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**The Metaverse in the Financial Sector**

**Master's Thesis (30 ECTS)**

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# The Metaverse in the Financial Sector

**Abstract:** Emerging technologies have the potential to disrupt industries. With the rise of new technology, often established business models face changes, and completely new business models appear. Recently, the Metaverse has been seen as one of the emerging technologies. Many sectors started to explore the Metaverse opportunities, and the financial industry is one of them. In light of this context, the thesis addresses five research questions centered around one essential research objective: how the financial sector benefits from the Metaverse. In order to answer this question, data was gathered from the literature review and the interviews with the experts. The obtained data was cleaned, analyzed, and structured into the framework. Thus, the contribution of this thesis is a Metaverse framework. The framework categorizes use cases of the Metaverse for the financial sector. It also provides information on the value each category of use cases brings to financial institutions and their customers. Additionally, the framework includes information about Metaverse's impact on the financial sector, challenges, and timeframes of mass adoption of the new technology.

**Keywords:** emerging technology, metaverse, financial sector, metaverse framework

**CERCS:** P170 Computer science, numerical analysis, systems, control

## Metaverse finantssektoris

**Kokkuvõte:** Esilekerkivad tehnoloogiad võivad tööstusharusid häirida. Uute tehnoloogiate esilekerkimise tõttu seisavad väljakujunenud ärimudelid sageli silmitsi muutustega ja ilmuvad ka täiesti uued ärimudelid. Viimasel ajal on Metaverse'i peetud üheks arenevaks tehnoloogiaks. Paljud sektorid hakkasid Metaverse'i võimalusi uurima ja finantssektor on üks neist. Selle konteksti valguses käsitleb lõputöö viit uurimisküsimust, mis keskenduvad ühele olulisele uurimiseesmärgile: kuidas finantssektor Metaverse'ist kasu saab? Sellele küsimusele vastamiseks koguti andmeid töötades läbi olemasolevat kirjandust ja intervjuerides eksperte. Saadud andmed puhastati, analüüsiti ja struktureeriti raamistikku. Seega on selle lõputöö panus Metaverse'i raamistik. Antud raamistik kategoriseerib Metaverse'i kasutusviise finantssektori tarbeks. Samuti annab see teavet selle osas, millist väärtust toob iga kasutusviiside kategooria finantsasutustele ja nende klientidele. Lisaks sisaldab raamistik teavet Metaverse'i mõju kohta finantssektorile, väljakutsete ja uue tehnoloogia laiema kasutuselevõtu ajaraamide kohta.

**Võtmesõnad:** arenev tehnoloogia, metaverse, finantssektor, metaverse'i raamistik

**CERCS:** P170 Arvutiteadus, arvanalüüs, süsteemid, kontroll

# Table of contents

<b>1 Introduction</b>	<b>5</b>
<b>2 Background</b>	<b>7</b>
2.1 Concept of the Metaverse	7
2.2 Technologies Behind the Metaverse	8
<b>3 Methodology</b>	<b>10</b>
3.1 Data Collection	11
3.2 Data Analysis	13
<b>4 Results</b>	<b>15</b>
4.1 Definition of the Metaverse	15
4.2 Use cases of the Metaverse for financial institutions	17
4.3 Value of Metaverse use cases	26
4.4 The impact of the Metaverse on the financial sector	28
4.5 Challenges of the financial sector in the Metaverse	29
<b>5 Discussion</b>	<b>32</b>
5.1 Limitations	36
<b>6 Conclusion</b>	<b>37</b>
<b>Acknowledgments</b>	<b>37</b>
<b>References</b>	<b>38</b>
<b>Appendix</b>	<b>43</b>
I. Interview guideline	43
II. Consent Form	45
III. Interview questions	47
IV. Licence	48

## List of Figures

Figure 1. Google search for "metaverse"	8
Figure 2. Research process	10
Figure 3. Themes of the Interview Analysis	14
Figure 4. KB Kookmin Bank's virtual branch in Gather Metaverse	18
Figure 5. HSBC's stadium in The Sandbox Metaverse	19
Figure 6. KEB Hana Bank's CEO, Park Sung-ho, takes photo with employees	20
Figure 7. Shinhan Baseball Park	20
Figure 8. KEB Hana Bank's training centre	21
Figure 9. Timeframes	30
Figure 10. The Metaverse in the Financial Sector Framework	35

## List of Tables

Table 1. List of the interviewees	13
Table 2. Definitions of a Metaverse in the literature	15
Table 3. Use cases of the Metaverse for the financial sector	24
Table 4. Value of the use cases of the Metaverse for the financial sector	28

# 1 Introduction

Technologies have the potential to disrupt industries, change how consumers interact with existing businesses, and instigate the emergence of entirely new business models [1]. For instance, the emergence of the Internet reshaped many aspects of people's lives, from getting an education to communicating with each other, from shopping to doing banking [2]. Nowadays, the Metaverse can be considered one of the emerging technologies with the potential to disrupt our everyday lives.

Metaverse is an immersive and persistent convergence of physical and digital worlds where people connect, interact, and collaborate. Neal Stephenson first coined the term Metaverse in 1992 in his novel "Snow Crash". In the novel, the term means a persistent virtual world where people spend their lives [3]. The persistence of the Metaverse implies that it exists perpetually and never resets, pauses, or terminates [4]. A sense of immersion means that a Metaverse creates a believable perception for a user of being physically present in a digital environment.

Companies from different industries, such as entertainment, fashion, and retail, have already started exploring how they can benefit from the Metaverse phenomenon [3]. For instance, in the entertainment sector, American rapper Travis Scott's concert on the Fortnite platform gathered more than 12.3 million concurrent users watching online [5]. In the fashion sector, Gucci created a limited collection of digital items, such as sporting handbags, sunglasses, and hats, which consumers could buy in "Gucci Garden" on Roblox [6]. In the retail sector, Samsung partnered with Decentraland and launched a virtual shop Samsung 837X modeled as Samsung's flagman shop in New York [7]. Users of Samsung 837X can customize avatars, collect badges and win unique wearables. Moreover, in the public sector, Dubai's Virtual Assets Regulatory Authority announced opening headquarters on The Sandbox [8]. Another economic sector that shows interest in the Metaverse adoption is the financial sector.

Some financial organizations are already exploring Metaverse technology, for instance, Singapore bank DBS announced partnership with the Sandbox [9], and J.P. Morgan opened a lounge in the Decentraland [10]. However, available data about these initiatives is scattered and not systematized. There is no clear list of the use cases of the Metaverse for the financial sector. Additionally, it is unclear what value such use cases can deliver for financial institutions and customers. In light of this, we decided to focus on the following central objective during this research: *"How can the financial sector benefit from the Metaverse?"*. In order to efficiently examine this problem, we identified the following five research questions (RQs).

***RQ1. How is the Metaverse described and understood?***

***RQ2. What are the potential use cases of the Metaverse for financial institutions?***

***RQ3. What value can Metaverse use cases bring to financial institutions and customers?***

***RQ4. What is the impact of the Metaverse on the financial sector?***

***RQ5. What are the challenges for the financial sector in the Metaverse?***

The contribution of this thesis is the Metaverse framework. The framework categorizes use cases of the Metaverse for the financial sector. It also provides information on the value each category of use cases brings to financial institutions and their customers. Additionally, the framework includes information about Metaverse's impact on the financial sector, challenges, and timeframes of mass adoption of the new technology.

We divided the process into three phases to answer the research questions. Firstly, we conducted a literature review. During the literature review, we gathered all relevant information on the Metaverse concept and the use cases of the Metaverse for the financial sector. Due to the scarcity of data, we focused only on RQ1 and RQ2 during the literature review phase. During the second phase, we collected data through the interviews and analyzed obtained data using a thematic analysis approach. During this phase, we focused on all five RQs. Lastly, during the third phase, we synthesized obtained data, produced the framework, and finalized the report.

The rest of the thesis is structured as follows. Section 2 outlines the background of the Metaverse concept. It provides a definition and history overview of the Metaverse, describes technologies behind the Metaverse, and provides an overview of the available statistics. Section 3 describes the research methodology, namely, the input and output of each research phase, the collection and analysis of the data, and the steps taken to produce the framework and the report. Section 4 describes the results. Section 5 provides a discussion of the obtained results. Finally, Section 6 summarizes the research with the conclusion.

## 2 Background

### 2.1 Concept of the Metaverse

Metaverse is an immersive and persistent convergence of physical and digital worlds where people connect, interact, and collaborate. The term Metaverse was first coined in 1992 by Neal Stephenson in his novel "Snow Crash". In the novel, the term Metaverse refers to the permanent virtual world where people spend most of their lives [3]. More than 30 years have passed, and the idea of the Metaverse has become more palpable than ever. Let us take a look at a few important milestones:

- In June 2003, Second Life was released [11]. Second Life was the first platform that allowed users to create digital avatars and have a virtual life online.
- In February 2020, Decentraland was opened to the public [12].
- In March 2021, Roblox, during its IPO, topped \$39 billion in market cap [12].
- In October 2021, Facebook changed its name to Meta and announced plans to bring the Metaverse to life [13].

This thesis focuses on the Metaverse in the financial sector. The financial sector is a part of the economy that consists of organizations that provide financial services to private and commercial clients. Among the financial organizations are retail banks, investment banks, brokerage firms, insurance companies, real estate companies. Retail banks mainly provide such financial services as transferring deposits to checking and saving accounts and lending money to customers. Investment banks focus on investment management, mergers and acquisitions, and restructuring. Brokerage firms act as middle-man for stock shares, bonds, and options sales. Real estate companies are also considered a part of the financial sector because mortgages, insurance of the property, and home inspection are financial services. Some of these financial organizations are already exploring the opportunities in the Metaverse, for instance, Singapore bank DBS announced partnership with the Sandbox [9], and J.P. Morgan opened a lounge in the Decentraland [10].

To get a better understanding of where the Metaverse stands currently, let us take a look at the data. Public interest in Metaverse exploded at the end of October 2021 when Facebook announced that the company changed its name to Meta and aimed to build a Metaverse [13]. Figure 1 demonstrates a Google search for "metaverse" worldwide from September 2021 to November 2021. In 2021, at the same time as the concept of Metaverse became more popular, the non-fungible tokens (NFTs) market cap surpassed \$40 billion [14].



