



## **Enabling the Metaverse**

Whitepaper on international user preferences, business models and innovation processes in the Metaverse

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### Enabling the Metaverse

#### Project management

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## List of abbreviations

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AR	augmented reality
BMC	Business Model Canvas
MR	mixed reality
NFT	non-fungible tokens
VR	virtual reality

## Executive Summary

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The Metaverse is on everyone's lips. After all, it is being treated as the successor to the Internet. Companies around the world are investing millions in its development. But so far it is unclear whether the preferences of people from different parts of the world about the Metaverse coincide or diverge. Therefore, over 1,500 people from Germany, the US and China were surveyed about their preferences in using the Metaverse. The results are presented in this whitepaper. The causal justification of these results is not the focus of the whitepaper. In addition, an introductory overview of relevant functions and technologies is given and, following the survey results, it is shown what impact the Metaverse can have on companies' business models and innovation processes and how they can approach the Metaverse.

One of the reasons for the current hype around the Metaverse is the convergence of different technologies with a high degree of maturity for processing, transmitting and displaying content, which together enable a new user experience.

However, the representative online survey of people from Germany, the USA and China revealed that there are different preferences about the favoured use and the advantages and disadvantages associated with the Metaverse. While the preferences of people from Germany and the USA are quite similar, the Chinese have a disproportionately higher expectation of the Metaverse, not least because of their comparatively high digital affinity shown in this survey. Accordingly, the analysis showed that China has by far the greatest market potential for the Metaverse. Due to the different preferences of people from China and the difficult market access of Western companies in China, a continuation of the power relations from the current generation of the Internet can be assumed.

Due to the large market potential identified in this study, the Metaverse will have an increasing impact on companies' business models - both in existing ones and new developments. When transferring existing activities to the Metaverse, it is important to work out the added value of a solution in the Metaverse compared to corresponding solutions in today's analog or digital world. One important factor is the conveyed feeling of commonality in contrast to current applications. Similarly, it is important to use new virtual sales channels and to establish new forms of customer relationships. At the same time, the underlying core processes must be adapted and potential savings in the cost structure must be leveraged. For new business models, versatile approaches can also be pursued far away from non-fungible tokens.

However, the need to adapt the business model is not the only issue. It is also necessary to rethink innovation processes and to leverage the additional potential, especially in the idea and marketing phase, in order to be able to compete with other companies against the backdrop of increasing innovation dynamics.

At the end of this whitepaper, companies are therefore also shown ways in which they can find access to the Metaverse and deal with the effects on their company. The focus here is on trial and error in order to gain important experience with the technology of the future at an early stage.

We hope to provide you with valuable insights through this study and look forward to hearing from you if you are interested in tapping into the potential of the Metaverse for your business.

## 1 Which Functions and Technologies are relevant for the Metaverse?

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In this study, the term Metaverse in capital letters serves as a collective term for all concepts of digitally supported or purely digital worlds (so-called metaverses), which differ from the digital worlds known so far by their consistent community character based in particular on the real-time multiplayer mode and by the use of new technologies especially for display and interaction, thus offering users new possibilities beyond pure gaming.

The convergence of different technologies with a high level of readiness, as shown for example by Meta (2021)<sup>1</sup>, is one characteristic of the hype around the Metaverse. At the same time, this convergence illustrates the complexity of the Metaverse. Therefore, and in preparation for the following chapters, a brief overview of which functions and technologies are relevant for the Metaverse is given.

### Develop Content:

For the development of a Metaverse, **game engines** are used to develop the gameplay. For high graphics requirements, photo-realistic 3D engines can be used. The modeling of content is done in particular with the help of **3D modeling tools**. The programming can be accelerated with the help of algorithms, e.g. of **artificial intelligence**.

### Save Data:

A Metaverse, like websites on the Internet, is hosted on company-owned servers or in a **cloud**, which are established technology. Massive capacities are available in many parts of the world. However, the energy consumption of server farms is considerable, which is why the issue of sustainability is playing an increasingly important role.

### Transfer Data:

Depending on the concept, it can be necessary to transfer a large amount of data between the servers or cloud and the users to run the Metaverse. In addition, a smooth user experience is crucial for the success of the Metaverse. This is where the current mobile network reaches its limits. Therefore, widespread deployment and use of the **5G standard** is required, through which large amounts of data can be distributed with low latency. This will eventually also enable the integration of real-time data from objects from the **Internet of Things**. In perspective, 5G also enables the trend towards ubiquitous computing, i.e. the ubiquity of small, wirelessly networked computers built into everyday objects.

*"The convergence of numerous existing and new technologies with a high degree of maturity is what makes the Metaverse so interesting at the moment."*

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<sup>1</sup> Meta (2021): The Metaverse and How We'll Build It Together - Connect 2021. Available 10/28/2021 at: <https://www.youtube.com/watch?v=Uvufun6xer8>, last accessed on 08.08.2022.

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### Process Data:

Processing the data requires computing power, which can take place on servers. In order to limit the data transfer between the end device such as a smartphone on the one hand and the server or the cloud on the other hand, the focus moves towards distributed and in particular local data processing in the end devices, which is also referred to as **edge computing**. In the long term, quantum computers can be used for specific applications.

### View Content:

Some Metaverse platforms can be used via the browser on the Internet, for which the screen of a PC or laptop is sufficient. Other concepts aim at a different user experience with the help of immersive Extended Reality (XR) technologies. **Augmented reality (AR)**, the extension of reality with digital content, or fully digital **virtual reality (VR)** are primarily used for display, although other mixed reality (MR) forms are also possible. While many people know augmented reality from the head-up display in their car or from the app Pokémon Go, which is why a smartphone display is sufficient to show AR content (but there are also open AR glasses), dedicated VR glasses are required for virtual reality. Powerful **graphics processing units (GPUs)** offer high graphics quality and fast frame rates for high-resolution content.

### Enable Interaction:

On top of established communication channels such as text and voice chat, for the interaction of the users with the Metaverse, on the one hand physiological data and motion data of the users must be captured from the real world and transferred to the Metaverse. In addition to classic controllers with acceleration sensors and gyroscopes for measuring rotational movements, sensor-based **motion capture methods** such as hand and eye tracking and, in the future increasingly, neural interfaces (**brain-computer interfaces**) for example by means of electroencephalography can be used for this purpose. **Computer vision** is also used to capture objects in reality. On the other hand, signals from the Metaverse are also transmitted to the user in reality. In addition to display and acoustics, this mainly includes haptic feedback through controllers. On top of the transfer of physiological and motion data, the machine understanding and generation of natural, human language through so-called **natural language processing (NLP)** is also important for interaction.

### Conduct Transactions

The **blockchain technology** forms the basic technology for processing transactions for example of digital goods, so-called **non-fungible tokens (NFTs)**, using **cryptocurrencies** in a traceable and manipulation-free manner. The best-known cryptocurrency to date is Bitcoin, but other so-called altcoins are frequently used in the Metaverse. Especially for secure transactions in the Metaverse, it is important to uniquely identify the users associated with the avatars by providing them with unique **digital identities (eIDs)** and authenticating them.

### Provide Security:

For companies in particular, the whole area of **cybersecurity** plays an important role. This primarily concerns data security, i.e. the protection of data from access by unauthorized persons.

## 2 What Metaverse do People want?

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People's expectations of the Metaverse vary. Some see it as a crazy idea or a repeat of a historical misunderstanding: the virtual world *Second Life*, which fell far short of expectations. Others see it as a niche, an interesting parallel world, or even the ultimate future of humanity. Duwe (2022)<sup>2</sup> already showed that initial surveys on people's attitudes towards the Metaverse had been conducted in recent months, but their results differed, sometimes significantly, despite the same area of investigation and similar survey periods. For this reason, it was analyzed why and how people from different places want to use the Metaverse. The focus is on showing differences in preferences and not on justifying these differences.

### Study Design:

With this in mind, to better understand what people want to do in the Metaverse, a structured online survey was conducted between April and July 2022, in which a total of 1,875 people successfully participated according to our screening criteria - i.e. completed the survey in an acceptable time, answered the quality question correctly and entered comprehensible values. Since the current second-generation Internet with players like Facebook has shown that the most successful social platforms operate internationally to serve global connections and leverage direct and indirect network and scale effects, the preferences of people from different countries were compared: Germany, USA and China. In order to make the sample of each country representative per gender, age, place of residence and employment, the responses of 540 people from Germany, 580 from the USA and 500 from China, i.e. a total of 1,620 responses were included in the analysis. Since the survey was implemented browser-based, the survey participants, supplied by a service provider, were Internet users. The results of the entire study are representative, since the same, complete basic population was always taken into account, including those people who had not yet heard of the Metaverse. The survey was preceded by a visual and textual description of current Metaverse concepts and their capabilities in order to elicit qualified responses from all the respondents - including especially those who had not yet heard of the Metaverse. Due to the already gathered experience of some people in the considered countries in using a Metaverse, a stated-preference survey was conducted. A four-month survey period was chosen to avoid bias in responses due to situational effects. The results are presented in the following subsections.

