49]
8. "**Headaches**"[49] - "What are negative headaches the persona experiences in their life? These could be in work, or private life."[49]
9. "**Fears**"[49] - "What fears does the persona have for the future?"[49]

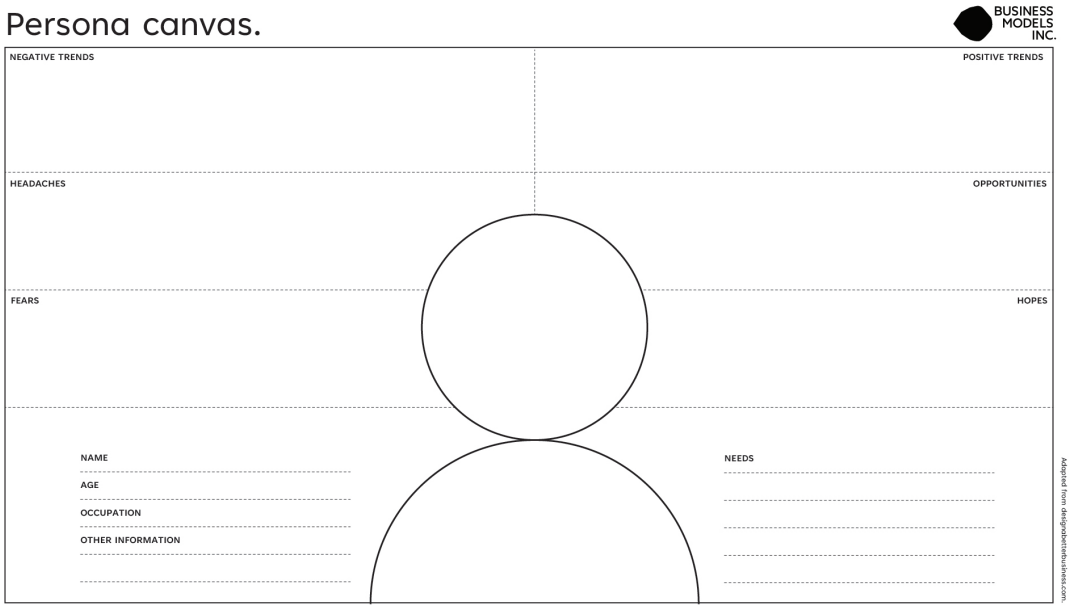

Figure 11: Persona canvas [49]

How to Do It?

The names of the steps were directly taken from the page *Design Thinking Tools* while the descriptions were interpreted [49].

1. "**Fill out the persona**"[49] - "try to think of experiences the persona has in his life. After defining the experiences, discuss how those experiences make them feel. "[49]
2. "**Check your persona**"[49] - "go through this checklist to see if the persona is complete:"[49]
    - "Does the persona have a name and a role?"[49]
    - "Did you create or attach a visual representation to the persona?"[49]
    - "Which parts of the canvas have been proven and which are assumption still?"[49]
    - "What is the most important part of the persona and what are their needs?"[49]

Following the previously mentioned steps it's possible to define a persona which can be used for better understanding of the customer, his needs, fears and hopes.

4.4.15. Value Proposition Canvas

The Value Proposition Canvas is a tool employed to investigate the customers' desires and requirements, and then assess how well the products or services align with them. Essentially, this method provides insight into the value that a product or service brings to the

customer. Conversely, it can also be instrumental in conceptualizing a new product in response to a perceived deficiency in value delivery. Additionally, it aids in comprehending how the customer perceives the product or service and the extent to which it addresses their needs. This method can be used in the **What if?** phase to come up with an idea for a product or in the **What wows?** step to evaluate a new concept against the customers wishes and needs[49].

Canvas Description

The canvas is divided into 7 sections, each section is described below [49]. The names of the sections were directly taken from the page *Design Thinking Tools* as well as the descriptions [49].

1. "**Persona**"[49] - "Fill in the name of your persona. Which customer segment do you have in mind for this proposition?"[49]
2. "**Job-to-be-done**"[49] - "What are the jobs your customer is trying to get done in work or life? These could be both functional and social. What basic needs do your customers have (emotional and/or personal)?"[49]
3. "**Gains**"[49] - "What would make your customer happy? What outcomes does he or she expect and what would exceed their expectations? Think of the social benefits, functional, and financial gains."[49]
4. "**Pains**"[49] - "What is annoying or troubling your customer? What is preventing him or her from getting the job done? What is hindering your customer's activities?"[49]
5. "**Products and Services**"[49] - "What are the products and services you can offer your customer so he can get his job done? How is it not a silver bullet?"[49]
6. "**Gain Creators**"[49] - "What can you offer your customers to help them fulfill the gains? Be concrete (in quantity and quality)!"[49]
7. "**Pain Relievers**"[49] - "How can you help your customer relieve his pains? Be explicit about how they can help."[49]

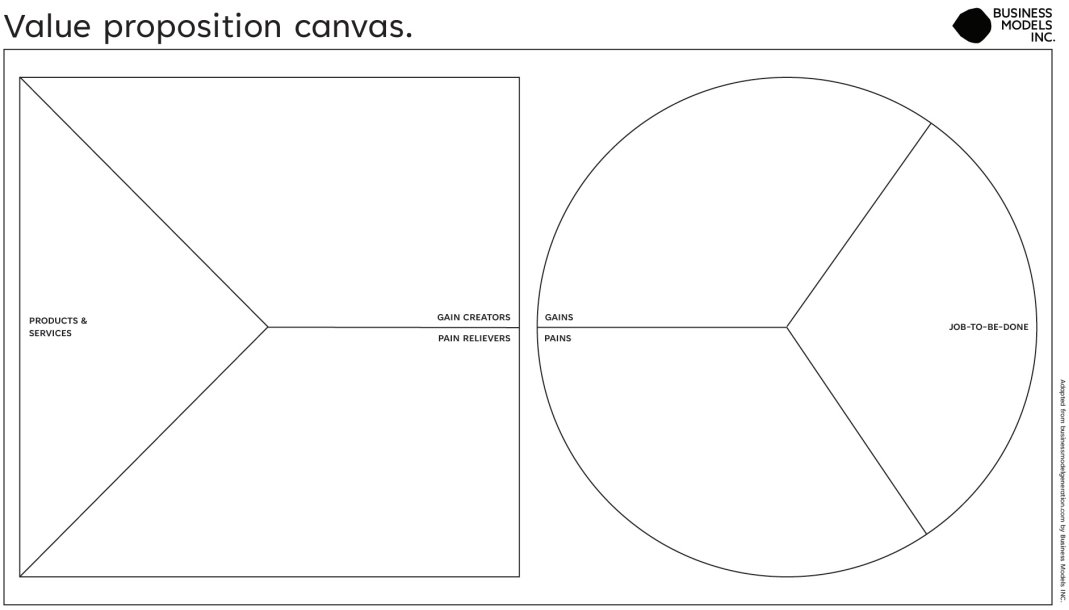

Figure 12: Value proposition canvas [49]

How to Do It?

