

The Impact of the Implementation of the Metaverse in B2B Firms

An Explorative Study

Master's Thesis

Felix Deleuze



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by

Felix Deleuze

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Thesis committee: Dr. T. L. Dolkens, TU Delft, 1st supervisor
Dr. R. M. Verburg, TU Delft, 2nd supervisor, Chair

Preface and Acknowledgments

It is with great pleasure and a sense of accomplishment that I present this thesis, the culmination of my journey through the Management of Technology program. These past two years have been filled with invaluable experiences, personal growth, and the acquisition of knowledge that has shaped me into the person I am today. This thesis serves as a testament to the dedication and passion that I have poured into my research, and I am honored to share the fruits of my labor with you.

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*Felix Deleuze
Delft, June 2023*

Executive Summary

The objective of this study is to investigate the impact of the implementation of the metaverse on B2B firm operations. This study is explorative in nature because very little is known about the subject and the study of an emerging technology is a highly complex phenomenon. In total, 16 semi-structured interviews were performed with a mix of B2B executives, metaverse consultants, metaverse platform executives and academics to combine insights from different perspectives and generalize the findings. Interview questions related to the definition, benefits, challenges, preparation and sustainment of a metaverse implementation in B2B firms as these were the relevant themes to answer the main research question. Interviews were transcribed and analysed with template analysis, an inductive form of reasoning where a bottom-up approach was adopted to develop a template for the interpretation of the data. Themes were not stipulated in advance but developed throughout collection and engagement with the data.

The following research findings were found and they all contribute in reaching the objective of the study. An unambiguous definition of a B2B metaverse was established which sets the foundation for understanding what it is and its impact on B2B operations. The metaverse in B2B was defined as a persistent and immersive virtual environment, consisting of four core layers, where businesses and organisations can interact, collaborate and conduct operations with each other and the environment. Then, the benefits and challenges evaluate the consequences of the implementation on operations. Five benefits and seven challenges of the implementation were identified. It enhances collaboration in B2B firms, it improves the B2B customer experience, it augments the overall productivity of employees within the firm, it increases the firm's profitability and it upgrades the current marketing practices. On the other hand, the implementation needs to fit in the business model, interoperability & standards have to be developed, lacking managerial capability & skill gaps are hurdles for the implementation, security, safety & governance need to be on point at all times, the implementation requires a strong technological support, the uncertainty around the return on investment is high and user adoption needs to be accelerated. Finally, a preparation roadmap was set up for the anticipation of the implementation and a sustainment strategy was outlined for maintaining the implementation. The preparation and sustainment strategies make B2B firms adapt their operations to leverage the metaverse and overcome the challenges. The preparation required for the implementation is an iterative threefold process: 1) Develop a value-oriented strategy, 2) Test & learn and 3) Adapt the workforce and expand capabilities. The sustainment strategy consists of two major components, continuous monitoring and user feedback, which allows to maintain the metaverse implementation on the long term. In sum, the implementation of the metaverse has a significant impact on B2B firm operations, due to the benefits and challenges it brings, as well as the need for thorough preparation and sustainment measures.

This study has both scientific and managerial implications. The scientific implications of this research concern the advancement of knowledge on the conceptual understanding of the metaverse and theoretical contributions were made on metaverse implementation in the B2B sector with findings concerning its benefits, challenges, preparation and sustainment based on theory that emerged from the data. This approach can be replicated in future studies on technology implementation. Methodological contributions were made with the inductive approach in the use of template analysis and interdisciplinary collaboration occurred as this research fostered knowledge exchange and bridged the gap between technical and managerial literature fields. Finally, the generalizability of the research due to the combination of multiple perspectives enhanced the relevance and applicability of the research findings.

This study involved a few managerial implications as well. Managers are equipped with the knowledge necessary to identify, modify, and abstain from essential practices regarding the implementation of the metaverse. The revised conceptualization and the discovered advantages allow managers to assess the potential role of the metaverse for their firm and effectively harness its most valuable benefits. Moreover, the identified challenges highlight the risks that managers must address and alleviate. Finally, the formulation and implementation of preparatory and sustainable strategies outline a pragmatic course of action for managers to adopt in order to successfully implement the metaverse within B2B enterprises.

Keywords: Metaverse; Business-to-Business (B2B); Implementation; Firm Operations

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Nomenclature

Abbreviations

Abbreviation	Definition
B2B	Business-to-Business
B2C	Business-to-Consumer
CAQDAS	Computer-Assisted Qualitative Data Analysis Software

1

Introduction

1.1. Background

In an ever-growing competitive business environment, firms are faced with several challenges and risks. "In recent years, firms in almost all industries have conducted a number of initiatives to explore new digital technologies and to exploit their benefits. This frequently involves transformations of key business operations and affects products and processes, as well as organizational structures and management concepts." (Matt et al., 2015). In this perspective, new, emerging digital technologies appear to have the ability to transform modern businesses by enabling a new strategy, business model or organizational design which can help organizations increase their performance and thereby allow them to gain a competitive edge in the market (Li, 2020).

Business-to-business (B2B) firms which are at the forefront of adopting new technologies and business models are also impacted by these digital transformations (Lievens and Blažević, 2021). "The nature of change, the impact of business relationships and the problem identification related to these changes require appropriate theoretical lenses fine-tuned for a B2B-context." (Pagani and Pardo, 2017). Hence, the transformation brought by digital technologies is an important topic in B2B research which can be considered as the study of business relationships between organizations (Kuusela et al., 2014). Moreover, given the economic relevance and size of the B2B sector, significant attention must be devoted towards the study of the B2B industry (Mittal and Sridhar, 2020).

Hence, one specific emerging technology that has gained increasing attention in recent years is the metaverse. The metaverse is defined as an "immersive three-dimensional virtual world in which people interact as avatars with each other and with software agents, using the metaphor of the real world but without its physical limitations" (Davis et al., 2009). Disruptive technologies such as the metaverse have the ability to significantly impact business and change industries (Danneels, 2004). The metaverse offers new opportunities for customer engagement and business management making it crucial to comprehend how it can be used and how to reduce potential hazards (Hollensen et al., 2022). In sum, the metaverse is a new, emerging technology that can potentially impact organizations and individuals which calls for further in-depth investigation in the B2B industry.

1.2. Research Problem and Objective

Firms in the B2B industry are constantly looking for new ways to innovate and grow. Recently, the transformative potential of digital technologies has emerged as an effective tool to disrupt current business models by changing the relationship a company has with its customers, suppliers or with other actors (Pagani and Pardo, 2017). Hence, the metaverse is a new, emerging digital technology that appears to have the potential to be a game-changer for B2B firms (Shree et al., 2021). Various studies have been carried out on the transformation potential of digital technologies in the Business-to-Consumer (B2C) sector while only a few have considered its impact on B2B exchanges (Pagani and Pardo, 2017). Moreover, a similar knowledge gap could be identified in the research priorities formulated by the Marketing Science Institute involving both the metaverse and the B2B sector. It stated that the impact of the metaverse on B2B customer experiences deserved further investigation (MSI, 2022). Overall, the implementation of the metaverse seemed to have the ability to impact operations in B2B firms by offering several new opportunities and requiring significant transformations within the firms, but relatively little ink had been spilled on the topic (Ritter and Pedersen, 2020).

Therefore, this research aimed at studying the impact of the implementation of the metaverse on B2B firm operations. In the first place, the status quo of literature on the implementation of the metaverse in B2B had to be analyzed. Therefore, all the different phases of the implementation process of the metaverse were explored (Bertram et al., 2015). It was found that studying the impact of the metaverse implementation on B2B firm operations required an unambiguous definition of the metaverse to set the foundation for exploring its impact, assessing benefits and challenges to evaluate the positive and negative consequences of this implementation as well as drawing a preparation and sustainment strategy for the implementation to optimize the operations and overcome challenges.

There have been numerous attempts to describe the metaverse, but it was unclear how the term was understood in the B2B industry (Ritterbusch and Teichmann, 2023). This called for additional research to establish a clear definition and understanding of the term "metaverse" in a B2B context as to facilitate its use in future B2B operations. Further, insufficient literature was available on the benefits and challenges offered by the metaverse in B2B (Dwivedi et al., 2022b). They had to be explored in this study as to understand what transformations they might cause on operations (Barrera and Shah, 2023). Moreover, aspects that are important in the preparation of the actual implementation needed to be evaluated by the researcher. This could involve the acquirement of resources as well as organizational preparation and training (Bertram et al., 2015)(Tlili et al., 2023). The existing studies on the preparation required for the adoption of digital platforms in B2B were often fragmented and context-specific failing to provide an in-depth understanding of the phenomenon. This called for more generalizable research in the B2B sector (Shree et al., 2021). Finally, the actual implementation of the metaverse involving both the initial and full implementation demanded an in-depth investigation because very limited literature existed on the implementation of metaverse functions in B2B firms and on tools and strategies to monitor and sustain the effect of the metaverse (Dwivedi et al., 2022a)(Shree et al., 2021). Thus, the whole implementation process of the metaverse required a more detailed analysis as to assess the impact it has on operations within B2B firms.

In sum, the objective of this research is to investigate the definition, benefits, challenges, preparation and sustainment of the implementation of the metaverse in an effort to assess its impact on B2B firm operations. This guided also the setup of the main research question and sub-research questions outlined in Section 1.3. An in-depth reflection on the scientific and managerial implications of the key findings of this research can be found in Section 5.2.

1.3. Research Questions

The knowledge gap discussed in Section 1.2 outlined that further research was required to understand the impact of the implementation of the metaverse on B2B firm operations. This led to the main research question of this study.

Main research question

What is the impact of the implementation of the metaverse on B2B firm operations?

In an effort to answer the main research question, four sub-research questions were designed following the findings of the literature review in Chapter 2 where each phase of the implementation process was assessed. Firstly, the metaverse needed to be defined in a B2B context and a clear definition had to be established leading to the first sub-research question.

Sub-research question 1

What is the metaverse for B2B firms?

Later, the impact of the implementation of the metaverse involved assessing the benefits and the challenges that this implementation brings. This formed the basis for the second sub-research question.

Sub-research question 2

What are the benefits and challenges of implementing the metaverse for B2B firms?

Then, the implementation of the metaverse into the operations of B2B firms requires preparation which in turn affects how B2B firms operate and therefore led to the third research question.

Sub-research question 3

How do B2B firms need to prepare for the implementation of the metaverse?

Finally, after implementing the metaverse, it needs to be sustained on the long term which also affects the operations within B2B firms. This called for the last sub-research question of this study.

Sub-research question 4

How can B2B firms sustain the implementation of the metaverse?

Answering these four sub-research questions allowed to answer the main research question which evaluates the impact of the implementation of the metaverse on B2B operations. This study belongs to an emerging stream of research since the metaverse is a new, emerging technology whose impact on the B2B industry had not been investigated yet. Hence, this study called for an explorative research since very little was known about the subject, the emergence of a new technology such as the metaverse in a new industry is highly complex and not enough theory was available to guide the development of a theoretical framework (Sekaran and Bougie, 2016)(Dwivedi et al., 2022a).

1.4. Outline

This report starts with Chapter 1, an introduction including the research problem & objective and the main research question and sub-questions. Then, Chapter 2 is the literature review assessing the current state of the implementation of the metaverse in the B2B sector. Based on this analysis of literature, the main research question and four sub-questions were formulated. Chapter 3 presents the methodology used for this research outlining both data collection and data analysis. Chapter 4 describes the research findings. Finally, Chapter 5 closes this report with a thorough discussion of the results and

a main conclusion as well as scientific & academic implications and avenues for future research based on existing limitations. The outline of this report is illustrated in Figure 1.1.

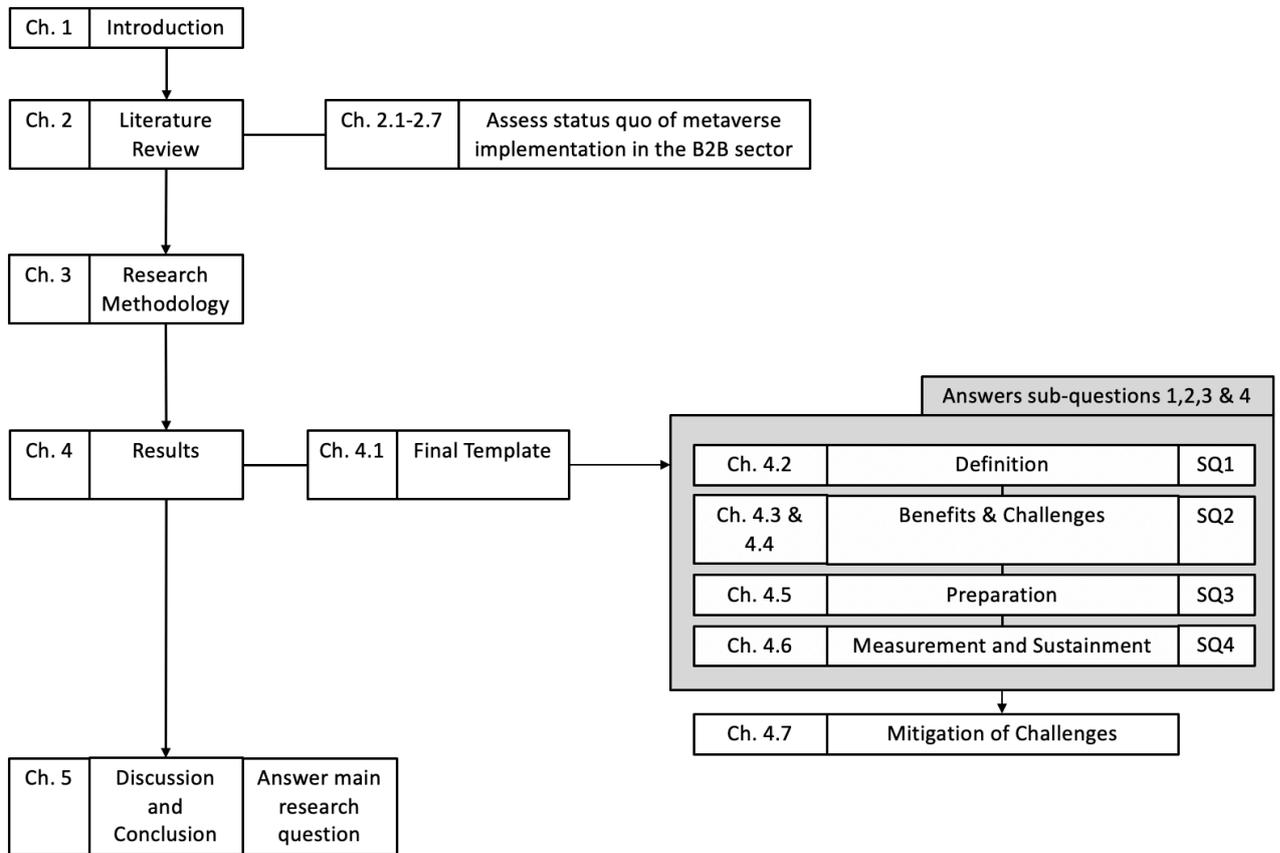


Figure 1.1: Research Outline

2

Literature Review

Metaverse in the B2B Sector

2.1. Introduction

The metaverse is a term coined by science fiction author Neal Stephenson in his 1992 novel *Snow Crash*, referring to a collective virtual shared space, a place where users can interact with each other and with virtual objects and environments (Jaimini et al., 2022). Later, in the early 2000s, platforms such as *Second Life* and *Roblox* were launched allowing users to interact in a virtual world and are nowadays counting millions of users worldwide. Recently, in 2021 Facebook decided to become *Meta* aiming at a transition to a metaverse ecosystem (McKinsey, 2022). Hence, the metaverse is a concept that has gained increasing attention and relevance in recent years, as technology advances and virtual and augmented reality (VR & AR) become more widespread.

The metaverse is broadly defined as a digital ecosystem where users can access a range of immersive experiences, from gaming and social networking, to education and business meetings, and has the potential to change the way we communicate, learn, and interact with the world around us (Davis et al., 2009). As the metaverse continues to grow and evolve, it is crucial to understand its potential impacts and implications on society and individuals. It is also important to understand how the metaverse can be leveraged and how to mitigate potential risks. In sum, research on the metaverse can provide valuable insights and understanding for both individuals and organizations (Papagiannidis et al., 2008).

The digital ecosystem created by the metaverse allows for the development of digital platforms that can significantly alter business relationships. Especially Business-to-Business (B2B) relationships are experiencing significant changes due to the emergence of digital platforms. These digital platforms allow for the development of new value creation and exchange mechanisms and appear to have the potential to be game-changers in the B2B sector (Shree et al., 2021). Hence, this review will analyze the current state of the metaverse in the B2B industry.

The decision to focus on the B2B sector is motivated by various reasons. Firstly, various studies have been carried out on the transformation potential of digital technologies in the Business-to-Consumer (B2C) sector while only a few have considered its impact on B2B exchanges (Pagani and Pardo, 2017)(Obal and Lancioni, 2013). Therefore, ample room exists for research on the impact of digitization on business relationships (Ritter and Pedersen, 2020). Moreover, the Marketing Science Institute has defined various research priorities where one involves both the metaverse and the B2B sector: How will the B2B customer experience be affected by the new balance between physical and virtual channels as well as by the new technological developments in IoT, AR and VR (MSI,

2022)? Finally, Lievens & Blažević found that B2B firms constantly have to deal with highly dynamic, complex, and heterogeneous constellations of stakeholders with a diversity of goals, motives, and capabilities which pushes them to be at the forefront of adopting new technologies and business models (Lievens and Blažević, 2021). This makes B2B firms a valuable source of innovation and insights for the use of the metaverse. The next section will describe the search description the researcher followed throughout this study.

2.2. Search Description

The research started with making a non-exhaustive list of all the interest fields of the researcher which could potentially form the basis for a thesis subject. The ambition was to investigate a new, emerging technology and its impact in the business world. This list included emerging technologies such as AI, blockchain, metaverse (Extended and Augmented Reality), Internet of Things (IoT), LiDAR technology, quantum computing, etc. Then, the researcher decided to select four emerging technologies out of this list based on its interest and a first skim of present literature and applications: AI, IoT, blockchain and metaverse. AI, IoT, and blockchain are also relevant and emerging technologies that are likely to have significant impacts on businesses and society. However, these technologies are typically focused on specific applications or domains, such as machine learning, connected devices, or cryptocurrencies. As such, they may not have the same broad and transformative potential as the metaverse. Moreover, the metaverse has gained increasing attention over the last years and implementation of this technology might raise several challenges. The goal was thus to find a knowledge gap concerning the impact of metaverse implementation in a particular business field. The search occurred in different stages and keywords as well as selection criteria were refined along the way. First, studies about the metaverse in business were evaluated. Literature on the impact of the implementation of the metaverse in business was explored and studies concerning the B2B sector appeared to be extremely limited. The definition of the metaverse in a B2B context and the current state of the metaverse in the various implementation phases were investigated in more detail. This literature review also included dead ends and roads not taken requiring to take a step back and reconsider the search direction. As an example, numerous studies on the metaverse were carried out in a particular industry such as gaming or fitness. Although, findings and research opportunities were not generalizable to a broader business context. Instead, the focus was put on B2B firms in general which allowed to combine multiple industries and an overarching view of the metaverse.

2.3. Keywords and Selection Criteria

Selection criteria for keywords included: keywords related to the research topic following the search description described in Section 2.2 and synonyms of these keywords. In a first stage, keywords were related to the metaverse in the business world: "metaverse," "definition", "business,". Then the focus was put on B2B firms adding: "B2B" to the keyword list. Later, keywords involving "Implementation framework" and "Technology adoption" were added and combined with metaverse. The keywords used in this literature search can be found in Table 2.1.

These keywords were used in combination with each other or with other related terms in order to identify relevant scientific studies related to the research topic. Online tools such as Web of Science, Scopus and Google Scholar were utilized to identify relevant scientific sources. The search occurred in two phases: Metaverse definition in business and implementation of the metaverse in B2B firms. The search results can be found in Table 2.2 and Table 2.3. Within these results, sources were selected based on inclusion and exclusion criteria discussed in Section 2.4 and authoritative sources with a high number of citations in other related studies were preferred.

Keywords	Synonyms
Metaverse	virtual reality, virtual space, digital realm, digital universe
Definition	Explanation, Description, Interpretation
Business	organization, corporation, institution, venture
B2B	business-to-business, company-to-company, Enterprise-to-enterprise
Implementation Framework	Implementation model, Operational framework, Implementation roadmap
Technology adoption	Technology acceptance, Diffusion, Integration

Table 2.1: Keywords and Synonyms

Information Source	Keywords Search	Articles found
Web of Science	Metaverse Definition	36
Web of Science	Metaverse Definition Business	9

Table 2.2: Metaverse Definition in Business

Information Source	Keywords Search	Articles found
Web of Science	Metaverse B2B	2
Web of Science	Metaverse Implementation Framework	16
Web of Science	Metaverse Implementation Framework Business	3
Web of Science	Metaverse Technology Adoption	40
Web of Science	Metaverse Technology Adoption Business	18

Table 2.3: Metaverse Implementation

2.4. Inclusion and Exclusion Criteria

Inclusion and exclusion criteria were used to determine which scientific articles to include in the literature review. Likewise, some of these criteria have been refined along the search process. Since the metaverse is a new, emerging technology, the review would benefit more from recent published material. Hence, research carried out before 2000 was excluded due to the high technological advancements. Then, technology and business field were specified along the literature study to narrow down the research. Since the language of this report is English, only English sources were used in order to allow the reader to verify sources mentioned throughout the report. Moreover, only scientific research types were considered where peer-reviewed scientific sources were prioritized. Finally, only scientific sources stemming from publication databases approved by the TU Delft were included to assure scientific integrity and ensure the use of authoritative sources. Inclusion and exclusion criteria are described in Table 2.4 below.