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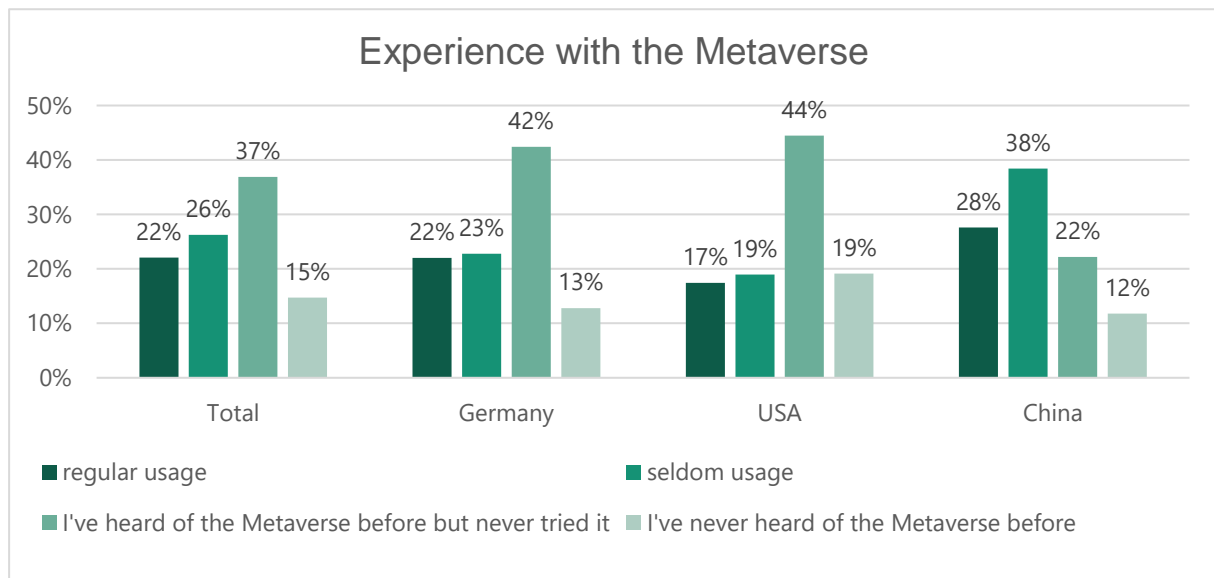
<sup>2</sup> Duwe, D. (2022): Metaverse for the people. In: Proceedings of the XXXIII ISPIM Innovation Conference "Innovating in a Digital World". Copenhagen, Denmark. 05-08 June 2022. ISBN: 978-952-335-695-5. LUT Scientific and Expertise Publications.



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### 2.1 How many People already have Experience with the Metaverse?

Digital or virtual worlds in which people interact already exist, even though some of them are of low technological progress. These include for example Decentraland, Fortnite or Roblox. Therefore, the survey participants were asked whether they have already used some kind of Metaverse.



**Figure 1: Experience with the Metaverse**

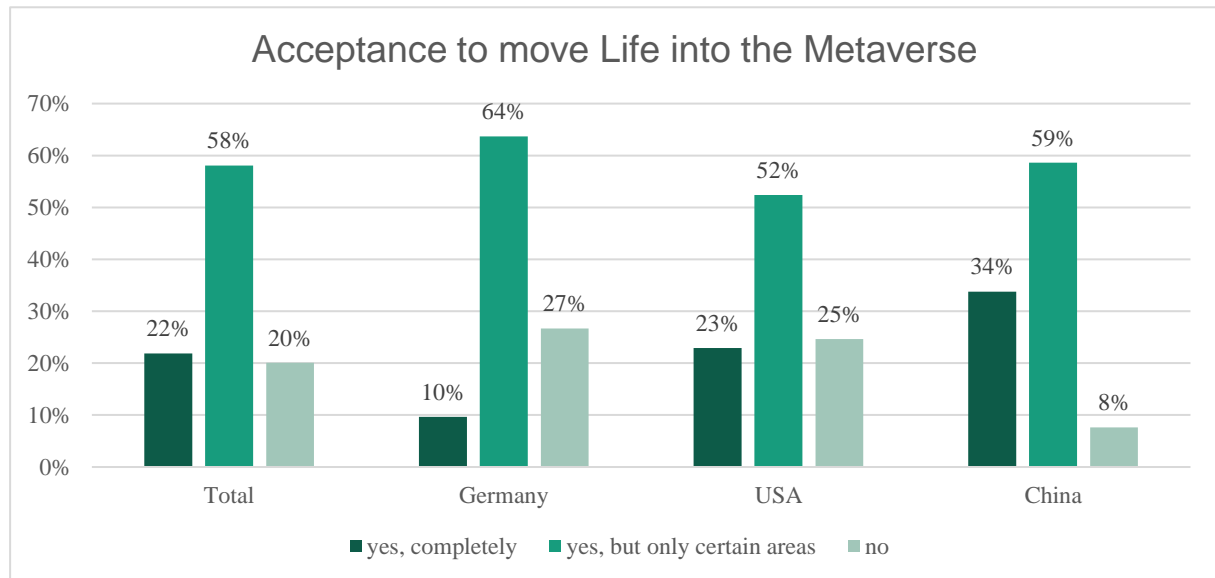
While the majority of Germans and Americans have heard little or nothing about the Metaverse, the majority of Chinese have at least some experience with it.

A deeper look into the data reveals that men and the group of 16 to 40-year-olds have above-average experience with virtual worlds. At the age of 60 and above, there is very little experience with the Metaverse.

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### 2.2 Who can imagine a Life in the Metaverse?

People were also asked in the survey if they could imagine living in the Metaverse, or at least moving certain activities into the Metaverse.



**Figure 2: Acceptance to move Life into the Metaverse**

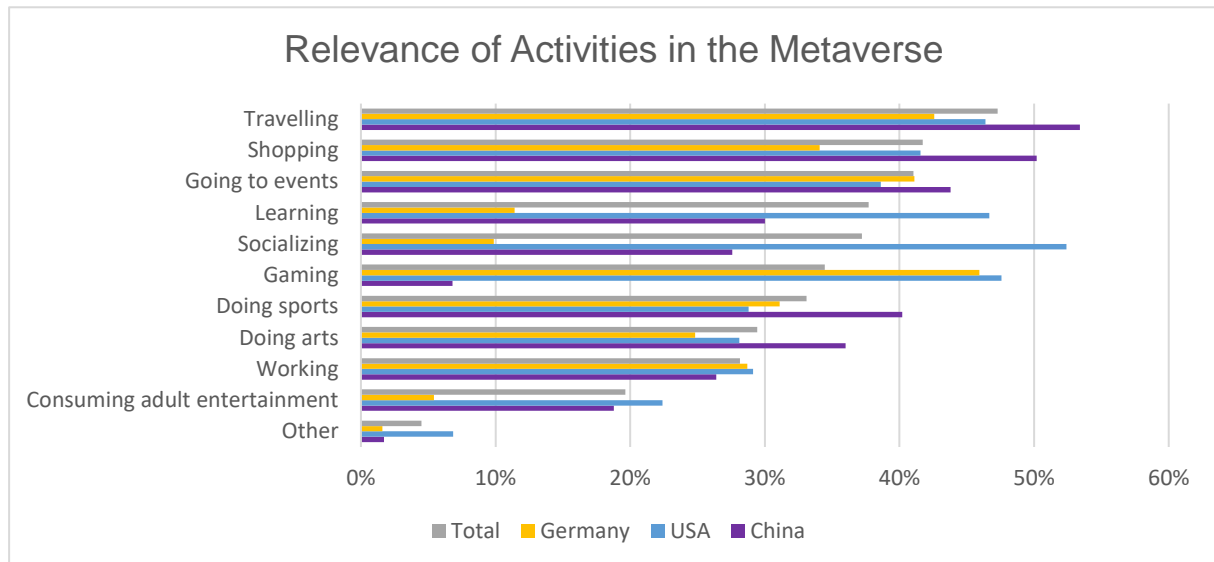
The absolute majority of the people from all countries considered can imagine at least a partial shift of activities to the Metaverse. While only 10% of Germans can imagine a completely digital life, this figure is already 34% in China. Only 8% of the Chinese reject the Metaverse completely, whereas in Germany it is more than three times as many people with 27%.

Moreover, when looking at the gender and the age, a significantly higher rejection among women compared to men can be seen. The 31- to 35-year-olds are the most open to a complete life in the Metaverse.

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## 2.3 What do People in the Metaverse want to do?

The possibilities in the Metaverse are almost unlimited, at least in theory. Therefore, the survey asked what activities people would most like to do in the Metaverse.