The names of the steps were directly taken from the page *Design Thinking Tools* while the descriptions were interpreted [49]. The only description that was modified while interpreting was the one explaining "Ask why, why, why?" with the addition of 5 Whys method [44].

1. "**Start with your customer. Always**"[49] - start with discussing who the customer segment is. If there are multiple customer segments, try to group them together; if that isn't possible, define multiple canvases for each customer.

2. "**Ask why, why, why?**"[49] - think of the jobs the customer is trying to get done on a daily basis. Those jobs can be social, emotional and functional. Go in depth about those jobs by using the mentioned 5 Whys method [44].

3. "**Your job**"[49] - move to the left side of the canvas by listing some solutions that come to mind when looking at what the customer is facing.

4. "**Check your work**"[49] - Please ensure that each canvas contains a single customer persona with a minimum of five functional, social, and emotional jobs-to-be-done. Additionally, confirm that there are at least five identified pains and gains, each of which should be directly alleviated or addressed by a corresponding pain reliever or gain creator. Double-check for accuracy in these aspects.

5. "**Next steps**"[49] - now you can start finding your riskiest assumptions and create experiments to test them. After that, make a value proposition for the prototype and check with your customers if it is something they would want.

By following the aforementioned steps, it becomes feasible to formulate a value proposition for a product or service and validate its assumptions with the customer.

4.5. Process

The process of using the framework is divided into four phases. Those four phases are based on the design thinking methodology. The first phase is the **What is?** phase, the second phase is the **What if?** phase, the third phase is the **What wows?** phase, and the fourth phase is the **What works?** phase. Each phase has a set of methods that should be used in that phase and documents which should be created at the end of each phase. The methods that were added to expand the original rooster of design thinking are:

- Lego Serious Play - this method was added because of its diverse use cases and its ability to be used in all phases of the process.
- Job-to-be-done - because of its different approach to researching user's needs, wants and pains through the lens of hireing products for a job, this method was a must.
- Context Canvas - this method was added to provide an alternative and expansion to the value chain analysis.
- Persona Canvas - using this method is helpful in defining customers and getting to know them better; it can be seen as an addition to the Journey Mapping method.
- Value Proposition Canvas - this method was added because it provides a unique way to look at the value that the customer is receiving from the product or service.

4.5.1. What is?

The first phase of the process, it is the phase where the problem is defined and the scope of the project is set. The phase revolves around doing customer research and understanding the problem. That is reflected by the methods used in this phase which include:

- Visualization
- Journey Mapping
- Value Chain Analysis
- Mind Mapping
- Lego Serious Play
- Job-to-be-done
- Persona Canvas

The document that is created in this phase of the process is the **Design Brief**. A design brief is a document that formalizes the project by defining available resources, deadlines, milestones and the scope of the project.

4.5.2. What if?

The second phase of the process, it is the phase where the problem is analyzed and the solutions are ideated. This phase is centered around ideation; it build on top of the results gained from the previous step and uses them to create ideas that could become solutions to customers problems. The methods used in this phase include:

- Visualization
- Brainstorming
- Concept Development
- Lego Serious Play
- Job-to-be-done
- Value Proposition Canvas

The document created in this phase is the **Design Criteria**. The design criteria is a document that defines criteria for the solution that will be created; the criteria consit of business requirement and customers needs.

4.5.3. What wows?

The third phase of the process, it is the phase where the solutions are prototyped and tested. This phase is centered around prototyping and testing against the criteria that was created in the previous steps. The methods used in this phase include:

- Visualization
- Assumption Testing
- Rapid Prototyping
- Lego Serious Play
- Job-to-be-done
- Value Proposition Canvas

The document created in this phase is the **Napkin Pitch**. The napkin pitch is a document that defines concepts for products or services that will be used in the next phase; the benefit of using the napkin pitch is the ability to compare concepts side by side, since everything is in the same format.

4.5.4. What works?

The fourth phase of the process, it is the phase where the solution is created and tested on a small sample of users. This phase is centered around creating the solution and testing it against refined criteria that was created in the previous steps. It is important to note that in this step, everything that is still un-answerd should be answered. The methods used in this phase include:

- Visualization
- Customer Co-creation
- Learning Launch
- Lego Serious Play

The document created in this phase is the **Learning Guide**. The learning guide is a document that defines the which two or three concepts will be further tested and allocates enough resources to accomplish that. After the concepts are tested, the best one is chosen and the project is finished.

5. Roadmap

This part of the thesis will describe the concept of a roadmap in the aspect of digital transformation. According to Dictionary.com the word roadmap is defined as "any plan or guide to show how something is arranged or can be accomplished" [50]. In a project management context, a roadmap is a high-level overview of a project's goals and deliverables presented on a timeline [51].

With the understanding of what a roadmap is, it is possible to define a digital transformation roadmap. A digital transformation roadmap would be a plan or guide to show how digital transformation is arranged or can be accomplished. If translated into a context that fits the previously mentioned framework, a digital transformation roadmap would be a strategy for implementing digital transformation with its starting point and end goal divided by methods and milestones.

5.1. Roadmap comapred to the framework

What does a roadmap proved that the previously mentioned framework doesn't?

The roadmap allows for a higher level plan of digital transformation. The roadmap offers the capability to visually depict and strategize whether certain phases have been iterated or require repetition. Additionally, by incorporating a timeline into the roadmap, it becomes feasible to illustrate the duration of the digital transformation process. A roadmap is also a format for the display of digital transformation and its implementation, therefore it would make it easier to compare and analyze different digital transformation projects and efforts.

What does the roadmap need to provide?

The roadmap needs to provide a timeline for the digital transformation; an estimation of time required for the implementation. It needs to have a clear starting point and end goal. For example, the starting point could be the current state of the company and the end goal could be the desired state of the company. Or the starting point could be an idea for a new product and the end goal could be the product on the market. The roadmap needs to provide a clear path from the starting point to the end goal. That path is defined by the methods and milestones that are used to achieve the end goal. In this case, the methods would be the methods that were defined in the previously mentioned framework, and the milestones would be the documents that were created at the end of each phase of the framework. The steps in-between are modular and can be repeated or skipped depending on the needs of the company.

5.2. Examples of roadmaps

The following examples of roadmaps will show some use-cases of the roadmapping concept.