Criterion	Inclusion	Exclusion
Period	Research carried out after 2000	Studies before 2000
Technology	Metaverse. General sources about emerging technologies were also considered	Specific non-metaverse technologies
Business field	Business-to-Business	Business-to-Consumer, Peer-to-Peer
Language	English	non-English
Research type	Peer-reviewed scientific journals, books, case studies	Blogs, forum, patent
Publication tool	Google scholar, Web of Science, Scopus	Other

Table 2.4: Inclusion and Exclusion Criteria

2.5. Metaverse Definition

The first step in this literature review which evaluates the current state of the metaverse in the B2B sector is to establish a clear and unambiguous definition of the metaverse. Various attempts have been undertaken in the literature to define the metaverse. Ritterbusch and Teichmann have performed a systematic literature review on the definition of the metaverse. They have gathered 28 definitions from different domains such as business & management, computer science, engineering, social sciences and others (Ritterbusch and Teichmann, 2023). After combining the key ideas of all the retrieved definitions, they defined the metaverse as "Metaverse, a crossword of "meta" (meaning transcendency) and "universe", describes a (decentralized) three-dimensional online environment that is persistent and immersive, in which users represented by avatars can participate socially and economically with each other in a creative and collaborative manner in virtual spaces decoupled from the real physical world."

Although, the 28 definitions gathered by Ritterbusch and Teichmann originate from different periods in which the understanding of the metaverse has undergone change and the list, being non-exhaustive, might not represent the full picture of the metaverse. Moreover, only two of the definitions stem from the business & management literature and only business activities that virtual environments can host are mentioned failing to give a deep understanding of the corporate metaverse phenomenon. The other definitions are based on scientific literature that do not fit the B2B context of this research. In the context of this research focusing on the B2B sector, this might raise the question if the given definition is still appropriate for this context. Therefore, Ritterbusch and Teichmann also acknowledge that there might not be a consensus between the scientific and the corporate view of the metaverse. For this purpose, further research is required to understand what B2B firms, carrying out corporate metaverse projects, understand under the term "Metaverse" (Ritterbusch and Teichmann, 2023).

Other studies confirm the urgency of establishing a clear understanding of the metaverse in the corporate sector. According to Polyviou and Pappas, it is necessary to enlarge our understanding on the intersection of the metaverse and business transformation as to derive useful theoretical and practical implications (Polyviou and Pappas, 2022). Further, Bartoli identified the importance of broadening the understanding of managers on the role of digital technologies such as the metaverse as to leverage them in their enterprises (Bartoli, 2022). Finally, Cui et al. found that only a few studies analyze or evaluate the origin of the metaverse concept and how this impacts B2B operations and management (Cui et al., 2022).

Overall, there is a need to explore and broaden the understanding of the metaverse in the B2B sector as to resolve existing ambiguities. Figuring out what B2B enterprises understand under the term of the metaverse and ruling out uncertainty with a clear definition might facilitate its use in future operations. The next section will evaluate the implementation process of the metaverse in B2B.

2.6. Metaverse Implementation

The next step to be taken in this review is to evaluate literature on the current state of implementation of the metaverse in the B2B sector. According to Dwivedi et al., organizations are keen to leverage the opportunities and power of the metaverse, but confusion exists around the actual implementation of the technology. This calls for additional research to shed light on the implementation of the metaverse in B2B firms (Dwivedi et al., 2022a).

The term "implementation" is broad and encompasses a process of multiple phases B2B firms need to go through for effectively implementing the metaverse. In an effort to structure the analysis of literature, the implementation process is divided into four core phases and literature in each of these phases is analyzed and discussed. As to identify these four implementation phases, authoritative technology implementation frameworks were first compared. Bertram et al. built an implementation framework based on the frequently cited National Implementation Research Network's (NIRN) seminal study and can be observed in Figure 2.1. They identified four core phases in the implementation process: *exploration, installation, initial implementation and full implementation* (Bertram et al., 2015). For purposes of comparison, two other authoritative studies on implementation frameworks are investigated. Rafique et al. performed a systematic literature review on technology implementation frameworks focusing on minimizing waste to increase operational efficiency. They also identified four major phases in the implementation: *the conceptual phase, the preparation phase, the implementation design phase and the completion phase* (Rafique et al., 2019). Another review carried out by Aarons et al. stemming from the implementation science literature which details the different phases in the implementation process was evaluated. Similarly, Aarons et al. identify four major phases in the implementation process: *Exploration, Adoption Decision/Preparation, Active Implementation and Sustainment*. Each of these phases are dual with internal and external factors (Aarons et al., 2011). The comparison of the three studies and phases can be found in 2.5.

Betram et al.	Rafique et al.	Aarons et al.
Exploration	Conceptual phase	Exploration
Installation	Preparation phase	Adoption Decision/Preparation
Initial implementation	Implementation design phase	Active Implementation
Full implementation	Completion phase	Sustainment

Table 2.5: Technology Implementation Frameworks

Overall, each of the phases identified by Rafique et al. and Aarons et al. are in line with the phases of Betram et al. and represent a similar content. The first phase is always a preliminary exploration of the technology followed by a second phase, the preparation phase, before actually performing the implementation. Then the initial implementation is performed in the third phase and the last phase consists in sustaining and monitoring the new implementation. These phases consist of multiple components as can be observed in Figure 2.1 and will be discussed in more detail in the next paragraph. Hence, it is crucial

to evaluate the current state of the metaverse in each of these implementation phases to identify which components of these phases require further research.

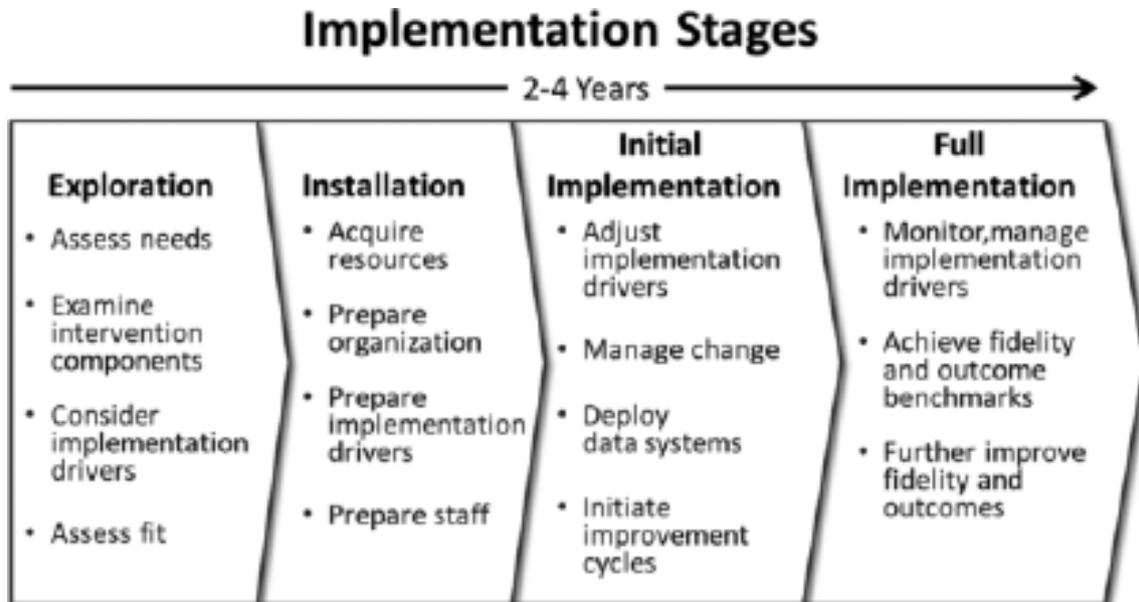


Figure 2.1: The Four Implementation Phases (Bertram et al., 2015)

2.6.1. Exploration phase

The exploration phase is the first phase of the implementation process. The exploration phase involves assessing needs and fit, examining intervention components and investigating implementation drivers. In other words, this phase initially requires a metaverse definition and is needed to evaluate the appropriateness and benefits as well as challenges of the metaverse in a B2B context (Bertram et al., 2015).

As mentioned in Section 2.5, ambiguities considering the definition of the metaverse in a B2B context need to be resolved. Concerning benefits and challenges, even if very few studies focus on the metaverse in B2B, various studies investigated the potential benefits and drawbacks of the metaverse on a higher level of analysis. Kraus et al. state that the metaverse will offer new experiences in terms of communication, work and entertainment, but further research is necessary to understand the potential uses and capabilities of the metaverse in more specific contexts (Kraus et al., 2022). Bartoli calls for greater understanding of enabling technologies such as the metaverse and how they can be used by enterprises (Bartoli, 2022). According to Dwivedi et al., future studies are encouraged to capture and analyse the multitude of factors that can help clarify how the metaverse can be beneficial in various business aspects such as marketing, value creation or branding (Dwivedi et al., 2022b). These recent studies recognize the need to explore the potential opportunities and challenges offered by the metaverse, specifically in the B2B sector where very little ink has been spilled on the subject.

Another cluster of studies took it one step further by investigating precise opportunities of the metaverse in business. However, most of these studies were focused on a B2C context and acknowledged the necessity for additional research focused on the B2B sector (Shree et al., 2021). Barrera and Shah believe a tremendous scope exists for future research on the impact of metaverse environments on innovation practices and customer relationships in B2B. The metaverse introduces a new array of changes for innovation practices such as co-creation and virtualization of physical assets as well as for customer

relationships with virtual brand-related marketing and new ways of collaboration (Barrera and Shah, 2023). Following Hennig-Thurau et al., it is crucial to weigh the added value of metaverse engagements with their costs. Infrastructure costs such as equipping employees with headsets need to be taken into account and large-scale negative outcomes such as privacy violations, harassment or abusive practices need to be prevented (Hennig-Thurau et al., 2022). Overall, these studies have identified critical opportunities and challenges the metaverse can offer in a B2C context and call for additional exploration on this subject in a B2B context.

2.6.2. Installation Phase

After exploring the potential benefits and challenges of the metaverse in the B2B context in the previous phase, a decision has to be taken on the eventual adoption of the technology. This adoption decision is often misinterpreted as a one-time event while organizations are more likely to experiment with the innovation before broad implementation. Only evaluating benefits & challenges of the metaverse is not sufficient to assure a successful adoption (Aarons et al., 2011). Therefore, the installation phase serves as a preparation for the active implementation where additional factors influencing the adoption of the metaverse in B2B need to be reviewed. These factors include the acquirement of resources and the preparation of organization, implementation drivers and staff or in other words the preparation strategy required to ensure a successful implementation (Bertram et al., 2015).

Shree et al. state that further research is required concerning the assessment of factors that will affect the successful adoption of digital platforms and performance outcomes in B2B. The existing studies are often fragmented and context-specific, calling for more generalizable research in the B2B sector (Shree et al., 2021). According to Tlili et al., additional research is also needed to determine the required competencies and knowledge for users as to effectively leverage the metaverse in a business context (Tlili et al., 2023). Moreover, research needs to be carried out on expectations of users and industry-specific contextual factors need to be taken into account when implementing the metaverse in B2B (Dwivedi et al., 2022a)(Filimonau et al., 2022). In sum, these studies demonstrate that not only the benefits and challenges of the metaverse in B2B count as deciding factors in its implementation, but also factors such as prerequisite competencies and knowledge, industry-specific contextual factors and user expectations which are aligning with the factors mentioned in Bertram et al.'s framework. Nevertheless, little or no research has been carried out on the preparation required for the implementation of the metaverse in a B2B context and what factors might be crucial in the implementation process preceding the active implementation.

2.6.3. Initial Implementation Phase

This phase refers to the actual implementation of the metaverse in a B2B context since all benefits and challenges have been assessed as well as other factors relevant for the adoption and use of the technology. This stage is extremely dynamic and involves managing change, improving and adjusting where needed (Bertram et al., 2015).

Since the implementation of the metaverse in a B2B context is an emerging area of study, no generalized framework exists for implementing metaverse functions in B2B firms (Dwivedi et al., 2022a). The implementation should occur as an iterative process where simulations serve as validation tools for the next implementation task (Rafique et al., 2019). In this phase, it is crucial to understand practical considerations when performing the actual implementation. Similarly to the exploration phase and installation phase, challenges related to the active implementation of the metaverse in a B2B context has not been investigated yet (Shree et al., 2021). This calls for additional research on managing change and adjustment brought by the initial implementation of the metaverse in B2B firms.

2.6.4. Full Implementation Phase

The last phase focuses on full implementation involving effective management and monitoring as well as achieving fidelity and improved outcomes. In this phase, it is crucial to sustain the novel implementation and to acquire tools that can help measure its effect on performance outcomes (Bertram et al., 2015).

Since the implementation of the metaverse in B2B is a new stream of research and only a few B2B firms already integrated it completely into their operations, very little amount of material is available for the study of this last phase (Shree et al., 2021). Again, this calls for further research concerning measurement and sustainment of the implementation of the metaverse in B2B firms.

2.7. Conclusion

This literature review aimed at investigating the current state of the implementation of the metaverse in B2B firms. The metaverse is a new, emerging technology and appears to have the potential to be a game-changer in the B2B industry. The B2B sector was chosen because of its economic relevance and also because the impact of the metaverse in this sector has not been given sufficient attention yet as opposed to the B2C sector. In an effort to assess the status quo of the implementation of the metaverse, the definition of the metaverse was investigated and the implementation process was divided in four sequential phases that were each explored.

Firstly, it was found that multiple attempts had been taken to define the metaverse, but the understanding of the term "metaverse" in the B2B sector was not unambiguous. Further, the four implementation phases revealed that the metaverse in B2B firms is able to bring several benefits and challenges, but these have not been investigated yet. Moreover, a metaverse implementation in B2B firms also appeared to necessitate a clear preparation and sustainment strategy. Again, both did not receive enough attention in existing studies. Hence, the lack of literature on the definition, benefits, challenges, preparation and sustainment of the implementation of the metaverse in B2B firms called for additional research. The investigation of these core themes contribute in understanding the impact of the implementation of the metaverse on B2B firm operations.

Overall, the implementation of the metaverse in B2B firms is a complex phenomenon and the transformation of B2B operations brought by this implementation needs to be investigated as only limited literature is available on this topic. This literature gap led to the main research question of this study. The findings of this literature review also guided the establishment of the sub-research questions in Section 1.3.

3

Research Methodology

3.1. Problem Analysis

This study aimed at investigating how the implementation of the metaverse impacts operations in B2B firms. As discussed throughout the literature review in Chapter 2, very little was known about the subject, the study of an emerging technology is highly complex and there was not enough theory available to guide the development of a theoretical framework. Hence, this study had to be explorative and the data collected and analysed was qualitative.

3.2. Data Collection

This section describes the process of choosing a method for collecting the data required for this research. One research method was selected based on its suitability for the research and is then further elaborated. Sample design and sample strategy are also outlined later in this section.

3.2.1. Choice of Data Collection Method

A research method had to be defined that was in alignment with the research design. The viewpoint of the researcher on what strategy would provide good research as well as practical aspects such as time and data access are determinant in the choice of the research method (Sekaran and Bougie, 2016). It is important to note that this research was exploratory and required the collection of qualitative data as discussed in the problem analysis section 3.1 (Sekaran and Bougie, 2016).

In this case, the exploratory study called for the collection of qualitative data through interviews as can be seen in Table 3.1. Interviews allowed to collect rich and relevant data, explore and understand complex issues and are known to be extremely suited for qualitative exploratory research such as this study (Sekaran and Bougie, 2016)(Saunders et al., 2009).

Data Collection	Definition	Advantage	Disadvantage
Interviews	Guided, purposeful conversation between two or more people	Rich data, explore and understand complex issues, suited for exploratory search	Interview bias, expensive if a large number of subjects are involved

Table 3.1: Data Collection Methods

This method also has its limitations such as the interview bias and the unsuitability if a large number of subjects are involved. The interview bias is inevitable, but several strategies were used to mitigate it. A structured interview protocol with unbiased questions was established to evaluate the interviewees based on the same criteria, the interviewees originated from different backgrounds to include multiple perspectives and the interview process was continuously reviewed and monitored to identify potential biases. Finally, the number of interviews that had to be performed was feasible for the time available for this study (Saunders et al., 2009). A more detailed elaboration of the interview design as well as the sample design is given in the next subsections 3.2.3 and 3.2.2 (Sekaran and Bougie, 2016).

3.2.2. Sample Design

This study required a grounded theory approach where theory emerged from data following an iterative process that involves repeated sampling, collection and analysis of data (Ciesielska and Jemielniak, 2018). Purposive sampling was used implying that samples were chosen based on the own judgement of the researcher. Participants were thus selected based on their expertise in the phenomenon of interest of the study. The participants were chosen in such a way to ensure that they reflected the diversity of the population (Sekaran and Bougie, 2016).

The sample for this study was determined by selecting interviewees that were expected to have a professional judgment on the research topic and research question. For this study, four different groups of interviewees were formed: Academics, metaverse platform executives, B2B firm executives and consultants with B2B metaverse expertise. Academics are professional researchers studying subjects involving the implementation of the metaverse and are key players in the advancement of knowledge on the metaverse and can provide useful insights based on their scientific work. Metaverse platform executives are employees holding a (senior) position within a company that develops or operates a metaverse platform and can shed light on the requirements for a successful metaverse implementation. Executives of B2B firms were also interviewed since this study focuses on the impact of the metaverse on operations in B2B firms. The researcher ensured the interviewed B2B executives were working in the digital department and held an experience with a metaverse implementation within the firm. Finally, consultants which had already worked and helped in the implementation and management of the metaverse for their clients in the B2B sector were also interviewed. These four categories of interviewees were initially defined and interviews were added until theoretical saturation was reached or in other words when no new information about the topic emerged in repeated interviews (Sekaran and Bougie, 2016). The interviewees stemmed from the personal network of the researcher or were contacted through LinkedIn based on their professional experience. Interviewees were restricted to Europe to limit the scope of this study. At the end of each interview, the snowball effect was used meaning that the participant was asked if it knew someone else that would be qualified to take part in this study (Noy, 2008).

Each of the interviews lasted around 30 minutes and they were all performed online through an online video conferencing tool. 16 interviews were performed in total: 6 consultants, 3 academics, 4 B2B executives and 3 platform executives as can be observed in Table 3.2. P stands for participant and the number allows to differentiate each participant and refer to them later in the results of this study. The 16 interviews were performed over a period of 4 weeks. First 2 interviews of each group were performed. The first two interviews with academics resulted in very similar answers and a third interview was added to ensure no new information was missed. After the third interview with an academic, theoretical saturation was reached which means no new information emerged after repeated interviews. The same process happened with platform executives where after 3 interviews, answers given were extremely similar and no new information arose. Similarly, saturation was reached after four interviews with B2B firm executives. On the other hand, consultants with B2B metaverse expertise did not reach saturation before the sixth

interview. Theoretically, more interviews could have been performed on top of these first 16 to strengthen the affirmation of theoretical saturation, but due to time constraints of this project, the researcher chose to limit the number of interviews to 16.

Interviewee	Company	Position	Category
P1	A	Chief Executive Officer (CEO)	Consultant
P2	B	Chief Executive Officer (CEO)	Consultant
P3	C	Chief Executive Officer (CEO)	B2B executive
P4	D	Director	Consultant
P5	E	Chief Executive Officer (CEO)	B2B executive
P6	F	Senior Consultant	Consultant
P7	G	Manager	Metaverse platform executive
P8	H	PhD Student	Academic
P9	I	Senior Consultant	Consultant
P10	I	Senior Consultant	Consultant
P11	J	Author & Researcher	Academic
P12	K	Chief Investment Officer	B2B executive
P13	L	Chief Web3 Officer	Metaverse platform executive
P14	M	Vice President (VP) Strategic Business Development	Metaverse platform executive
P15	N	Chief Executive Officer (CEO)	B2B executive
P16	O	Professional Researcher	Academic

Table 3.2: Interviewees

3.2.3. Interview Design

For this study, semi-structured interviews were used since it was already clear what information was needed, but flexibility was required as to allow the interviewer to determine which factors needed more in-depth investigation. A pre-determined list of questions was combined with the possibility for the interviewer to explore some themes or responses in further detail. First, an introduction was given presenting the interviewer, the purpose of the interview, confidentiality terms and permission to record the interview. Then a set of topics was discussed following a logical order going from easy-to-answer warm-up questions to the essential questions covering the real purpose of the interview. The questions concerned definition, benefits, challenges, preparation and sustainment of metaverse implementation in B2B firms following from the sub-questions formulated in the Chapter 2. Long-term vision and success & failure examples were also added to the interview questions to complement the existing questions and form a well-rounded perspective. A list of questions was slightly adapted to each category of interviewees depending on their area of expertise. These four lists of interview questions tailored to the four different categories of interviewees can be found in Appendix A.1. Probing questions were also used in case the first answer was incomplete or unclear. Each interview was recorded and automatically transcribed through the video conferencing tool as to be processed into the research (Sekaran and Bougie, 2016). At the end of each interview, an informed consent document

was sent to the participant for their agreement on the use of the interview in this study. The informed consent can be found in Appendix A.2.