**Figure 3 Relevance of Activities in the Metaverse**

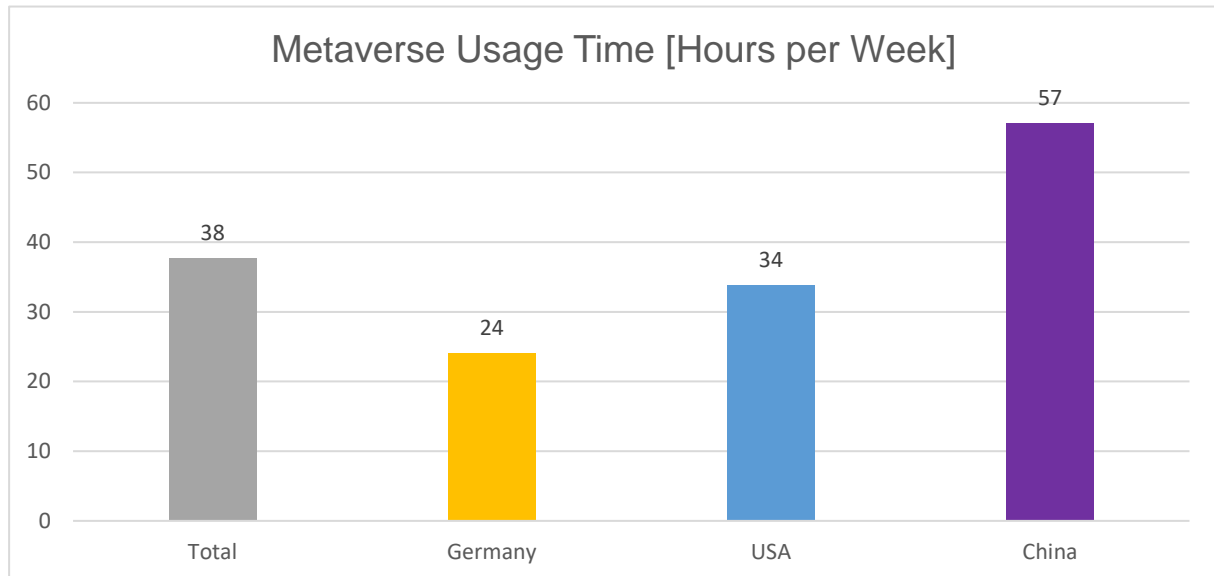
On average, virtual travelling is the most important activity in all countries: just under one in two people can imagine doing this. This is followed by shopping and attending events. Working in the Metaverse is only of interest to less than a third of the respondents.

When comparing the countries, Germans have the lowest and Chinese the highest interest in virtual activities. What is striking is the very high interest of people from China in virtual travelling, followed by Americans and Germans. This order is reciprocal to the average available vacation days in the respective countries<sup>3</sup>, which may indicate that people with little vacation days hope for additional recreational or experiential opportunities through the Metaverse. It is also noticeable that, in contrast to people from other countries, people from Germany hardly want to use the Metaverse to meet friends, which is often, but not exclusively, attributed in qualitative interviews to catch-up effects after the restrictions on freedom while the Corona pandemic. Germans are also sparsely interested in using the Metaverse for learning and show relatively little interest in adult entertainment. They would rather like to use the Metaverse for playing games, in which people from China, in turn, show little interest. In this respect, clearly different usage motives are visible between China and the two Western countries. The open question about other activities in the survey only resulted in concretizations especially in sports and leisure activities like travelling to another planet. Interest was also expressed in virtual dating and - especially in China - in additional opportunities to earn money.

<sup>3</sup> Mercer (2009): Gesetzlicher Urlaubsanspruch: Deutschland Schlusslicht in Europa. Available at: <https://www.pressreleasepoint.com/gesetzlicher-urlaubsanspruch-deutschland-schlusslicht-europa>, last accessed on 16.08.2022.

## 2.4 How much Time do People want to spend on Activities?

In addition to their interest in activities in the Metaverse, the survey participants were asked how many of the 168 hours per week they would like to spend in the Metaverse in general and what specific activities they would like to pursue.



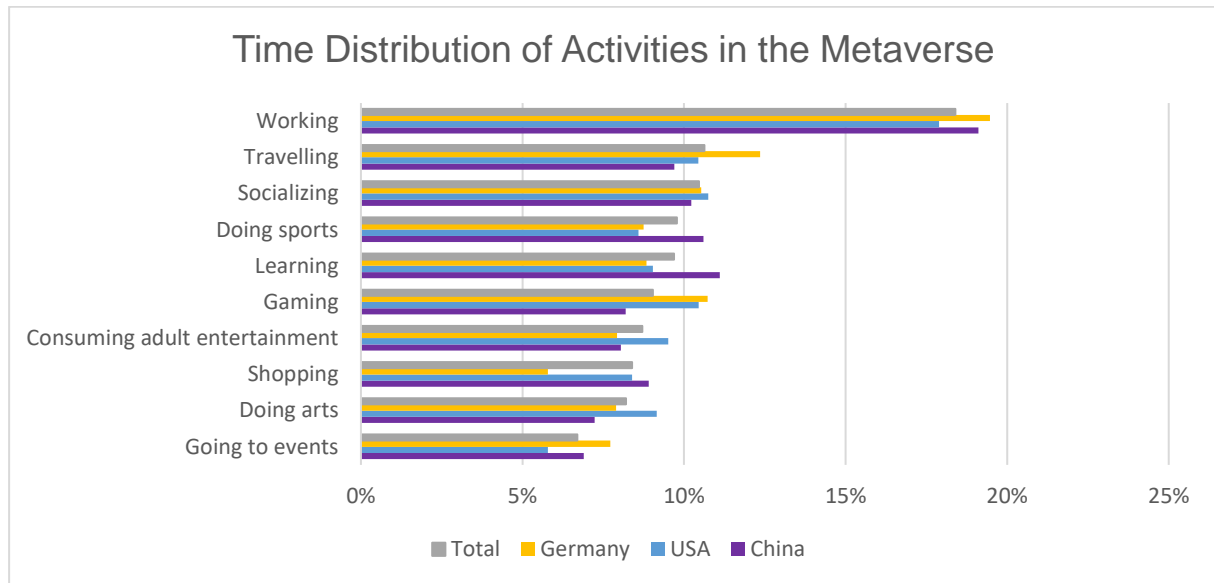
**Figure 4: Metaverse Usage Time [Hours per Week]**

The average duration of use amounted to 37 hours per week, which corresponds to slightly more than 5 hours per day. The Chinese state that the desired duration of use is more than twice as high as the one of Germans which is longer than the usual working week of a German employee.

An examination of other socio-demographic characteristics shows that men and 36- to 40-year-olds indicate the highest duration of use.

In addition to the total usage time, the usage times per activity that people are willing to invest in the Metaverse were also surveyed. The total of these is significantly higher than in the Figure 4 which was carried out after the individual evaluation of the advantages and disadvantages of the Metaverse described in chapter 2.7. Therefore, a realistic lower limit of the actual usage duration can be assumed for the overall query. It is interesting to have a look at the distribution of the usage durations among the activities.

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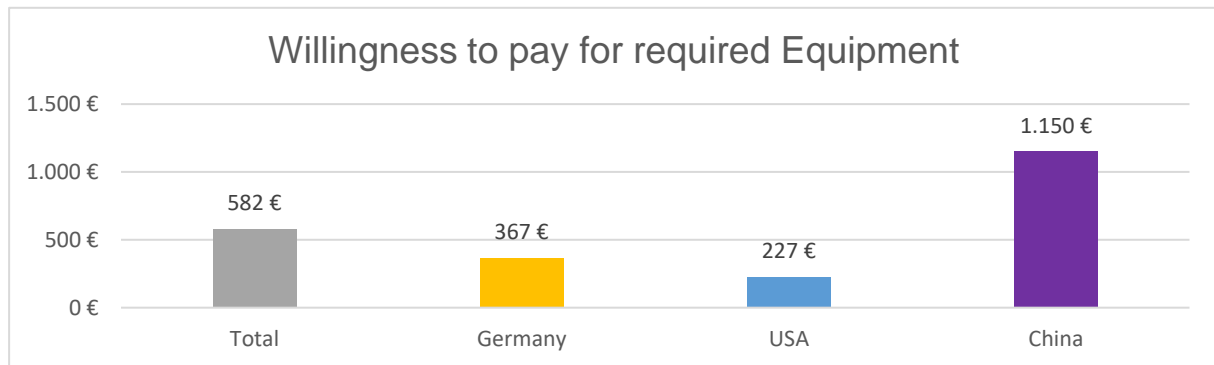
**Figure 5: Time Distribution of Activities in the Metaverse**

Across all countries, the people surveyed assume that they would invest by far the most time in working in the Metaverse, even if it is not of the highest interest to them - as previously shown. This is followed by travelling and meeting friends. For the two activities shopping and attending events, which were rated second and third highest in terms of relevance, the least time is invested. The relatively large proportion of time that the Chinese would invest in education is also striking. While Germans would spend the least time on shopping, Americans and Chinese would spend the least time on attending events.

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## 2.5 How much would People spend on the necessary Hardware?

Metaverse concepts based on virtual reality currently come along with entry barriers for many people as they do not have the necessary hardware. Therefore, the people were asked how much money they would be willing to spend to purchase hardware that may be required to use the Metaverse, such as VR goggles and controllers.