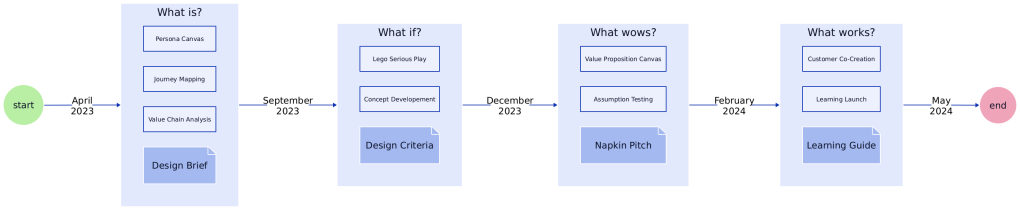

Figure 13: A basic roadmap example with a start point, defined steps and methods for each step and an end.

This figure displays a basic use-case of the roadmap concept. There is a starting point, defined steps and methods for each step and an end goal. The steps are not repeated and there are multiple methods per each step.

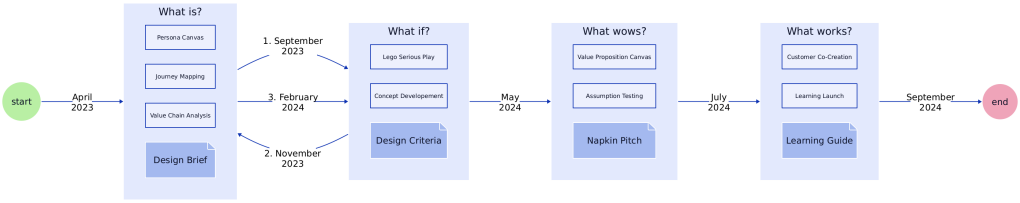

Figure 14: A recursive example of the roadmap showing the possibility of repeating steps.

This figure displays the possibility of repeating steps. In this case, the company left some room open for the possibility that they would fail in the **What if?** phase. Maybe it was a bad first attempt at **What is?** or maybe it was some other reason, but the company decided to repeat the **What is?** phase to gather more insights. After repeating the **What is?** phase, the company moved forward onto the **What if?** phase again. After that, everything went smoothly and the company was able to get to the end of the transformation.

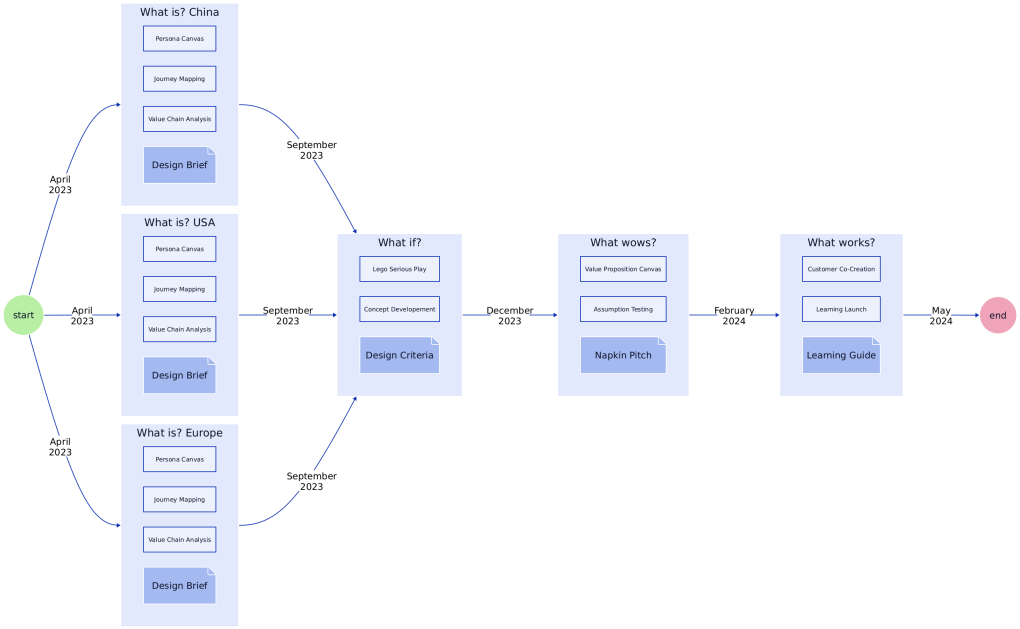

Figure 15: A roadmap displaying the possibility of having multiple same steps for different audiences.

This figure displays the possibility of having multiple same steps for different audiences. The company wanted to launch a product that would hit the makrets of China, the USA and Europe. They knew that the regions had different cultures and they wanted to explore them to get the best possible results. In that case, the roadmap displays three **What is?** steps, one for the audience in China, one for the audience in the USA and one for the audience in Europe. After completing the three **What is?** steps, the company moved on to the other steps of the roadmap without issues and got to the end of the transformation.

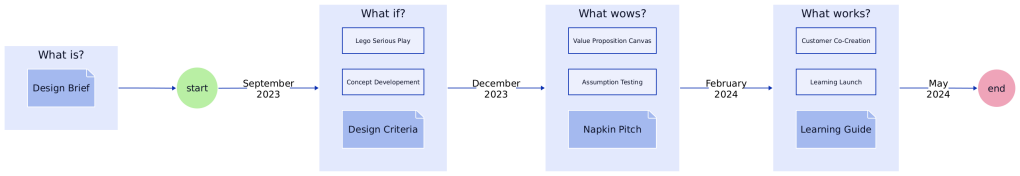

Figure 16: This roadmap shows the possibility that some steps have already been done before the starting point of the roadmap.

Lastly, this figure displays the possibility that some steps have already been done before the starting point of the roadmap. In this case, the company had acquired another company that had already finished the **What is?** phase. While doing the roadmap they annotated that by placing the **What is?** step before the starting point of the roadmap. They used the data provided and finished the digital transformation without any issues.

As it can be seen from the examples, the roadmap is a very flexible concept that can be

used in many different ways. Those illustrated here were just some of the possibilities that the roadmap concept provides.

6. Application

The application was made using the Svelte, Elysia and Prisma. The Svelte framework is a JavaScript framework for building user interfaces [52]. Elysia is a new JavaScript library based on Bun [53] for a wide variety of tasks such as writing fullstack applications or application backends [54]. Prisma is a database toolkit [55]. The application isn't hosted, however, the source code can be found in the attachments.