3.3. Data Analysis

Qualitative data analysis follows data collection and consists of three important steps: data reduction, data display and drawing of conclusions. Data reductions refers to the process of selecting, coding and categorizing the collected data. Data display is the way in which data is represented and finally conclusions can be drawn. This whole process is rather a continuous and iterative process than a linear process as can be observed in Figure 3.1 (Sekaran and Bougie, 2016). This process is applied and described in detail in Subsection 3.3.2.

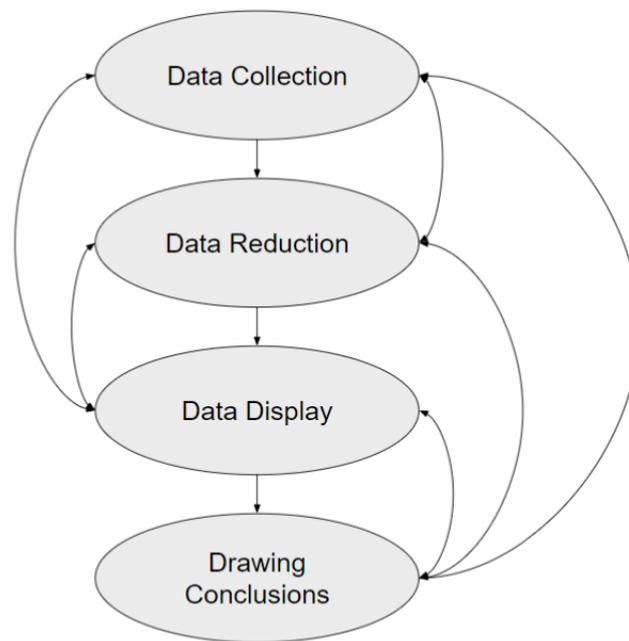


Figure 3.1: Iterative Process of Data Collection and Analysis

3.3.1. Choice of Data Analysis Method

After collecting the data, it had to be analyzed in an effort to draw useful insights from the research. This study is exploratory and is collecting qualitative data through semi-structured interviews meaning data had to be coded, clustered and relationships had to be established among different codes and clusters. Therefore, one qualitative data analysis method, template analysis, was selected as can be observed in Table 3.3.

Data Analysis	Definition	Advantage	Disadvantage
Template Analysis	Development of a template to guide the identification and analysis of themes in qualitative data	Structure, Inductive Approach, In-depth themes and relationship identification	Researcher bias

Table 3.3: Data Analysis Methods

Template analysis is a form of thematic analysis that allows to guide the identification and development of themes through the establishment of a template. This template outlines the relationships between the themes and sub-themes, often in a hierarchical structure (Cassell and Symon, 2004). Template analysis focuses on gaining an in-depth understanding of the core recurring themes, which is crucial for this study (Ciesielska and Jemielniak, 2018). Moreover, this method allows to take a grounded theory approach because theory emerges from the data since themes are not stipulated in advance. This offers great flexibility for new insights emerging throughout the process. On the other hand, this analysis technique still provides a certain structure through the establishment of a template for data interpretation (Saunders et al., 2009). The construction of the template is entirely based on the judgement of the researcher and may introduce a certain bias. This is mitigated by continuously reassessing and refining the developed template (Drisko and Maschi, 2016).

In this perspective, template analysis, suited the needs of this research. It allowed to identify, organize and interpret common themes and patterns within the collected qualitative data. Themes were not stipulated in advance but developed throughout collection and engagement with the data (Ciesielska and Jemielniak, 2018). Coding was performed through the use of a ATLAS.ti, a computer assisted quantitative analysis software (CAQDAS). This CAQDAS was chosen because it allowed to save time and facilitated the management of qualitative data while enhancing transparency and replicability (Hwang, 2008). Moreover, this software was provided for free to the researcher under a TU Delft license which also encouraged this decision.

3.3.2. Data Analysis Procedure

A step-by-step approach developed by Ciesielska and Jemielniak is described below and is applied to this study (Ciesielska and Jemielniak, 2018):

- *Familiarization with the data*

The first step requires the familiarisation with the data because the goal is not to code each line of text as a discrete unit, but more to consider its meaning in relation to the participant's full account. Hence, before starting to code, the researcher needs to read through the data multiple times and in this case also listen to the recording of the interviews. Therefore, after each interview and before reading through the automatically generated transcripts, interview recordings were first watched two times after performing the interview. Then, interview transcripts, generated automatically through the video conferencing tool, were read also two to three times to get a good sense of the collected data. After watching the recording and reading through the transcripts, extensive summaries were made of the interviews including the most important information of the answer to each interview question based on the judgement of the researcher. An example of an interview summary can be found in Appendix B. This allowed to accelerate the coding phase later since only relevant information would be coded. The order in which interviews were analyzed followed the order of the data collection which means every time a new interview was done, it was immediately analysed following the protocol described in this subsection.

- *Preliminary coding*

In this phase, open coding is performed where each segment of text that may be relevant to answering the research question is highlighted by a code summarizing the main concept of the passage. At this stage, it is not about developing well-thought themes, but rather about identifying every potential information that might benefit the research. After familiarizing with the data, open coding was performed on each interview summary. Each relevant passage in the answers to the interview questions were coded by choosing a code from one to maximum five words, to keep it concise, highlighting the main idea of the passage.

- *Clustering and core themes*

Then, codes are assembled together in meaningful groups. Obvious duplications are removed and codes that relate to each other are grouped in clusters. This is the first step towards the creation of meaningful themes and clusters. Core themes were formed based on the sub-research questions following from the literature review since they also informed the setup of the interview questions: definition, benefits, challenges, preparation and sustainment. During the interviews, two additional questions were asked, one about the long term vision of the respondent on the evolution of the metaverse and one about the failure or success examples of metaverse implementation they experienced. This allowed to better grasp the actual vision and the challenges or benefits they encountered in real-life. Hence, two additional core themes were added on top of the five previous ones. Codes that related to each other within every core theme were clustered and formed groups within the core theme. But this step was only done after performing the first 10 interviews to make sure enough data was collected to start forming core themes and clusters.

- *Developing the initial template*

Once the researcher gets a good sense of the groups and corresponding themes, it might be possible to start creating the initial template. This step does not necessarily happen after performing all the interviews. In this research, since interview participants have diverse backgrounds and expertise, it is reasonable to start designing the initial template after including enough interviews from each group. In this research, the initial template was only started after the 10th interview. The initial template involved defining core themes and clusters within core themes. Multiple coding levels were developed within core themes by evaluating the relationship among every groups of codes. Hence, an initial template with a particular hierarchy was developed with seven core themes and initial categories within these core themes. This initial template is illustrated in Figure 3.2. Only first-level categories were made within core themes, except for the theme "definition" where a second-level coding was developed giving an initial version of the multiple definition layers.

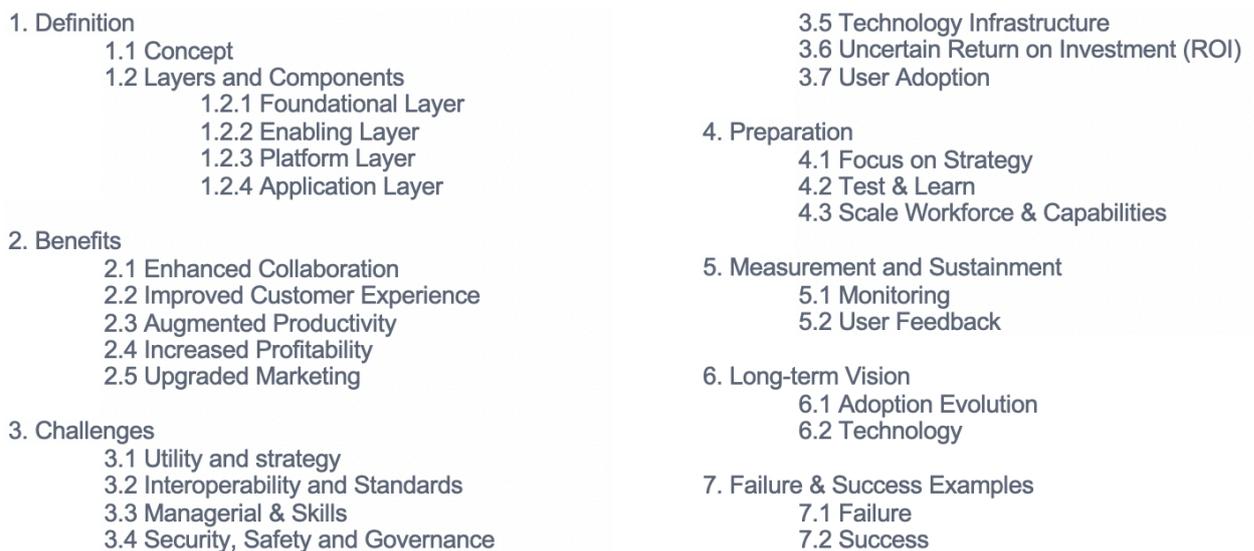


Figure 3.2: Initial template after 10 interviews

- *Modifying the template and Defining the 'final' version*

This step includes redefining themes, moving themes to other clusters, adding new themes or removing redundant themes. In this stage, refining the template does not take place after each new interview, but as a rule of thumb the template should be revised one or

two times before the final template. The template was revised after the 13th interview and second-level categories were formed and some of the first-level categories were reformulated such as for example in challenges "Utility and strategy" became business model fit as this comprised both strategy elaboration and utility creation within the business. The modified template can be observed in Figure 3.3.

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Definition <ul style="list-style-type: none"> 1.1 Concept 1.2 Layers and Components <ul style="list-style-type: none"> 1.2.1 Foundational Layer 1.2.2 Enabling Layer 1.2.3 Platform Layer 1.2.4 Experience Layer 2. Benefits <ul style="list-style-type: none"> 2.1 Enhanced Collaboration <ul style="list-style-type: none"> 2.1.1 Co-creation Practices 2.1.2 Community 2.1.3 Global Accessibility 2.1.4 Immersive Collaboration 2.2 Improved Customer Experience <ul style="list-style-type: none"> 2.2.1 Customer Engagement 2.2.2 Data Analytics 2.2.3 Immersive Experience 2.2.4 Product Demonstration 2.3 Augmented Productivity <ul style="list-style-type: none"> 2.3.1 Organizational Optimization 2.3.2 Simulations 2.3.3 Strategic Talent Management 2.3.4 Training 2.4 Increased Profitability <ul style="list-style-type: none"> 2.4.1 Cost Effectiveness 2.4.2 Increased Revenue 2.5 Upgraded Marketing <ul style="list-style-type: none"> 2.5.1 New Marketing Channels 2.5.2 Marketing Experience 2.5.3 Brand Image 3. Challenges <ul style="list-style-type: none"> 3.1 Business Model Fit <ul style="list-style-type: none"> 3.1.1 Long Term Strategy Lack 3.1.2 Utility 3.2 Interoperability and Standards <ul style="list-style-type: none"> 3.2.1 Interoperability 3.2.2 Standards 3.3 Managerial Capability and Skill Gap <ul style="list-style-type: none"> 3.3.1 Skills 3.3.2 Workforce 3.4 Security, Safety and Governance <ul style="list-style-type: none"> 3.4.1 Governance & Trust 3.4.2 Safety 3.4.3 Security 3.5 Technology Infrastructure <ul style="list-style-type: none"> 3.5.1 Hardware 3.5.2 Technology Immaturity 3.6 Uncertain Return on Investment (ROI) 3.7 User Adoption <ul style="list-style-type: none"> 3.7.1 Resistance to Change 3.7.2 User Friendliness | <ul style="list-style-type: none"> 4. Preparation <ul style="list-style-type: none"> 4.1 Develop a Value-Oriented Strategy <ul style="list-style-type: none"> 4.1.1 Research & Analysis 4.1.2 Define Objectives and Value Proposition 4.1.3 Identify Target Audience 4.2 Test & Learn <ul style="list-style-type: none"> 4.2.1 Pilot & Feedback 4.2.2 Customize Environment 4.2.3 Focus on Experience 4.3 Adapt Workforce & Expand Capabilities <ul style="list-style-type: none"> 4.3.1 Awareness & Education 4.3.2 Designate Ambassador 4.3.3 Manage Change 4.3.4 Develop Skills 5. Measurement and Sustainment <ul style="list-style-type: none"> 5.1 Monitoring <ul style="list-style-type: none"> 5.1.1 Data Metrics 5.1.2 Environmental Scanning 5.1.3 Long Term Strategic Alignment 5.2 User Feedback <ul style="list-style-type: none"> 5.2.1 Testing 5.2.2 User Analysis 6. Long-term Vision <ul style="list-style-type: none"> 6.1 Adoption <ul style="list-style-type: none"> 6.1.1 Creation 6.1.2 Early Adopters 6.2 Technology <ul style="list-style-type: none"> 6.2.1 Hardware Evolution 6.2.2 Technology Evolution 7. Failure & Success Examples <ul style="list-style-type: none"> 7.1 Failure Reasons <ul style="list-style-type: none"> 7.1.1 Budget 7.1.2 Flawed Experience 7.1.3 No Utility 7.1.4 Target 7.1.5 Team & Capabilities 7.2 Success Case |
|--|---|

Figure 3.3: Modified template after 13th interview

Later, after performing all the 16 interviews, the template was modified again to form the final template. Two minor changes were made to arrive at the final template. Sub-layers were created within the layers of the definition of the metaverse and a fourth code level in the Test & Learn theme of the core theme "Preparation" was formed because further categorization was needed. The final template is illustrated in Figure 4.1 in the Results Chapter.

- *Using the template to interpret the data*

In this last stage, the final template is developed and interpretation of the data needs to be clear as well. It is crucial to prioritize the themes and clusters that contribute the most to answering your research questions. It is not sufficient to simply "show" the final template, code all the data to it and then summarize the contents of every theme. In order to interpret the data, a theme-by-theme approach was chosen where every theme and their sub-categories are discussed throughout the results chapter. The core themes which are definition, benefits, challenges, preparation and sustainment were discussed one by one while both long-term vision and success & failure examples were incorporated into the discussion of these five previous themes. This choice was made as to focus on answering the sub-research questions that help in answering the main research question. Failure reasons were integrated in the discussion of challenges and success cases in the discussion of benefits. The link to the long-term vision was made in every section. Moreover, the template helped in establishing the link between the preparation, sustainment and the mitigation of challenges, which are core themes of the template.

- *Writing-up*

Findings are then organized around the thematic findings of the developed template. Themes are elaborated and are illustrated with direct quotes from the data. At the end of every quote the letter P and a number were specified referring to the interviewee in Table 3.2. It is important, as mentioned previously, to be selective with the prioritization of the developed themes. The approach chosen for the methodology in this research ensures to convey an overall sense of the key findings of the interviews, but leaves less room for the perspective of each individual participant. In this study, key findings across interviews benefited more in answering the main research question and thus justified the approach chosen. As mentioned previously, the five core themes relating to the sub-research questions were prioritized in the writing-up and the two remaining themes were incorporated into the former five themes. The results and discussion can be found in the next chapter, Chapter 4.

4

Results

This section presents the results of this study following the methodology outlined in Chapter 3. Interview transcripts formed the basis of the collected data and followingly data was reduced, displayed and conclusions were drawn.

4.1. Final Template

In Chapter 3, the data collection and data analysis method have been described. Semi-structured interviews were performed and transcribed and then template analysis was carried out. Template analysis is a qualitative data analysis method where a template is developed iteratively during the data collection phase and this template allows to interpret the collected data and draw useful conclusions.

The final template for this study is illustrated in Figure 4.1 and consists of 7 core themes. The first five themes definition, benefits, challenges, preparation and sustainment of the implementation of the metaverse in B2B firms follow directly from the four sub-research questions defined at the end of the literature review in Chapter 2. These four sub-research questions guided the setup of the interview questions displayed in Appendix A.1 and shaped the major part of the template because findings were organised around these core themes. Moreover, two additional themes were added to the interview question and consequently also to the template: long term vision and failure & success examples. This allowed to gain a better understanding on what the vision of the interviewees was on the future implementation of the metaverse in the B2B sector. Investigating failure & success examples of metaverse implementation gave a more practical view on the real-life experience of interviewees with a metaverse implementation in a B2B firm. Each of these 7 elements consists of multiple levels and components. All the components of the template are discussed in the following section of this chapter and are highlighted with quotes from the interviews. Again, the letter P with a number, between brackets, after a quote refers to the participant that pronounced this passage. The occurrence of the different codes in each of the interviews are displayed in the code frequency tables and a Sankey diagram and can be found in Appendix C.

- 1. Definition
 - 1.1 Concept
 - 1.2 Layers and Components
 - 1.2.1 Foundational Layer
 - 1.2.1.1 Digital Infrastructure
 - 1.2.1.2 Physical
 - Infrastructure
 - 1.2.2 Enabling Layer
 - 1.2.2.1 Access
 - 1.2.2.2 Identity
 - 1.2.2.3 Security &
 - Governance
 - 1.2.2.4 Virtual Transactions
 - 1.2.3 Platform Layer
 - 1.2.3.1 Creator Platform
 - 1.2.3.2 Interaction and
 - Interface Platform
 - 1.2.4 Experience Layer
 - 1.2.4.1 3D Virtual World
 - 1.2.4.2 B2B Applications
 - 1.2.4.3 Creator Economy
- 2. Benefits
 - 2.1 Enhanced Collaboration
 - 2.1.1 Co-creation Practices
 - 2.1.2 Community
 - 2.1.3 Global Accessibility
 - 2.1.4 Immersive Collaboration
 - 2.2 Improved Customer Experience
 - 2.2.1 Customer Engagement
 - 2.2.2 Data Analytics
 - 2.2.3 Immersive Experience
 - 2.2.4 Product Demonstration
 - 2.3 Augmented Productivity
 - 2.3.1 Organizational Optimization
 - 2.3.2 Simulations
 - 2.3.3 Strategic Talent Management
 - 2.3.4 Training
 - 2.4 Increased Profitability
 - 2.4.1 Cost Effectiveness
 - 2.4.2 Increased Revenue
 - 2.5 Upgraded Marketing
 - 2.5.1 New Marketing Channels
 - 2.5.2 Marketing Experience
 - 2.5.3 Brand Image
- 3. Challenges
 - 3.1 Business Model Fit
 - 3.1.1 Long Term Strategy Lack
 - 3.1.2 Utility
 - 3.2 Interoperability and Standards
 - 3.2.1 Interoperability
 - 3.2.2 Standards
 - 3.3 Managerial Capability and Skill Gap
 - 3.3.1 Skills
 - 3.3.2 Workforce
 - 3.4 Security, Safety and Governance
 - 3.4.1 Governance & Trust
 - 3.4.2 Safety
 - 3.4.3 Security
 - 3.5 Technology Infrastructure
 - 3.5.1 Hardware
 - 3.5.2 Technology Immaturity
 - 3.6 Uncertain Return on Investment (ROI)
 - 3.7 User Adoption
 - 3.7.1 Resistance to Change
- 3.7.2 User Friendliness
- 4. Preparation
 - 4.1 Develop a Value-Oriented Strategy
 - 4.1.1 Research & Analysis
 - 4.1.2 Define Objectives and Value Proposition
 - 4.1.3 Identify Target Audience
 - 4.2 Test & Learn
 - 4.2.1 Pilot & Feedback
 - 4.2.1.1 Launch Pilots
 - 4.2.1.2 Learn from Feedback
 - 4.2.2 Customize Environment
 - 4.2.2.1 Governance
 - 4.2.2.2 Open Ecosystem
 - 4.2.2.3 Security and Safety
 - 4.2.3 Focus on Experience
 - 4.2.3.1 Focus on Quality
 - 4.2.3.2 Focus on Simplicity
 - 4.3 Adapt Workforce & Expand Capabilities
 - 4.3.1 Awareness & Education
 - 4.3.2 Designate Ambassador
 - 4.3.3 Manage Change
 - 4.3.4 Develop Skills
- 5. Measurement and Sustainment
 - 5.1 Monitoring
 - 5.1.1 Data Metrics
 - 5.1.2 Environmental Scanning
 - 5.1.3 Long Term Strategic Alignment
 - 5.2 User Feedback
 - 5.2.1 Testing
 - 5.2.2 User Analysis
- 6. Long-term Vision
 - 6.1 Adoption
 - 6.1.1 Creation
 - 6.1.2 Early Adopters
 - 6.2 Technology
 - 6.2.1 Hardware Evolution
 - 6.2.2 Technology Evolution
- 7. Failure & Success Examples
 - 7.1 Failure Reasons
 - 7.1.1 Budget
 - 7.1.2 Flawed Experience
 - 7.1.3 No Utility
 - 7.1.4 Target
 - 7.1.5 Team & Capabilities
 - 7.2 Success Case

Figure 4.1: Final Template

4.2. Definition

The first question in the interviews required the interviewee to describe their understanding of the metaverse in a B2B context. This resulted in diverging answers where a recurring pattern could be identified. First, a conceptual answer of the metaverse was given followed by explaining that the metaverse is a multi-layered ecosystem where each layer is the building block for the next layer and has its specific function. Hence, after comparing all the interviews a conceptual answer could be formulated and four layers with each multiple components could be identified. The concept, layers and components of the definition of the metaverse in a B2B context can be observed in Figure 4.2 and are discussed in the next sections.