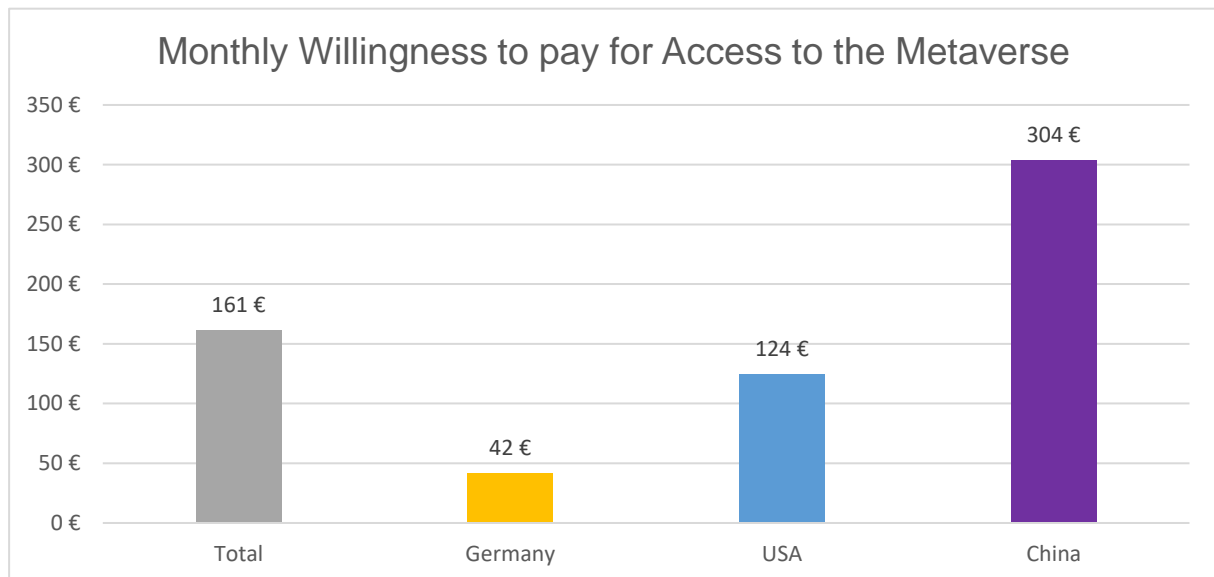
**Figure 6 Willingness to pay for required Equipment**

On average, the willingness to pay for the required hardware is just under 600 €. People from the USA have the lowest willingness to pay at 227 €. The Chinese indicated the highest willingness to pay with the equivalent of 1,150 €, although they have the lowest average gross domestic product per capita of all the populations considered<sup>4</sup>. This illustrates the high importance that the Chinese attribute to the Metaverse.

<sup>4</sup> The World Bank (2022): GDP per capita. Available at: <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>, last accessed on 16.08.2022.

## 2.6 How much would People spend to access the Metaverse?

The largest social networks such as Facebook are generally free of charge in their basic functions and finance themselves in particular through advertising, the sale of user data or additional functions and content for which a fee is charged. However, especially in the area of dating and access to artistic content such as music, monthly fees are also charged for usability. Therefore, the survey also asked how much money people are willing to spend per month for access to the Metaverse.



**Figure 7: Monthly Willingness to pay for Access to the Metaverse**

Overall, 84 % of respondents indicated a willingness to pay more than 0 € per month - 79 % of Germans, 80 % of Americans and 96 % of Chinese. On average, respondents indicated a maximum willingness to pay of 167 € per month - 42 € in Germany, 124 € in the US and 304 € in China. The high willingness to pay of the Chinese is particularly striking, but is in line with the fact that apps from Chinese providers are more often than average subject to payment<sup>5</sup>.

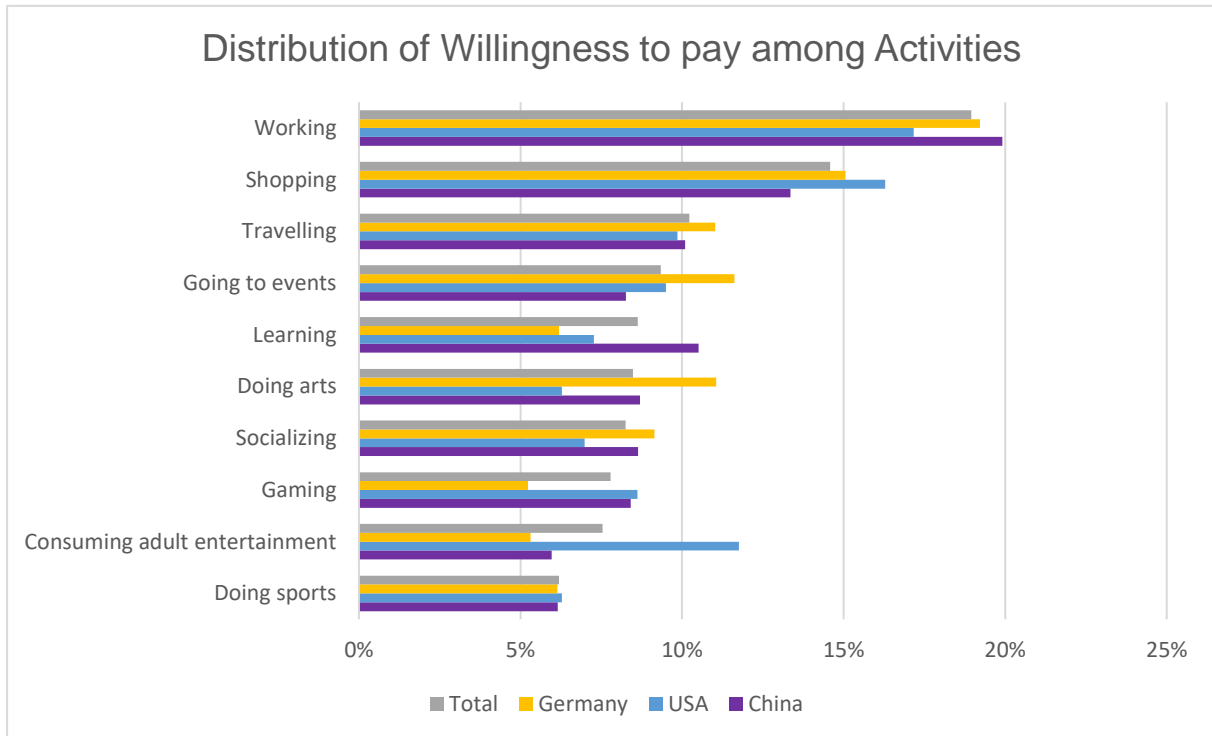
Taking into account the respective population levels and an exchange rate of 1.08 US dollars and 7 Chinese yuan per euro, this would result in a total annual market potential of 5.3 trillion € for these three countries: 33 billion € for Germany, 394 billion € for the US and 4.9 trillion € for China. Accordingly, China will become the commercial lead market for the development of the Metaverse.

*"China is becoming the lead commercial market for the Metaverse with a total market potential of about 5 trillion €."*

<sup>5</sup> 42matters (2022): China App Market Statistics in 2022 - How Do Chinese Apps Monetize. Available at <https://42matters.com/china-app-market-statistics>, last accessed on 16.08.2022.

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In addition, the distribution of the willingness to pay among the various activities in the Metaverse was of interest in this study. The sum of the stated willingness to pay for the individual activities again exceeded the total willingness to pay, which is why the latter is assumed to be the lower limit.



**Figure 8: Distribution of Willingness to pay among Activities**

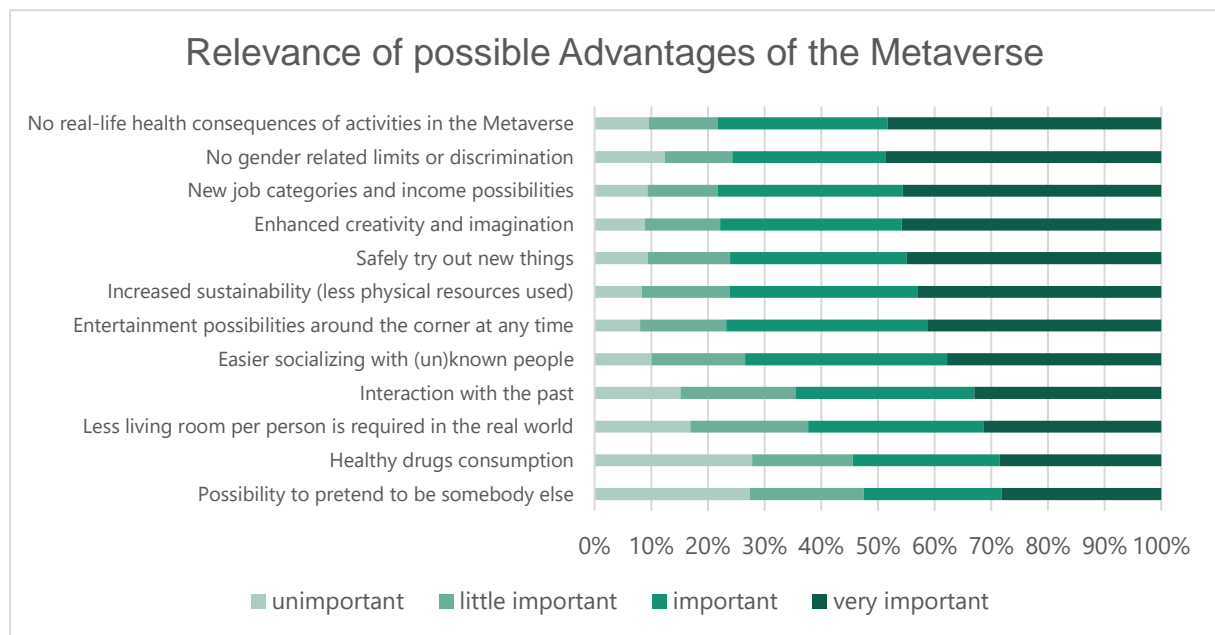
When looking at the distribution, it becomes clear that people dedicate the largest share of their willingness to pay to the opportunity to work, followed by shopping and travelling. In Germany, the willingness to pay is comparatively high for attending events and performing artistic activities. The lowest willingness to pay on average is found in all countries for sports. Only in Germany is the willingness to pay for games and adult entertainment even lower.

Activities for which there is a relatively high willingness to pay with relatively little time invested are of particularly high value for business modeling. Shopping has the highest value across countries, followed by attending events. Artistic activities and works can also be considered quite high-value according to this definition, with art being particularly important to Germans. Also of relatively great importance is adult entertainment in the USA and gaming in China.