Figure 1. Google search for "metaverse"

The Metaverse's total addressable market (TAM) is estimated to be between \$1 trillion and \$13 trillion by 2030, depending on the definition of the Metaverse [15]. Under a narrow definition of the Metaverse, a range between 900 million - 1 billion virtual reality (VR) users is considered, resulting in a TAM of \$1-2 trillion by 2030. Under a broad definition of the Metaverse, 5 billion unique Internet users are considered, resulting in a TAM of \$8-13 trillion by 2030 [15]. The impact on the e-commerce industry is estimated to be between \$2 trillion and \$2.6 trillion by 2030, on the academic virtual learning industry – between \$180 billion and \$270 billion, and on the advertising industry – between \$144 billion and \$206 billion [11]. It is estimated that the revenue of the Metaverse entertainment industry will exceed \$200 billion in 2024 [16].

McKinsey and Company's research, published in June 2022 [11], stated that almost 60% of today's Metaverse users are excited to connect with other people in virtual worlds, explore new digital worlds, and work remotely. Moreover, they reported that 95% of business leaders expect Metaverse to positively impact their industry in the next 5 to 10 years. What is more, total investment in the Metaverse reached \$42.6 billion, with 132 projects under development [17].

## 2.2 Technologies Behind the Metaverse

The Metaverse is sometimes considered to be the next iteration of the Internet, also known as Web 3.0 [11], [15]. Similarly to the Metaverse, Web 3.0 does not have a strict definition, but it is most commonly associated with decentralization and data ownership (or so-called creative economy) [11], [15], [18]. However, although both concepts – Metaverse and Web 3.0 – are closely interconnected, they are not the same. The Metaverse can also exist in Web 2.0 and be centralized, such as Roblox or Fortnite Metaverses [15]. It would be more accurate to say that transition from Web 2.0 to Web 3.0 gave rise to the Metaverse [11], [15], or that the Metaverse is a forefront of the Internet evolution [19].



But what has enabled this transition from Web 2.0 to Web 3.0 in terms of technologies? According to McKinsey & Company's research [11], three core technologies are responsible for the change:

- blockchain
- digital assets
- smart contracts

Blockchain is a distributed database that stores generated data into new blocks and links them to the previous blocks [20]. Blocks are connected in chronological order. Each user stores the complete record of the blockchain data locally and synchronizes it with their peers. In case an error occurs, millions of users will notice the discrepancy. Thus, blockchain technology serves as a universal, public and permanent source of the truth [11].

In the paper "Will NFTs be the best digital asset for the Metaverse?" [21], Brown Sr. et al. defined digital assets as "nothing more than a digital representation of ownership of something". Blockchain technology made this digital representation of ownership possible, providing a secure and fast way to store ownership records without a middleman. Popular examples of digital assets are cryptocurrencies, NFTs, stablecoins, collectibles, skins, and avatars [22], [15]. NFTs are unique non-fungible assets that provide the public with a way to create, own and trade digital assets, while blockchain technology allows to quickly write and verify ownership history [15].

Ownership of NFTs can sometimes be described as "smart contracts maintained by blockchain technology" [21]. So what are the smart contracts exactly? Nick Szabo, in his article "Smart Contracts: Building Blocks for Digital Markets" [23], defines a smart contract as "a set of promises, specified in digital form, including protocols within which the parties perform on these promises". More specifically, smart contracts are programs written on blockchain in specialized high-level programming languages that describe complicated functionality [24]. Smart contracts run when predetermined conditions are met, and, importantly, they can not be changed or revoked in the process. Thus, smart contracts are particularly useful to ensure the payments of funds upon triggered predetermined conditions or to impose penalties if conditions were not met [25].

VR is another technology associated with the Metaverse concept. VR can be described as a human-computer interface that allows the user to be immersed in the environment generated by computer power [26]. Users can experience virtual reality using attachable devices that create visual and sensible scenes [27]. Oculus Quest and The HTC Vive are a few examples of such devices. VR technology is connected to the Metaverse because it enables an immersive experience for the user.

### 3 Methodology

The thesis aims to understand how the financial sector can benefit from the Metaverse. Specifically, we aim to gain an overview of the Metaverse use cases for the financial industry and understand the value they can bring to financial institutions and their customers. Moreover, we want to know how the Metaverse is defined, its impact on the financial sector, and its challenges. Thus, to collect the available data, we decided to conduct a multivocal literature review [28]. However, a preliminary review of the literature showed that available data is limited. Therefore, we also conducted interviews with the experts to obtain an understanding of the questions not covered in the literature [30].

This section describes the research process we followed. Specifically, it describes the main phases of the process, the inputs and outputs of each phase, and conducted activities. Figure 2 provides an overview of the research process.

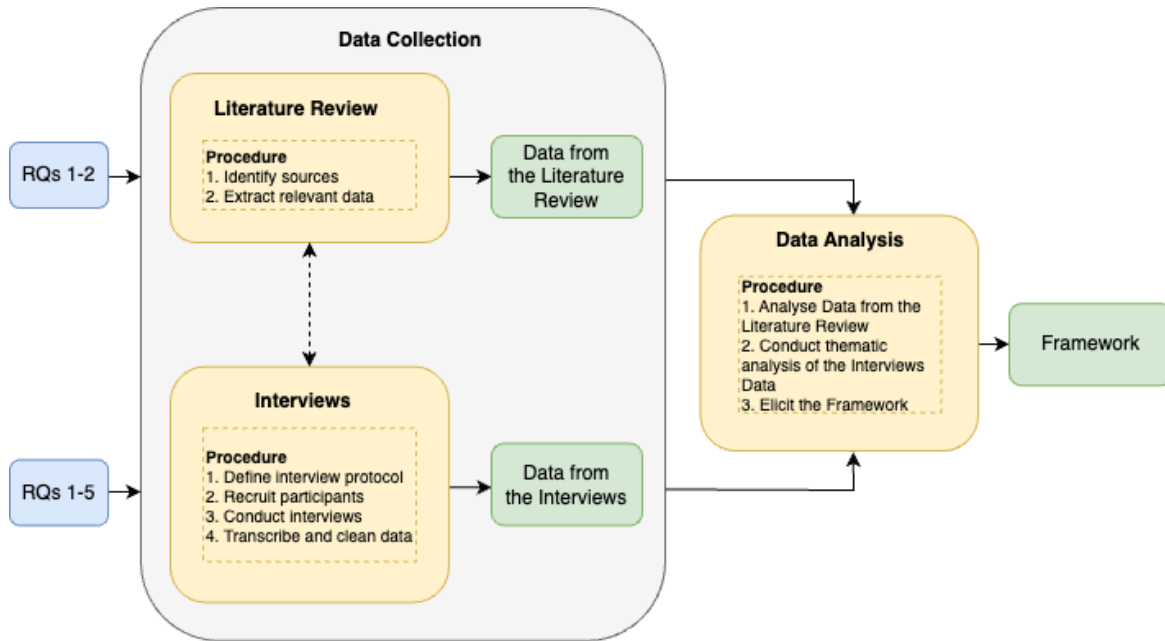


Figure 2. Research process

First of all, in order to accommodate our research objective, we formulated the following research questions:

**RQ1.** *How is the Metaverse described and understood?* A preliminary review of the literature showed that there is no common understanding of the Metaverse. Therefore, to gain an understanding of the Metaverse and set the definition, we posed this question.

**RQ2.** *What are the potential use cases of the Metaverse for financial institutions?* The objective of this thesis is to investigate how the financial sector can benefit from the Metaverse

technology. Therefore, we formulated RQ2 to start with an overview of potential use cases of the Metaverse for financial institutions.

**RQ3.** *What value can Metaverse use cases bring to financial institutions and customers?* To understand how the financial sector can benefit, it is not enough to obtain an overview of potential use cases. It is also necessary to gain an understanding of what value these use cases bring to financial institutions and their customers.

**RQ4.** *What is the impact of the Metaverse on the financial sector?* We formulated this research question to understand how the Metaverse can affect the financial sector overall. Namely, what business processes of the financial sector can be affected by the emerging Metaverse technology.

**RQ5.** *What are the challenges for the financial sector in the Metaverse?* When exploring how the financial sector can benefit from the Metaverse, it is also important to understand what challenges new technology faces in the financial sector.

As Figure 2 illustrates, research questions served as input for the Data Collection phase. We performed two research activities during Data Collection: Literature Review and Interviews. The objective of the Literature Review activity was to gather state-of-the-art data on RQ1 and RQ2. In order to do that, we identified relevant sources of the literature and extracted data from them. It is important to mention that due to the scarcity of the data available in the literature, we focused only on RQ1 and RQ2 during the Literature Review phase. The Interviews aimed to gather data from the experts to answer RQ1 to RQ5. To achieve this goal, we defined the interview protocol, recruited participants, conducted interviews, and transcribed and cleaned the data. During the Data Analysis phase, we analyzed and categorized the data gathered from the Literature Review and conducted a thematic analysis of the data collected from the Interviews. The findings are presented in Section 4. Lastly, we discussed all the obtained results and summarized our findings in the Metaverse framework in Section 5.

## 3.1 Data Collection

### 3.1.1 Literature Review

Firstly, during the Literature Review activity, we identified relevant sources. When it comes to the Metaverse in the financial sector, academic research is scarce on the matter. Therefore, we included grey literature, such as white papers, research reports, press releases, and news posts, in our list of relevant sources. During the literature review phase, we followed the principles of multivocal literature reviews [28]. As we mentioned before, due to the scarcity of the data available in the literature, we focused only on RQ1 and RQ2 during the Literature Review phase. Firstly, we identified reports, whitepapers, and studies that discuss Metaverse and financial aspects using the following search string on Google Advanced Search: "*metaverse, OR bank, OR financial, OR report, OR whitepaper, OR study*". We also identified use cases of the Metaverse using the search "*metaverse, OR bank, OR financial*".

To ensure the high quality of the sources, we aimed to include papers that meet one or more of the following criteria:

- articles with authors who are experts in the field;
- reports from well-known and respectful research companies;
- white papers from firmly established businesses;
- press releases from financial companies;
- reputable tech news sources.