1. Definition

1.1 Concept

1.2 Layers and Components

1.2.1 Foundational Layer

1.2.1.1 Digital Infrastructure

1.2.1.2 Physical Infrastructure

1.2.2 Enabling Layer

1.2.2.1 Access

1.2.2.2 Identity

1.2.2.3 Security & Governance

1.2.2.4 Virtual Transactions

1.2.3 Platform Layer

1.2.3.1 Creator Platform

1.2.3.2 Interaction and Interface Platform

1.2.4 Experience Layer

1.2.4.1 3D Virtual World

1.2.4.2 B2B Applications

1.2.4.3 Creator Economy

Figure 4.2: Template Definition

4.2.1. Concept

The first sub-research question aimed at investigating what the metaverse is fine-tuned for a B2B context since confusion remained regarding the actual understanding of the metaverse. During the interviews, participants were asked to explain what their understanding was of the metaverse in a B2B context and what it represented in an effort to gain a deeper understanding of the term.

Firstly, the most frequent answers started with explaining that the metaverse represented the new iteration of the internet. The metaverse is the logical evolution of web1 and web2 and represent a continuity rather than a fracture. The metaverse is also seen as a complementary canal to the real world rather than a replacement and forms the intersection of the real and digital world.

The metaverse is an additional canal, not a replacement of the internet. Web3 in its whole is not a fracture, but a continuity. (P10)

It was also found that the metaverse is not a new concept for most of the participants. As

soon as a new parallel world is created, it can be qualified of a "metaverse". The only difference now is that we become actors in the ecosystem.

In reality the metaverse is already present since several years because as soon as a parallel universe is created such as in literature, cinema or gaming, it can be called a "metaverse". The revolution now is that we become actors in the ecosystem. (P1)

Overall, combing all the different views of the participants, the metaverse in B2B is a persistent and immersive virtual environment, consisting of four core layers explained in Subsection 4.2.2, where businesses and organisations can interact, collaborate and conduct operations with each other and the environment.

4.2.2. Layers and Components

The understanding of the metaverse in B2B also differed in many ways, but these differing views originated from the fact that the metaverse is a whole composed of multiple building blocks where various technologies are intertwined (Cui et al., 2022). Depending on the experience and area of expertise of the interviewee, this resulted in varying answers.

The metaverse consists of multiple layers because it is a complex virtual world based on intertwined technologies with various dimensions. (P12)

Therefore, instead of trying to unify all the answers into one main definition, the multiple dimensions of the metaverse were identified. The results allowed to break down the metaverse into four core layers on top of each other: *Foundational layer*, *Enabling layer*, *Platform layer* and *Experience layer*. Each of these layers are composed of multiple components and form the basis for the next layer as can be seen in Figure 4.3.

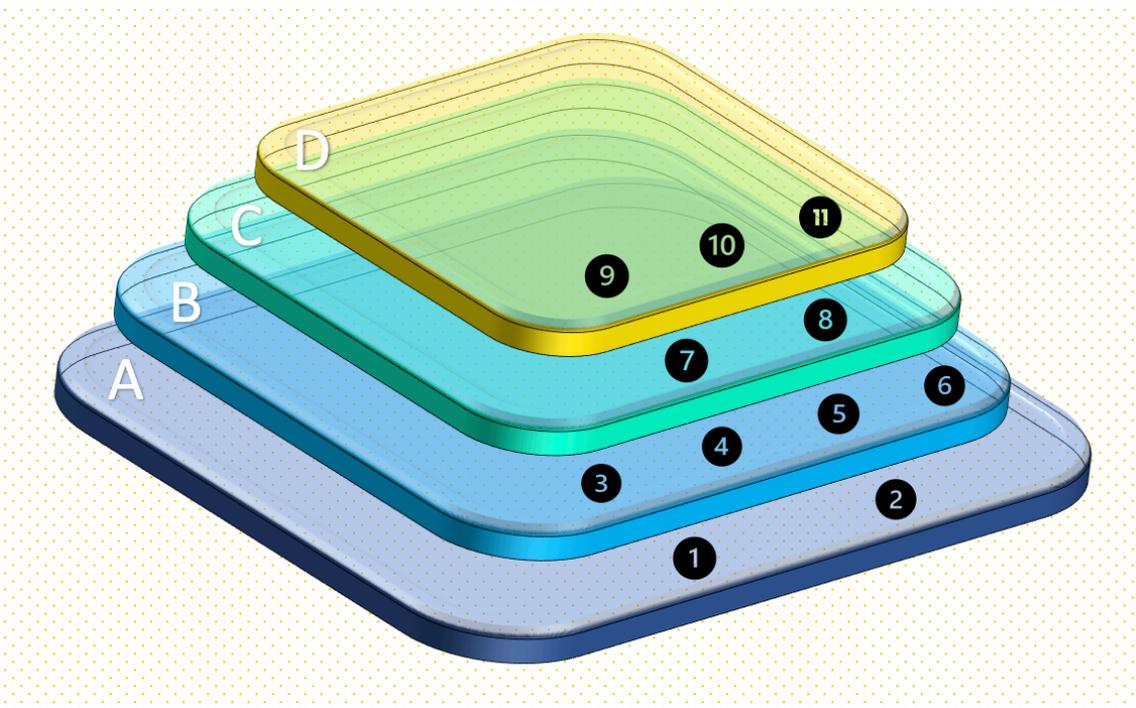


Figure 4.3: Metaverse Definition - Layers and Components

A. Foundational Layer

This layer forms the basis of the metaverse and includes the physical and digital infrastructure B2B firms require to enable the creation of the metaverse.

1. Physical infrastructure refers to the physical devices and accessories required to enable the metaverse. In this perspective, devices that allow the access to the metaverse such as VR/AR headsets or glasses as well as smartphones, computers and more ensure the basis for the physical infrastructure required in B2B firms.

2. Digital Infrastructure is the foundation needed to power the metaverse and relies on several technologies. Firstly, spatial computing and network infrastructure were found to be essential in powering the metaverse since both contribute in creating and sustaining a virtual environment (Nalbant and UYANIK, 2021). Several enabling technologies were mentioned facilitating the services in the metaverse such as AI, blockchain or 6G. Blockchain was mentioned the most, especially for its ability to enable digital property in the metaverse. (Generative) AI came across multiple interviews for its potential to facilitate activities in the metaverse and 6G arose for matters of connectivity.

B. Enabling Layer

The enabling layer comes on top of the foundational layer and is primarily needed to enable actions essential for the existence of the metaverse.

3. Access to the virtual world needs to be facilitated. The metaverse is a multi-channel accessible environment and both technologies VR and AR were found to be essential in accessing the metaverse by providing an entry to a virtual space. Hence, they enable the connection from the real world to the virtual or augmented world.

The metaverse is where the digital and the real world come together. They both melt into each other and this can be done through the utilization of VR as well as AR. (P11)

4. Identity is crucial to enable the existence of users in the metaverse and spreads across different levels. First, verifying the identity of a user entering the metaverse is a matter of cybersecurity and is frequently done through a unique username and password. Moreover, the aspect of identity appeared to be redefined in a metaverse environment since users have the choice to embody the avatar of their choice or an avatar they designed themselves.

Embodiment is an important aspect of the metaverse because your avatar in VR can be different from your own identity. (P8)

5. Security & Governance are crucial enabling factors of the metaverse. It was found that B2B firms tend to see the metaverse as a corporate environment where companies can interact securely in a safe environment.

The corporate metaverse, a virtual environment set up and managed by the companies, is mostly a closed environment used for business where you set your rules, aims and behaviour. (P15)

Hence, the metaverse needs to be secure by ensuring the protection of personal data, the protection of digital ownership and content moderation in the environment. The governance needs to be decentralized as this is the essence of web3. Ensuring both security and governance in the metaverse environment appeared as crucial enablers for its sustainability.

6. Transactions are essential to allow the creation of a virtual economy in the metaverse environment. Mainly, tools such as cryptocurrencies or non-fungible tokens (NFTs) are leveraged to enable transactions.

Transactions are facilitated through crypto or NFTs which are inherent to the web3 environment. (P1)

C. Platform Layer

The next layer, built on the foundational and enabling layer, is the platform layer and consists of two different platform types essential to the metaverse: Creator platforms and interface & interaction platforms.

7. Creator Platform is a general term for referring to a set of tools that allow the 3D creation and modelling of the virtual environment. This appears to be crucial as to allow the creation of a virtual environment which is a core feature of the metaverse. In a B2B context, the metaverse is a platform that allows 3D design for the creation of an immersive environment.

A platform that enables its customers (other businesses) to work and create 3D workflows and 3D applications and thereby create an immersive environment. People can collaboratively create a virtual world step by step. (P7)

8. Interface and Interaction Platform are platforms that set the foundation for enabling experiences and content sharing. These platforms mainly facilitate interactions with other users and objects. Moreover, they appeared to play a key role in the user interface experience, in redefining social interactions and they should account for interoperability across platforms in the metaverse.

The metaverse is a persistent virtual space where any kind of person should enter and see virtual elements as well as avatars synchronously. They should also be able to interact among them and with 3D objects in the environment. (P8)

D. Experience Layer

The final layer, on top of the previous three layers, is the dimension of the metaverse that came back the most throughout the interviews. It focuses on the experience that the metaverse enables for B2B firms and is immediately observable. This layer being immediately observable justifies why most of the interviewees included the experience aspect to their definition of the metaverse.

9. Specific B2B applications

The metaverse was described as a corporate virtual world enabling several B2B applications such as a product demonstration tool, a product testing environment with digital twins and a virtual meeting environment. Further, it is seen as a journey in a virtual world which is revolutionizing the current employee and customer experiences in the B2B sector.

The corporate metaverse, a virtual environment set up and managed by the companies, is mostly a closed environment used for business where you set your rules, aims and behaviour. (P15)

In a B2B context, it is how companies can engage with their customers and with employees involving these virtual environment and experiences. (P16)

10. Immersive 3D virtual world (immersive journey, interaction, persistent)

Evidently, the metaverse was described as a 3D virtual environment allowing deep immersion into a new or augmented reality. The emphasis was put on the immersive journey and persistent environment the metaverse is offering for B2B firms. The sense of presence and the often gamified experience, a gaming approach for designing B2B virtual environments and experiences, were named as key traits of B2B metaverse environments.

The metaverse is an immersive world, based on blockchain technology. It is sensed, 3 dimensional and a follow-up of our real-life. (P10)

it is a technical evolution of the actual web to a virtual, 3D, interactive and immersive world. (P3)

11. Creator economy (value creation, economy of property)

Finally, a B2B metaverse was also described as an environment for the creation of content and value. Since we become actors in the environment, we are able to create our own digital creations in this virtual world. Moreover, blockchain technology, one of the building technologies of the metaverse, offers the possibility to possess digital assets through smart contracts and NFTs. Hence, the metaverse can be compared to an environment where creation, transactions and possession is enabled.

The revolution now is that we become actors in the ecosystem where we can possess assets in a digital world. (P13)

4.3. Benefits

In this section, the benefits brought by implementing the metaverse in B2B firms need to be discussed as they induce transformations of B2B operations. Five major benefits were identified, each composed of multiple elements: *Enhanced Collaboration*, *Improved Customer Experience*, *Augmented Productivity*, *Increased Profitability* and *Upgraded Marketing*. Figure 4.4 highlights these benefits and each of them are discussed in detail in the next subsections. The goal is not to superficially describe the benefits, but to identify the underlying reasons for the emergence of these benefits.



Figure 4.4: Benefits of Metaverse Implementation

All of the benefits mentioned throughout the interviews were coded and then grouped in common themes and then rearranged in clusters. This resulted in the following template in Figure 4.5.

- 2. Benefits
 - 2.1 Enhanced Collaboration
 - 2.1.1 Co-creation Practices
 - 2.1.2 Community
 - 2.1.3 Global Accessibility
 - 2.1.4 Immersive Collaboration
 - 2.2 Improved Customer Experience
 - 2.2.1 Customer Engagement
 - 2.2.2 Data Analytics
 - 2.2.3 Immersive Experience
 - 2.2.4 Product Demonstration
 - 2.3 Augmented Productivity
 - 2.3.1 Organizational Optimization
 - 2.3.2 Simulations
 - 2.3.3 Strategic Talent Management
 - 2.3.4 Training
 - 2.4 Increased Profitability
 - 2.4.1 Cost Effectiveness
 - 2.4.2 Increased Revenue
 - 2.5 Upgraded Marketing
 - 2.5.1 New Marketing Channels
 - 2.5.2 Marketing Experience
 - 2.5.3 Brand Image

Figure 4.5: Template Benefits

4.3.1. Enhanced Collaboration

Collaboration among B2B firms appeared to be enhanced by the implementation of the metaverse thanks to multiple transformations it brought in co-creation practices, community building, global accessibility and immersiveness of communication channels.

Co-creation Practices

The implementation of the metaverse facilitates co-creation practices where multiple actors can work together on a project or product in an immersive virtual space. A recurring theme across interviews was the "digital twin" which is a virtual representation of a physical product. Digital twinning allows to co-create in a virtual space where employees within

B2B firms as well as other stakeholders along the supply chain can take decisions collectively and synchronously. Hence, the metaverse facilitates co-creation practices which in turn enhances collaboration in B2B operations.

Digital twinning where design can be made in collaboration in VR or AR. This allows different stakeholders to participate simultaneously in a product design. (P11)

Originally, people used to plan everything individually without communicating enough leading to issues that had to be resolved later. Now, stakeholders can discuss together and the goal of such an environment is to simulate everything in the metaverse beforehand. (P7)

Community

The implementation of the metaverse fosters community creation involving B2B firms and their clients. By including clients in their decisions, B2B firms are shaping in them a feeling of appurtenance and importance in the decision-making process. Moreover, the metaverse allows to host meetings and networking events virtually for the community. Therefore, creating a strong community and hosting engaging virtual events thanks to the metaverse allows to enhance collaboration.

The metaverse enables to create an environment where you can include your community in decisions. This makes sure your decisions are informed and more impactful. Moreover, you can create a real community engaged with the company. Including your community in decisions is also part of the process of community creation and creates engagement and increases retention rate by creating a feeling of appurtenance. (P1)

Networking is a great opportunity in metaverse, meetings online in the metaverse combine the advantages of both in-person and online meetings. Aspects such as the sense of presence and body language are omnipresent while accessibility does not depend on geographical position which offers more convenience. (P8)

Global Accessibility

Another crucial advantage of implementing the metaverse seems to be the global accessibility. As mentioned with virtual events, geographical barriers are lifted with the metaverse and activities that usually require in-person presence such as product testing, important meetings and others can be effectuated in a virtual environment. Increasing accessibility automatically impacts collaboration among and across B2B firms.

Immersive Collaboration

The immersion offered by the metaverse through VR or AR has a direct impact on in-person and long-distance collaboration. In-person collaboration can mainly be enhanced by AR where augmented objects can be demonstrated directly while collaboration from different geographical positions becomes more engaging and realistic by combining the advantages of both online and in-person meetings. This includes both internal collaboration in B2B firms as well as with partners.

The collaboration is more immersive, geographical barriers are lifted and processes can in general be accelerated. A hyperrealistic collaboration experience will enhance collaboration since it will give a real sense of immersion such as a real social interaction. (P11)

4.3.2. Improved Customer Experience

Another benefit of the implementation of the metaverse was found for B2B firms. The customer experience appeared to be significantly improved through better customer engagement, data analytics, immersiveness and enhanced product demonstrations.

Customer Engagement

The implementation of the metaverse allows to strengthen the customer relationship by offering a more engaged customer experience. Customer engagement is mainly influenced by the emotions you are able to appeal in your customer throughout the process. The metaverse allows B2B firms to shape the environment in which the customer interaction occurs. Hence, B2B firms are able to create specific emotions by customizing their metaverse environment which directly impacts customer engagement.

The enhancement of the customer experience comes from a more engaging interaction because emotions are created and emotions influence purchase. (P13)

Moreover, B2B purchasing processes are often coupled with back-and-forth movements between the firms before the actual transaction occurs since generally significant more money is involved in a transaction as compared to B2C transactions. The metaverse offers this flexibility and therefore suits the needs of B2B customer experiences.

This proximity is really important in B2B because there is much money invested. It is not like using a pair of shoes, you are buying a machine worth thousands of dollars or a technology that truly impacts your business. There are a lot of back-and-forth movements in the purchasing process. (P3)

Data Analytics

The customer experience also relies deeply on data collected throughout the process that is consequently used for improvement. The metaverse offers the possibility to collect a broader set of data than traditional customer processes because the whole customer experience can be measured along the way. Data such as eye-tracking can give insights about how a B2B customer is experiencing its journey in the virtual environment.

Collection of data generated in the metaverse can be really helpful for company since that data was not collectable before. A typical example is eye-tracking during a customer experience which reveals information about visual attention of the customer. (P1)

Immersive Experience

The immersiveness of the customer experience allows for more interactive content and creativity in the customer journey. Again, emotions can be created through a sense of immersion which enhances the customer experience (Kral et al., 2022). Immersiveness is achieved by enabling technologies such as AR and VR which augments or totally emerges customers in a virtual environment.

Product Demonstration

Last but not least, the implementation of the metaverse grants the opportunity to completely revolutionize product demonstrations. In B2B, as mentioned previously, product purchases often involve significant investments and it is crucial for a B2B customer to be able to experience the product before purchasing it. Enhancing product demonstrations by implementing the metaverse allows to test the product directly through simulations, analyse technical features and compare with other products in a virtual space. In sum, an optimized product demonstration has a crucial impact on the customer experience.

Product visualisation is much better. A product can be presented virtually, you can test it and touch it. You can even compare multiple products and check all details. And all of this can happen with other people simultaneously. In B2B, this is even more crucial because a lot of products need to be sold and technical details need to be demonstrated. This proximity is really important in B2B because there is much money invested. It is not like using a pair of shoes, you are buying a machine worth thousands of dollars or a technology that truly impacts your business. (P3)

4.3.3. Augmented Productivity

Implementing the metaverse proved to be beneficial to the overall productivity within B2B firms. Multiple factors are responsible for this productivity boost: simulations, strategic talent management, supply chain optimization and training.

Simulations

Simulations in virtual environments are extremely useful since they allow to accelerate processes by reducing errors and increasing accuracy. Products can be realised more rapidly and more testing can be done. In the industrial sector, factory lay-out planning appeared to be extremely suited in the metaverse where processes could be simulated and tested before building the actual factory. Simulations are thus responsible for a higher productivity and efficiency of operations within B2B firms.

This is also a great potential for B2B companies because they can simulate their processes and work more accurately in real life following the simulations. (P7)

Strategic Talent Management

Lifting geographical barriers and being able to work simultaneously in a virtual work environment brings important changes to recruiting. This implies that the best talents can be recruited from whole over the world without the necessity to be in the same physical location. Therefore, the best teams can be set up without limitations ensuring a better working efficiency.

A huge advantage is the productivity in the metaverse which is achieved in many different ways. For example you can create a product more rapidly, test more often, you can dispose of teams all over the world to combine the best talents. (P11)

Organizational Optimization

Since the metaverse encourages co-creation practices, transparency across the whole design process is enhanced which improves decision-making along the supply chain. Moreover, immersion has proved to ensure a better working efficiency (Durana et al., 2022). Enhancing both transparency and working efficiency across each department in B2B firms results in augmented productivity.

Training

Education and training is one of the major benefits of the metaverse since a virtual environment both enhances concentration and is able to reproduce a realistic work environment. Hence, education in a virtual space allows to improve the training of soft and hard skills which in turn benefits the overall productivity of employees within B2B firms.

For educational purposes, VR learning allows to learn better and study faster. Studies show that you can concentrate better in a virtual environment. (P5)

Corporate training is extremely effective in VR. The training is more immersive and imitates reality through real-life situations better. This will eventually lead to increased efficiency. (P12)

Especially teaching soft skills appears to be a huge opportunity in the metaverse where experiences can be specifically designed to train an implicit skill.

Possibilities for education include both hard and soft skills. Hard skills is a direct/practical skill such as surgery or designing products. A soft skill is a more implicit skill such as empathy or communication. It is more difficult to design good metaverse experiences that are meaningful and understandable for teaching a soft skill since you need to create a good story and be more patient with participants. (P8)s

The implementation of the metaverse in B2B firms also offers the possibility to improve onboarding of new hires and education or training on specific matters which consequently contributes to a better productivity throughout B2B firms.