## 2.7 How do People rate the Advantages and Disadvantages of the Metaverse?

The adoption of new, especially IT-based technologies depends on the perceived usefulness and the perceived ease of use according to the widely accepted Technology Acceptance Model<sup>6</sup>. Due to the large number of Metaverse concepts still under development, the focus was placed on the usefulness, which, along with the revenue model and the value creation system, represents the central element in the development of business models. People were therefore asked how they assess the (possible) advantages and disadvantages as well as positive and negative consequences of the Metaverse.

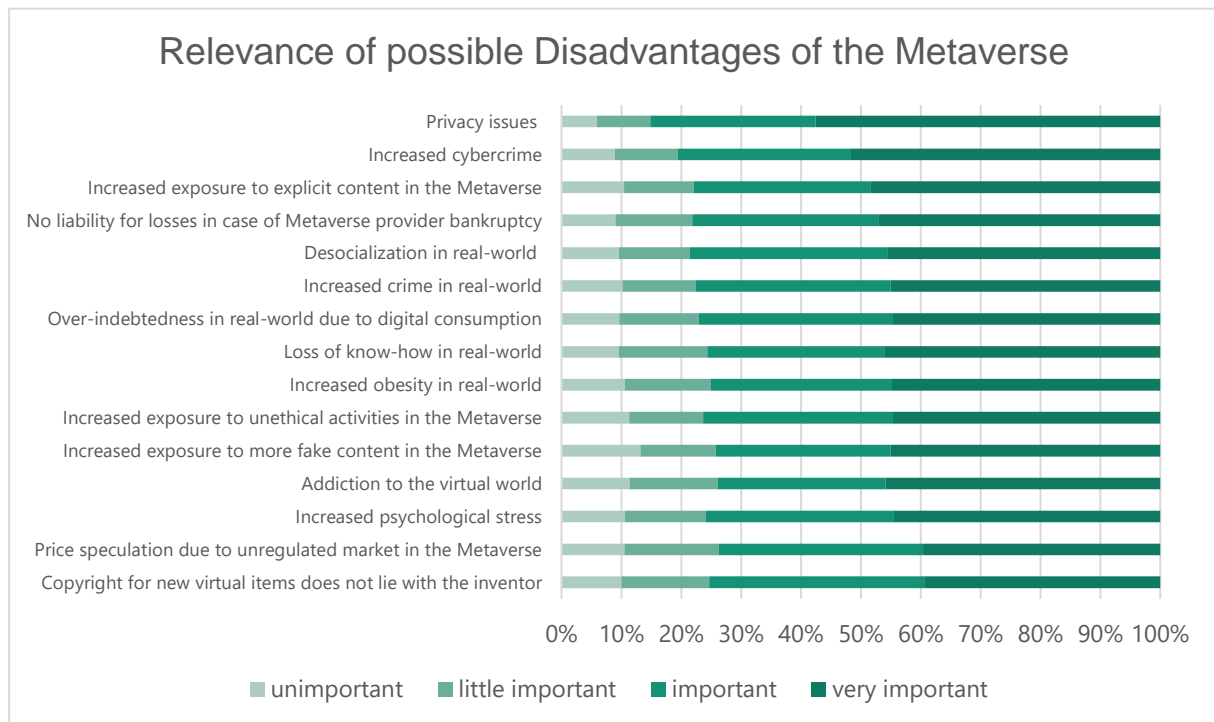


**Figure 9: Relevance of possible Advantages of the Metaverse**

The lack of physical consequences of virtual actions in reality, new job categories and increased creativity are named as positive added value. Overcoming gender-based discrimination is also considered very important by just under half of the respondents, but at the same time it is also rated as not very important or unimportant by a relatively large number of people. The possibility of being somebody else in the virtual world is considered relevant by half of the people, but least important compared to other benefits.

<sup>6</sup> Davis, F. D.; Bagozzi, R. P.; Warshaw, P. R. (1989): User acceptance of computer technology: a comparison of two theoretical models. In: Management Science 35 (8), page 985.

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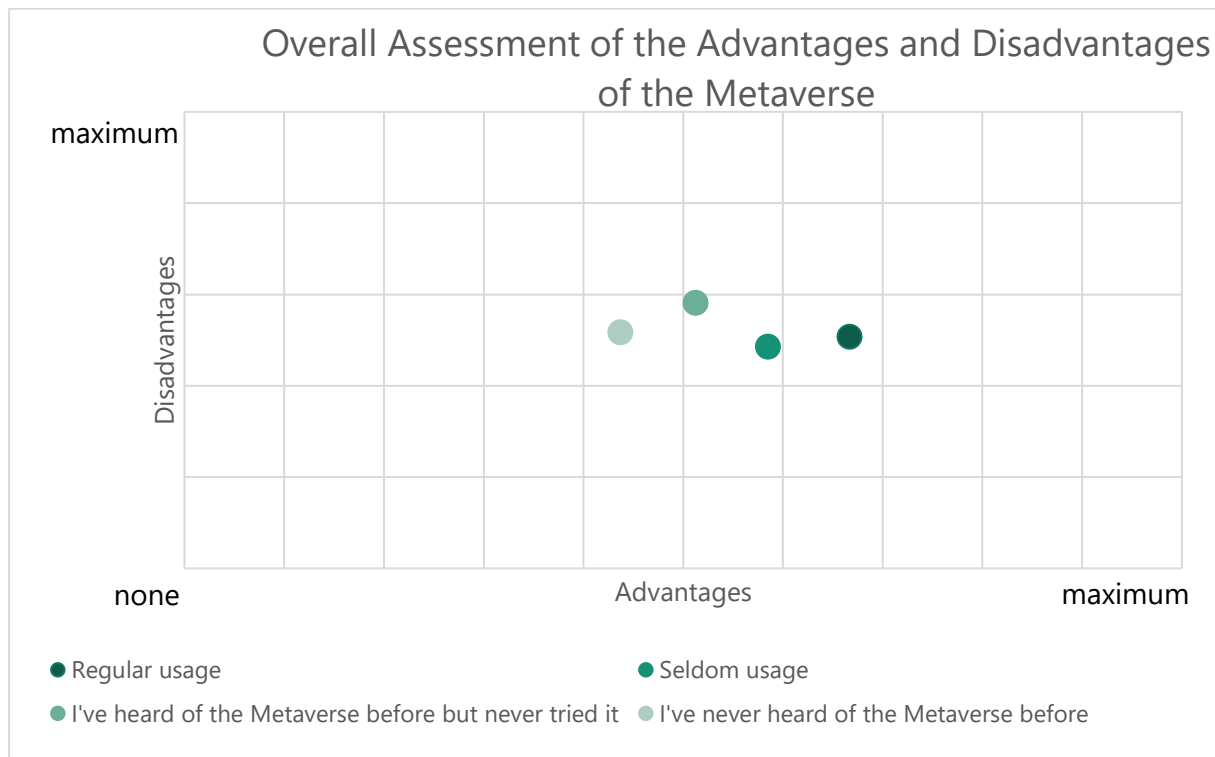


**Figure 10: Relevance of possible Disadvantages of the Metaverse**

Among the negative characteristics and consequences of the Metaverse, in particular problems with the protection of personal or company-related data and increased cybercrime were highlighted, in which bots and deepfakes, for example, will play an increasingly important role. Also cited as significant problems were exposure to adult content and consequently non-compliance with the protection of minors, as well as the lack of liability for losses in the event of Metaverse operator insolvency, which may be related to the *Second Life* experience reports or cryptocurrency exchange fraud incidents.

Due to the numerous positive and negative aspects associated with the Metaverse, respondents were asked to evaluate its advantages and disadvantages holistically for a final assessment of the Metaverse. The results are presented in Figure 11.

## Enabling the Metaverse



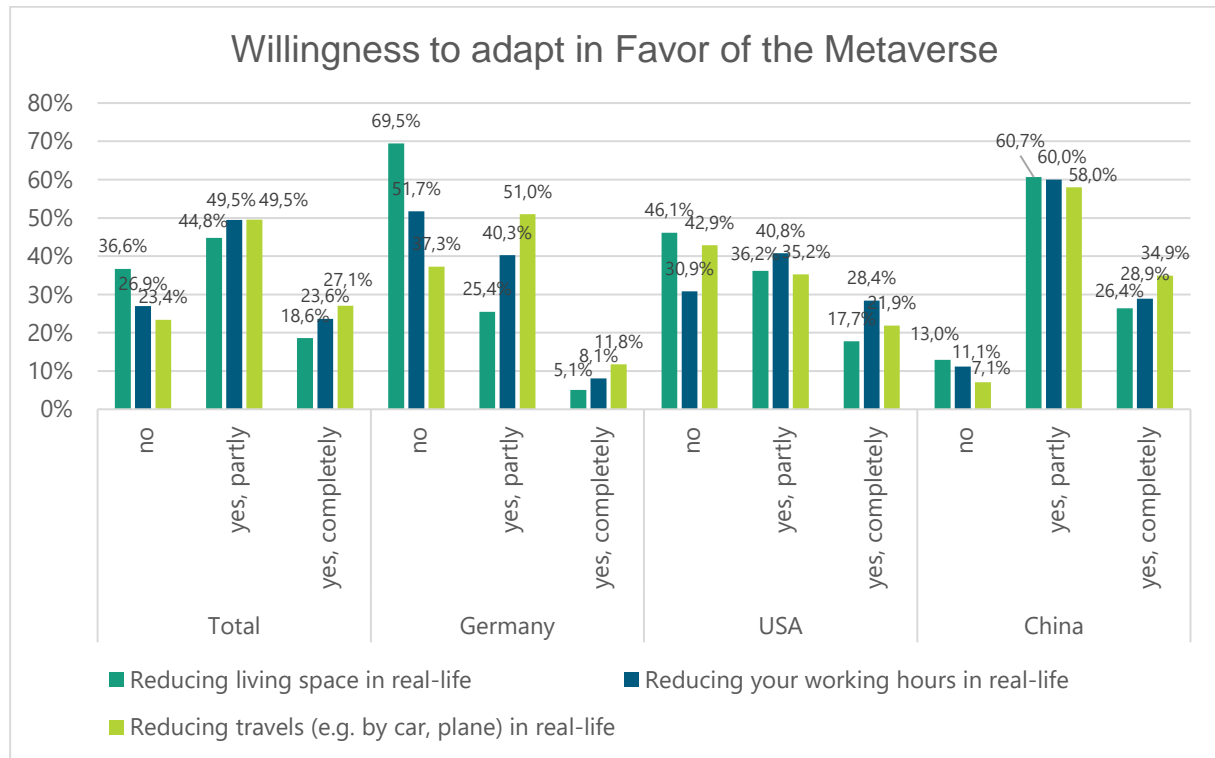
**Figure 11: Overall Assessment of the Advantages and Disadvantages of the Metaverse**