The application was designed with the focus on roadmap creation. Therefore, the database looks as follows:

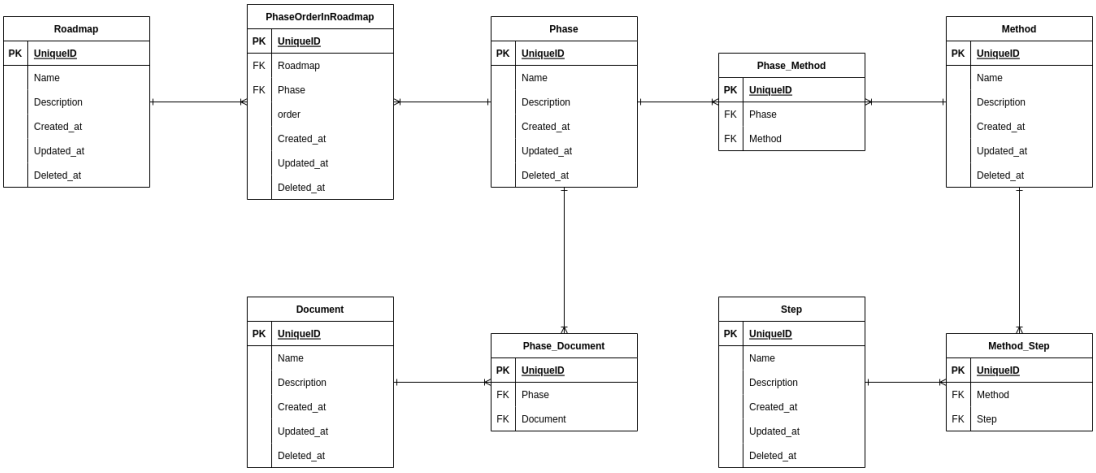

Figure 17: ERA diagram of the application

The application has a simple user interface, which can be seen in Figure 18. and Figure 19. It was designed to be appropriate for both desktop and mobile devices.

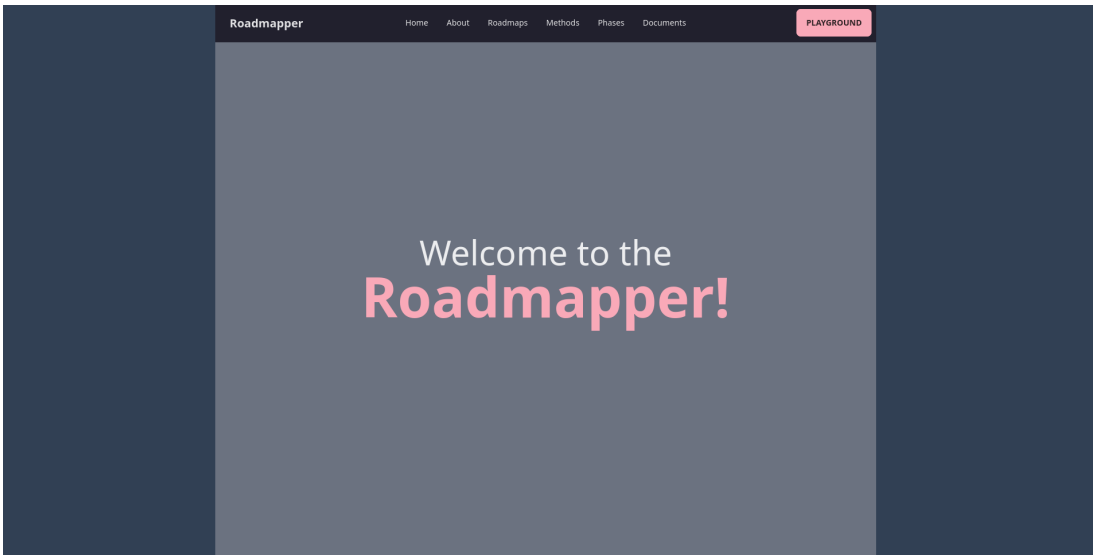

Figure 18: User interface of the application

Figure 19: Home screen on mobile

The application consists of multiple windows for different tasks. Figure 20. and Figure 21. show the window for viewing, creating and modifying methods. Other screens such as phases, documents and roadmaps is similar to this one.

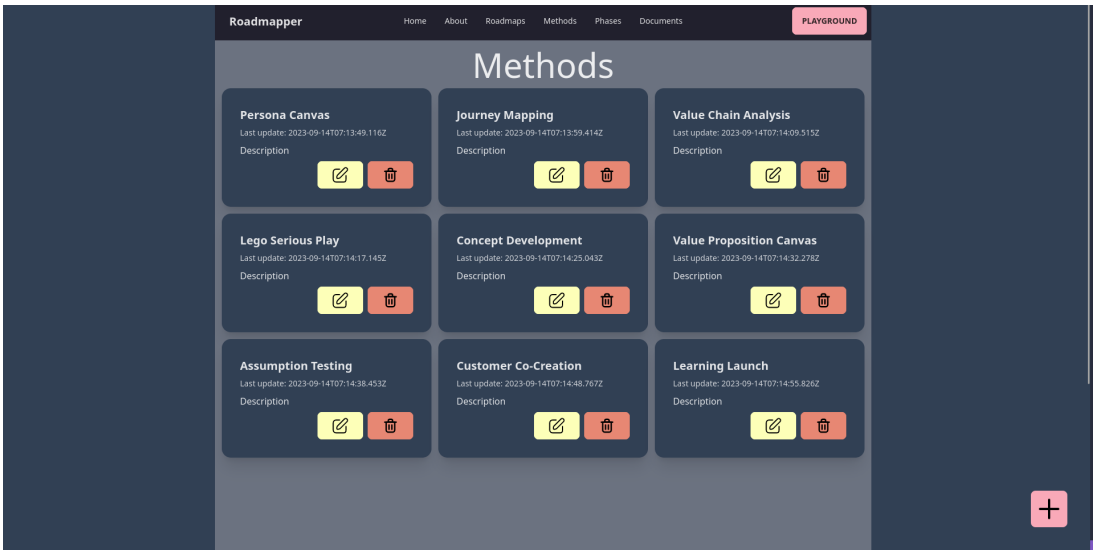

Figure 20: Display of the methods screen on desktop

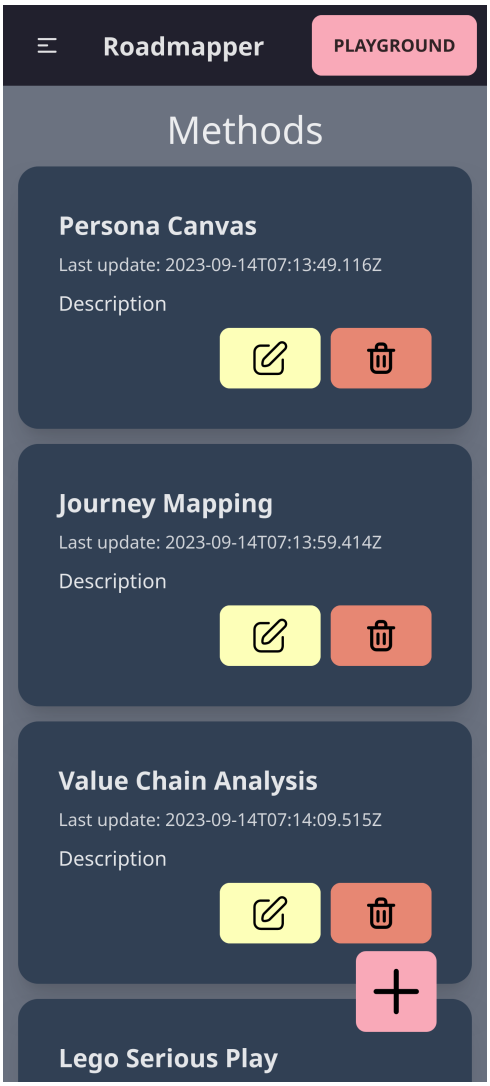

Figure 21: Display of the methods screen on mobile

The most important part of the application is the playground which can be seen in Figure 20. and Figure 21. The playground is the place where the user can create roadmaps. It enables the user to create roadmaps with multiple layers and multiple methods in each layer.