4.3.4. Increased Profitability

Another benefit came from the ability of the metaverse to simultaneously reduce costs as well as increase revenue. As a result, profitability of B2B firms increases.

Cost Effectiveness

Cost reduction is achieved in three different ways. Firstly, the metaverse being able to lift geographical barriers, mobilisation and practical costs related to transport are reduced. Moreover, simulations in the metaverse allow to design and test more accurately allowing a reduction of costs throughout the process. Last but not least, the quality of corporate training is enhanced as mentioned before which accelerates processes due to more skilled workers and thereby reduces costs.

The biggest advantage is the cost-cutting possibilities in terms of mobilisation cost, training such as onboarding and more specific trainings, security processes and simulations. All of these, if you have to do them in real-time, you need to shut down factories, invest more, etc. If there are very high security and safety processes, you always have to keep it up to date and have everyone trained on it. The metaverse is a facilitator in this sense. (P14)

Increased Revenue

The metaverse represents a new source of revenue since digital property is enabled. Transactions are facilitated through cryptocurrencies and non fungible tokens (NFTs). These factors represent a new opportunity for diversifying the sources of revenue of a B2B firm.

The metaverse represents a new source of revenue through the enhancement of the customer experience. The enhancement of the customer experience comes from a more engaging interaction because emotions are created and emotions influence purchase. The customer can be implicated more rapidly because there is no need to be present physically. The metaverse allows the purchase of digital assets and the transfer of revenue in a digital world. (P13)

4.3.5. Upgraded Marketing

B2B marketing seems to be positively impacted by the implementation of the metaverse. New markets can be reached, the marketing experience is more engaging, it can even serve as a marketing tool to benefit the perception of the B2B brand.

New Marketing Channels

The metaverse as a while represents a new market canal in the marketing mix. It can be used for example as a sales canal and opens up to innovative marketing channels. In general, the metaverse allows to reach a wider audience and connect more easily with potential partners for marketing purposes.

Carrying out a metaverse transformation can help target a younger audience or rejuvenate your audience. It can be seen as a marketing tool to attract the younger generations. (P1)

Marketing Experience

Marketing in the metaverse is more immersive and offers a cutting-edge experience to potential clients compared to traditional methods. Engaging experiences can be created and result in more sales.

Marketing will be transformed by the metaverse with more engaging experiences. (P13)

Brand Image

Carrying out the implementation of the metaverse in a B2B firm benefits the image of the brand in two different ways. Firstly, the metaverse is a promising emerging technology and implementing it proves that a firm is innovative, aware of the new technological developments and anticipates future needs.

Adopting the metaverse in its operation is a good marketing tool: it gives the image of an innovative and modern company. It is important to explore the possibilities of the metaverse and be ready for when the mass market comes. (P4)

Moreover, the metaverse is also closely related to sustainability. The implementation of the metaverse allows to reduce the number of physical locations, diminish the amount of waste through predictive simulations and cut down CO2 emissions due to transport by removing geographical barriers.

It also supports sustainability by avoiding CO2 emissions through less transport and less waste facilitated by simulations. (P10)

CO2 emissions are also reduced by avoiding the opening of physical stores and offices since less space is required for meetings or events if they are held online. (P4)

4.4. Challenges

On the other hand, the implementation of the metaverse in B2B firms also raised several challenges that need to be discussed. In total, seven main challenges were identified: *Business Model Fit, Interoperability and Standards, Managerial Capability and Skill Gap, Security, Safety and Governance, Technology Infrastructure, Uncertain Return on Investment and User Adoption.*

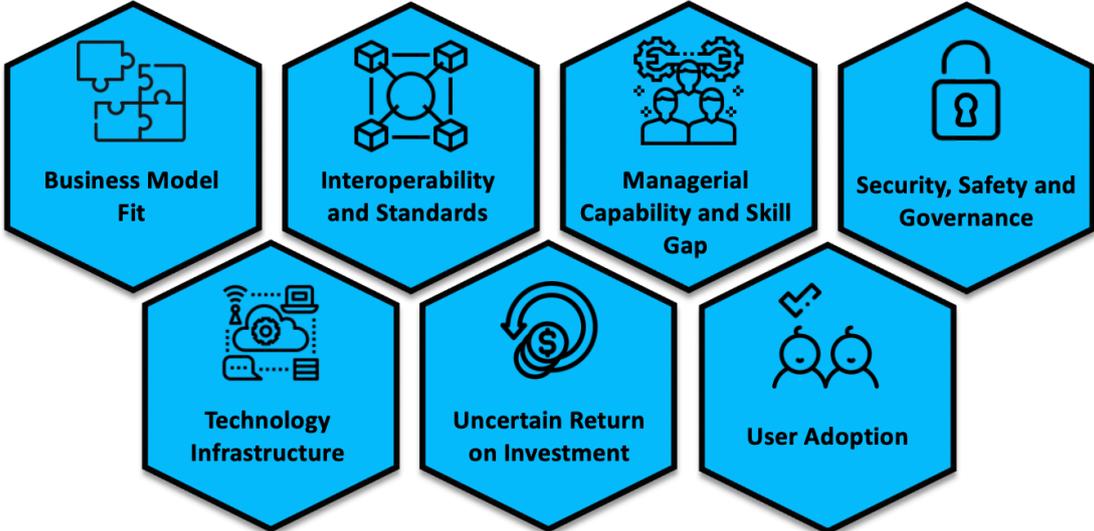


Figure 4.6: Challenges of Metaverse Implementation

Similarly as with benefits in the previous section, challenges are identified and the common themes are displayed in the template each with several components as can be seen in Figure 4.7. Again, every challenge and its underlying factors are discussed in the following subsections.

- 3. Challenges**
 - 3.1 Business Model Fit**
 - 3.1.1 Long Term Strategy Lack
 - 3.1.2 Utility
 - 3.2 Interoperability and Standards**
 - 3.2.1 Interoperability
 - 3.2.2 Standards
 - 3.3 Managerial Capability and Skill Gap**
 - 3.3.1 Skills
 - 3.3.2 Workforce
 - 3.4 Security, Safety and Governance**
 - 3.4.1 Governance & Trust
 - 3.4.2 Safety
 - 3.4.3 Security
 - 3.5 Technology Infrastructure**
 - 3.5.1 Hardware
 - 3.5.2 Technology Immaturity
 - 3.6 Uncertain Return on Investment (ROI)**
 - 3.7 User Adoption**
 - 3.7.1 Resistance to Change
 - 3.7.2 User Friendliness

Figure 4.7: Template Challenges

4.4.1. Business Model Fit

The business model fit was identified as a crucial pain point in failed metaverse implementations. B2B firms with a business model that did not align with the purpose of the implementation of the metaverse did not manage to create real utility and lacked a long term strategy leading to failure.

Utility

In the first place, implementing the metaverse in B2B firms needs to have a certain utility. There has to be an added value and B2B firms have struggled in the past with identifying how implementing the metaverse could benefit their operations. Being able to create true

utility as to fit in the business model appears as a key challenge to take into account.

The added value needs to be there. Do things that make sense in the metaverse and don't try to carry out random metaverse experiences that would be way better with existing resources. (P4)

Long-term Strategy Lack

Aside from creating real utility, it is important to sustain it on the long term. Therefore, B2B firms that lacked a long term strategy for their metaverse implementation ended up failing. "Repeaters" need to be created referring to clients that come back after a successful first metaverse experience and B2B firms only turning to the metaverse for enhancing their brand image need to be avoided at all costs. Lacking a long-term strategy hinders a good fit into the business model.

Often, metaverse project are able to create that "wow" effect, but that works only one time. The real question is how do you create "repeaters". The only possible answer to this is to carry out metaverse projects only with real utility. (P2)

4.4.2. Interoperability and Standards

Both interoperability between existing technologies and the metaverse and the development of standards emerged as important challenges in the implementation of the metaverse in B2B firms. The integration of the metaverse in B2B operations require the integration of a new technology in a pool of existing systems and networks. As a result, creating interoperability is a key point to increase the chance of successful adoption.

Technical challenges because lot of the technology is new and hard to integrate in existing networks or infrastructures companies are using for several years already. In this sense, creating interoperability is a key point to integrate in new metaverse systems to create a bigger chance of getting adopted. Companies are not going to switch from one to the other technology so abruptly, especially if they are used to the technology for several years already. (P7)

Additionally, a lack of standards was found concerning the operationalisation of a metaverse experience. B2B firms require guidelines or protocols that give guidance on how a metaverse experience should be designed from start to end.

There is no definition and operationalisation on how to design a good metaverse experience. How to design from beginning to the end in order to create something the user can care about. (P8)

Aside from integrating the metaverse in existing systems, the metaverse is also made up by multiple virtual spaces that require interoperability and standardisation among them. (Dwivedi et al., 2022a).

4.4.3. Managerial Capability and Skill Gap

Another challenge that came up frequently throughout the interviews was the lack of managerial capability and the apparent skill gap. Implementing the metaverse both requires managers with the right set of skills and knowledge to perform their role. Besides managerial capabilities, the skills of the whole workforce are crucial for succeeding in the implementation of the metaverse.

Skills

Acquiring the necessary skills for carrying out a metaverse implementation requires in the first place a deep understanding of the metaverse itself. This was experienced as a major hurdle in B2B companies as most of the employees did not understand what a transition with the metaverse could add to the existing organisation. The lack of understanding of the phenomenon was the root of the problem. This resulted in managers not knowing where to start and the establishment of unfeasible objectives.

Creating user acceptance within the business that has not been in touch with the metaverse yet is difficult. People doubt the advantages of the metaverse because many advantages are not foreseeable now, it is difficult to ask people to have a vision on something they do not really trust or understand. An example is Google maps which was first a map, now you can book tables, give ratings and even more. People need to believe in the opportunities it can bring. (P7)

Aside from a poor understanding, a lack of experience combined with the high workload for the creation of metaverse experiences appeared to hinder the implementation as well. In sum, the skill set needed for the implementation of the metaverse was not adapted because of a poor understanding of the phenomenon and a lack of experience.

Workforce

Aside from the apparent skill gap of the existing managers and employees, the workforce itself seemed unadapted in several cases. A metaverse transformation requires the recruitment of web3 specialist such as coders to create virtual environments and the establishment of a metaverse-focused team. Failing to adapt the workforce accordingly materialized as key a challenge to the successful implementation of the metaverse.

4.4.4. Security, Safety and Governance

The metaverse goes beyond existing countries and lifts all geographical barriers which raised questions in terms of security, safety and governance within B2B firms. The identified challenge comes from the concern of B2B firms regarding security, safety and governance rather than from the inability of the metaverse to ensure these. These concerns translated in most cases into the unwillingness to undertake a metaverse implementation instead of making sure these are taken care of.

Businesses are often concerned about security reasons. Downloading new softwares or making major changes to how information is disclosed about a company is not popular among B2B firms. There is always a risk of infection in the system. (P3)

Security and safety need to be taken into account. Cybersecurity to prevent data theft for example, but that is the same as any other platform. The environment needs to be safe at all times. There has been bad propaganda about violent situation or harassment in the metaverse. The environment needs to get clear rules and filters on how the content is inputted and managed. (P16)

Further, governing the metaverse emerged as a tricky question since the metaverse is based on the principle of decentralisation and governance implicitly calls for the regulation by a central entity. The concerns around security, safety and governance were crucial aspects to consider in the implementation of the metaverse.

The governance in a metaverse environment is important to consider. Should content be censored and the environment should be safe and secure without having one central entity controlling it. (P13)

4.4.5. Technology Infrastructure

The technology infrastructure arose as an additional key challenge to the implementation of the metaverse in B2B firms. In this perspective, hardware unreadiness and the immaturity of the technology came out as the prominent issues in the establishment of the technological infrastructure.

Hardware

Hardware used to access the metaverse such as VR or AR headsets are not on point yet. The headsets currently are uncomfortable, expensive and dispose of a poor battery. Portability also appeared as a barrier for its wide distribution. Hence, hardware unreadiness is an obstacle to the installation of a strong technological infrastructure.

It is still really early in the process for most of these emerging technologies. The experience is new and the headset for example is not comfortable, has a poor performing battery, has portability issues, meaning it is not easy to transport the headset everywhere, and the virtual experience is not super realistic yet. (P1)

The long term vision of interviewees was also investigated where luckily all of the them believed in the potential of a positive hardware evolution where the mentioned issues are mitigated.

Technology Immaturity

The metaverse encompasses multiple technologies to enable the creation of a virtual environment. Limitations in current technological capabilities result in an unrealistic virtual experience because of the simplistic environment modelling and the poor connectivity compared to the demands of such a high-resolution environment. This gives a poor sense of immersion and impacts the metaverse experience negatively.

The experience is not realistic enough and needs to be improved in order to enhance adoption and use. The connectivity will have to be higher with more bandwidth. (P16)

This simplistic metaverse environment is due to performance needs of platforms where for efficiency reasons or for saving money, environments are made extremely simplistic because it is easier for modelling. In all of my projects, I had certain capacity limitations for modelling. (P4)

Similarly to hardware evolution, the technology is expected to mature in the future according to the long term vision of interviewees.

4.4.6. Uncertain Return on Investment (ROI)

It was found that the implementation of the metaverse bears a high uncertainty in the perspective of B2B firms and a metaverse implementation seems to require significant upfront investing before getting actual results.

The last challenge concerns budget. Cash can be burnt extremely easily for building metaverse environments and this might pose difficulties to B2B firms. Often you require a big amount of money to invest upfront which might cause some resistance because of the uncertainty it bears compared to the investment required. (P13)

This uncertain return on investment surfaced as a huge barrier in budget validations. Budget validations are based among others based on a risk assessment and allocating budget to high-risk projects puts the reputation of the decision makers in jeopardy. This constitutes a major barrier for carrying out the implementation of the metaverse.

The costs are always a hurdle for companies because hardware is expensive. It is also difficult to get budget approvals, because the people allocating budget are scared of failure because the uncertainty is extremely high. That means their reputation is put at risk and leads them to hinder metaverse implementation. The uncertainty of failing is still really high. (P16)

4.4.7. User Adoption

Finally, the last major challenge found following the interviews is user adoption. Struggles in B2B firms concerning user adoption originates from two factors: resistance to change among employees and user friendliness of the metaverse experience.

Resistance to Change

The adoption of a new technology is often associated with resistance to change because

it involves changing habits and routines within a firm. This readjustment requires additional effort which forms an obstacle for a successful implementation. This resistance to change is part of a cultural challenge that needs to be addressed.

The adoption of a new technology implies change in an organisation. The difficulty with change comes often from the people and not from the technology itself. People need to understand and get involved with the metaverse to avoid resistance or failed adoption. The biggest challenge is thus not the technology, but the adoption of the technology. (P11)

The adoption by the employees is a big challenge. If you are an expert doing your job for 20 years in a certain way, changing it can be difficult. People are not always open to such a change. (P15)

Change in an organisation brings two major challenges: changing the employee-culture and employee-habit. (P14)

According to multiple interviewees, early adopters are more inclined to be people with a gaming background or experience because they are already more used to a virtual environment.

User Friendliness

Another essential point impacting user adoption is the user friendliness of the metaverse experience. The fluidity and simplicity of existing experiences in B2B were often neglected resulting in poor user adoption and disappointment.

Simplicity is key: if the metaverse experience is complicated, people will not get it or if a more simple solution already exists, it makes no sense to create a metaverse application. Fluidity and easiness of use of the experience in the metaverse are crucial. If you need 3h to figure out how to open a door, you will create disappointment. (P2)

The entry barrier to the metaverse was also experienced as high since experiences were designed by web3 natives instead of business-oriented people which resulted in a mismatch between the actual needs and the delivered experience.

Currently, there is a fracture between our real life and immersive experiences because these experiences are designed by crypto natives and blockchain natives which do not understand the needs of web2 and in this case of B2B firms. (P10)

The entry barrier for the user is still high. Some are doing a good job by only asking for your e-mail and password, others ask for a crypto wallet for example. That raises the barrier to entry for non-web3 natives. (P16)

In the long term perspective, the easiness to create a metaverse experience by providing an accessible toolbox to build upon will lower the barrier to metaverse implementation and accelerate adoption.

Same as with AI, the pioneers have to invest and develop a huge amount and when an easy-to-use toolbox or API will come out on top of which you can build metaverse tools, the metaverse will be widely adopted. We are currently still in an early stage where access to the metaverse is more difficult. (P13)

4.4.8. Lessons Learned from Failure Cases

During the interviews, interviewees were asked about failed metaverse implementations in B2B they experienced to gain a deeper understanding on challenges, discussed earlier, faced in practical situations. From the practical examples discussed, these prominent reasons for failure emerged and illustrate better the challenges discussed in this whole

7. Failure & Success Examples
7.1 Failure Reasons
 7.1.1 Budget
 7.1.2 Flawed Experience
 7.1.3 No Utility
 7.1.4 Target
 7.1.5 Team & Capabilities
7.2 Success Case

Figure 4.8: Failure Examples

Section 4.4. The template is illustrated in Figure 4.8.

Budget

It appeared as a failure factor mainly because some failed projects did not succeed because insufficient budget was allocated to the metaverse implementation by the higher body of the firm or because the estimation was not done correctly. This demonstrates the challenges discussed before of the uncertain ROI and the fear of decision-makers to risk too high investments into projects with high uncertainty.

Flawed Experience

In some cases, the experience did not reach the expectations and the metaverse implementation was then considered a failure. A flawed experience was the result of an inadequate technological infrastructure, low user friendliness or poor interoperability with other metaverse environments. These failure examples relate to the challenges of "Technology Infrastructure, User Adoption and Interoperability & Standards".

We [Manufacturing company] have multiple systems that have been used in the past such as CAD files, 2D tools which are all converted in a certain format to fit in the metaverse. We encountered some problems on projects where this conversion did not match or problems occurred which of course falsifies the whole manufacturing process. (P7)

No Utility

The lack of utility and failing to answer a real need resulted in failed metaverse implementations. This relates directly to the challenge "Business Model Fit" where a lack of strategy and utility could potentially lead to failure.

An example of a failed metaverse experience is [Company X] which bought a land in sandbox without really knowing what to do with it. That was a flop because no strategy was defined beforehand. (P10)

Target

Another example given was the issue with acquiring the first early adopters and focusing on the right target to acquire them. This reveals again the challenge of "User Adoption" discussed previously.

It is difficult to convince the first users or clients because utility of the metaverse is not always understandable. (P5)

Team & Capabilities

The creation of the right technical capabilities through training or recruitment was or neglected or not developed enough. Delay of projects also occurred because of long internal processes in B2B firms before validation of metaverse projects due to concerns regarding security, safety and the build of trust and due to the resistance to change. This example illustrates better the challenges "Managerial Capability and Skill Gap" and "User Adoption" as well as concerns related to "Security, Safety and Governance".

Every project we [Consultants] have is delayed because of internal processes with the client. Companies take a long time to validate a metaverse project. (P15)

4.5. Preparation

This section discusses the third sub-research question on how B2B firms should prepare for the implementation of the metaverse. In fact, deciding to implement the metaverse after evaluating benefits and challenges and actually implementing it are two distinct matters. The actual implementation of the metaverse has to be preceded by an appropriate preparation. Figure 4.9 describes a three-stage preparation that has to precede the actual implementation of the metaverse in a B2B firm. The three steps found were:

1. Develop a value-focused strategy
2. Test & Learn
3. Adapt workforce & expand capabilities

Each of these phases consist of multiple components that are discussed in the next sections.

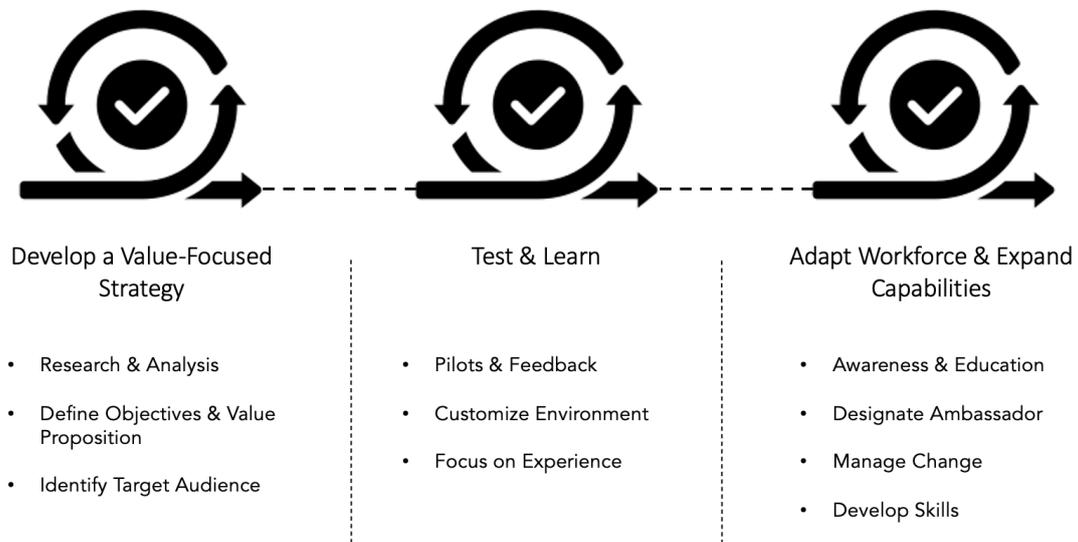


Figure 4.9: Three-stage Preparation for Metaverse Implementation

The template in Figure 4.10 shows the three phases and the multiple levels and components in each phase. The order of the phases is based on the answers of the interviewees on how to prepare for the implementation of the metaverse in B2B firms. Each element of the preparation is discussed in the following sections.