The negative aspects are largely considered average (i.e. between a little and a lot) for digital solutions, regardless of the frequency of use, with the exception of those people who have heard of the Metaverse but have not yet tried it. The latter see an above-average number of disadvantages associated with the Metaverse. With increasing knowledge and experience, respondents clearly see more benefits in the Metaverse. One reason for this could be negative reservations about the Metaverse, which is why providers should be keen to encourage people to try it out.

## 2.8 What are the Implications of the Metaverse for Work, Mobility and Housing?

Because of the many possibilities in the Metaverse, the survey participants were asked to what extent the Metaverse could affect their real lives. Specifically, they were asked whether they would be willing to reduce living space, working time and travel in reality in favor of the Metaverse. Because people generally need living space for basic needs such as sleeping, the term living space is understood here to mean exceeding usable space that is available for longer periods of time.

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**Figure 12: Willingness to adapt in Favor of the Metaverse**

Overall, around three quarters of people are willing to reduce their working hours and travel in reality in favour of the Metaverse. Almost two-thirds of all people are also willing to reduce their living space, at least in part. The highest resistance to change concerns the case of living space compared to the other two points. When comparing nations, it becomes clear that Germans have the lowest willingness to change and Chinese the highest one. This willingness to change may, among other factors, be related to the already very advanced digitalization of Chinese society.

These results suggest that the Metaverse can contribute to climate protection and greater sustainability by reducing travel in the real world. This is especially true if renewable electricity is used for the servers. Due to the willingness of the respondents to reduce working hours in the real world, there is sufficient room for the creation of new professional fields in the digital world. At the same time, however, the (skilled) labor shortage, especially in vital industries, may continue to intensify in the real world. A strong spread of the Metaverse can also help to reduce housing demand in the real world and consequently the housing shortage, which in turn could reduce the cost of housing.

### 3 What Impact does the Metaverse have on Business Models and the Innovation Process?

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#### 3.1 What is the general Impact of the Metaverse on Business Models?

In the previous chapters, it was shown that the Metaverse can virtually enable known and new activities and that this can have a wide range of consequences, both positive and negative. In order to enable or support these virtual activities, it will be necessary in many areas to adapt business models which are successful today or to invent completely new business models. Such business models can take very different forms. Although Baumann points out that it is not yet clear "how successful business models can be designed in the Metaverse"<sup>7</sup> the first ideas of business models in the Metaverse for private individuals and companies are already emerging and will be discussed below. The changes associated with the Metaverse can be seen as an opportunity or a challenge, depending on one's perspective. In this chapter, first, the opportunities and challenges are presented in general terms and then discussed on the basis of selected industries. For reasons of simplicity, a simplified model of the "Business Model Canvas" (BMC)<sup>8</sup> framework, which is popular in business model development, is used for the discussion in this chapter featuring the following dimensions:

- Value proposition
- Target groups, customer relationships & sales channels
- Revenue streams
- Key activities, resources & partners
- Cost structure

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<sup>7</sup> The German Academic Association of Business Research (VHB) (2022): Schöne neue Welt: Big Business mit Metaverse - VHB expert Sabine Baumann zu Geschäftsmodellen im Metaverse. Available since 03.07.2022 at: [https://www.vhb-online.org/vhb-experts/state-ments?tx\\_news\\_pi1%5Baction%5D=detail&tx\\_news\\_pi1%5Bcontrol-ler%5D=News&tx\\_news\\_pi1%5Bnews%5D=391&cHash=ef316d29972f11bd24a13d4a3eabc90c](https://www.vhb-online.org/vhb-experts/state-ments?tx_news_pi1%5Baction%5D=detail&tx_news_pi1%5Bcontrol-ler%5D=News&tx_news_pi1%5Bnews%5D=391&cHash=ef316d29972f11bd24a13d4a3eabc90c), last accessed on 02.08.2022.

<sup>8</sup> The 9 dimensions of the Business Model Canvas were originally described by Osterwalder in: Osterwalder, A. (2004): The Business Model Ontology - A Proposition In A Design Science Approach. Dissertation. Lausanne: University of Lausanne.

## Enabling the Metaverse

Impact of the Metaverse on Business Models (based on simplified Business Model Canvas)			
<div>Key activities, resources &amp; partners</div> <div>Which are the most important activities? What physical, human and financial resources are indispensable? Who are the most important partners?</div> <div>Opportunities:<ul style="list-style-type: none"><li>Better employee sourcing (e.g. through worldwide access and virtual site visits)</li><li>Faster exchange of important process data</li></ul>Challenge:<ul style="list-style-type: none"><li>Any necessary adjustments to key processes (e.g. "just-in-time everywhere" delivery)</li></ul></div>	<div>Value proposition</div> <div>What problem is solved for the user, what need is satisfied?</div> <div>Opportunity: to work out added value compared to services in today's analogue and digital world, e.g.:<ul style="list-style-type: none"><li>24/7 availability</li><li>Geographical independence</li><li>Social commonality (benefit from the presence of others)</li><li>Certain degree of anonymity</li><li>No effects on real control operation</li><li>Lower costs (e.g. no physical transport)</li><li>New things that were previously unthinkable in reality (e.g. new object shapes)</li></ul></div>	<div>Target groups, customer relationships &amp; sales channels</div> <div>To whom should the products be sold, how and where? How do people find out about it? How are customers won &amp; kept?</div> <div>Opportunities:<ul style="list-style-type: none"><li>Development of new customer groups (especially communities as target groups)</li><li>Early customer contact possible</li><li>New customer channels (e.g. secure, virtual product demonstrations and tours of virtual twins or virtual showrooms)</li></ul>Challenges:<ul style="list-style-type: none"><li>First mover advantage for more awareness</li><li>New key attributes: trust, emotion</li><li>New customer channels (e.g. virtual influencers)</li></ul></div>	
<div>Cost structure</div> <div>What are the most important expenses without which the business model would not run?</div> <div>Opportunities:<ul style="list-style-type: none"><li>Lower overhead costs by decoupling from physical constraints</li><li>Lower personnel costs (e.g. for the training of employees, distributed in different locations, on production machines and products) and material transport costs due to fewer business trips and trade fair visits</li></ul>Challenge:<ul style="list-style-type: none"><li>Additional costs for the creation of digital environments or the Metaverse presence and provision of Metaverse access in real stores</li></ul></div>	<div>Revenue streams</div> <div>How is money generated? (selling, renting, etc.)</div> <div>Opportunities:<ul style="list-style-type: none"><li>Sale of services (e.g. provision of a cinema film or concert, virtual building construction, analytics, display of additional information through AR)</li><li>Sale of NFTs (e.g. art objects, clothing) and content (e.g. games)</li><li>Paid admission to virtual places (e.g. zoo)</li><li>Paid admission to real-world locations like a Metaverse Experience Center with technology for multi-dimensional movement</li><li>Sale and rental of virtual land</li><li>Placement of virtual advertising</li></ul></div>		

Figure 13: Effects of the Metaverse on Business Models

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### Value proposition:

When transferring already known activities from today's analogue or digital world into the Metaverse, it is particularly important for a successful diffusion of new offers in the Metaverse to work out and highlight the added value for users over the offers in today's world. This added value can satisfy hedonistic or functional needs<sup>9</sup> and can, for example, lie in the permanent availability, the local independence or the conveyed feeling of togetherness e.g. in virtual cinema screenings. This, however, does not exclude individual offers as in today's world. Accordingly, it is also important to elaborate the product experience along the virtual customer journey. It is worth taking a look at South Korea to understand another added value of the Metaverse: Differentiation. For example, in the Asian metaversum Zepeto, designer Kim Ji Yoon successfully designs clothing for avatars, which currently involves much effort if 3D scanners are not used, since each hair must be programmed individually<sup>10</sup>. With her clothing, she offers South Koreans opportunities for development that are limited in real life by local norms and regulations. In addition, the Metaverse also offers people a certain degree of anonymity in social contacts despite virtual proximity due to the spatial distance. For companies in particular, the advantages of the Metaverse also lie in the independence from regular operation times in reality when using digital twins and in low costs for example due to the elimination of the transport of physical goods. In general, however, the value proposition depends on the Metaverse rules that apply in each case.