From these sources, we extracted data about the definition of the Metaverse (RQ1) and the use cases of the Metaverse for the financial sector (RQ2). Our stopping criteria for the literature search was evidence exhaustion, i.e., the quality of the information declined before we reached theoretical saturation or were bounded by large volumes of the data. To identify more relevant sources, we also used a "backward search" approach [29]. During the backward search, we noted the potentially relevant references in the preliminary list of sources and included them in the list.

### 3.1.2 Interviews

We chose the interviews as the method of the Data Collection phase to obtain expert knowledge of the participants [30]. During the Interviews part of the Data Collection phase, we defined the interview protocol, recruited participants, conducted interviews, and transcribed and cleaned the obtained data. The interview protocol consisted of the Interview Guideline, Consent Form, and Interview Questions.

To recruit participants, we utilized LinkedIn<sup>1</sup>, the social media platform for professionals. We had a list of three requirements for the potential research participants. As we stated in the Consent Form, to be eligible to participate, a person should 1) be 18 or older, 2) have work experience in the financial sector and/or expertise in the Metaverse, and 3) be a fluent English speaker. In total, we conducted ten interviews with professionals who met these requirements. The interviews were conducted online via Zoom with each interviewee individually in a semi-structured manner. Interviews lasted 20-25 minutes on average, and the language of the interviews was English. Each interviewee was assigned a code in the form "I-x," where *x* stands for the serial number of the interview. For instance, the seventh interviewee was assigned an I-07 code. For the interview scheduling, a service called Calendly<sup>2</sup> was used. Table 1 presents the domains of knowledge and experiences of the interviewees. Interviewees have 4-5 years of experience in the domain on average.

During the interviews, we covered five RQs of the thesis with each of the participants. Firstly, to gain knowledge on how the Metaverse is described and understood (RQ1), we started each interview with the following question: *"What is the Metaverse in your view?"* Secondly, to

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<sup>1</sup> <https://www.linkedin.com/>

<sup>2</sup> <https://calendly.com/>

understand what are the use cases for the financial sector in the Metaverse (RQ2), we asked: *"How do you see the Metaverse can be used in the financial sector?"* For each use case that was mentioned, we then asked clarifying questions to ensure better understanding and avoid misinterpretations. While on a topic, we also asked about the value each mentioned use case can bring to customers and to financial institutions (RQ3). To gain knowledge on the potential that Metaverse has to impact the financial industry (RQ4), we asked questions like *"How is the Metaverse going to impact the financial sector?"* and *"What are the unique characteristics of the Metaverse that can attract financial institutions?"*. Lastly, to understand the challenges the financial sector face in the Metaverse (RQ5) and what is the timeframe of the adoption, we asked questions like *"In your opinion, what are the main challenges of the Metaverse right now if we are talking about the financial sector?"* and *"When will we see these financial services in the Metaverse used by the early majority? Which one of the financial services will come first or has already come to the Metaverse?"*.

Table 1. List of the interviewees

Code	Domain	Experience
I-01	Metaverse	Top-level manager at the Metaverse company
I-02	Metaverse	Investor
I-03	Metaverse	Top-level manager at the Metaverse company
I-04	Metaverse	High-level manager at the Metaverse company
I-05	Metaverse	Metaverse Consultant
I-06	Metaverse	Metaverse Consultant
I-07	Metaverse	Top-level manager at the Metaverse company
I-08	Advertising	Middle-level manager
I-09	Metaverse	Top-level manager at the Metaverse company
I-10	Advertising	Middle-level manager

After each interview, audio was transcribed using the otter.ai service and afterward manually cleaned. During cleaning, mistakes made by Otter.ai<sup>3</sup> were fixed manually, and repetitive words and false starters of the sentences were removed. Transcripts, on average, had five pages of text.

## 3.2 Data Analysis

As we mentioned before, for the literature review, we followed the principles of multivocal literature reviews [28]. We initially identified around 50 relevant sources. We stopped the search

<sup>3</sup> <https://otter.ai/>

due to rapid evidence exhaustion. After several iterations, 26 sources were filtered out for RQ1 and RQ2. From these sources, we extracted data about the definition of the Metaverse (RQ1) and the use cases of the Metaverse for the financial sector (RQ2). For RQ1, we gathered and compared different Metaverse definitions. We carefully analyzed definitions and highlighted similarities. For RQ2, we gathered, analyzed, and categorized use cases of the Metaverse. We went through several iterations of use case categorization until we reached a final version.

Additionally, during the Data Analysis phase, we conducted a thematic analysis of the data obtained from the Interviews. According to V. Braun and V. Clarke, the main idea of thematic analysis is *"identifying, analyzing, and reporting patterns (themes) within the data"* [31]. Thus, in accordance with RQs, five initial themes were defined: T1. Metaverse Definition, T2. Use Case, T3. Value of the Use Case, T4. Impact, and T5. Challenge.

Once initial themes were defined, we tagged the transcriptions of the interviews with the themes. For instance, if the interviewee talked about a possible challenge that the financial sector can face in the Metaverse, the text was tagged with "T5. Challenge". Afterward, all tagged segments of the transcriptions were transferred to a Miro<sup>4</sup> board and grouped by themes. Having all the segments grouped together enabled us to notice further similarities and patterns. Thus, theme T2. Use Case, T3. Value of the Use Case and T5. Challenge were divided into subthemes. Figure 3 demonstrates the final structure of the themes.

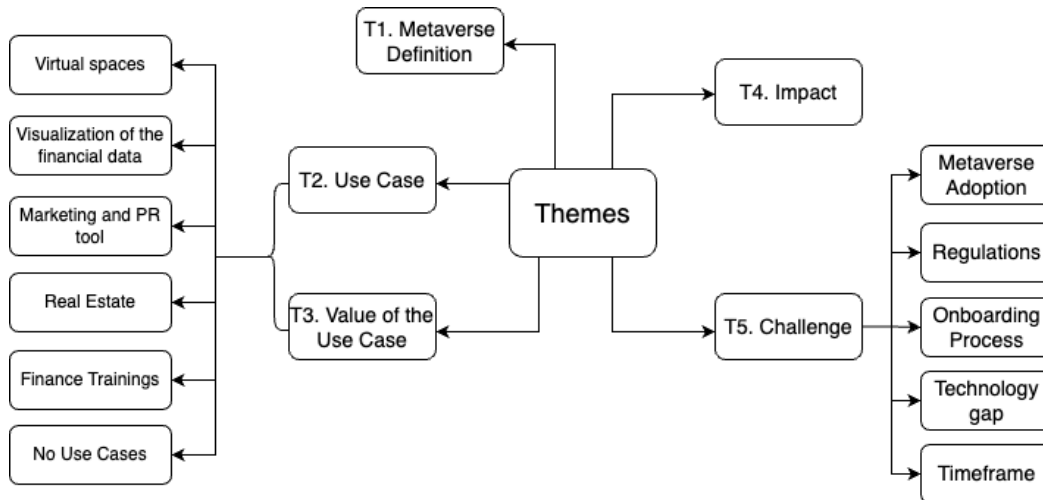


Figure 3. Themes of the Interview Analysis

Finally, a service called Grammarly<sup>5</sup> was used to correct grammar mistakes in the final report. Interview Guideline, Consent Form, and Interview Questions can be found in Appendix I, II, and III, respectively.

<sup>4</sup> <https://miro.com/>

<sup>5</sup> <https://www.grammarly.com/>

## 4 Results

This section presents results obtained from the literature review and interviews. Section 4.1 contains findings for **RQ1**. *How is the Metaverse described and understood?*, Section 4.2 contains findings for **RQ2**. *What are the potential use cases of the Metaverse for financial institutions?*, Section 4.3 contains findings for **RQ3**. *What value can Metaverse use cases bring to financial institutions and customers?*, Section 4.4 contains findings for **RQ4**. *What is the impact of the Metaverse on the financial sector?*, and lastly Section 4.5 contains findings for **RQ5**. *What are the challenges for the financial sector in the Metaverse?*.

### 4.1 Definition of the Metaverse

In this section, we present findings from the literature review and interviews for **RQ1**. *How is the Metaverse described and understood?* Firstly, let us take a look at the findings from the literature review. For the reason that a Metaverse is a relatively new and continuously evolving concept, no unanimous definition of the Metaverse has been found in the literature at the moment. In Table 2, we look at some definitions found in various sources.

Table 2. Definitions of a Metaverse in the literature

Definition	Keywords and concepts	Source
A persistent digital world that is inhabited by digital twins of people, places and things [32].	Persistent; Digital twins	Microsoft
A set of digital spaces, including immersive 3D experiences, that are all interconnected so you can easily move between them [33].	Connected digital spaces; Immersive 3D experiences; Easy to move	Facebook
The next iteration of the Internet that seamlessly combines our digital and physical lives [11].	Next iteration on the Internet; Seamless; Combines digital and physical	McKinsey & Company
The next generation of the Internet - combining the physical and digital world in a persistent and immersive manner - and not purely a Virtual World [15].	Next generation of the Internet; Combines digital and physical; Persistent; Immersive	Citi GPS: Global Perspectives & Solutions
A seamless convergence of our physical and digital lives, creating a unified, virtual community where we can work, play, relax, transact and socialize [12].	Seamless; Converges digital and physical; Unified; Work, play, relax, transact, socialize	J.P. Morgan
A network of linked virtual worlds, overlapping with physical realities, that facilitates an immersive experience to meet, interact and transact without geographical boundaries [16].	Linked virtual words; Virtual overlaps with physical; Immersive experience Meet, interact, transact	Standard Chartered
A continuum that spans the spectrum of digitally enhanced worlds, realities and business models [34].	Continuum; Digitally enhanced worlds	Accenture

Several sources also provide the main features of the Metaverse. For instance, McKinsey & Company's research [11] denotes the following features the Metaverse should ideally have:

- a sense of immersion
- real-time interactivity
- user agency (user is able to affect and change the Metaverse)
- interoperability across platforms (Decentraland, Roblox, The Sandbox, etc.) and devices
- concurrency with thousands of people interacting simultaneously
- use cases spanning human activity well beyond gaming.

Another research, conducted by PwC [35], lists six concepts of the Metaverse framework:

- functional economy
- interoperability across users and platforms
- governance of the Metaverse
- trusted digital identity
- unique experience
- persistence.