4. Preparation

4.1 Develop a Value-Oriented Strategy

4.1.1 Research & Analysis

4.1.2 Define Objectives and Value Proposition

4.1.3 Identify Target Audience

4.2 Test & Learn

4.2.1 Pilot & Feedback

4.2.1.1 Launch Pilots

4.2.1.2 Learn from Feedback

4.2.2 Customize Environment

4.2.2.1 Governance

4.2.2.2 Open Ecosystem

4.2.2.3 Security and Safety

4.2.3 Focus on Experience

4.2.3.1 Focus on Quality

4.2.3.2 Focus on Simplicity

4.3 Adapt Workforce & Expand Capabilities

4.3.1 Awareness & Education

4.3.2 Designate Ambassador

4.3.3 Manage Change

4.3.4 Develop Skills

Figure 4.10: Template Preparation

4.5.1. Develop a Value-Oriented Strategy

Results demonstrate that the first step required in the preparation for the implementation of the metaverse is the development of a value-oriented strategy. This phase consists of three major elements: *Research & Analysis*, *Define Objectives & Value Proposition* and *Identify Target Audience*.

Research & Analysis

This initial step includes carrying out preliminary market research on the specific industry the B2B firm is operating in and thereby identify which possibilities the metaverse can offer. Importantly, scanning the market and learning from competition is essential in this step as well.

But the face of the pre-project is always similar: first research needs to be done depending on the vertical industry to consider all rules, regulations, complaints and thereby identify what kind of possibilities the implementation of the metaverse could offer. (P12)

Define Objectives & Value Proposition

After preliminary research on the possibilities the metaverse can offer, the objectives and

value proposition need to be delineated. First, creating real utility is essential by identifying one or more specific needs where the implementation of the metaverse can contribute. Failure appeared to often come from the fact that B2B firms would launch a metaverse project without really understanding how this implementation could create real utility for them.

It is essential to create a use-case that has utility!. If there is no added value, there is no need to do it. First you need to identify if there is a real potential or need for a metaverse transformation. What is the added value? and then you can proceed further. The customer, in this another businesses, also has to understand what the need is of this environment. (P2)

After identifying how the metaverse could create real utility, a value creation strategy needs to be established and objectives need to be set. A value creation strategy outlines how exactly value will be created through the use of the metaverse and the objectives set need to be feasible. Moreover, it is essential to develop a strategy on the long term and to be precise. The vision should be clear and unequivocal throughout the whole B2B firm and feasible objectives as well as specific key performance indicators need to be tentatively defined. This means they will serve in assessing the progress and performance of the implementation of the metaverse, but they can also be redefined at any time.

Strategy on the long term is crucial. Questions such as what is the goal and where do I want to bring it for my enterprise need to be answered beforehand. Do not build something just to be in the metaverse because that will most probably lead to a failure. (P6)

Preparing a roadmap (clear strategy) with a well-defined time frame is important. That is also when objectives and KPIs are tentatively defined. (P12)

Identify Target Audience

Targeting the right audience is also an important element to consider. B2B firms need to be aware that the younger generation is often more comfortable with virtual environments. Considering this, targeting a younger audience at the start of a metaverse implementation can help boost the adoption of the metaverse internally as well as with business partners.

Younger audience is also more used to the metaverse environment. A possible preparation would be to target a younger audience that can help with the adoption. (P6)

Additionally, a client-acquisition strategy needs to be established. It is not because you create a metaverse environment that people are going to use it. It is important to make sure the targeted users are redirected towards the metaverse environment they were targeted for.

Develop a strategy to get or acquire your clients. If your clients are on another platform for example Tiktok, then you need to develop a strategy to bring potential customers there back to your metaverse environment. It is not because you create a metaverse that people will come. The offer has to be put where people and potential customers are. (P2)

4.5.2. Test & Learn

After developing a value-focused strategy, an incremental test-and-learn phase was found as the next step to take in the preparation of the implementation of the metaverse. Throughout this phase and the testing processes, multiple elements need to be taken into account: *Pilots & Feedback, Customizing the Environment and Focusing on the Experience.*

Pilots & Feedback

Pilots are a fundamental part of the test-and-learn phase. Pilots refer to small-scale, preliminary projects to test the feasibility and impact of the metaverse in B2B operations. It

is really important to perform pilot projects and consequently use the feedback of these projects to adapt accordingly for the next iteration. Pilots are also a tool to demonstrate real use-cases and actually assess if the implementation of the metaverse is suited to reach the objectives defined in the previous phase. Several B2B companies appeared to neglect this phase and immediately started with larger projects resulting in significant losses in case of failure and poor agility for adjustments compared to smaller pilots. This step-by-step approach is vital for a successful implementation.

The implementation needs to be carried out step-by-step. First start with something small and test it and then improve it. For example create a showroom and invite first your own employees. Test-and-Learn! (P3)

Customize Environment

The metaverse environment created by a B2B firm needs to take the following elements into account for the customization: governance, the creation of an open ecosystem as well as focusing on safety and security.

Governance of a metaverse environment is an important matter to ensure a certain structure and directions for decisions that needs to be taken to sustain the environment. In this perspective, maximum transparency needs to be ensured where stakeholders are involved at an early stage in decision-making in the virtual environment to account for their needs and maximise implementation success.

Create maximum transparency with all stakeholders, especially future users. You have to involve them at a really early stage and inform them about your plans, possible outcomes, scenarios, how it is going to play out in the coming years, etc. (P7)

On the other hand, B2B firms need to spend enough time customizing their metaverse environment because it is an immediate reflection of the image and values of the firm. This is crucial for potential customers, but also for employees internally because designing a metaverse space influences the emotions that are generated in the users.

It is crucial to define in advance how you want your metaverse environment to look like because this is transferring the values of your (B2B) firm to your client and will greatly influence the interaction because space influences enormously people by shaping their emotions. (P3)

Further, the creation of an open ecosystem seemed crucial where interoperability and accessibility need to be maximized to allow an easy integration within current operations in B2B firms. Especially, metaverse platforms executives emphasized this necessity because it favors adoption.

A platform needs to be open with other platforms because otherwise there is a risk of lock-in. Technical infrastructure needs to be on point and as a platform you need to be able to integrate any kind of new technology. (P5)

Finally, the metaverse environment created by B2B firms need to focus on security and safety. Security and safety appeared as one of the major concerns of B2B firms that were considering implementing the metaverse. A secure access and management of data needs to be ensured and a safe environment with predetermined rules and behaviours need to be established by the B2B firm.

In order to tackle the security aspect, we always start with the security side. We make sure that the security is first taken care of and then we proceed with the rest of the implementation. (P14)

Companies also need to provide a safe and secure environment for their employees and business partners. (P11)

Focus on Experience

While designing the experience in this test-and-learn phase, two critical aspects need to be included as to address existing challenges the metaverse implementation brings that has led to failure in the past: Simplicity and Quality of the metaverse experience. As discussed in Chapter 4.4, a low fluidity and easiness of use resulted in failure because users would not understand how to interact in the metaverse environment. Therefore, simplicity is the key to successful metaverse experiences and needs to be followed as a general guideline in the design of metaverse experiences. Aside from simplicity, quality of the experience needs to be ensured as to create a real sense of immersion for users entering the metaverse environment.

We made sure our platform is extremely simple and easy-to use where you do not need any skills to use and operate it. The easiness of use is crucial. A marketing person does not have to wait for someone of the IT to do it, otherwise it will never work. It has to be accessible to everyone. (P3)

4.5.3. Adapt Workforce & Expand Capabilities

The last phase of the preparation for the implementation of the metaverse in B2B firms is adapting the workforce and expanding capabilities. This phase involves multiple actions to undertake within the B2B firm to ensure a successful implementation: *Awareness & Education, Designate an Ambassador, Manage Change and Develop Skills*.

Awareness & Education

Enhancing the understanding of employees within the B2B firm on the metaverse came out as one of the most vital points to get everyone on board. B2B firms struggled with the advancements of their metaverse implementation because of a lack of understanding on the transformational potential of the metaverse across each department. Thus, all the employees across each department within the B2B firm need to be onboarded through trainings and education on the matter to ensure a successful implementation.

It is important to educate the people in the whole company on the web3 transformation. Provide trainings and education across all departments to get everyone involved in that transformation. (P7)

The impact of the implementation of the metaverse has the potential to transform each department within a B2B firm as discussed in Section 4.3 where the benefits and their impact on B2B operations are analyzed. Therefore, employees should be able to understand how the metaverse will impact their activities depending on their position and department in the firm.

Training of all your employees across all departments is important. They have to get used to leverage the metaverse for their activities. Before actually implementing a huge project. (P3)

Hence, the education process on the concept of the metaverse can be done for the whole B2B firm, but more specific training should be given tailored to each department. In this education process, it is important to keep in mind that an iteration between theory and practice is required.

In this journey of educating your staff on the metaverse, it is a real intertwined process where you explain theory and show demonstrations of what is possible with the metaverse. It's not first one and then the other, it's an iteration. (P4)

Designate Ambassador

Designating an ambassador appeared as a crucial turning point in the progress of the implementation of the metaverse within B2B firms. This ambassador needs to be someone with authority and is responsible for overlooking the progress of the metaverse implementation. This is really important since many B2B metaverse projects did not succeed because of a lack of support in the higher managerial direction within the firm.

Find the enthusiastic leader in a company that can help you support the metaverse project to make sure progress is made. (P6)

The ambassador has to be someone with authority to push the implementation forward. (P15)

Manage Change

The implementation of the metaverse clearly impacts operations within B2B firms which in turn necessitates changes within the firm. The management of this change seemed critical to enable a smooth implementation. Both a cultural shift in the B2B firm as well as a rescaling and upscaling of the workforce were found necessary. A cultural shift means in this case that the implementation of the metaverse brings a significant change on how B2B firms operate and therefore impacts the "culture" of the firm. Employees need to be incentivized and helped with this shift in their working routines. This shift needs to be guaranteed in every department as to avoid cultural divergences across the firm. Rescaling and upscaling of the workforce allows to adapt the needs of the firm to the rapid changing environment by setting up dynamic teams. The actual development and enhancements of skills is discussed in the next paragraph, but the changes associated to the transformation of the workforce need to be carried out and managed effectively.

We always start with the culture and the workforce. That means bring the people onboard immediately. If you don't have the people with you, it does not matter what great technology you are providing or implementing, it will be stuck on the shelves and nobody will actually use it. People will still be working the same way unless you incentivize and help them with a cultural shift across the workforce. This does not necessarily mean recruiting, but more upscaling and rescaling of the workforce when starting the implementation of metaverse technologies. (P14)

Develop Skills

Another resource to acquire is the development of specific skills for implementing the metaverse. Two specific set of skills for metaverse implementation were identified: technical skills and managerial skills. Building and sustaining a metaverse environment requires a strong technical support. Hence, recruitment of web3 experts such as blockchain architects, 3D designers and more that are able to build such virtual spaces is the most straightforward option. Moreover, having an innovation manager that is able to maintain a vision on how the metaverse should be built to meet the objectives defined during the value-oriented strategy phase is essential. Building a strong team in charge of the metaverse implementation and sustainment within the firm is essential. On the other hand, onboarding people within the company is also important to ensure a strong synergy within the whole B2B firm.

Recruiting specialised web3 consultant for missions such as a blockchain architect, 3D designer, innovation manager, etc is a great way to get going, but it is also important to onboard persons that are knowledgeable about this digital transformation. (P1)

Companies need to provide the technical infrastructure required to ensure the best virtual journey. This technical infrastructure has to be intuitive to ensure employees and clients understand the use of the technology immediately. (P11)

4.6. Measurement and Sustainment

This last section concerns the fourth sub-research question on how the implementation of the metaverse can be sustained. After establishing a clear definition of the metaverse in B2B, assessing the benefits and challenges of implementing the metaverse in B2B operations and investigating the preparation required to ensure a successful implementation of the metaverse, the actual implementation occurs and it needs to be sustained on the long term. Therefore, measurements of the effectiveness of the metaverse implementation need to be facilitated and a clear strategy for implementation sustainment needs to be established. The measurement and sustainment of the metaverse implementation in B2B firms turned out to be enabled by continuous monitoring and user feedback. The different components of the template on measurement and sustainment are showed in Figure 4.11 and discussed in the following sections.

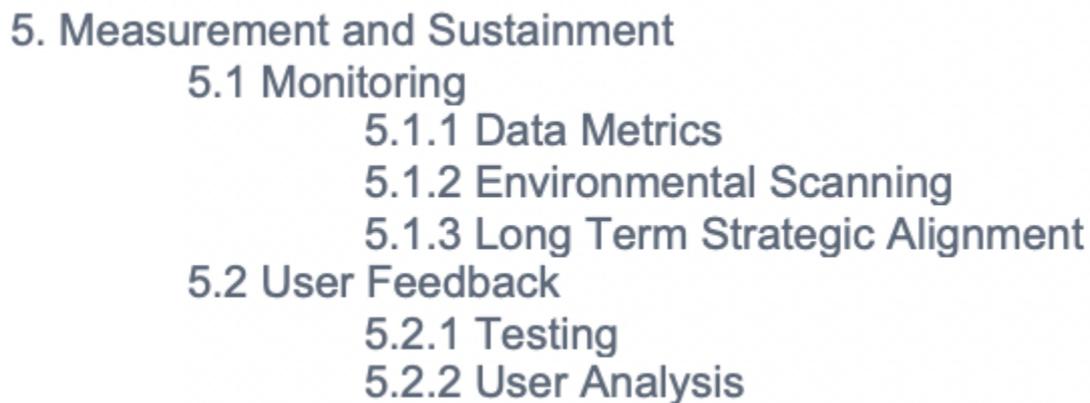


Figure 4.11: Template Sustainment

4.6.1. Monitoring

Continuous monitoring of the implementation is crucial to guarantee the objectives of the implementation are met or to reassess processes frequently to track progress. Monitoring happened on three different levels: *Data Metrics*, *Environmental Scanning* and *Long-Term Strategic Alignment*.

Data Metrics

Data metrics are the basis of measurement and provide useful insights on the status of the implementation of the metaverse. In the metaverse, several data metrics were identified that are useful for the measurement and sustainment phase. The data generated also appeared to be completely different from typical digital platforms since behaviour in 3D space can be analyzed in real-time. The data metrics that emerged the most throughout the interviews were: activity monitoring, duration of presence, number of visitors and the bounce rate.

The metaverse offers a major advantage which is the direct collection of metaverse user data. (P9)

Our focus is on the output of marketing data and we were the first company offering this on the market. Marketing data involves engagement, interest, interactions, similar as to measuring on a website. We are tracking what is happening in a virtual environment. (P15)

Activity monitoring refers to the analysis of user behaviour and interactions in the virtual environment. This is facilitated thanks to eye-tracking allowing the analysis of eye movements and reactions through the headset which grants access to the virtual environment.

Duration of presence and the number of visitors are good indicators on the quality of the virtual experience. Finally, the bounce rate is similar to the click-through-rate on a website. It is a measure to assess how a certain action in the metaverse ended up resulting in another, a sale for example.

Environmental Scanning

Environmental scanning was identified as an important skill to sustain a metaverse implementation. It encompasses three major elements: agility in technology testing, continuous opportunity screening and market scanning.

Agility in the implementation and in the sustainment allows to account for changes in the environment rapidly. Especially, agile technology testing appeared as critical since the metaverse is a body of different intertwined technologies. While implementing the metaverse, it is important to remain agile for the eventual addition of other technologies throughout the process. Agility can be considered as a measure of success in itself.

We are still in the R&D stage and what we build is still open to others. We try to be very flexible to integrate any new technology. Flexibility and agility are crucial for testing different technologies. For example we are testing LiDAR in our metaverse environment, but if it does not work out, we can just remove it. Agility is a measure of success in itself. (P5)

Further, continuous opportunity screening and awareness of new technological developments were found to be important in the sustainment of the implementation. Lastly, market scanning and especially learning from competition came out as a crucial point to not be left behind and fail to sustain the implementation.

Long-Term Strategic Alignment

Monitoring involves evaluating if the long-term strategy is respected and if it is aligned with the predetermined objectives. In this process, objectives and specific KPIs determined during the preparation phase need to be reassessed continuously and adjusted where needed. Guaranteeing this flexibility was found to enhance the sustainment of the implementation.

These KPIs can be very different depending on where the assessment has put them. We also reassess all the time to keep track of the progress and reassess with the clients and we recalibrate the KPIs if needed. It's important to be agile in every activity. (P14)

Define KPIs beforehand and assess how these objectives have been reached, for example the number of users. KPIs are often about deliverable features such as avatars, virtual environment creation, etc, but it can also involve objectives of the client. (P12)

4.6.2. User Feedback

The other element aside from monitoring for measuring and sustaining the implementation of the metaverse is user feedback. This feedback is specifically based on the experience of a user in a virtual environment. Direct testing and user analysis form the core of user feedback.

Testing

Testing refers to the establishment of experiments and pilots even after the full implementation is carried out. It emerged as an effective method to keep innovating in the metaverse implementation which is essential for an effective sustainment. The testing is mainly done through pilots in the metaverse and also by comparing experiments in real life and in a virtual world to identify the differences.

We also measure through pilot projects where we try out small manufacturing in the metaverse and then in real life to assess the quality of the simulation and

adapt accordingly. Testing happens continuously, it already starts before actual pilots, especially in manufacturing. (P7)

User Analysis

User analysis is the direct analysis of a user experience in the metaverse based on questionnaires. These questionnaires can be quantitative as well as qualitative. Statistical analysis is then performed on the questionnaires and it allowed B2B firms to better understand the pain points of metaverse users throughout their experience.

They use quantitative analysis (quantitative questionnaires and metaverse users simply answer after experiment) and they also make sure questionnaires are validated by a majority of researchers. They then also compare their metaverse experiments by performing experiments in real life and then they compare the questionnaires they have and perform statistical analysis. (P8)

Qualitative studies can also be useful because it is difficult to assess a complete experience of 20 min in metaverse only with quantitative questionnaires. (P8)

4.7. Mitigation of Implementation Challenges

As discussed in Section 4.4, seven main challenges were identified in the implementation of the metaverse in B2B firms. Later, in Section 4.5 and 4.6, the preparation and sustainment needed for the metaverse implementation were thoroughly analyzed and outlined. The seven challenges might impede the successful implementation of the metaverse and need to be mitigated for that reason. Hence, it is crucial to evaluate how the preparation and sustainment of the metaverse implementation in B2B firms contributes in mitigating the challenges discussed previously. This allows to establish a clear link and to investigate existing relationships between core themes of the final template. Figure 4.12 illustrates the relationships between preparation & sustainment on one side and the challenges on the other side.

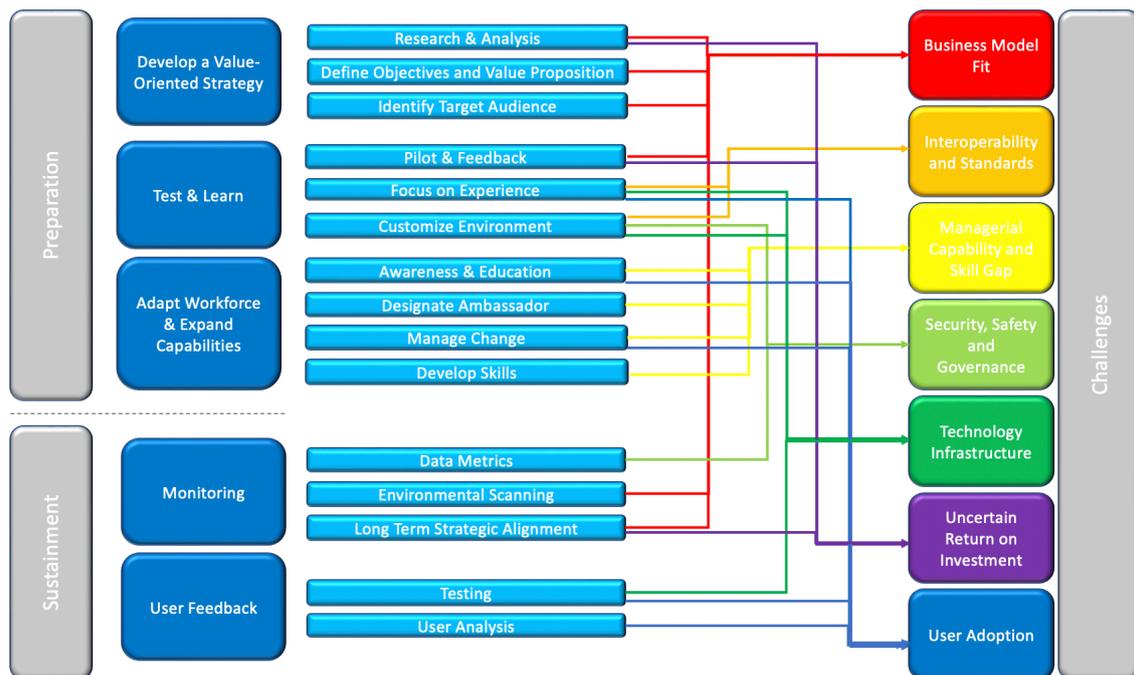


Figure 4.12: Mitigation of Challenges

The first challenge, business model fit, is addressed by performing preliminary research and analysis, defining objectives and a clear value proposition and identifying a target audience. Pilots & feedback also help in testing if the implementation has real utility before full implementation. In the sustainment phase, environmental scanning and long term strategic alignment scan developments in the market and ensure the objectives of the implementation are met. The business model fit is thus also continuously monitored.