### Target groups, customer relationships & sales channels:

The value proposition can be offered to new customer groups in the Metaverse, with the community idea becoming increasingly important. But also for individuals, advertisements in the Metaverse can be more individualizable than in reality. The viewing of safe, virtual product demonstrations, virtual twins or showrooms open up new customer channels through which products can be experienced in a playful way, if desired. Hereby, fascination for one's products can be triggered and a very early brand loyalty of potential customers can be achieved. Finally, products can be tested by people before they are allowed to use them in reality, for example due to age restrictions. Some companies have been linking NFT tokens to access to exclusive physical products or real-world events. This represents a new form of customer relationship that aims to create and serve specific communities as new target groups.

The establishment and maintenance of intact customer relationships is an important task in the Metaverse, as for example so-called "vampire attacks" showed. The developers of new but similar decentralized finance protocols for trading virtual content carried them out in order to gain customers and liquidity from a competitor by offering better conditions. As the volume of transactions increased, the protocol increasingly gained value, and because the developers simultaneously held a large portion of the respective currency themselves, their share also gained value. In some cases this portion was ultimately liquidated, leading to much distrust among users. This example highlights the short response times and the automation capability of activities in the virtual world, which can lead to lower customer loyalty.

Similar to today, there is the challenge in the new customer channels and relationships that usage behavior and consumption decisions in the Metaverse can be influenced, for example, by targeted peer-to-peer marketing or by artificial, automated entities. This illustrates the great importance of

<sup>9</sup> Gursoy, D.; Malodia, S.; Dhir, A. (2022): The metaverse in the hospitality and tourism industry: An overview of current trends and future research directions. In: Journal of Hospitality Marketing & Management 31 (5), page 530, DOI: 10.1080/19368623.2022.2072504.

<sup>10</sup> Peters, K. G. (2022): South Korean designer. She makes 11,000 euros a month - with fashion in the metaverse. Available 01.08.2022 at: <https://www.spiegel.de/ausland/designerin-kim-ji-yoon-aus-suedkorea-sie-macht-11-000-euro-im-monat-mit-mode-im-metaverse-a-6461c739-fbe1-419e-9959-d4a4ccde9c31>, last accessed on 02.08.2022.

## Enabling the Metaverse

trust and authenticity in customer loyalty in the Metaverse, especially in the early development phase of it.

Early activities in the Metaverse also provide an opportunity for companies to raise their profile and build an innovative reputation.

### Revenue streams:

For individuals and businesses, numerous opportunities exist in the Metaverse to earn money. Most of these are directly related to the added value provided in the Metaverse, which encourages users to pay for it.

The first and probably best-known possibility lies in the development and trading of non-fungible tokens (NFTs) as a new key activity. Especially in the artistic field, NFTs are experiencing increasing popularity, as the diffusion of virtual art objects or virtual clothing shows.

Another example is the sale of services in the Metaverse such as the provision of a film, programming services for the construction of virtual real estate, consulting services for the selection of the right Metaverse to be used or the evaluation of the usage intensity of offers in the Metaverse. But also information that is superimposed on reality, such as years of construction of buildings during city tours, condition information during inspections of infrastructure or virtual opponents during skiing tours are conceivable. In addition, paid access can be granted to virtual worlds such as zoos or real places such as Metaverse Experience Centers, which make the experience even more realistic through multidimensional movements such as vertical falling. In addition, money can be made by selling or renting virtual land and placing virtual advertisement on it.

It is also not uncommon to provide users with free tokens for certain activities in the Metaverse, such as sharing a particular post, via so-called airdrops. The airdrops can therefore represent a new, but usually unsteady source of income for the users.

Last but not least, companies can also make money by selling the necessary hardware which allows users to access the Metaverse such as wireless VR goggles or gaming consoles.

Through decoupling from physical limitations, the Metaverse offers high scalability of products and services. However, it is important for companies to consider that the increasing demand for virtual products may decrease the demand for their corresponding physical products in reality. Furthermore, when developing the business model, it is also important to consider that the revenue and possibly also the gross margin per virtual product may be lower than for the corresponding real product.

### Key activities, resources & partners:

To offer a good value proposition to the target groups in the Metaverse, resources of multiple kinds are required. When it comes to human resources, the Metaverse offers the opportunity to attract new employees through global access to work and virtual site visits, allowing development activities to take place worldwide. It also enables the rapid sharing of digital resources such as key process data across company boundaries. However, some core processes need to be adapted, which will be discussed in chapter 3.2 in more detail. In addition, the Metaverse enables the decoupling of services from the constraints of physical resources. For example, the number of attendees at concerts in the Metaverse is not tied to the capacity of the halls, which allows for high scalability of the service. However, for the Metaverse activities such as the exchange of data, digital competencies must be built up in the company and possibly also in the partner companies in the innovation ecosystem, or they need to be covered externally.



## Enabling the Metaverse

### Cost structure:

The Metaverse enables an improvement in the cost structure because, as previously described, less physical space such as offices, sales rooms or warehouses is required for the development and provision of a product or service. In addition, personnel costs for business trips, for example to training courses, and transport costs, for example for physical exhibits at trade fairs, can be saved. In addition, new forms of usage and forms of financing for real objects such as machines can be realized and orchestrated via the Metaverse on the basis of the blockchain. The production costs, which usually dominate in reality, are increasingly giving way to digital development costs in the Metaverse. At the same time, the Metaverse is accompanied by additional costs for the creation of the virtual presence and access to it in real stores, for example. Providing the product both in reality and in the Metaverse, however, can create expensive duplicate structures which is why it can make sense for companies to possibly only offer a product through one channel. Therefore, companies need to carefully weigh the revenue and cost advantages and disadvantages of a virtual presence and product delivery.

## 3.2 What is the Impact of the Metaverse on Business Models in selected Industries?

In the following, the possible effects of the Metaverse on the business model dimensions are outlined for selected industries. As in the previous chapter, this is done using the categories of the simplified Business Model Canvas (BMC).

In **gaming**, the leap from digital and often already high-definition games to the virtual is comparatively small. The improvement of the **value proposition** through the immersive and more realistic gaming experience with the help of VR glasses is already known in this industry. So are downloading or streaming of games, multiplayer online gaming and in-game purchases. In addition, social communities have already formed around certain games. The change in the business model due to the Metaverse will therefore be comparatively small and will primarily lie in the new distribution channels of the games and the smooth transition from activities in reality or activities in the Metaverse to gaming in the Metaverse.

An improved value proposition through the use of XR to try out products is also already known in the **tourism industry**, in **real estate marketing**, in the **clothing industry** or in **furniture retail**. While VR is used in all areas, the use of AR is increasing in clothing and interior design. It is already possible today to digitally select items such as clothing or furniture, to test them by projecting them onto digital mirrors for so-called virtual fitting or into the camera image of the smartphone with the help of AR, and to buy them digitally. Savings on physical display items can improve the **cost structure of** companies if they exceed the cost of the virtual presence. However, companies will need to be careful to build a strong community for long-term **customer relationships** for these products.

A similar situation applies to the **automotive industry**, where cars can be digitally configured, virtually viewed and increasingly ordered directly via the Internet. However, the usability of non-automated cars is limited to people with a driving license, which requires a certain minimum age. In the Metaverse, virtual test drives can introduce minors to the product and the brand at an early stage, even before they legally possess a driving licence and are therefore allowed to use the product. In this way, a strong **customer relationship** can be established at an early stage.

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**Food delivery** is a comparatively young industry affected by the Metaverse. Delivery services that conveniently process online orders for users, for example from restaurants, via an app have achieved high market penetration in a short time. Most of these services deliver the goods as soon as possible or offer users to specify a desired delivery time - but always for delivery to one location. However, when people who are located in different areas in reality arrange to eat together in the Metaverse, a good user experience requires that these people get their food delivered at the same time and everywhere in reality. In this respect, delivery services need to change their **core activity** from "as soon as possible there" to "just-in-time everywhere".

*"Delivery services must change their value proposition from "as soon as possible there" to "just-in-time everywhere" to be successful in the Metaverse."*

In the field of **dating**, the use of digital platforms has already been established for years. The Metaverse creates additional virtual interaction possibilities. For initial contacts, the Metaverse offers a certain anonymity and thus more security through physical distance compared to direct, face-to-face meetings. Initial platforms such as Tinder are already aiming to extend the **value proposition** in this way. In the long run, there is also the possibility that initially only avatars meet in the virtual world, knowing the preferences of the assigned people, and thus pre-select suitable partners for the real people. Such an automation would save people a lot of time and thus provide an even better value proposition.

The formerly purely analog fields of **collaboration** and **education** have received a significant digitalization boost as a result of the Corona pandemic. In addition to improving the value proposition, the Metaverse allows to effectively engage even more people in these areas, regardless of where they are, if the technical requirements are in place. For manufacturing companies, the Metaverse can provide the opportunity to train their own employees on complex machinery and give customers the opportunity to view production equipment and products using their avatar - in real time, without having to travel long distances and without having to stop production. Incidentally, this can also achieve a higher degree of democratisation of the labour market. By better integrating the **key resource** of employees and by opening up new **customer groups** via **new channels**, there is a clear improvement in the BMC's eponymous areas.

In the **marketing industry**, real people have established themselves as influencers in recent years. In the meantime, however, the first digital influencers such as Lil Miquela have also become successful. In the Metaverse, this trend towards more purely virtual personalities could accelerate. This would permanently change the BMC area of **customer relations**, as the elimination of being tied to a natural person with their limited capacities, e.g. due to their sleep, makes permanent marketing activities possible and automatable. This can lead to a further acceleration of customer interaction.