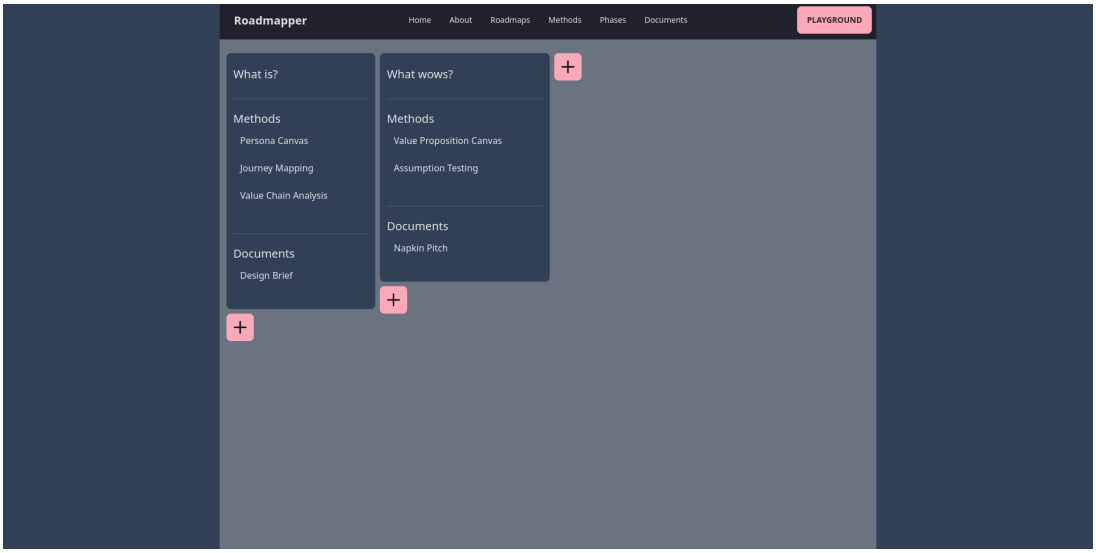

Figure 22: Display of the playground on desktop

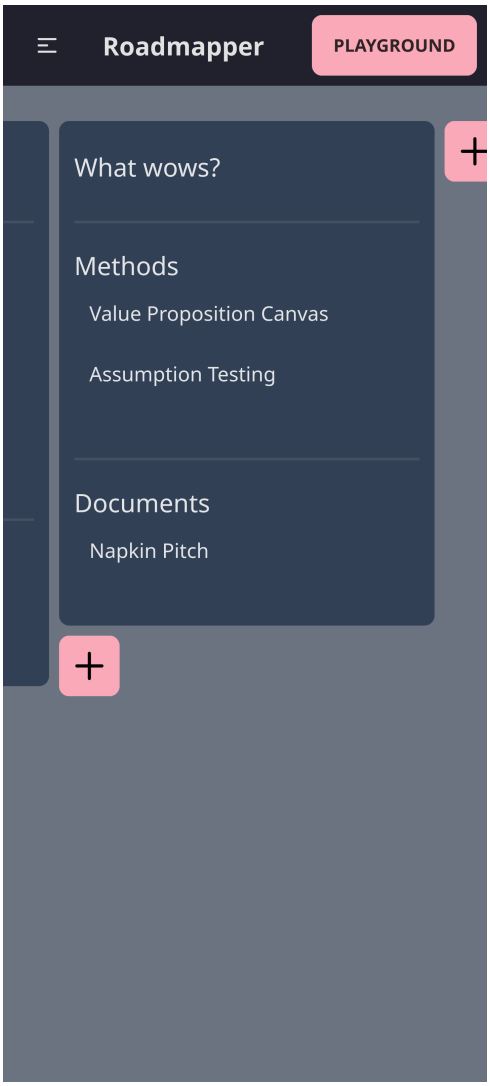

Figure 23: Display of the playground on mobile

Examples of using the playground can be seen below.

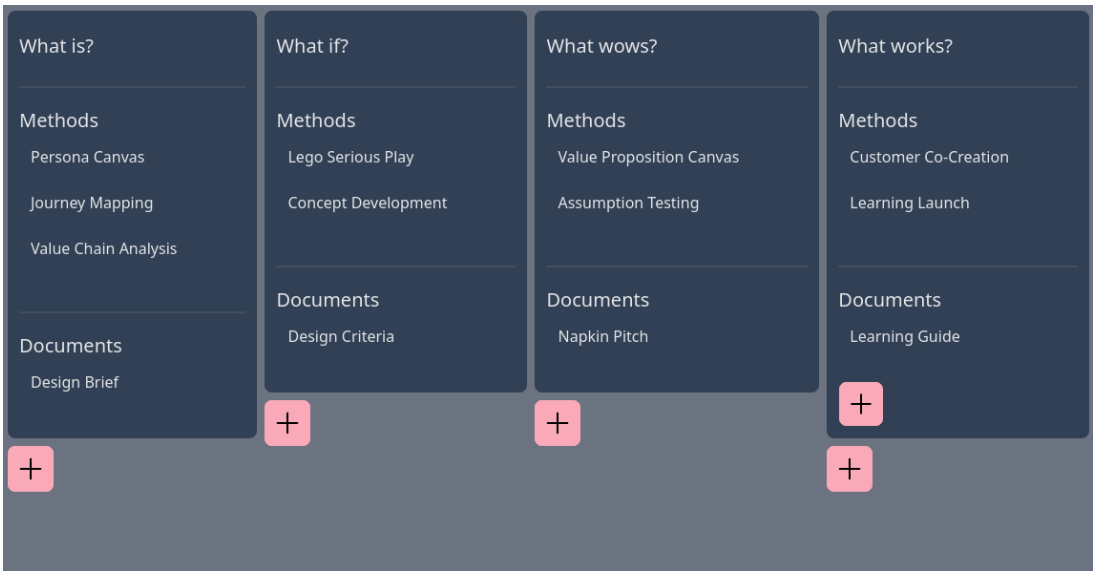

Figure 24: Recreation of Figure 13. with the application

The playground enables the creation of a basic roadmap like the one that was displayed in the previous chapter.