It is clear from Table 1 that most sources agree that Metaverse is *a persistent, immersive, seamless connection between the digital and physical worlds*. Persistence of the Metaverse means that it exists perpetually, never resets, pauses, or terminates [4]. A sense of immersion implies that a Metaverse creates a believable perception for a user of being physically present in a digital world. Lastly, a seamless connection means the user does not experience delays, setbacks or errors.

When it comes to the findings from the interviews, a few essential aspects of the Metaverse definition emerged. Firstly, several interviewees brought up the connection between digital and physical worlds in the definitions of the Metaverse: *"the Metaverse is simply the replica of the physical world in a 3D digital space"* (I-03), *"The Metaverse, in my view, is the convergence of the digital and physical world... I know some people say that the Metaverse is a virtual world, but for me and the people I work with, it's more than that. It's a bigger convergence of our digital and physical lives."* (I-05), *"Metaverse is a digital parallel world that is trying to replicate what we have in physical world"* (I-08). However, many interviewees only highlighted the virtuality of the Metaverse without drawing parallels to the physical world (I-01, I-04, I-07, I-09). For instance, the following definitions of the Metaverse as a virtual world were given: *"Virtual immersive world, where users can interact with each other as though it's in real-time from anywhere in the world"* (I-09), *"Basically, it's just a virtual world, people can connect, and they can collaborate or have fun"* (I-01). It is worth mentioning that one interviewee defined the Metaverse as online interaction as opposed to the world, *"So the Metaverse is the web 3 version of online interaction"* (I-02).



Secondly, it is evident from the interviews that the main functions of the Metaverse are perceived to be connection, interaction, and collaboration of people (I-01, I-02, I-03, I-04, I-07, I-08, I-09). As one of the experts noted about the Metaverse, *"there's a social element there when everyone can interact with each other"* (I-04). Another interviewee stated that his definition of the Metaverse is *"a virtual environment in which you can collaborate with others"* (I-07). Moreover, several of the definitions we quoted in the previous paragraph mention connection, interaction, and collaboration aspects as well (I-01, I-02, I-09).

What is more, a few important characteristics of the Metaverse emerged from the interviews. Three interviewees brought up the fact that the Metaverse should be immersive (I-01, I-06, I-09): *"Virtual immersive world, users can interact with each other"* (I-09), *"I think the most important thing is to be more immersive... the feeling and smelling, all those things"* (I-01). Several interviewees mentioned that the Metaverse has a 3D aspect to it (I-02, I-03, I-04): *"it's got a 3-dimensional aspect"* (I-02), *"It's kind of a website in 3D, it doesn't have that difference from what you can find online"* (I-04).

Lastly, it is worth mentioning that experts acknowledge that there is no singular definition of the Metaverse: *"I heard at least four or five different definitions. Obviously, for the most part it overlaps. But people discuss whether it's a singular or whether there are multiple Metaverses. There are a lot of disagreements"* (I-01), *"That question has been asked probably about 1000 times and the answer is never the same"* (I-07).

## 4.2 Use cases of the Metaverse for financial institutions

Even though Metaverse is a relatively new concept, some financial organizations have already started exploring the opportunities that Metaverse brings to the business. This section looks closely at the Metaverse use cases for the financial sector identified through the literature review and interviews (**RQ2**. *What are the potential use cases of the Metaverse for financial institutions?*). At the end of the section, we provide a table with a summary of the findings presented in this section (Table 3).

Firstly, let us take a look at the literature review findings. During the literature review phase, we identified five use cases of the Metaverse that center around virtual spaces in the Metaverse, such as virtual offices or branches.

The first bank which launched virtual space in the Metaverse was South Korean bank KB Kookmin Bank. In 2021, the bank launched a virtual financial town within a Metaverse platform Gather [36]. According to the article, the virtual financial town consists of a virtual branch and a virtual office. In the virtual branch, customers can move their avatars to communicate with bank advisors via video chat that will automatically start when the customer avatar will stand in front of the adviser's avatar. Similarly, in the virtual office, bank employees can communicate with

staying-at-home colleagues by approaching avatars of each other via video chat that will automatically start. Figure 4 depicts KB Kookmin Bank's virtual branch [36].

In February 2022, J.P. Morgan launched a facility in the Metajuku mall of the Decentraland Metaverse called Onyx lounge [10]. According to the article, Onyx lounge visitors can enjoy a dynamic roaming tiger, a floating portrait of the bank's CEO, and a spiral staircase. Another financial organization that joined Decentraland is Fidelity Investments [37]. The company opened multi storage facility called The Fidelity Stack, where customers can learn about investment by participating in quests.

In March 2022, The Sandbox Metaverse announced a partnership with one of the largest banking and financial services providers, HSBC [38]. According to the publication, HSBC is to buy a plot of The Sandbox real estate called LAND. It is also said that this LAND will be developed to engage with sports, e-sports and gaming fans. A screenshot of the promotional GIF with the HSBC's stadium facility in Sandbox Metaverse is depicted in Figure 5 [38].



Figure 4. KB Kookmin Bank's virtual branch in Gather Metaverse

In April 2022, Standard Chartered Hong Kong (SCHK) became the first bank to acquire land at The Sandbox Metaverse [39]. According to the press release, "SCBHK will actively engage its clients, partners, staff, and the tech community, to explore co-creation opportunities in this new and exciting space, with the goal of experimenting and building new experiences for clients, as well as bringing the local sports and art communities into the Metaverse". In September 2022, Singapore bank DBS also announced a partnership with The Sandbox. According to the press release DBS aims to create "an interactive metaverse experience showcasing the importance of building a better, more sustainable world, and inviting others to come alongside" [9].



Figure 5. HSBC's stadium in The Sandbox Metaverse

To sum up the above-mentioned use cases, financial organizations open the following types of virtual spaces in the Metaverse:

- Virtual branches for customers to visit
- Virtual work offices for employees
- Other facilities, i.e., a sports stadium, an art gallery, etc., to attract new customer segments

Another category of use cases is related to the various events held by financial organizations in Metaverses. For example, Woori Bank, one of the few largest domestic banks in South Korea, held an in-house event with new employees in July 2021 in Metaverse [40]. According to the article, the event occurred in the Jump Virtual Meetup app, which is part of the SK Telecom Metaverse. It is stated that during the event CEO of the Woori Bank, Kwang-Seok Kwon answered questions, played games and took selfies.

In July 2021, KEB Hana Bank celebrated the opening of the Hana Global Campus with the Grand Opening ceremony on the Zepeto Metaverse [40]. Figure 6 depicts the CEO of KEB Hana Bank, Park Sung-ho, named Raul in the Metaverse, taking a photo with new employees in front of Hana Global Campus [40].



Figure 6. KEB Hana Bank's CEO, Park Sung-ho, takes photo with employees

Shinhan Bank invited 20 000 baseball fans to the Shinhan Baseball Park, which was created within the Shinhan Metaverse, to support the 2020 Tokyo Olympics baseball team together [41]. According to the article, fans had the opportunity to participate in quizzes and win various prizes. Figure 7 depicts Shinhan Baseball Park [41].

In July 2021, Standard Chartered Korea also held a seminar on wealth management in Metaverse [40]. In March 2022, NH NongHyup Bank held the opening ceremony of "NH 2022 Panel" using SK Telecom Metaverse's app called Ifland [42].



Figure 7. Shinhan Baseball Park



Overall, it seems that financial organizations view virtual events in a Metaverse as a simple and quick way to start exploring this field. Virtual events can be used in order to:

- Hold in-house events
- Hold various seminars and panels
- Hold events to engage specific communities of customers, such as art, sports communities, etc.

A third group of use cases identified through the literature review centers around employee finance training. In July 2021, KEB Hana Bank opened a training centre called "Hana Global Campus" on Zepeto app [41]. According to the article, this centre is a copy of KEN Hana Bank's physical training centre, where employees should have been trained but could not attend because of the COVID-19 pandemic. Figure 8 depicts KEB Hana Bank's employees taking a training class on Hana Global Campus [43].



Figure 8. KEB Hana Bank's training centre

In October 2021, Bank of America issued a press release announcing that they are the first bank in the industry to launch a Virtual Reality training program [44]. The training program covers nearly 4,300 financial centers and will allow around 50,000 employees to participate in various customer interaction tasks via VR headsets. The program includes 20 different customer interaction simulations, which allow employees to get training in navigating unpleasant conversations, practicing active listening, and deepening relationships with clients.

In March 2022, Shinhan Card sent employees to the training camp organized on the Gather platform [45]. According to the article, employees were sent to complete various missions in order to understand Shinhan Card's new vision better. Therefore, we can conclude that when it comes to employee finance training, financial organizations can:

- Open training centers in the Metaverse
- Develop immersive training programs

The last use case category we identified during the literature review is real estate. In January 2022, TerraZero Technologies Inc. announced that it became the first company to finalize the "Metaverse mortgage". TerraZero provided a client with the financial means to purchase a piece of real estate in the Decentraland Metaverse [46]. So far, when it comes to Metaverse mortgages, only one use case of TerraZero was found. However, we have reason to believe that more and more companies will offer Metaverse mortgages to consumers since the average price of land sale in the Decentraland was around \$4,500 in July 2022 [47]. Moreover, some experts forecast a minimum price for Metaverse real estate to be in a range from \$25,000 to \$35,000 [48].