Interoperability and standards are accounted for mainly in the test & learn phase where both the metaverse experience and environment are designed to be interoperable and standardized.

The management capacity and skill gap challenge is tackled in the third stage of the preparation phase. Awareness & education, the designation of an ambassador, the management of change and the development of skills all contribute to closing that managerial and skill gap that B2B firms are often experiencing.

Then, concerns around security, safety and governance are taken into account in the preparation phase during the customization of the metaverse environment. In the sustainment phase, data metrics constantly inform the status of security, safety and governance within the virtual environment.

The technology infrastructure needs to be on point to deliver the best metaverse experience. The technological evolution of metaverse technologies and hardware are not predictable, but a special focus is appointed to the elaboration of a qualitative experience by optimizing available technologies and hardware. For the sustainment, testing is often performed to assess new technological innovations and their eventual adoption.

The uncertain ROI can only be addressed by attempting to reduce the uncertainty. Preliminary research & analysis as well as pilots & feedback are useful tools to make informed decisions and therefore reduce the uncertainty surrounding the metaverse implementation in the B2B firm. Further, the long term strategic alignment is constantly monitored to ensure objectives are met and the return on investment is achieved.

Lastly, user adoption arose as a critical challenge in the implementation of the metaverse in B2B firms where both resistance to change and user friendliness formed the basis for this challenge. Firstly, focusing on an intuitive and qualitative experience enhances user adoption. Enabling awareness and education on the metaverse to enlarge the understanding of users also boosts user adoption. In the sustainment stage, user feedback generated with testing and user analysis also contributes in understanding the users and adapt accordingly.

5

Discussion and Conclusion

5.1. Discussion of Results

This section discusses the results found in the previous chapter. The discussion of the definition, benefits, challenges, preparation and sustainment of the implementation of the metaverse contribute in understanding its impact on B2B operations. The four sub-questions are answered throughout this discussion.

Definition

As to answer the main research question, the study had to start with defining the metaverse in a B2B context to resolve existing ambiguities. This guided the set-up of the first sub-research question which reads as follows: *What is the metaverse for B2B firms?*. Therefore, interviewees were asked to define the metaverse in a B2B context to gain a deeper understanding of what the term metaverse represented for them in the mentioned context. This allowed to establish a clear description of what the metaverse is for B2B firms.

As a starting point, the metaverse appeared to be the new iteration of the internet and a logical evolution of web1 and web2 towards web3. The term metaverse was not seen as a new concept and has been utilized in the past to describe the creation of a new parallel universe such as in gaming or in movies. Then, the metaverse in B2B was defined as a persistent and immersive virtual environment where businesses and organisations can interact, collaborate and conduct operations with each other and the environment, and was often referred as a multi-layered ecosystem. Therefore, a more in-depth analysis was carried out to identify these layers. Hence, four layers were identified where each layer forms the basis for the next layer. The first and base layer is the foundational layer consisting of the physical and digital infrastructure. This is the infrastructure that lays the ground for the creation of the metaverse. Then, on top of the foundational layer comes the enabling layer encompassing access, identity, security & governance and transactions. This layer is necessary to enable and secure key actions in the virtual environment. Next comes the platform layer which contains creator platforms mainly for the creation of content and interface & interaction platforms which facilitate (social) interactions in the metaverse. The final layer is the experience layer composed of specific B2B applications, immersive 3D virtual world and a creator economy. This layer was mentioned more often in the interviews because it is the experience that is directly observable by B2B users interacting in the metaverse.

The analysis of the metaverse and decomposition in four different layers fine-tuned for a B2B context allowed to gain a deeper understanding of what the metaverse represents for B2B firms. This definition provides a strong foundation for evaluating its impact on B2B operations.

Benefits & Challenges

After defining the metaverse, benefits and challenges of implementation were evaluated. This formed the second sub-question which was formulated as follows: *What are the benefits and challenges of implementing the metaverse for B2B firms?*. This discussion is crucial since evaluating how the implementation of the metaverse can impact operations within a B2B firm automatically requires the assessment of potential benefits and challenges of that implementation.

Five major benefits were found each composed of multiple components that contribute to the emergence of the benefit. First, enhanced collaboration was found as an important benefit for B2B firms since the metaverse facilitates co-creation, the establishment of a strong community, global accessibility and immersive collaboration. Then, improved customer experience emerged as another benefit because the metaverse implementation increases customer engagement, offers insightful customer data analytics, ensures a more immersive customer experience and grants the possibility to level up product demonstrations. Next, augmented productivity came out as another advantage where the metaverse seemed to improve organizational optimization, simulations, strategic talent management and training across B2B firms. Increased profitability emanated as another benefit thanks to cost-reduction and increased revenue possibilities offered by the implementation of the metaverse. Finally, upgraded marketing appeared as the final perk of the metaverse implementation in B2B firms with the opening of new marketing channels, a revolution of the marketing experience and a revised brand image.

On the other hand, seven main challenges were identified that are associated with the implementation of the metaverse in B2B firms. The first one is business model fit where both a lack of long term strategy establishment and the absence of real utility brought by the metaverse can result in a failed implementation. Then, interoperability and standards appeared that if not sufficient attention is paid to their integration, it could lead to a lock in for B2B firms and again a failed implementation. Next, the managerial capability and skill gap appeared as crucial challenges in B2B firms. The acquirement of the right skills through training and recruiting and the adaptation of the workforce for a successful implementation are essential. Security, safety and governance came out as major concerns B2B firms had before starting a metaverse implementation. Failing to successfully incorporate these matters and thereby build real trust in the implementation formed a major challenge for B2B firms. The technology infrastructure emanated as another issue where both hardware and technology immaturity hindered the achievement of the objectives due to the existing limitations. Later, the uncertain return on investment came out as another challenge which majorly impeded pre-project validations and appropriate budget allocations. Finally, user adoption emerged as a crucial challenge to overcome. Both resistance to change within B2B firms as well as a poor user friendliness of the metaverse experience led to failed implementations.

Preparation

B2B operations are impacted even before the actual implementation because preparation is needed. The third sub-question revolved around that required preparation and is stated as follows: *How do B2B firms need to prepare for the implementation of the metaverse?*. The preparation plan found in this study is divided into three main phases that need to be applied in the following order: 1) Develop a value-oriented strategy, 2) Test & learn and 3) Adapt workforce & expand capabilities. This provides a clear plan to B2B firms that want to prepare optimally for the implementation. Even if these phases need to be applied in the given order, each phase should be continuously reassessed throughout the process and iterations should be accounted for.

Developing a value-oriented strategy has to be done by means of research & analysis, defining objectives & a clear value proposition and identifying the right target audience for the B2B firm. Preliminary research & analysis allows you to gain a better understanding

of the potential of the metaverse to impact B2B operations and assists in shaping your strategy based on reliable information. Defining objectives & a clear value proposition provides a well-defined direction and purpose to your strategy to align your efforts and resources accordingly to create real utility. The success of the defined strategy can be monitored based on these pre-defined objectives. Lastly, identifying the right target audience to understand their characteristics and preferences helps in steering your strategy and goals. Accomplishing this first phase offers a good starting point for a successful metaverse implementation.

Secondly, the test-and-learn phase follows and serves as a preliminary feedback loop before the full implementation in the B2B firm. Pilots, small-scale experiments with the first users, are ran and feedback is then used to adapt accordingly. During this testing phase, special focus is put on the customization of an open, safe and secure metaverse environment with a decentralized governance. The environment needs to be safe and secure to protect the users and has to be open to allow an easy integration within existing systems. The governance ought to be decentralized where stakeholders are involved at an early stage to maximize transparency. Focus in the testing phase is also directed towards the quality and simplicity of the experience. Developing a qualitative, realistic and intuitive experience is essential for boosting metaverse adoption.

The last phase, adapt workforce and expand capabilities, ensures B2B employees are educated and trained on the metaverse subject to bring everyone onboard, an ambassador is designated responsible for the metaverse implementation, change within the firm is managed and the required skills are developed and trained to scale the implementation. Enhancing the understanding of employees and partners on the transformational potential of the metaverse as well as relying on an powerful ambassador that can take the implementation forward are key in accelerating the implementation. Change management related to the rescaling and upscaling of the workforce as well as the development of skills through the recruitment of experts or provision of training are crucial to successfully anticipate the implementation of the metaverse.

Overall, B2B firms need to follow this threefold preparation plan to enhance the chance of a successful implementation of the metaverse within their firm which directly impacts their operations.

Sustainment

Results show that, aside from before and during the implementation, B2B operations are also impacted after because of the necessary sustainment. Sustainment consists in measuring and constantly monitoring the status of the metaverse implementation within the B2B firm. This is a crucial step to sustain the benefits and carry on the mitigation of challenges on the long term. The fourth sub-question addressed the sustainment of the metaverse implementation in B2B firms and reads as follows: *How can B2B firms sustain the implementation of the metaverse?*. Sustainment of the metaverse implementation in B2B firms appeared to be facilitated by continuous monitoring and user feedback.

Monitoring consists in the evaluation of data metrics, environmental scanning, and constantly assessing the alignment with the pre-defined long term strategy. New data metrics such as activity monitoring, duration of presence, number of visitors and the bounce rate provide useful insights for the monitoring of the metaverse. Scanning the environment allows to remain agile and screen for new opportunities to not miss the boat on new technological developments. Finally, predefined objectives and KPIs serve in assessing to what extent the implementation aligns with the pre-defined goals.

On the other hand, direct user feedback allows to keep the iteration of learning and adapting based on the direct experience of metaverse users. This can be realized by performing and comparing tests between real and virtual life. Further, direct qualitative or quantitative

user analysis such as questionnaires can also be used to learn more about user experiences.

5.2. Implications of Key Findings

The implications of key findings are evaluated. In this perspective, both the scientific contributions and practical implications of this research are outlined.

5.2.1. Scientific Contributions

In the first place, this study contributes in the advancement of knowledge on the metaverse. The research brings clarity to the conceptual understanding of the metaverse and its implications in the B2B context. It defines the metaverse conceptually and breaks it down in four building layers to describe the multiple components. Existing ambiguities are resolved concerning the understanding of the term metaverse in a B2B context. The advancement of knowledge also occurs in the B2B literature where a novel approach is used. The approach chosen to study the impact of an emerging technology on operations of B2B firms is innovative and simple, because it is based on the benefits and challenges it brings, but also on the preparation and sustainment it requires. This approach can be replicated in future studies on the impact of technology implementation within a specific firm or industry.

Theoretical developments are made in this study since the theory emerged based on a grounded theory approach, through the continuous engagement with the data. In this explorative research, theory emerged concerning the benefits, challenges, preparation and sustainment of the metaverse implementation where insights from interviewees with different backgrounds and perspectives were continuously compared and then combined. These theoretical developments can be compared with related studies in the B2C sector and help academics understand where the similarities and nuances lie. Moreover, theoretical contributions on how preparation and sustainment of the implementation contributed in overcoming the challenges were also formulated. This can guide academics in the field of emerging technologies understand how to address potential obstacles in the implementation.

This research also brought methodological contributions by carrying out an explorative and novel research approach to study the impact of metaverse implementation on B2B firm operations. Template analysis, combined with a grounded theory approach, allowed to capture the complexity of the phenomenon and enabled the identification and display of core themes of the emerging theory. Again, these methodological contributions can inspire and guide future research in related technological fields.

Interdisciplinary collaboration is also encouraged throughout this research. This study fosters knowledge exchange and bridges the gap between technical and managerial literature fields since the development of a new technology and its actual implementation within a business context require both technical and managerial expertise. Therefore, the aim of this study was to combine insights from both technical and managerial experts in an effort to fill this gap. This encourages future studies where researchers from various fields collaborate which can lead to innovative research approaches and enrich research outcomes.

Finally, this study focused on the B2B sector in general by combining insights from multiple perspectives across industries. It allowed to examine the generalizability of findings concerning the impact of the implementation of the metaverse on B2B firm operations. Results emerged from different industries, firm sizes and geographical regions. Hence, it allowed to uncover nuance and contextual factors such as cultural differences and industry-specific challenges. This generalizability enhances the applicability and relevance of the research findings.

5.2.2. Practical Implications

The findings of this study offer several managerial implications that can be used in real-world settings to inform managerial choices and actions.

The establishment of a new definition of the metaverse fine-tuned for a B2B context allows managers to understand and update their understanding of the metaverse to align their business strategies with this emerging concept. Managers can identify specific layers of the metaverse that align with the firm's industry, vision and goals to leverage their potential. As an example, B2B firms can decide to rather position themselves within the platform layer or the experience layer. Being able to identify the role the metaverse can play and capitalizing on it is crucial to help B2B firms benefit from the implementation. Upgrading this understanding also facilitates its integration within existing B2B systems.

Then, the findings concerning the benefits and challenges the metaverse offers for B2B firms also involves several practical implications. Firstly, managers are better informed to assess if a metaverse implementation is useful for their firm by being aware of the potential benefits and challenges. Managers can gain a better understanding of the positive influence of the metaverse and evaluate which benefits are of the biggest value for their firm. Consequently, they can allocate resources and investments strategically to leverage the benefits of the metaverse implementation and gain a competitive advantage in the market. Managers can more accurately assess risks by being aware of the difficulties associated with metaverse deployment. Managers can establish risk mitigation measures by detecting potential pitfalls or integration difficulties in order to reduce the negative effects and guarantee a successful implementation.

Finally, a clear preparation plan and sustainment strategy were built which also leads to important managerial implications. The preparation required for the implementation consists of three phases each with multiple components. In this phase model, the three phases need to be followed one after another while being continuously reassessed throughout the whole implementation process. This threefold structure brings clarity on how managers should start with the implementation by offering practical recommendations. The focus lies on strategy, testing and change management. Findings on the strategy development outline how a fitting strategy should be established, findings on the testing phase emphasizes the importance of feedback loops and guides managers in choosing the right focus points during the testing phase, and the last phase informs the scaling strategy managers need to follow to ensure a wide implementation. Further, the role of managers is also to sustain the implementation. Practical recommendations are given concerning the sustainment strategy for the metaverse where both detailed monitoring and user feedback strategies assist managers in sustaining the implementation successfully. Lastly, results on how the preparation and sustainment plans help in overcoming the challenges give managers a comprehensive view on how the recommendations of this study are established and their relationships.

With these findings, managers are aware of what they need to do, avoid and change concerning the metaverse. The new definition and the benefits found help managers evaluate the role the metaverse can play for them and capitalize on the most valuable advantages. The identified challenges point out the risks managers need to mitigate. Last but not least, the preparation and sustainment strategies draw a practical action plan managers need to leverage for accommodating a metaverse implementation in B2B firms.

5.3. Limitations and Future Research

This study on the impact of the implementation of the metaverse on B2B firm operations is associated with several limitations that pave the way for future research avenues.

First, the generalizability of the research is restricted to the time period, context and sample used in the study. Perspectives from four different interviewee groups from Europe were collected across several B2B industries. Generalizing the results to a broader population may be limited. Future research can replicate this study in diverse contexts to validate the research findings. Moreover, carrying out comparative analysis between industries or firm sizes can help uncover industry-specific effects and variations.

Methodological constraints are also captured within this study. Data collection was based on transcripts of semi-structured interviews. Data analysis relied on template analysis performed by the researcher based on the interviews. Hence, the researcher bias is still present and may impede capturing the full impact of the metaverse on B2B firm operations. These restrictions can be overcome by encouraging future research to investigate alternate research methodologies or mixed-method approaches and validate the research findings.

The metaverse is still in an early stage in the B2B sector, and technology is changing quickly. The study might not have taken into account the most recent or upcoming metaverse advances. This limitation can be addressed through ongoing technology monitoring or by performing longitudinal studies. This research was also limited in time which made the choice for a longitudinal study not the most suitable. The effect on B2B firm operations may shift over time as the metaverse develops. Future longitudinal studies can examine the evolution of metaverse implementation and the long-term consequences of its impact on B2B operations. This can help uncover the evolution of advantages, disadvantages, and strategies over time to prepare and sustain the metaverse implementation in B2B firms.

Aside from the limitations of this study, throughout the interviews one group of interviewees, the academics, were asked about which academic challenges needed to be resolved in the future to gain a deeper understanding of the impact of the implementation of the metaverse on B2B firm operations. P8 claimed additional studies are needed to understand the sensibility of users based on their age, gender or culture to virtual technologies. P11 stated that more room for research will come on the consequences of the metaverse after wide adoption and implementation. Finally, P16 declared that connectivity issues call for further research on the development of connectivity to improve the sense of realism of metaverse experiences.

More studies are needed to assess the differences between VR and AR and the effects on users. We need to understand the difference in sensibility of different users based on for example their age, gender, background, etc to the new technology and environments. (P8)

More studies will be facilitated when the metaverse is more widely implemented. Consequences of metaverse implementation can then be evaluated (P11)

The experience must be more realistic because the current polygonal metaverse experience currently looks like a basic video game. Improvements in connectivity need to be investigated. (P16)

Researchers can advance our knowledge of how the metaverse affects B2B firm operations by overcoming these limitations and exploring these new research directions.

5.4. Main Conclusion

After discussing the results and answering the four sub-questions, the main research question can be answered. The main research question is the following:

What is the impact of the implementation of the metaverse on B2B firm operations?

It was found that the metaverse impacts B2B operations before, during and after its implementation. In the first place, studying its impact required the establishment of a clear definition of the metaverse in a B2B context and shaped the first sub-question. The metaverse in B2B is a multi-layered persistent and immersive virtual environment where businesses and organisations can interact, collaborate and conduct operations with each other and the environment. The conceptual understanding of the metaverse was enhanced by identifying four core layers: Foundational layer, Enabling layer, Platform layer, and Experience layer.

Then, the consequences of the implementation were investigated to grasp the impact on B2B operations which led to the second sub-question. The implementation of the metaverse impacts B2B firm operations by offering five benefits. It enhances collaboration among the firm and with partners, it improves the global customer experience, it augments the overall productivity of employees within the firm, it increases the profitability and it upgrades the current marketing. The implementation of the metaverse in B2B firms also comes with seven main challenges that need to be overcome. The implementation must fit into the business model, interoperability & standards have to be guaranteed, a lack of managerial capability & skill gaps for the implementation need to be addressed, security, safety & governance need to be on point at all times, the technology infrastructure has to be adapted, the uncertainty around the return on investment has to be reduced and user adoption needs to be boosted.

Accomplishing a successful metaverse implementation in B2B firms requires the mitigation of these challenges. Both preparation and sustainment strategies were found essential to contribute in overcoming the mentioned seven challenges and formed the third and fourth sub-question. Hence, requiring a certain preparation impacts B2B operations even before the actual implementation and the sustainment impacts operations after. The preparation required for augmenting the chance of a successful metaverse implementation within B2B firms consists of three phases that each impact operations in B2B firms. In the first phase, a value-oriented strategy needs to be established where a clear value proposition is outlined. Then, in the second phase, testing of small-scale metaverse pilots and learning from feedback needs to be anchored into B2B operations. Finally, in the third phase, the workforce needs to be adapted and capabilities need to be expanded. Aside from the preparation, the sustainment of the metaverse implementation in B2B firms is crucial to maintain the benefits on the long term. Continuous monitoring of collected data, of the competitive environment and of the alignment with the long term strategy as well as learning from user feedback based on metaverse experiences need to be incorporated into B2B operations. The detailed explanation of how the preparation and sustainment mitigate every single challenge can be found in Section 4.7.

In sum, the benefits and challenges brought by the implementation of the metaverse impact B2B firm operations, but the preparation and sustainment required to mitigate challenges and increase the chance of a successful implementation also affect these operations. These findings are based on the perspective of diverse groups of experts across Europe where variations among groups and contextual factors have been taken into account. This shows clear opportunities for generalizing the study results to a broader population.

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6

Reflection on MOT

This master thesis is carried out to complete the master's program in Management of Technology, delivered by Delft University of Technology. The goals of the master thesis project outlined in the study guide are discussed by evaluating how these goals are pursued throughout this research (Verburg, 2023).

- The work contains an analytical component

This thesis involved the analysis of the impact of the implementation of the metaverse on B2B firm operations. It required the analysis of literature, the collection of qualitative data through semi-structured interviews and the analysis of these interviews to create a template to interpret the data that emerged.

- The work is multidisciplinary in nature

This research focused on a variety of fields, including virtual reality, technology, business management, and other fields as well. The research's multidisciplinary nature enabled to take into account numerous viewpoints, theories, and approaches from these domains. It helped in capturing the interactions between the metaverse and the operations of B2B firms.