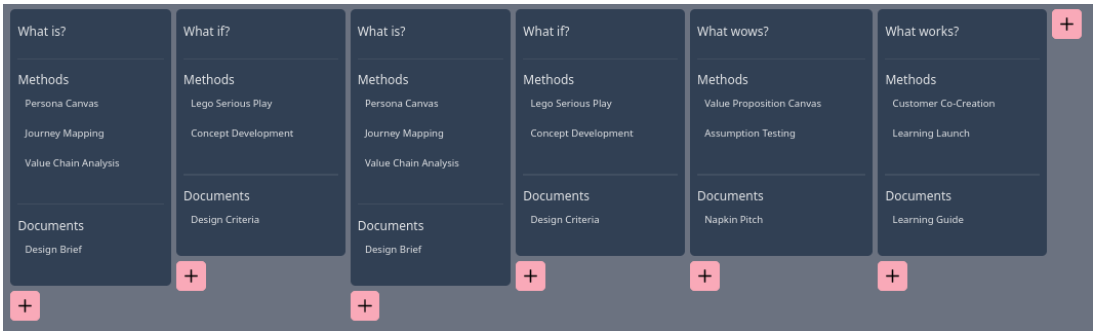

Figure 25: Recreation of Figure 14. with the application

The playground enables the creation of a recursive roadmap like the one that was displayed in the previous chapter. Hoever, the only difference is that the steps are sequential.

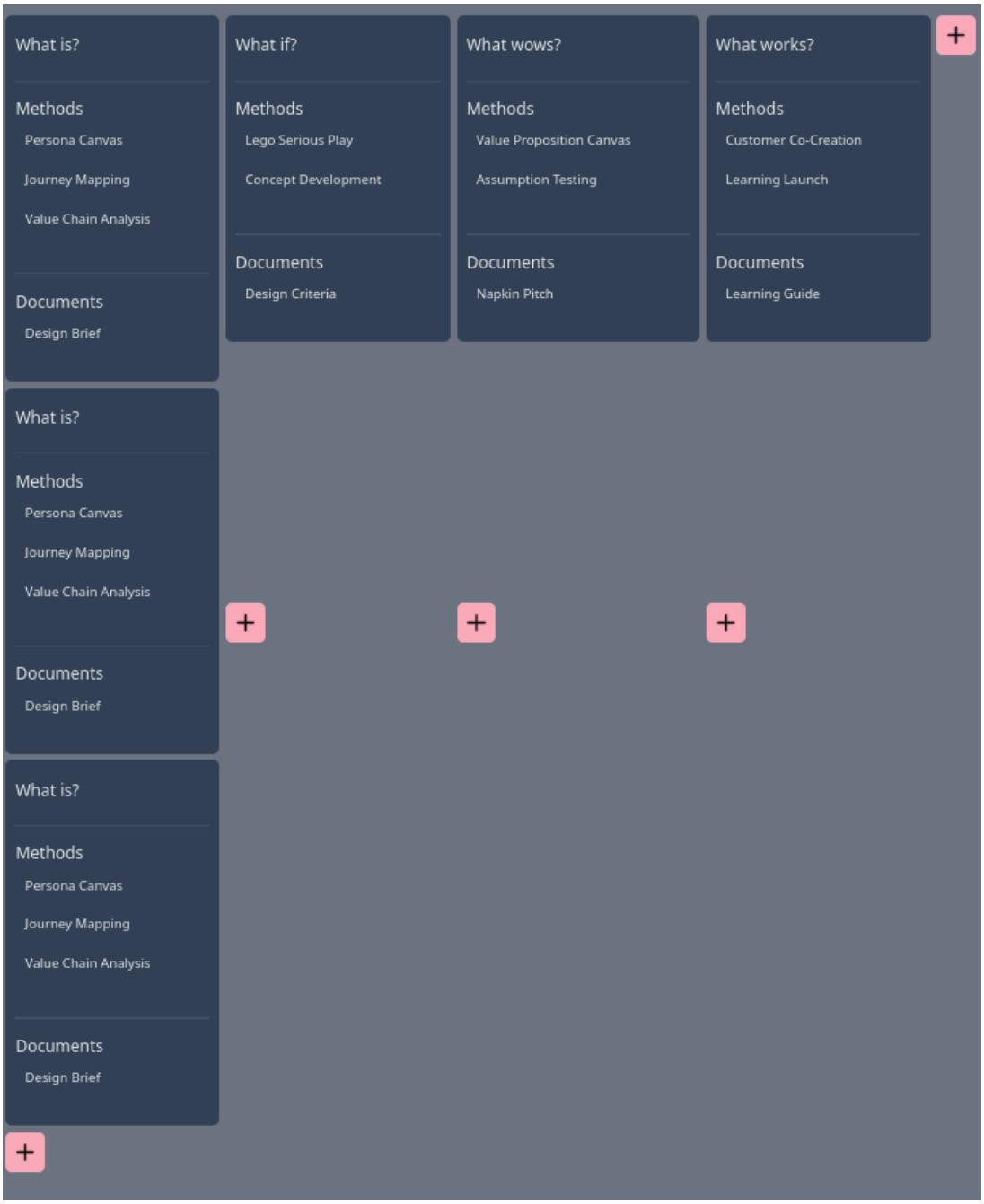

Figure 26: Recreation of Figure 15. with the application

The playground enables the creation of a roadmap for a wide audience like the one that was displayed in the previous chapter.