Additionally, in May 2017, BNP Paribas announced the launch of a VR-based app designed to enhance customer experience [49]. The app would allow customers to go through real estate purchases, as well as access their bank transaction records in VR mode. More recently, in June 2022, BNP Paribas Real Estate announced that they continue to develop a technological platform called W.I.R.E.D (Wearable Immersive Real Estate Dataroom) [50]. W.I.R.E.D allows customers to virtually visit neighborhoods throughout Europe, access qualified data of properties, and meet with other parties in virtual space for viewing of the property. Moreover, W.I.R.E.D reproduces past developments and forecasts future changes in the neighborhoods. Therefore in real estate category two use cases were identified:

- Metaverse mortgages
- Immersive real estate tours

Let us take a look at the interview findings. Firstly, interviewees highlighted having virtual offices and branches in the Metaverse as one of the use cases of the financial sector (I-02, I-05, I-07, I-08, I-09, I-10). As I-05 explained, some banks have already joined the Metaverse by opening virtual offices, *"We've seen banks open offices in Decentraland, which is a virtual world. I think, Fidelity and JPMorgan Chase opened up virtual offices."* Similarly, I-09, who works with Web 3.0 technologies, brought up the use case of Singapore's DBS bank, *"They [financial institutions] have already started joining because we have Singapore DBS bank that already set up its virtual offices."* Other interviewees didn't mention specific examples of the virtual spaces opened in the Metaverse by the financial institutions but made a point that it can be a valuable use case. For instance, I-07, who is a Top-level manager at the Metaverse company, explained his vision, *"So let's say you're a big financial firm, the applications, which I find interesting, are more about the virtual office space."* (I-07). This is similar to what other interviewees mentioned: *"What they might be able to do is have a space which I could go into. And then I could find out about different financial products and different financial services."* (I-02), and *"For banks, there are different use cases. For example, you can have virtual customer meetings in the Metaverse."* (I-10). I-02 also mentioned meetings with clients in the virtual spaces, *"It's an opportunity to meet clients, meet competitors, meet collaborators. And so as with all businesses, it will no longer be sufficient that they can interact in a web 2.0 space"*

Another use case for the financial sector in the Metaverse that was identified during the interviews is a visualization of the financial data. For instance, I-05 gave an elaborative example of the virtual forecast for retirement planning: *"If you're saving for retirement, how do you know how much you need to save? How can you determine based on how much money you're making now how much you'll need in the future? But if you think back to the virtual world, artificial intelligence and simulation, if financial institution has a Metaverse experience, they can help their individual clients virtually forecast. And so you'll be able to visually see what your life will look like, or how much money you'll have in a 3D more natural environment [instead of] just looking at graphs and charts that can be confusing. So I think financial institutions can use the Metaverse to make finance more available to everyday people."* I-07 gave another example of the visualization of movements of money for charities to make charities more transparent and trustworthy. He explained what he means by visualization of money for charities, *"You now have the ability to virtually showcase things that are happening. If you donate \$100 to a tree planting charity, currently, you will not receive anything in return, you can't visualize that, you can't really understand what's happened with that. But if you go to a Metaverse platform and make that same donation, you now gain access to virtual trees. So you can showcase it. It's something that's tangible."* Additionally, I-08 provided even more insights on data visualization for customers and institutions: *"But maybe in the Metaverse surrounding you could visualize the data set, you can actually walk through it, or you can see how the pillars are rising or things like this."*

Many interviewees also highlighted a presence in the Metaverse for marketing and public relationships purposes as a separate use case. As I-04, a High-level manager at the Metaverse company, stated, *"It's more like today it's a marketing tool. For the bank, it's saying we are cool because we create experiences for the people to remember."* I-06 had a similar take saying that *"I think currently banks in the traditional finance sectors, like J.P. Morgan, HSBC, DBS, they're using it as a public relations stunt, for branding, to tell the whole world that 'hey, we are actually progressive.'" I-04 also mentioned that joining the Metaverse is a way for the traditional financial institution to brand themselves as more fun and approachable, "it's a way for the financial people to be seen as fun people."*, but he also emphasized that from his experience it is very important for the financial institutions to know what kind of experiences they want to offer to their customers before moving to the Metaverse, *"the key element is experiences, is what's going to happen and how regular it's going to happen. Because you can create the most beautiful world for the avatars and the avatars will come to see, that is great, but then they will come back, and if nothing happens then you will have a bad buzz on social horizon. So it's all about the experiences, what's going to happen."*

Another group of the use cases that was identified during the interviews relates to real estate (I-02, I-10). For instance, I-10 gave an example of using the Metaverse for real estate showings for customers, *"In Germany, we have this app, Immobilien Scout. If you want to find another flat*

*or a house for the sale or for the rent, you go into the app, and you have this boring PDF, and you are scrolling. And I think if you can meet at the Metaverse and go through the property or the real estate, you can look and you have the real feeling how it is at the moment."*

Lastly, one interviewee mentioned finance training as one possible use case for the financial sector in the Metaverse: *"People will be using the Metaverse as a learning environment, which would include learning about financial assets and financial products"* (I-02). Similarly, I-06 also mentioned that customers could complete quizzes or surveys in the Metaverse to engage with the financial institution, which could have an educational angel, *"maybe they can push questionnaires to me and make me do surveys. And then once I finish the quiz, I get a branded bank associated merchandise that I can wear"*.

It is worth mentioning that some interviewees said that they do not see any use cases for the financial sector in the Metaverse (I-01, I-03, I-08). I-01 explained that there is no strong use case for the Metaverse yet, *"So, the Metaverse and web 3.0, there haven't emerged one very strong use case that everyone's talking. Like the early days of Facebook. And you're not feeling this FOMO. Now, there haven't been like this real use case."* I-03 stated that it is too early to see actual use cases for the financial sector yet, *"They haven't really used it. But I've seen Citi doing reports of the Metaverse, but they're not immersed into it. So I think we have to wait for the future. I've just seen J.P. Morgan doing researches and all that, but not really confirmed in the Metaverse. We just a little bit early to confirm."* I-08 also noted that, in his opinion, it would be hard to find a unique to the Metaverse application for the financial institutions, *"I mean, playing around with different sceneries, playing around with different things...You can try it and it's nice, and it is what Meta is doing right now. But for example, for a bank to find use cases that are actually unique to Metaverse and where this gives a real competitive advantage would be really tough"*.

Table 3 provides the summary of the findings presented in Section 4.2. It contains categorized use cases, descriptions of the use cases, and identified examples from the financial sector.

Table 3. Use cases of the Metaverse for the financial sector

Use Case Category	Use Cases	Description	Examples
Virtual spaces in the Metaverse	Virtual branches	A financial institution can open a virtual branch in the Metaverse for customers to visit and receive financial services.	South Korean bank KB Kookmin Bank in the Gather, JPMorgan in the Decentraland, Fidelity Investments in the Decentraland
	Virtual work offices	A financial institution can open a virtual office in the Metaverse for employees to work and collaborate remotely.	South Korean bank KB Kookmin Bank in the Gather



	Other custom facilities	A financial institution can open a custom facility to attract and engage new customer segments, for instance, a sports stadium to attract sports fans.	HSBC in the Sandbox, DBS in the Sandbox, Standard Chartered Hong Kong in the Sandbox
Events in the Metaverse	Meetings with customers	A financial institution can hold a meeting with customers in the Metaverse.	South Korean bank KB Kookmin Bank in the Gather
	Virtual in-house events	A financial institution can hold a meeting within a company in the Metaverse.	Woori Bank in the SK Telecom Metaverse, KEB Hana Bank in the Zepeto Metaverse,
	Seminars, panels, conferences	A financial institution can hold a public event such as a seminar, panel, or conference in the Metaverse.	Standard Chartered Korea in the unspecified Metaverse, NH NongHyup Bank in the SK Telecom Metaverse
	Custom events for specific customer groups	A financial institution can hold a custom event, such as a concert or sports event, to attract new customer segments.	Shinhan Bank in the Shinhan Metaverse
Visualization of the financial data	Immersive financial forecasting for customers	A financial institution can provide immersive financial forecasting for the customer.	Immersive visualization of the impact the amount of retirement savings will have on a customer's life.
	Visualization of money movements	A financial institution can provide a transparent visualization of the movements of money.	Visualization of donations to the charity by planting virtual trees in the Metaverse.
	Visualization of financial reports	A financial institution can provide a visualization of complex financial reports for the customer.	A customer can see pillars rising in front of him instead of pillars of data on the paper.
Real Estate	Metaverse Mortgages	A financial institution can give a mortgage for the customer to purchase an expensive piece of land in the Metaverse.	TerraZero in the Decentraland
	Real Estate tours	A financial institution can provide an immersive real estate tour for the customer.	BNP Paribas via W.I.R.E.D.
Finance Training	Financial tutorials for customers	A financial institution can develop a financial tutorial, course, or quiz for the customer.	Fidelity Investments in the Decentraland
	Training centers for employees	A financial institution can open a training center for employees in the Metaverse.	KEB Hana Bank in the Zepeto Metaverse, Shinhan Card in the Gather Metaverse
	Training programs for employees	A financial institution can develop an immersive training program for employees.	Bank of America via VR headsets
Marketing and PR tool	Any presence in the Metaverse	A financial institution can positively impact an employer branding or public perception via presence in the Metaverse.	Any of the above examples.

### 4.3 Value of Metaverse use cases

In this section, we present findings from the interviews for **RQ3**. *What value can Metaverse use cases bring to financial institutions and customers?* At the end of the section, we provide a table with a summary of the findings presented in this section (Table 4).

Regarding the value for financial institutions of having virtual spaces or virtual events in the Metaverse, interviewees highlighted cost and time efficiency. As I-07 explained, *"I can hop online in this virtual workspace and work with them instantly. It's cost-effective. It's easier, everyone's can stay in their home to do it now."* Similarly, I-10 stated, *"And it's independent from time, space, or the place you live. [...] You don't have to travel, to go there with your car or a bus, so it's no effort and you spend no time at traffic jams."* Another important value that was identified for this use case category is collaboration and a sense of connectivity. As I-02 put it, *"It will allow opportunities to meet clients, to show them content, to let clients navigate resources for themselves."* Similarly, I-07 brought up the connectivity aspect, *"So I think the connectivity aspect is big. Being able to collaborate with people from every end of the world or every part of the globe in the one environment and at one time is really valuable."* Moreover, I-10, when asked to elaborate on the value of customer meeting in the Metaverse, recalled her own experience of connectivity, *"We made a meeting together at the Metaverse in the, I think in the Horizon Workspace. And it was amazing to meet each other and to click at the whiteboard together, and it was real! There was no border between us!"*

As for the use cases under the umbrella of the visualization of the financial data, making financial data more available, understandable, and tangible for customers was highlighted as the value. As I-07 explained, *"But if you go to a Metaverse platform and make that same donation, you now gain access to virtual trees. So you can showcase it. It's something that's tangible."* Another interviewee added that *"looking at graphs and charts that can be confusing. So I think financial institutions can use the Metaverse to make finance more available to everyday people."* (I-05). Moreover, I-08 also provided insights on data visualization value for customers and institutions: *"For the customers, the value would then be that they have it easier to understand complex matters. Basically, they can try to actually grasp things visually, not just looking at the sheet where it says this is the interest rate development over certain years. But maybe in the Metaverse surrounding you could visualize the data set, you can actually walk through it, or you can see how the pillars are rising or things like this. And for the bank, I guess the benefit would then come from having a completely new means to sell their product to the clients, new means of convincing their clients, basically."* It is worth mentioning that I-07 noted that in his opinion visualization of the financial data *"benefits more the visual learners"*.