- The work focuses on a technical domain or application

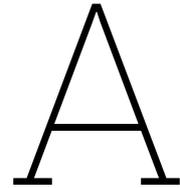
This study focused on the technological aspects of the metaverse, which include immersive technologies, digital platforms, and virtual reality. It looked at the intersection between these technical elements and B2B operations. The emerging concept of the metaverse was studied to evaluate how its technical features could impact B2B operations.

- The work shows an understanding of technology as a corporate resource or is done from a corporate perspective

By analyzing how the use of the metaverse might impact B2B firm operations, this research demonstrated the potential of metaverse technology, as a corporate resource, to shape B2B strategies and processes. It recognized that changes in technology may have an impact on B2B firms and analyzed it from a corporate viewpoint.

- Students use scientific methods and techniques to analyze a problem as put forward in the MoT curriculum.

This study combined a structured literature review protocol, semi-structured interviews and template analysis, a form of thematic analysis, which are all scientific methods and techniques taught throughout the MOT curriculum. This thesis follows the scientific rigor and methodological standards demanded by the MOT curriculum.



Interview Protocol

A.1. Interview Questions

Metaverse Platform Executives:

1. How do you define the metaverse in a B2B context?
2. What benefits do you see for B2B firms that adopt the metaverse in short term and long run (> 2 years)?
3. What challenges do you see for B2B firms that adopt the metaverse?
4. What concerns do you see for B2B firms that adopt the metaverse?
5. How does your platform support businesses that are using the metaverse in the B2B sector?
6. Do you use key performance indicators to measure the success of the metaverse in your organisation/platform?
7. How do you recommend B2B firms to prepare for metaverse implementation (of your platform)?
8. Do you have a suggestion to whom I can talk also about this topic?

Academics:

1. How do you define the metaverse in a B2B context?
2. What research have you conducted on the metaverse and its potential impact on the B2B sector?
3. What benefits do you see for B2B firms that adopt the metaverse in short term and long run (> 2 years)?
4. What challenges do you see for B2B firms that adopt the metaverse?
5. What concerns do you see for B2B firms that adopt the metaverse?
6. How can B2B firms prepare for and successfully implement the metaverse?
7. What academic challenges need to be overcome to better understand the impact of the metaverse on B2B firms?
8. Do you have a suggestion to whom I can talk also about this topic?

Consultants:

1. Do you have B2B expertise in the metaverse?
2. How do you define the metaverse in a B2B context?
3. What are some common reasons B2B firms consider adopting the metaverse?
4. What challenges do B2B firms often face in metaverse implementation?
5. What concerns do you see for B2B firms that adopt the metaverse?
6. How can B2B firms best prepare for metaverse implementation?
7. Can you share any case studies or examples of successful/failed metaverse implementation in B2B that you have been involved in?
8. What key performance indicators do you recommend to measure the success of the metaverse for your clients?

9. Do you have a suggestion to whom I can talk also about this topic?

B2B Executives:

1. How do you currently define the metaverse in your business context?
2. What benefits do you see for B2B firms/divisions that adopt the metaverse in the short and long run?
3. What challenges do you see for B2B firms that adopt the metaverse?
4. What concerns do you see for B2B firms that adopt the metaverse?
5. How have you prepared for metaverse implementation in your business?
6. Have you implemented the metaverse in any capacity yet? If so, what has been your experience so far?
7. Do you use key performance indicators to measure the success of the metaverse in your firm?
8. Do you have a suggestion to whom I can talk also about this topic?

A.2. Informed Consent

Informed consent interview: Metaverse implementation in B2B

You are being invited to participate in an explorative research study on *The Impact of the Implementation of the Metaverse in the B2B sector*. This study is being done by Felix Deleuze from the Delft University of Technology as part of a Master Thesis project.

The purpose of this research is to investigate the potential applications of the metaverse for B2B firms, including its benefits, challenges, concerns, required preparation, and the use of indicators to measure success, and will take you approximately 30 minutes to complete. I will be asking you to answer questions about your own (work) experience and expertise with the metaverse.

If you agree, the audio of the interview will be recorded, and the recording will be stored in TUD on a secure storage, accessible only to myself (Felix) and my TU Delft supervisors (Dr. T.L. (Tom) Dolkens and Dr. R.M. (Robert) Verburg). A transcript and anonymous summary of the discussion will be created and only your domain of activity and your job title will be included in these documents. The audio recording, transcript and summary will be stored in TUD institutional storage for the duration of the project, accessible only to the research team. The summary will be made publicly available at the end of the study (+/- end of June 2023). The audio recording and transcript will be deleted 2 years after the end of the study (+/- end of June 2025), and preserved in TUD institutional storage under the responsibility of Dr. Tom Dolkens. The audio and transcript may be used for future publication, in which you will be anonymous as well.

As with any online activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by keeping the data in the TUD. We will make a summary available to you, and you will be welcome to express any concern regarding their content (including refusing the publication).

Your participation in this study is entirely voluntary **and you can withdraw at any time**. You are free to omit any questions. Should you have any questions regarding the management of your personal data, feel free to contact Dr. Tom Dolkens.

Contact details:

Corresponding researcher:

Felix Deleuze

F.G.S.Deleuze@student.tudelft.nl

Responsible researcher:

Dr. T.L. (Tom) Dolkens

T.L.Dolkens@tudelft.nl

Signature		
_____	_____	_____
Name of participant [printed]	Signature	Date

Figure A.1: Informed Consent

B

Interview Summaries

B.1. Interview Summary P1

1. How do you define the metaverse in a B2B context?

The metaverse is a new iteration and a continuity of the internet. A virtual Experience in a virtual world with social interactions. It also has the possibility to impact e-commerce. In sum interactions and transactions in virtual world through immersive and social experiences.

2. What advantages do you see for the companies (B2B) you support in adopting the metaverse in the short term and in the long term (> 2 years)?

Advantages are really context and client dependent! For example actors of luxury brands (see examples) will have different needs than manufacture oriented actors. Traceability is a huge advantage to keep track of all your products. This is enabled through the use of blockchain on which the metaverse is partly based. Authentication since the metaverse allows digital property. It will impact e-commerce through transactions that are facilitated through crypto or NFTs (Non Fungible Tokens). Carrying out a metaverse transformation can help target a younger audience/rejuvenate your audience. It can be seen as a marketing tool to attract the younger generations. Customer experience is more immersive and creative to present a product. The possibility to showcase product and show their world to their client makes more sense than a picture on a website. The metaverse offers a new immersive experience: a virtual experience for clients which is revolutionary for the customer experience. Possibility to test/simulate products virtually before actual transaction allows to reduce errors and increase accuracy. Use-cases are in all departments: Marketing digital, IT, law. The metaverse enables to create an environment where you can include your community in decisions. This makes sure your decisions are informed and more impactful. Moreover, you can create a real community engaged with the company. Including community in decisions is also part of community creation and creates engagement and increases retention rate by creating a feeling of appurtenance. Collection of data generated in the metaverse can be really helpful for company since that data was not collectable before. Example eye-tracking during a customer experience. There is also a huge potential for education/formation/training of employees. The metaverse offers a more immersive experience putting people in realistic situations that can almost perfectly recreate their (work) environment. Long-term vision: P1 thinks both the real and virtual world will be complementary! Real and virtual experience will go hand in hand (some use cases are better for the one or better for the other ex. Visit a country for handicaps virtually, but better run real life for non-handicaps). The idea of having one replacing the other is a misconception.

3. What challenges do you see for B2B companies embracing the metaverse?

1) Understanding of metaverse/explain the potential of the metaverse to everyone in the

company. The communication surrounding the possibilities of metaverse projects need to be extremely clear, because it does not evoke a single thing to the majority. This can pose problems in budget validations and project deployment for metaverse projects for example. 2) Demonstrate a real interest through actual use-cases. It is only by showing that people will eventually understand and get involved 3) Technological challenges: It is still really early in the process for most of these emerging technologies. The experience is new nice but the headset for example is not comfortable, has a poor performing battery, has portability issues (not easy to transport the headset everywhere) and the virtual experience is not super realistic yet. 4) Simplify as much as possible to encourage adoption and be completely transparent from the start is crucial to avoid disappointment/failure. It is not always easy to do this for new projects because in an early stage, the outcome is uncertain and simplifying can be a struggle.

4. What concerns do you see for B2B companies embracing the metaverse?

The major fear that B2B companies have is the same fear as with AI. They are sometimes scared that the technology would grow too fast and be uncontrollable. Therefore, they prefer to control completely which is against the essence of decentralisation of web3 and thereby the metaverse. Challenges mentioned earlier and concerns go hand in hand.

5. How do you recommend that your customers prepare for the implementation of the metaverse (of your platform)?

B2B companies need to carry out “evangelisation/democratise” the metaverse in their company through (virtual or in-person) education/training by showcasing theory. This means showing use-cases, explain definitions, etc. This can be easily done by asking for help to an external metaverse expert. B2B firms need to have a long-term strategy (not just buy a land in sandbox). It has to be a well-thought strategy for in-depth use-cases, not simply a wow experience once. The metaverse implementation needs to have true utility. One possibility is to establish a long-term strategy is creating a clear roadmap. Recruiting specialised web3 consultant for missions (architect blockchain, 3D designer, innovation manager, ...) is a great way to get going, but it is also important to onboard persons that are knowledgeable about this digital transformation. Prior to a metaverse project, B2B firms need to ensure enough communication in advance of a web3 project to create a community that will be ready to engage in this metaverse environment. This is similar to selling a product. Include community in decisions making their clients also part of the decision process will create engagement and increases retention rate by creating a feeling of appartenence.

6. Can you share examples of successful/failed B2B metaverse implementations you have been involved in?

P1 worked with (luxury) brands that were selling both directly to consumers, but also to retailers (B2B): The web3 transformation was a must for them because thanks to the allowance of traceability and authentication, they were able to fight against fake products. The lesson here was that the implementation of a metaverse ecosystem answered a real need. Fiat as well as BMW co-created (virtual manufacturing before process) and presented their product in the metaverse. This allowed an experience that is very immersive and provides a complete new experience to their partners. They have very few reviews because it is still really early in the process making it difficult to get feedback on their work. Although, they happened to refuse certain projects because it did not focus on the right target (no use-case) or they were too early (precursor, fit-to-market was not on point yet). Often metaverse projects that are not working are projects too much focused on the short-term, In most cases, they are marketing attempts instead of real utility and do not possess a real strategy/vision. These are bound to fail. P1 worked with Lacoste. They have 2 kinds of customer groups: 1 group is web3 native and understands the potential of the metaverse and also feels comfortable interacting/using it, The other group, often older in age, does not understand the possibilities. We have to be aware that a certain part of the population prefers being identified in the virtual world than in the real world. The next

generation coming and it is important to prepare that transition. Finally, It is crucial to prioritise simplicity in the experience where non-experts can easily use and create in the metaverse. Moreover, transparency across the whole process is essential.

7. How do you measure the success of the metaverse in your organisation/platform? (KPIs, customers, ...)

In general, data collected in the metaverse is extremely valuable: Number of visitors of metaverse environments, bounce rate (marketing indicator to evaluate click-through rate, if it's high people are not clicking through your website/platform), duration of presence in metaverse environment and activities done, data pointing out if one certain activity generated another action (contact, sale, ...).

8. Do you have a suggestion of someone I could talk to about this topic as well?

Yes, one of his friends, Amaury de Kermel, could potentially help me.

C

Code Frequency Tables

	2 P1 59	3 P2 59	4 P3 51	5 P4 40	6 P5 28	7 P6 37	8 P7 38	9 P8 35	10 P9 28	11 P10 33	12 P11 26	13 P12 36	14 P13 33	15 P14 29	16 P15 40	17 P16 22	Totals
Augmented Pro...	3	4	1	4	1	2	9	3	2	2	5	2		3	2		42
Organizational Optima...	1			1			7		1	1	2	1					13
Simulations	1			1			3			1	1			1			9
Strategic Talent Manag...	3									1	1						3
Training	1	2	1	2	1	2	3	3	1	1	2	1		2	2		21
Enhanced Collab...	6	5	5	5	1	1	3	4	2	1	4		3	2	6	1	44
Co-creation	2	1	2	2			3			2							10
Community	4		1	2				1	1	1			2		1		14
Global Accessibility						1		2	1	1	1		1		1		8
Innovative Collaboration		1	4	1	1	1	1	2	1	1	1		1		4		16
Increased Costs...	6	8	8	1		3	1	5	1	3	1		3	4	4	1	62
Customer Engagement	1	1	2					1	1	1			3				11
Data Analytics	1	1				2				2			1				4
Immersive Experiences	2	1	2							1	1		1				11
Product Customization	2	4	5	1	2	1	1	1	1	2	1	2	3	4	1	3	27
Increased Profit...	2	1	1	1	2	3	1			1	1	1	1	4	1	3	19
Cost Effectiveness	19		1	1	2		1		1	1	1	1	3	4	1		8
Increased Revenue	2								1	1	1	1	1	1	1		17
Upgraded Marke...	1	1	1	5	1	2	1	1	1	1	1	1	1	1	1		13
Brand Image																	1
Marketing Experience																	1
New Marketing Channels	1			1		1							1				4
Totals	36	18	35	34	10	22	30	23	13	19	23	10	22	14	28	17	364

Figure C.1: Benefits

	2 P1 39	3 P2 39	4 P3 51	5 P4 45	6 P5 28	7 P6 37	8 P7 38	9 P8 39	10 P9 28	11 P10 23	12 P11 20	13 P12 39	14 P13 33	15 P14 28	16 P15 45	17 P16 21	Totals
Business Model	1	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	13
Long Term Strategy Lack	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
Utility	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6
Interoperability	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
Standards	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Managerial Capa...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Skills	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Workforce	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Security Safety	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Governance & Trust	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Safety	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
Security	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Technology infra...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
Hardware	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Technology Immaturity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13
Uncertain ROI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
Budget validation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
High uncertainty	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
High upfront investment	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
User Adoption	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
Resistance to change	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12
User fearfulness	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12
Totals	22	15	13	14	19	10	10	10	10	14	5	10	19	16	20	12	200

Figure C.2: Challenges

	2 P1 359	3 P2 59	4 P3 51	5 P4 40	6 P5 28	7 P6 37	8 P7 38	9 P8 35	10 P9 28	11 P10 33	12 P11 26	13 P12 35	14 P13 33	15 P14 29	16 P15 40	17 P16 22	Totals
Concept	1	1	2			1	1		1	4	1	4	4	1	1		22
Enabling Layer	1				1			2	1	1	1	2	2		2		13
Experience Layer	5	13	2	2	2	3	4	5	4	6	5	1	1	2	4	2	59
Foundational L...					1	1			4	1	2	5	1	2	2		22
Platform Layer	3	4	2	2		1	1	2	1	1	3	2	1		1		23
Totals	10	21	6	4	4	6	6	9	11	12	12	14	9	3	10	2	139

Figure C.3: Definition

	2 P1 30	3 P2 59	4 P3 51	5 P4 40	6 P5 28	7 P6 37	8 P7 38	9 P8 35	10 P9 28	11 P10 33	12 P11 26	13 P12 35	14 P13 33	15 P14 29	16 P15 40	17 P16 22	Totals
Apply Work...	3	2	2	1	1	2	3	4	1	4	2	1	2	3	3	1	39
Awareness & Education	2	1	2	1	1	1	2	1	1	1	1	1	2	1	2	1	14
Designate Ambassador	1	1	1	1	1	1	1	2	1	1	1	1	2	1	1	5	
Develop Skills	1	1	1	1	1	1	1	2	1	1	1	1	2	1	1	10	
Manage Change	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	10	
Develop a Value...	4	5	1	1	1	4	1	1	1	1	1	3	2	3	2	28	
Define Objectives and M...	3	4	1	1	1	3	1	1	1	1	1	2	2	3	2	22	
Identify Target Audience	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	4	
Research and Analysis	2	1	1	4	4	1	8	1	1	1	3	3	1	2	2	42	
Test & Learn	1	1	4	2	2	1	4	1	1	1	1	1	1	1	1	16	
Customize Empl...	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	10	
Focus on Exper...	1	1	3	1	1	2	2	1	1	1	1	2	1	1	1	17	
Pilots & Feedback	1	1	3	1	1	1	2	1	1	1	1	2	1	1	1	2	17
Totals	18	16	23	12	12	12	23	12	3	12	10	14	9	11	16	12	215

Figure C.4: Preparation

	2 P1 3.98	3 P2 3.59	4 P3 3.51	5 P4 3.40	6 P5 3.28	7 P6 3.37	8 P7 3.38	9 P8 3.35	10 P9 3.28	11 P10 3.33	12 P11 3.26	13 P12 3.31	14 P13 3.33	15 P14 3.29	16 P15 3.40	17 P16 3.22	Totals
Monitoring	4	5	5	3	3	1	5	1	4	1	3	7	5	5	1	2	50
Data Metrics	4	5	5	2	2	1	3	1	1	1	3	3	1	1	1	1	27
Environmental Scanning					1				3		3	1		1			7
Long-Term Strategic All...				1		1	2		1		1	3		4	1	2	16
User Feedback							1	4	1		1						8
Testing							1		1		1						3
User Analysis								3			1				1		5
Totals	8	10	10	6	6	2	12	10	10	2	8	14	0	10	4	4	116

Figure C.5: Sustainment

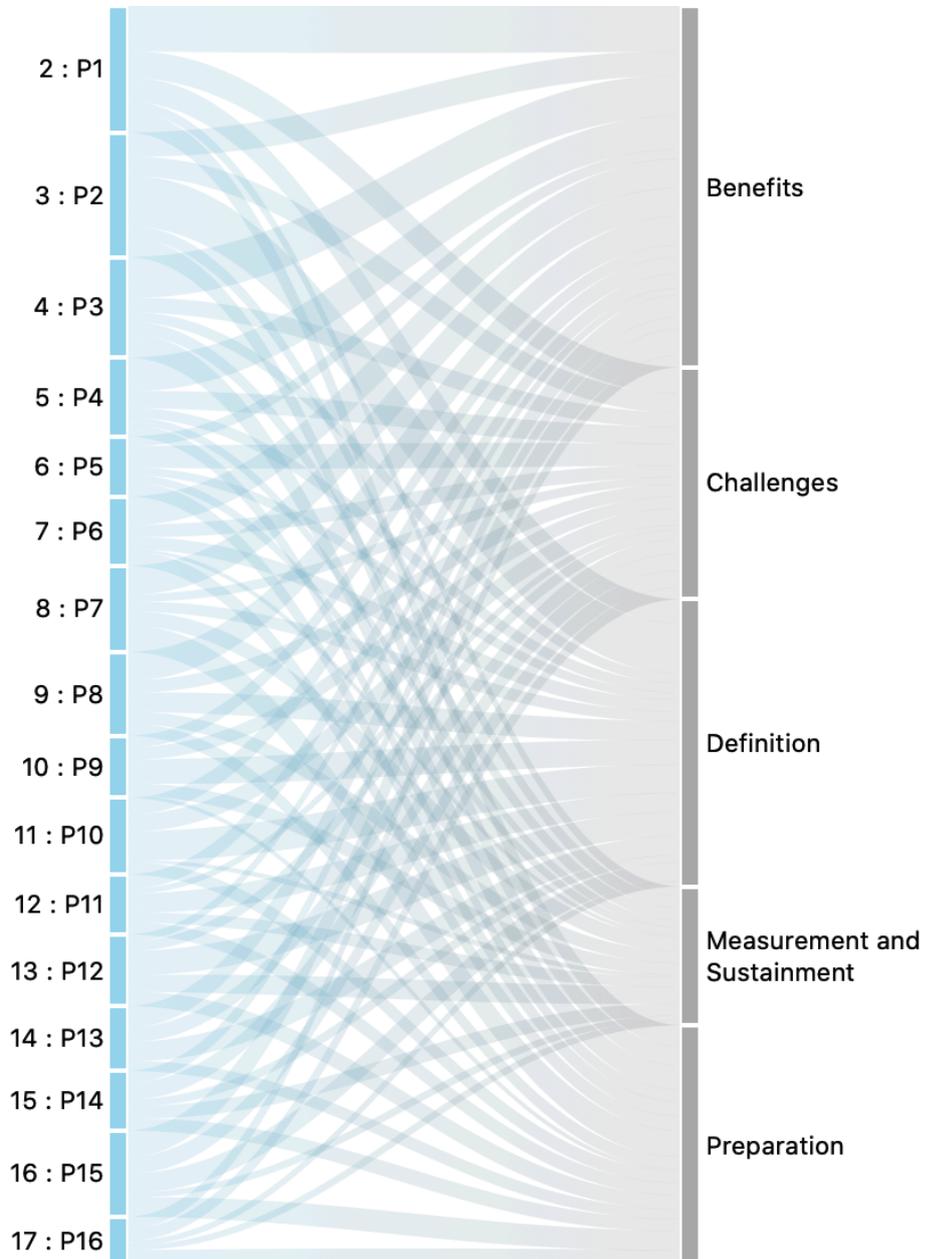


Figure C.6: Sankey Diagram of Codes