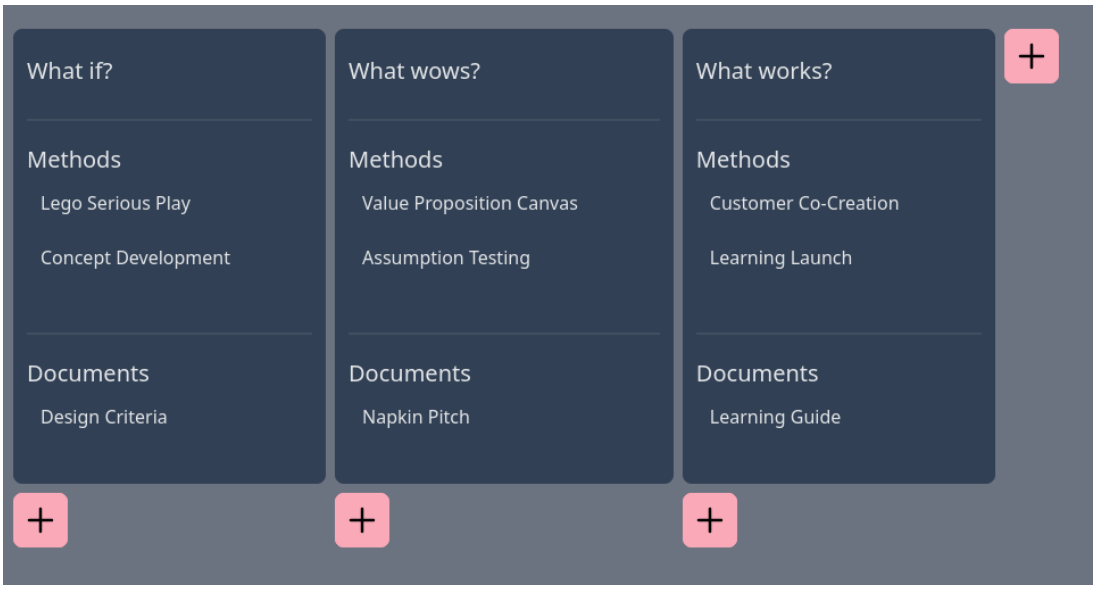

Figure 27: Recreation of Figure 16. with the application

The playground enables the creation of a roadmap which starts with a different method like the one that was displayed in the previous chapter.

As it can be seen, all the use-cases that were described in the previous chapter can be recreated with the application.

7. Future Research

Due to the lack of time, the application of the framework was not tested in the real world. Therefore, future research should focus on the application of the framework and the roadmaps in the real world.

In particular, the application of the framework and the roadmaps should be tested in the real world in the following ways:

- The framework should be used for case studies.
- The framework should be applied to a company that is undergoing digital transformation.
- The framework should be applied to a company that is starting digital transformation.
- The framework should be applied to a company that has already finished a successful digital transformation.
- The framework should be applied to a company that has already finished an unsuccessful digital transformation.

The answers to the previously mentioned questions should yield valuable information about the framework and the roadmaps which should determin space for improvement.

8. Conclusion

In summary, this thesis has established a framework for digital transformation along with corresponding roadmaps. The examination of existing literature indicates that while the realm of digital transformation is expanding, there remains a gap in operational-level frameworks, strategies, and methodologies. Given the expansive nature of digital transformation, it is crucial to have a framework capable of addressing a diverse array of subjects. Following the literature review, it was concluded that the most effective approach, covering a broad spectrum of topics, involves integrating Design Thinking and Agile methodologies. A new framework was defined by combining the two frameworks and by adding missing parts in form of methods. Following the framework definition, roadmaps for digital transformation were defined as a way to apply the framework in the real world while maintaining the ability to compare different digital transformation projects. The framework and roadmap concept were implemented in the form of an application.

Future research should focus on the application of the framework and the roadmaps in the real world to test its validity and viability.

Bibliography

[1] BBC. “Covid global health emergency is over, who says.” (07/2023), [Online]. Available: https://www.bbc.com/news/health-65499929 (visited on 08/20/2023).

[2] K. Gurusamy, N. Srinivasaraghavan, and S. Adikari, “An integrated framework for design thinking and agile methods for digital transformation,” in *Design, User Experience, and Usability: Design Thinking and Methods: 5th International Conference, DUXU 2016, Held as Part of HCI International 2016, Toronto, Canada, July 17–22, 2016, Proceedings, Part I 5*, Springer, 2016, pp. 34–42.

[3] F. Li, “Leading digital transformation: Three emerging approaches for managing the transition,” *International Journal of Operations & Production Management*, vol. 40, no. 6, pp. 809–817, 2020.

[4] F. Faeth. “Project failure rates: Facts and reasons.” (03/2022), [Online]. Available: https://www.linkedin.com/pulse/project-failure-rates-facts-reasons-frank-faeth/ (visited on 08/25/2023).

[5] A. Mersino. “Why agile is better than waterfall (based on standish group chaos report 2020).” (11/2021), [Online]. Available: https://vitalitychicago.com/blog/agile-projects-are-more-successful-traditional-projects/?utm_campaign=2021.11.3_why_agile_is_better_than_waterfall_%28based_on_standish_group_chaos_report_2020%29&utm_medium=social&utm_source=Linkedin (visited on 08/28/2023).

[6] L. Heilig, E. Lalla-Ruiz, and S. Voß, “Digital transformation in maritime ports: Analysis and a game theoretic framework,” *Netnomics: Economic research and electronic networking*, vol. 18, no. 2-3, pp. 227–254, 2017.

[7] A. Issa, B. Hatiboglu, A. Bildstein, and T. Bauernhansl, “Industrie 4.0 roadmap: Framework for digital transformation based on the concepts of capability maturity and alignment,” *Procedia Cirp*, vol. 72, pp. 973–978, 2018.

[8] C. Ebert and C. H. C. Duarte, “Digital transformation.,” *IEEE Softw.*, vol. 35, no. 4, pp. 16–21, 2018.

[9] D. Goerzig and T. Bauernhansl, “Enterprise architectures for the digital transformation in small and medium-sized enterprises,” *Procedia Cirp*, vol. 67, pp. 540–545, 2018.

[10] I. Pihir, K. Tomičić-Pupek, and M. T. Furjan, “Digital transformation insights and trends,” in *Central European Conference on Information and Intelligent Systems*, Faculty of Organization and Informatics Varazdin, 2018, pp. 141–149.

[11] I. Mergel, N. Edelmann, and N. Haug, “Defining digital transformation: Results from expert interviews,” *Government information quarterly*, vol. 36, no. 4, p. 101 385, 2019.

[12] I. Petrov, M. Zemtsov, and A. Butyrin, “Digital transformation method for value mapping in public management,” in *E3S Web of Conferences*, EDP Sciences, vol. 110, 2019, p. 02 151.

[13] K. Tomičić Pupek, I. Pihir, and M. Tomičić Furjan, “Smart city initiatives in the context of digital transformation–scope, services and technologies,” *Management: journal of contemporary management issues*, vol. 24, no. 1, pp. 39–54, 2019.

[14] I. Pihir, K. Tomičić-Pupek, and M. Tomičić Furjan, “Digital transformation playground-literature review and framework of concepts,” *Journal of Information and Organizational Sciences*, vol. 43, no. 1, pp. 33–48, 2019.

[15] M. T. Furjan, I. Pihir, and K. Tomicic-Pupek, “Digital transformation playground operationalization-how to select appropriate technologies for business improvement initiatives.,” in *PrOse@ PoEM*, 2019, pp. 61–71.

[16] S. Yamamoto, “A strategic map for digital transformation,” *Procedia Computer Science*, vol. 176, pp. 1374–1381, 2020.

[17] F. Zaoui and N. Souissi, “Roadmap for digital transformation: A literature review,” *Procedia Computer Science*, vol. 175, pp. 621–628, 2020.