Additionally, interviewees identified different values associated with a financial company being present in the Metaverse for marketing or public relations purposes. First of all, many interviewees highlighted access to the young generation, or as it is often called Gen-Z, as a value

for financial institutions. For instance, one interviewee explained that it is important for businesses to stay on the same cultural level with their customers, *"Kids of today are meeting with their friends, they're playing in an online games. They're digital natives. And so banks and financial institutions, in order to keep getting customers in the future, they need to be on the same cultural level and technological level as kids today. We know they're going to be their future customers."* (I-05). Similarly, I-07 mentioned that gamification, which is tightly connected with the Metaverse experiences, attracts the younger generation *"When I say marketing and PR, I mean, the ability for more traditional companies to gain access to a demographic to which they couldn't originally, because of the nature of the gamification of different things."* Moreover, I-02 also stressed a value of being on the same cultural level with the younger generation by giving an example of generational wealth movement: *"So as wealth is moving down through the generations, some younger people are more likely to be engaged with the Metaverse, and if a financial institution is also engaged in the Metaverse, then they're meeting on a common ground. If a younger person inherits from a grandparent or a parent, who might not be so inclined to use web 3, might not be so interested in the Metaverse and the bank also remains disengaged with the Metaverse, then they've got a gap between themselves and their potential clients. Whereas if the bank is keeping up to speed with what their clients are doing and how they're interacting, then there's just an advantage to be in that space and, competitive hazard for the banks that remain out of that space."* Interestingly, another value of being present in the Metaverse is a positive impact on financial institution's branding as an employer among younger potential employees. As I-04 explained, *"Regarding a HSBC, something when it comes to the finance is quite important, and we did not know that. We talked to the CEO of HSBC, and she told us they have a lot of new beginners joining the bank. And the internal noise that HSBC was part of the Metaverse is big. [...] So the young people that just joined the finance said "Okay, I'm in the right bank, you know, they move into the Metaverse, so they probably are way ahead of others." So the internal impact was very great."*

As for an immersive real estate tour, I-10 explained the value of this use case - customers will have more feelings attached to the property: *"And I think when you make that at the Metaverse and you can go through all the different rooms, and maybe you can touch something, or you can open a window and see through it. It's more feelings, and you are more into it."* I-02 explained that the value of buying real estate in the Metaverse for the financial institutions lies in being present in the emerging virtual environment, *"as I mentioned, there's the use case of just having a presence in the Metaverse, which they'd be cut out if they didn't."*

Finally, when it comes to the finance training, I-02 highlighted that educational experience will be richer than traditional educational experience in that case: *"So not just have the lecturers and the students, but that if they're doing something on financial services, have bankers or investors, kind of a richer ecosystem of participants, and engagement."* Additionally, I-06 explained that customer engagement is another value of having finance training in the Metaverse, *"maybe they*

*can push questionnaires to me and make me do surveys. And then once I finish the quiz, I get a branded bank associated merchandise that I can wear".*

Table 4 provides the summary of the findings presented in Section 4.3. It contains categorized use cases and the value each category provides to financial institutions and customers.

Table 4. Value of the use cases of the Metaverse for the financial sector

Use Case Category	Value for financial institutions	Value for customers
Virtual spaces in the Metaverse	<ul style="list-style-type: none"> <li>• Cost-efficiency</li> <li>• Location independence</li> <li>• Customer engagement</li> <li>• Additional means of collaboration</li> <li>• The attraction of new customer segments</li> </ul>	<ul style="list-style-type: none"> <li>• Time-efficiency</li> <li>• Location independence</li> <li>• Sense of connectivity</li> </ul>
Events in the Metaverse		
Visualization of the financial data	<ul style="list-style-type: none"> <li>• Additional means to communicate data to customers</li> <li>• Convincing sales tools for financial products</li> </ul>	<ul style="list-style-type: none"> <li>• Financial data becomes more understandable, transparent, and tangible</li> </ul>
Real Estate	<ul style="list-style-type: none"> <li>• Additional streams of revenue</li> <li>• Convincing sales tools for real estate</li> </ul>	<ul style="list-style-type: none"> <li>• Opportunity to buy expensive virtual land</li> <li>• A better overview of real estate compared to traditional tools</li> </ul>
Finance Training	<ul style="list-style-type: none"> <li>• Engagement with customers</li> <li>• Cost-efficient and location-independent training programs for employees</li> </ul>	<ul style="list-style-type: none"> <li>• Richer educational environment</li> </ul>
Marketing and PR tool	<ul style="list-style-type: none"> <li>• Access to the young generation of customers</li> <li>• Positive impact on employer branding</li> </ul>	<ul style="list-style-type: none"> <li>• Younger customers can engage with financial institutions on the same cultural level</li> </ul>

## 4.4 The impact of the Metaverse on the financial sector

In this section, we present interview findings about the impact of the Metaverse on the financial sector (*RQ4. What is the impact of the Metaverse on the financial sector?*).

When asked about the impact the Metaverse will have on the financial sector, many interviewees hesitated to give definitive answers reasoning this with the fact that the Metaverse is still in the very early stages of development. As I-08 explained, *"I'm feeling that we are still quite far from Metaverse having a real life impact."* However, some possible impacts were mentioned. For instance, I-01 said that the number of virtual goods sold would keep increasing as the number of Metaverse users increases, which will incentivize financial institutions to join: *"And that's why the institutions will have incentive to partake and to get involved. But I'm not sure if they are going to change themselves too much."*

Another point about the possible impact was made by I-09. She mentioned that biometric digital

wallets would become ubiquitous in the financial sector: *"Basically, we'll have a situation where people use their digital wallets that also probably are connected to their biometric systems for identity verification. And when you want to purchase any good or service in the virtual immersive world, you just need to authenticate through your digital wallet, then payment goes through to the service provider."*

Another interviewee stated globalization of the workforce as a most prominent impact on the financial sector: *"I think, in the short term, you've got the ability for the financial sector, in terms of the employment level, to collaborate with international teams. So it's almost like the globalization of workforces."* (I-07).

## **4.5 Challenges of the financial sector in the Metaverse**

In this section, we present interview findings about the challenges of the financial sector in the Metaverse (**RQ5**. *What are the challenges for the financial sector in the Metaverse?*). We also give the timeframes for the mass adoption of the Metaverse and the financial services in the Metaverse provided by the interviewees. From the interviews, we found that challenges are a slow adoption of the Metaverse, unclear regulations, a complicated user onboarding process, and a technology gap.

When asked about challenges that the financial sector faces in the Metaverse, several interviewees brought up slow adoption by the general population (I-02, I-03, I-04, I-07). As I-02 pointed out, *"it's still a very, very small fraction of the population that's engaging with it."* Another interviewee explained the reason behind the slow adoption of the Metaverse: *"A lot of people still don't understand what the Metaverse is. People still have their own stereotypes that the Metaverse is Meta that is Facebook. Still don't understand the whole concept. So it is a lot of education and awareness to be done"* (I-03). Similarly, I-07 mentioned bad public perception of the Metaverse concept as a reason for a slow adoption: *"And now if you speak to the everyday person on the street, and you say what is the Metaverse, they will instantly 9 times out of 10 will say Mark Zuckerberg and Meta. That PR is really bad for the space because it's gonna kill all kinds of really cool innovation."* Thus, slow adoption due to the poor public image and unclear concept is one of the biggest challenges for the Metaverse.

Secondly, a couple of interviewees mentioned that governmental regulations are a challenge for the financial sector in the Metaverse. For instance, I-05 recalled her experience with the J.P. Morgan Chase establishment in Decentraland. She pointed out that what started as an ambitious project had to pivot to something more simple, seemingly to strict regulations typical for the financial sector: *"When I first went to the J.P. Morgan Chase lounge in Decentraland, they had opened, and there was a promise that it would be one thing. And then when I went back a few months later, they totally changed it. So that it was no longer an office is more just like a library and you could read what kind of books they were reading. And they had a big message about*

how they couldn't give any financial advice and don't listen to anyone in that space about financial advice, because they're not allowed to give it." Similarly, I-01 noted that unclear regulations keep the financial industry from pursuing Metaverse initiatives. Still, he added that *"regularity, clarity... once we have that, a lot of the edge projects, and institutions, they will be much more eager to engage."*

Another challenge the interviewees often brought up is the users' onboarding process (I-01, I-02, I-06, I-10). Interviewees explained that even for tech-savvy people, it was a hard task to start using financial services in the Metaverse, which means that for the general population, it is probably the barrier. As I-01 noted, *"I cannot imagine, at least at this stage, my mom using the Metaverse, using those web 3.0 tools, it would be too hard"*. I-06 stated that in order to improve this situation, *"there needs to be less friction, people need to maybe instead of entering your Metamask wallet, it can be public address, it can be one click."*

Lastly, the technology gap was also mentioned as a challenge of the financial sector in the Metaverse (I-01, I-07, I-09). For instance, I-07 said that *"the tech is not there. In order for me to run, let's say J.P. Morgan's online workspace, I need a gaming laptop with a really high-end graphics card. So once that tech is sorted, and people work out how to do it on a larger scale, you'll see more and more people using it."* Another interviewee explained that for his vision of a better Metaverse than exists now to come to reality technology gap has to be bridged, *"So I think for the 'strong Metaverse', full immersion one, that means the hardware, and the graphic quality I would care, and like not making people dizzy"* (I-01). Additionally, I-09 mentioned insufficient internet connection when asked about challenges, *"because it needs very high speeds, very high uplink and downlink speeds that can only be met by either 5G technology or very strong fiber broadband connectivity"*.