[18] S. Albukhitan, “Developing digital transformation strategy for manufacturing,” *Procedia computer science*, vol. 170, pp. 664–671, 2020.

[19] M. Tomičić Furjan, K. Tomičić-Pupek, and I. Pihir, “Understanding digital transformation initiatives: Case studies analysis,” *Business Systems Research: International journal of the Society for Advancing Innovation and Research in Economy*, vol. 11, no. 1, pp. 125–141, 2020.

[20] K. Tomičić-Pupek, M. Tomičić Furjan, I. Pihir, and N. Vrček, “Disruptive business model innovation and digital transformation,” *Available at SSRN 3975574*, 2021.

[21] I. Gregurec, M. Tomičić Furjan, and K. Tomičić-Pupek, “The impact of covid-19 on sustainable business models in smes,” *Sustainability*, vol. 13, no. 3, p. 1098, 2021.

[22] P. C. Verhoef, T. Broekhuizen, Y. Bart, *et al.*, “Digital transformation: A multidisciplinary reflection and research agenda,” *Journal of business research*, vol. 122, pp. 889–901, 2021.

[23] S. V. Aleksandrova, V. A. Vasiliev, and M. N. Aleksandrov, “Methods of digital transformation of management systems,” in *2021 International Conference on Quality Management, Transport and Information Security, Information Technologies (IT&QM&IS)*, IEEE, 2021, pp. 7–10.

[24] P. F. Borowski, “Digitization, digital twins, blockchain, and industry 4.0 as elements of management process in enterprises in the energy sector,” *Energies*, vol. 14, no. 7, p. 1885, 2021.

[25] S. Kraus, S. Durst, J. J. Ferreira, P. Veiga, N. Kailer, and A. Weinmann, “Digital transformation in business and management research: An overview of the current status quo,” *International Journal of Information Management*, vol. 63, p. 102 466, 2022.

[26] P. Fruerlund and S. Peters, “Surviving the digital transformation: A method for lawyers to approach legal tech,” in *The Cambridge Handbook of Lawyering in the Digital Age* (Cambridge Law Handbooks), L. A. DiMatteo, A. Janssen, P. Ortolani, F. de Elizalde, M. Cannarsa, and M. Durovic, Eds., Cambridge Law Handbooks. Cambridge University Press, 2021, pp. 358–371. DOI: 10.1017/9781108936040.027.

[27] Y. F. Telnov, A. A. Bryzgalov, P. A. Kozyrev, and D. S. Koroleva, “Choosing the type of business model to implement the digital transformation strategy of a network enterprise,” *Business Informatics*, vol. 16, no. 4, pp. 50–67, 2022.

[28] M. Sarfraz, Y. Zhixiao, F. Dragan, L. Ivascu, and A. Artene, “Digital transformation strategy and environmental performance: A case study,” *INTERNATIONAL JOURNAL OF COMPUTERS COMMUNICATIONS & CONTROL*, vol. 17, no. 6, 2022.

[29] R. Brisco, “Understanding industry 4.0 digital transformation,” *Proceedings of the Design Society*, vol. 2, pp. 2423–2432, 2022.

[30] “Manifesto for agile software development.” (2001), [Online]. Available: https://agilemanifesto.org/principles.html (visited on 08/28/2023).

[31] S. Laoyan. “What is agile methodology? (a beginner’s guide).” en. (), [Online]. Available: https://asana.com/resources/agile-methodology (visited on 08/28/2023).

[32] Atlassian. “What is agile?” en. (), [Online]. Available: https://www.atlassian.com/agile (visited on 08/28/2023).

[33] “What is agile?” en-US. (06/2015), [Online]. Available: https://www.agilealliance.org/agile101/ (visited on 08/28/2023).

[34] T. Dingsøyr, S. Nerur, V. Balijepally, and N. B. Moe, *A decade of agile methodologies: Towards explaining agile software development*, 2012.

[35] T. Dybå and T. Dingsøyr, “Empirical studies of agile software development: A systematic review,” *Information and software technology*, vol. 50, no. 9-10, pp. 833–859, 2008.

[36] *Human centered design: Toolkit*. IDEO, 2011.

[37] *The Field Guide to human-centered design*. IDEO.org, 2015.

[38] J. Liedtka, J. Eldridge, and K. Hold. “Design thinking.” (), [Online]. Available: https://www.coursera.org/specializations/uva-darden-design-thinking (visited on 08/28/2023).

[39] J. Liedtka and T. Ogilvie, *Designing for growth: A design thinking tool kit for managers*. Columbia Business School Publishing, 2011.

[40] T. S. of Life. “The school of life.” (2010), [Online]. Available: https://www.youtube.com/@theschooloflifetv (visited on 08/28/2023).

[41] A. Maslow and K. Lewis, “Maslow’s hierarchy of needs,” *Salenger Incorporated*, vol. 14, no. 17, pp. 987–990, 1987.

[42] S. McLeod, “Maslow’s hierarchy of needs,” *Simply psychology*, vol. 1, no. 1-18, 2007.

[43] A. Maslow, *A theory of human motivation*. Lulu.com, 1974.

[44] O. Serrat and O. Serrat, “The five whys technique,” *Knowledge solutions: Tools, methods, and approaches to drive organizational performance*, pp. 307–310, 2017.

[45] LEGO. “Lego serious play open-source.” (06/2010), [Online]. Available: https://www.lego.com/cdn/cs/set/assets/blt8ec1d6ff766ddfd4/LEGO_SERIOUS_PLAY_OpenSource_14mb.pdf.

[46] ProductPlan. “Jobs-to-be-done framework.” (), [Online]. Available: https://www.productplan.com/glossary/jobs-to-be-done-framework/ (visited on 09/04/2023).

[47] Coursera. “Jobs to be done: Definition, examples, and framework for your business.” (06/2023), [Online]. Available: https://www.coursera.org/articles/jobs-to-be-done (visited on 09/04/2023).

[48] “Innovation summit ’09, clayton christensen (clip #4, techpoint),” Youtube. (), [Online]. Available: https://www.youtube.com/watch?v=s9nbTB33hbg (visited on 09/04/2023).

[49] B. M. Inc. “Design thinking tools.” (), [Online]. Available: https://www.businessmodelsinc.com/en/inspiration/tools (visited on 09/08/2023).

[50] Dictionary.com. “Roadmap definition.” (), [Online]. Available: https://www.dictionary.com/browse/roadmap (visited on 09/09/2023).

[51] O. Timeline. “Roadmap: Definition, tools, examples.” (), [Online]. Available: https://www.officetimeline.com/roadmaps (visited on 09/09/2023).

[52] *Sveltejs/svelte: Cybernetically enhanced web apps*, en.

[53] *Bun — a fast all-in-one javascript runtime*, en.

[54] *Elysiajs*, en-US.

[55] *Prisma: Database tools for modern application development*, en.

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