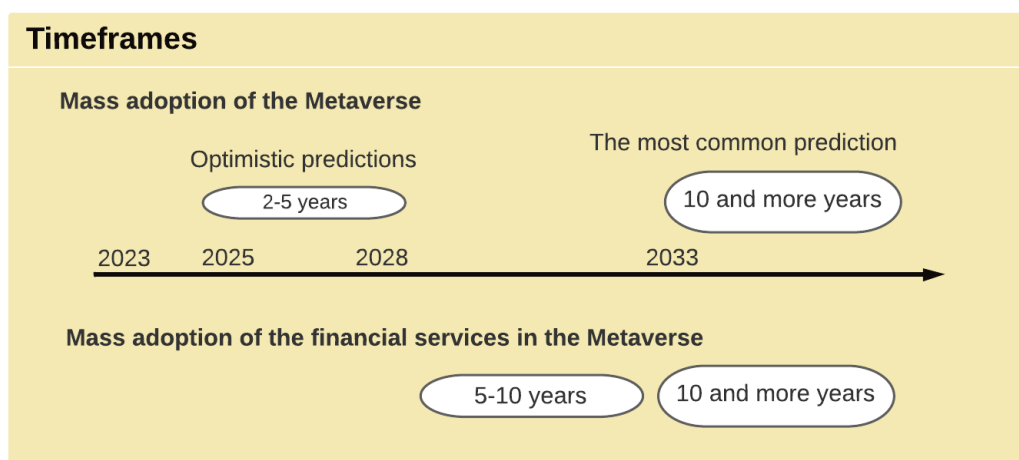


Figure 9. Timeframes

Taking into consideration the challenges, interviewees also provided their timeframe estimation for the mass adoption of the Metaverse in general and financial services in particular. Figure 9 illustrates provided timeframes. It seems to be a common understanding that it will take at least ten years for the Metaverse to be mass adopted (I-03, I-06, I-07, I-09). Interviewees expressed their predictions as "*I would say that adoption is going to come in the next ten years*" (I-07), and "*for majority of people I think it will be more than ten years*" (I-06). However, there were a few more optimistic forecasts. For instance, I-04 estimated a timeframe of 2-5 years, I-01 estimated 3-5 years, and I-08 estimated a timeframe of 4-5 years. More importantly, many interviewees (I-02, I-05, I-08) mentioned that financial services in the Metaverse would be adopted even later because, as I-08 put it, "*financial sector is usually a bit behind and not in front of these developments*". Thus, for the financial sector specifically, I-08 estimated a timeframe of 5-10 years, and I-05 a timeframe of at least ten years.

## 5 Discussion

In light of **RQ1**. *How is the Metaverse described and understood?*, the findings suggest that the Metaverse is often understood as an immersive virtual world where people can connect and collaborate. But there seems to be a significant difference of opinions regarding the relationship of the Metaverse to the physical world. In one part of the literary sources, Metaverse is considered a purely digital world. In contrast, another part emphasizes the fact that the Metaverse represents a convergence of the physical and the digital worlds. This aligns with the interview results, where some participants defined the Metaverse as a virtual or a digital world, while others highlighted Metaverse's connection to the physical world. However, taking into consideration the conducted research, it seems more accurate to define the Metaverse as a convergence of physical and digital worlds because we saw a variety of use cases that tie directly to the physical world, for instance, immersive real estate tours or virtual offices.

Another debate seems to be centered around the question of whether there is one or multiple Metaverses. Some definitions explain the Metaverse as a set or network of digital spaces. However, most of the definitions seem to agree on the fact that Metaverse is a singular persistent world. It might be suggested that this definition discrepancy arises from the technology gap. Many companies are currently trying to build the Metaverse, but interoperability between different platforms has yet to be achieved. Therefore, the Metaverse of today is not a singular world. However, it seems that the ultimate vision of the Metaverse is a persistent and seamless singular world.

One characteristic of the Metaverse that most of the sources seem to agree upon is the fact that the Metaverse centers around connection, interaction, and collaboration of people. Taking into account all the findings, we propose the following definition of the Metaverse: *Metaverse is an immersive and persistent convergence of physical and digital worlds where people connect, interact, and collaborate.*

As for **RQ2**. *What are the potential use cases of the Metaverse for financial institutions?*, various use cases of the Metaverse for financial institutions were identified through the literature review and interviews. Firstly, the Metaverse can be used by financial institutions as a marketing or public relations tool. In this case, the mere presence of the financial institution in the Metaverse is required, which can be achieved through, for instance, organizing events or buying a piece of land in the Metaverse. Secondly, there is a use case of having a virtual space opened in the Metaverse by the financial institution. Examples of such spaces can be virtual branches for customers to visit, virtual offices for employees, or unrelated to financial theme spaces like stadiums and art galleries. Another use case of the Metaverse is the facilitation of events. Here events can vary from meetings with customers, various panels, and conferences to custom events organized for specific customer groups, such as sports events or concerts. Moreover, our research



showed that visualization of complex financial data seems to be another use case of the Metaverse for the financial sector. It can include services like immersive financial forecasting for customers, visualization of money movements for charities, and visualization of complex financial reports. Additionally, a couple of use cases related to virtual real estate were identified during the research. One is providing mortgages for the virtual land in the Metaverse, and the second is facilitating virtual immersive real estate tours. Lastly, the Metaverse can be used by the financial sector for educational purposes, such as facilitating financial tutorials for customers, opening training centers, and developing immersive training programs for employees.

Thus, it is evident that there are a lot of different use cases of the Metaverse for the financial sector. However, it is worth noting that none of these use cases seem unique for the Metaverse. In other words, the use cases we identified seem to either replicate existing services in a virtual environment or complement existing services by providing a more immersive experience. Thus, it is fair to conclude that the Metaverse is an additional tool in the financial sector's toolbox of activities, methods, and channels, but it is not unique.

When it comes to ***RQ3. What value can Metaverse use cases bring to financial institutions and customers?***, different values associated with different use cases were identified. Firstly, using a presence in the Metaverse as a marketing or public relations tool gives the financial institution access to the young generation of customers and can have a positive impact on employer branding. Young customers, in turn, receive an opportunity to engage with financial organizations on the same cultural level. Secondly, use cases of the virtual spaces and events in the Metaverse are cost-efficient for the institutions and possess the value of being independent of the physical location. They can bring a sense of connectivity to the employees and customers and additional means of collaboration with the customers. Moreover, these use cases can help to attract new customer segments. Customers who visit financial institutions in the Metaverse or attend virtual events receive the value of saving time, being independent of physical location, and having a sense of connectivity. When it comes to the value of financial data visualization, financial institutions obtain additional means of communicating complex financial data to the customers and a convincing sales tool for financial products. For customers, in turn, financial data becomes more understandable, transparent, and tangible. Next, the use cases under the real estate umbrella bring additional revenue streams for the financial sector and can be a convincing sales tool for real estate. Customers get a more immersive real estate overview than via traditional digital tools, such as real estate apps and websites. Customers also obtain an opportunity to purchase an expensive virtual piece of land via a mortgage. Lastly, use cases related to education in the Metaverse have the value of cost-efficient and location-independent training for employers. They also provide additional means to engage with customers through financial tutorials. Customers get a richer educational environment in return.

Therefore, we can sum up that Metaverse use cases can bring a wide variety of values to the financial sector. However, it seems that none of these values are unique to the Metaverse. Financial institutions can obtain all of these values through other environments, methods, and technologies. Therefore, considering the findings, the Metaverse seems to be a technology-driven and not a business-driven innovation.

Regarding **RQ4**. *What is the impact of the Metaverse on the financial sector?*, fewer findings were obtained. Both literature sources and interviewees are hesitant to discuss the possible implications the Metaverse can have on the financial sector. Nevertheless, we elicited a few possible consequences of the further Metaverse adoption from the interviews. One of them is that the Metaverse will increase the number of virtual goods sold, incentivizing financial institutions to join the Metaverse. Another possible impact is that the Metaverse will promote the spread of biometrical digital wallets. And finally, the Metaverse might promote the globalization of the workforce. It seems that the Metaverse technology is still in too early stages of development to predict possible outcomes it will have overall on our lives, let alone on the specific sector. A lot of uncertainty is still present around the Metaverse, which brings us to the final research question.

Finally, as for **RQ5**. *What are the challenges for the financial sector in the Metaverse?*, we identified four main challenges: slow adoption of the Metaverse, unclear regulations for the financial industry, the complicated user onboarding process for financial services, and a technology gap. Only two of these challenges seem directly connected to the financial sector - unclear regulations and a difficult onboarding process for financial services. On the other hand, the slow adoption of the Metaverse and the technology gap are more generic challenges. This brings us back to the point that the Metaverse is in the very early stages of development. Therefore, the essential challenges have to be sorted out before the Metaverse technology can reach its full potential and before the financial sector can fully utilize the new technology. With this being said, it is evident that Metaverse is already capable of being a valuable tool in the financial sector's toolbox.

To summarize and systemize our findings, we developed the Metaverse in the Financial Sector Framework. Figure 10 presents the framework, which categorizes use cases of the Metaverse for the financial sector. It also provides information on the value each category of use cases brings to financial institutions and their customers. Additionally, the framework includes information about Metaverse's impact on the financial sector, challenges, and timeframes of mass adoption of the new technology.

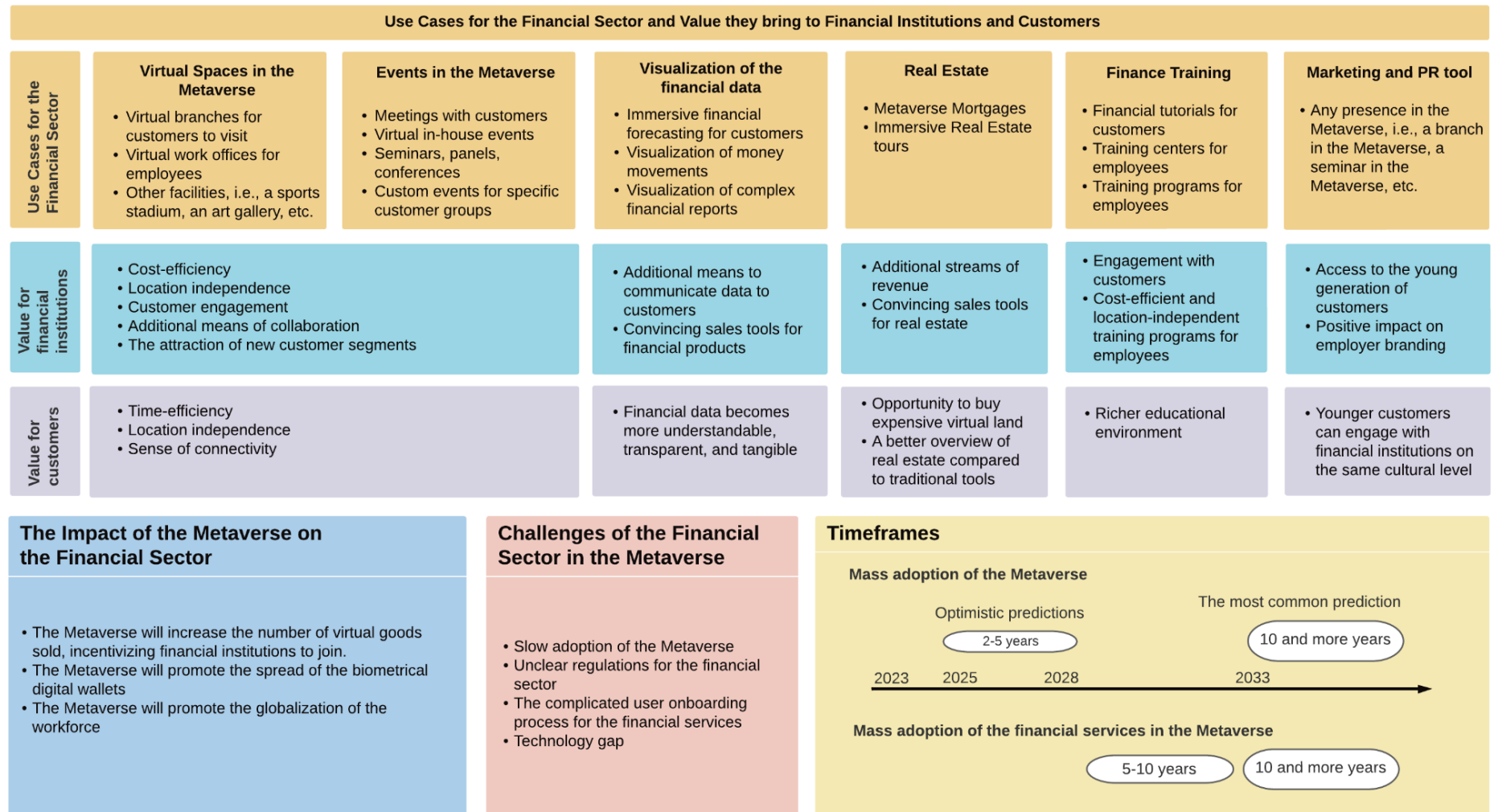


Figure 10. The Metaverse in the Financial Sector Framework

## 5.1 Limitations

As we discussed in Section 3, the semi-structured interview is a qualitative research method well-suited for eliciting the experts' knowledge [30]. However, this method has limitations. First of all, semi-structured interviews are affected by the interviewer's internal bias. Inevitably, a researcher comes to the interview with some set of preconceptions about the topic. These preconceptions are likely to affect the structure of the interview. Moreover, the researcher's judgment is likely to affect the quality of the research during the data analysis phase [51]. Additionally, the researcher's level of domain expertise can also have a significant influence on the quality of the research, especially if research focuses on a highly specialized topic. If the difference in domain expertise between the researcher and interviewee is significant, then the researcher can fail to note the important details of the study context [52]. Therefore, to address these limitations, we asked open questions when possible and always asked clarifying questions.

## 6 Conclusion

This thesis aimed to investigate how the financial sector can benefit from the emerging technology, the Metaverse. As a result, the Metaverse in the Financial Sector Framework was developed based on the findings from the multivocal literature review and interviews.

To accommodate our research objective, we formulated five RQs:

***RQ1.** How is the Metaverse described and understood?*

***RQ2.** What are the potential use cases of the Metaverse for financial institutions?*

***RQ3.** What value can Metaverse use cases bring to financial institutions and customers?*

***RQ4.** What is the impact of the Metaverse on the financial sector?*

***RQ5.** What are the challenges for the financial sector in the Metaverse?*

To answer RQ1 and RQ2, we conducted a multivocal literature review. We gathered, analyzed, and categorized different definitions of the Metaverse from the literature and various use cases of the Metaverse for the financial sector. We also conducted ten interviews to complement the findings from the literature review for RQ1 and RQ2 and to answer RQ3, RQ4, and RQ5. As a result, we were able to define six use case categories, specify different use cases and provide examples for these categories, and highlight the value they bring to financial institutions and their customers. Moreover, we provided a list of possible effects the Metaverse can have on the financial sector and a list of challenges for the financial industry in the Metaverse. Lastly, we included information about the timeframes of mass adoption of the new technology in general and for the financial sector. These findings were structured in The Metaverse in the Financial Sector Framework.

There is an opportunity for the future development of the framework. Since Metaverse is a rapidly advancing technology, the list of use cases and the value they bring can be further developed in the future. Moreover, Metaverse's future impact on the financial sector could be researched more thoroughly when more data becomes available.

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# Appendix

## I. Interview guideline

**Introduction:** This is a study conducted by a research group from the University of Tartu (Estonia). This study is a part of a Master's Thesis. The study's objectives are to research how the Metaverse is described and understood, and how the Metaverse can be used in the financial sector. The study aims to develop a framework for the Metaverse in the financial sector. The framework will put into the organized system the notable use cases, capabilities, challenges, and timeframes of the Metaverse in the financial industry. During the study, Researcher will conduct an interview with you on the topics mentioned above. A researcher will record the conversation during the study.

**Materials, software and environment:** a printed version of this document, a printed consent form, a printed interview questions, a piece of paper, a pen, a laptop, a charger, the headphones, a glass of water, Zoom, a quiet place

### Overall procedure:

#### *Before the interview:*

1. Send a consent form to the participant and ask to sign before the interview. Upon receiving: assign index number to the file, store it in a separate designated folder.
2. Send a Zoom link to the participant.
3. Create a Google Calendar event and invite the participant. Add Zoom link to the event description.
4. *Right before the interview:* Check if all materials are there (*see materials above*)

#### *During the interview:*

1. Welcome the participant
2. Thank her/him for participating in the study
3. Introduce yourself
4. Introduce the study (*see introduction part above*)
5. Ask participant if s/he has any clarifying questions about the study
6. Start video recording
7. In case the participant did not send a signed consent form: walk the participant through the form, ask for a verbal consent on the record.
8. Conduct the interview
9. Ask for additions/clarifications
10. Stop recording
11. Thank the participant again

*After the interview:*

1. Convert the video recording. Delete a video file.
2. Assign the index number to the audio file, and store it in a designated folder (not the same one that contains the consent forms).
3. Write down the initial findings of the interview.

## II. Consent Form

**Study title:** Metaverse in the Financial Sector

**Researcher:** Yana Halas, Master's Student, University of Tartu

**Supervisor:** Fredrik Milani, Associate Professor of Information Systems, University of Tartu

**Introduction:** This is a study conducted by a research group from the University of Tartu (Estonia). This study is a part of a Master's Thesis. The study's objectives are to research how the Metaverse is described and understood, and how the Metaverse can be used in the financial sector. The study aims to develop a framework for the Metaverse in the financial sector. The framework will put into the organized system the notable use cases, capabilities, challenges, and timeframes of the Metaverse in the financial industry. During the study, Researcher will conduct an interview with you on the topics mentioned above. A researcher will record the conversation during the study.

**Participation requirements:** To be eligible to participate, a person should 1) be 18 or older, 2) have work experience in the financial sector and/or expertise in the Metaverse, 3) be a fluent English speaker.

**Expected duration of the study:** The study will take about 30 minutes of your time.

**Risks and Benefits:** The risks associated with this research are no greater than those ordinarily encountered in daily life. There are no direct benefits to participants, but the development of the publicly accessible metaverse framework is anticipated.

**Privacy and Confidentiality:** In order to protect the participants' identities during this study, the research team will follow the following procedure. The original recordings will only be accessible to the Researcher and Supervisor. The audio contained in the recordings will be transcribed using Otter.ai, potential identifiers will be removed or aggregated, and the original recordings will be deleted afterwards. Your data and consent form will be kept separate. Your consent form will be stored securely and will not be disclosed to third parties.

By participating, you understand and agree that the data and information gathered during this study may be used by the participating university for publication purposes. However, any identifiable information will not be mentioned in any such publication or dissemination of the research data and/or results. The University of Tartu requires all research records to be maintained for at least five years following the final reporting or publication of a project. Aggregated data will thus be archived by the Researcher for that timespan.

**Questions about the Study:** If you have any questions, comments, or concerns about the study either before, during, or after participation, please contact the Researcher (email).

**Voluntary Participation:** Your participation in this research is voluntary. You may discontinue participation at any time during the research activity.

I am age 18 or older. I have read and understood the information above and I want to participate in this study:

☐ Yes   ☐ No

**Participant:** The above information has been explained to me and all of my current questions have been answered. I understand that I am encouraged to ask questions, voice concerns or complaints about any aspect of this study during its course and that such future questions, concerns, or complaints will be answered either by Researcher, by Supervisor, or by a qualified individual.

**Researcher:** I certify that I have explained the nature and purpose of this research study to the participant, and I have discussed the potential benefits and possible risks of study participation. Any questions the participant had about this study have been answered, and we will always be available to address future questions, concerns, or complaints as they arise.

Participant\_\_\_\_\_

Researcher\_\_\_\_\_

### **III. Interview questions**

1. What is the Metaverse in your view?
2. How do you see the Metaverse can be used in the financial sector?
3. What value can the Metaverse bring to customers and to financial institutions?
4. Overall, how is the Metaverse going to impact the financial sector?
5. What are the unique characteristics of the Metaverse that can attract financial institutions?
6. In your opinion, what are the main challenges of the Metaverse right now if we are talking about the financial sector?
7. When will we see these financial services in the Metaverse used by the early majority?  
Which one of the financial services will come first or has already come to the Metaverse?

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