Another interesting industry is the **health sector**, where analogue activities cannot be completely eliminated in the future. Telemedicine already makes it possible to consult a doctor at a spatial distance through audiovisual communication technologies. Through the use of controllers and other sensors that can transmit physiological data such as pulse and movement data, the Metaverse will enable the patients to localize their ailments even better and transmit important medical information to the doctor. Similarly, the use of AR and VR can support surgical procedures, for example, by allowing doctors to use AR to project images of CT scans directly onto the patient. In addition, the Metaverse can also be used in surgical simulations. In this respect, the Metaverse can offer a patient a **value proposition** of higher quality by improving the **key activities** of a medical consultation in the BMC area of the same name.

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In addition to companies, other organizations such as **research institutions** and **municipalities** are also affected by the Metaverse. For research institutions, the Metaverse offers a new research area for its **key activities**, as illustrated in this white paper. At the same time, the Metaverse offers **new channels to** communicate research results, especially to younger people. For municipalities, the Metaverse offers virtual dialogue possibilities with citizens and simplification possibilities for bureaucratic **key activities** at the interface with citizens. However, the possible simultaneous provision of both analogue and virtual products such as passports may incur additional costs for maintaining a duplicate infrastructure. The Metaverse can also significantly impact the **resources** of a municipality. While businesses enjoy the scalability of products in the Metaverse by detaching from physical capacity constraints, the Metaverse simultaneously deprives municipalities of revenue from renting out real event spaces such as stadiums.

### 3.3 What Impact does the Metaverse have on the Innovation Process?

The Metaverse also has an impact on the innovation process of companies. In the idea phase, customers and suppliers from all over the world who have the necessary equipment could be quickly and easily integrated via the Metaverse, so that product and service ideas can be tailored even more closely to the respective needs. Furthermore, the evaluation and selection of product concept alternatives can take place faster. At the same time, the Metaverse offers additional design freedom beyond today's imagination in the development of both real and virtual products, for example in terms of object shapes and functionalities. The products and the associated production facilities could already be virtually simulated and tested during the planning process, and the knowledge gained from this could be fed back into the development process for necessary improvements. Production data could be quickly sent to various production facilities distributed around the world in reality, thus increasing the speed of implementation. The latter also applies to any necessary product(ion) adjustments after the market launch. Likewise, in the Metaverse - as in general through virtual reality - virtual training for production and sales employees in the handling or marketing of the product to be produced could be carried out regardless of location and time. Virtual sales channels and new forms of customer relationships in the Metaverse, which, as described in the previous chapter, are based primarily on trust and are characterized by a high degree of dynamism, can also change marketing and sales irrevocably. However, it is important to bear in mind that the theoretically unlimited possibilities in the virtual world may face limits in practice. For example, a virtual crash test of a car with occupants could be presented so realistically for the people involved that it could lead to physiological consequences such as vomiting in reality.

The Metaverse also has implications at the innovation system level. Due to the lower intensity of use, some public infrastructure could become superfluous in reality. The reduction in real encounters, for example due to the just described elimination of infrastructure with opportunities for encounters, could also be accompanied by a real feeling of loneliness, especially for those people who do not use the Metaverse, and thus increase social fragmentation. However, in today's complex world, the exchange with other people is more important than ever for innovation.

## 4 Who will win the Race to the Metaverse and how can Companies approach the Metaverse?

### 4.1 Who will win the race for the Metaverse?

The lucrative race for the Metaverse is in full swing. After all, the most successful company has the unique opportunity to simultaneously become the Facebook of the future by owning all user data, the Apple of the future by deciding what content is allowed in the Metaverse and the ecosystem, and the Amazon of the future by earning money on all transactions in the Metaverse. Therefore, the question of who will win the race for the Metaverse was explored.

*"The most successful company has a unique opportunity to simultaneously become the Apple, Facebook and Amazon of the future."*

In the previous chapters it was shown in detail that the Metaverse will enable new activities and that this will be accompanied by a variety of consequences, both positive and negative. Although all respondents of the performed survey agree that they will spend most of their time in the Metaverse doing productive work, the highest-priority activities of people from Germany, the USA and China differ. They ranked gaming, meeting friends, and traveling first, respectively. Overall, the preferences of people from the Western countries Germany and the USA seem to be quite similar, while Chinese people have different and especially higher expectations for the Metaverse. As shown in the previous subsections, they also have the highest usage rate with respect to the Metaverse, the greater willingness to pay, and a more pronounced willingness to change in reality than people from Germany and the USA. This could also be true for other countries where human rights are severely restricted, discrimination is widespread, or collectivist behavior in society is strong, so that people could live out their desire for freedom in the Metaverse without being stigmatized by the rest of society. Duwe (2022)<sup>11</sup> also showed earlier that people from Germany and the USA prefer virtual reality as the Metaverse technology, while Chinese people favor augmented reality. Furthermore, he pointed out that Germans and Americans prefer exactly one metaverse, while Chinese people favor 5 or more metaverses. Moreover, according to him, the willingness to share personal data with the respective Metaverse provider or third-party service providers active in the Metaverse is present among the majority of Chinese people, unlike the Germans and Americans.

Therefore, it seems likely that one Metaverse platform can be successful in both Germany and the USA at the same time. American platforms such as Facebook are in a good starting position for this. However, Duwe (2022)<sup>3</sup> showed that in the countries surveyed there is a pronounced nationalism in the preference of the Metaverse provider, so that European companies are also not without a chance in the Western market. In China and other countries with similar political systems, on the other hand, one or more other platforms will probably be more suitable. Chinese tech companies are aware of the virtual lead-user nature of their population and want to serve their needs as quickly as possible through billions of dollars of investment and many patents. Western companies are at a disadvantage in the Chinese market for a variety of reasons. For instance, Western platforms like

*"The geoeconomic power distribution we know today from the current second-generation Internet is likely to be perpetuated in the third generation around the Metaverse."*

<sup>11</sup> Duwe, D. (2022): Metaverse for the people. In: Proceedings of the XXXIII ISPIIM Innovation Conference "Innovating in a Digital World". Copenhagen, Denmark. 05-08 June 2022. ISBN: 978-952-335-695-5. LUT Scientific and Expertise Publications.

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Facebook are basically unavailable in China. Likewise, products such as the popular VR glasses Oculus and their ecosystem such as apps are not usable due to access via American platforms, such as the one of Facebook. In addition to technological hurdles, bureaucratic barriers generally exist in China. For example, a platform in China must be operated by a local company, as in the Chinese "Fapiao" accounting system official invoices are only issued by the tax office and only for Chinese companies, which is why separate corporations must be established or partnerships with trustworthy and reliable Chinese companies must be formed. Furthermore, numerous licenses are required, for example for the operation of a website or eCommerce platform (ICP license) and certificates such as the Software Copyright Certificate for the distribution of software. In addition, all personal data must be stored in China. Accordingly, Chinese server infrastructures are also isolated from the rest of the world. For these reasons, the geoeconomic distribution of power known today from the current second-generation Internet is likely to be perpetuated in the third generation around the Metaverse.

## 4.2 How can Companies approach the Metaverse?

The previous chapters have outlined the opportunities and challenges associated with the Metaverse. Both private individuals and companies will have to face these. For all those who have not yet developed a professional strategy for dealing with the Metaverse, including a virtual vision and mission, the following section shows ways in which they can approach the Metaverse.

### 1. Unbiased Trial and Error

Familiarize yourself with the Metaverse by visiting one or better yet several of the existing virtual worlds. For some worlds you will need VR goggles, which you can also rent from respective providers. Others can be explored without purchasing expensive hardware. Also familiarize yourself with the challenges of using the Metaverse, which Mystakidis (2022) also addresses.<sup>12</sup>

### 2. Understand the Metaverse Rules

In order to assess the potential impact of the Metaverse on your business model, you need to understand the (different) rules in the virtual worlds, for example in terms of movement and payment. Similarly, you need to know the current legal framework, for example, regarding transactions in the virtual world.

### 3. Identify Use Cases

Get an idea of which products and processes in your company can be implemented in the Metaverse or moved there. Also distinguish between different forms of extended reality such as VR or AR if you have the technical possibility. Talk to employees and customers and answer the questions: What are currently the biggest pain points in the interaction with your internal and external stakeholders? Would your customers accept activities in the Metaverse?

### 4. Analyze the Skills and Competences

You've identified potential use cases and concluded that you can achieve a higher value proposition through the Metaverse. Now it's a matter of understanding what skills you need to do this. After all, to be active in the Metaverse as an individual or business, digital skills such as using VR goggles or programming can be required. Many traditional professions such as artists, event managers, real estate agents, architects or designers can be transferred to the Metaverse and have to adapt to the

<sup>12</sup> Mystakidis, S. (2022): Metaverse. In: Encyclopedia 2 (1), pages 486-497, DOI: 10.3390/encyclopedia2010031.

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new constraints in the virtual world, which is why adaptability is an important skill. This also applies to relatively new professions such as community managers and moderators or content creators for yet unknown content, for which creativity and the ability to interact are particularly important. It is also important to clarify who in your company can push the implementation. So ask yourself the following questions: Which employees are particularly motivated? Which employees possibly have experience in Metaverse? In addition to skills, the mindset of the employees is also important. Are there motivated and adaptive employees in the company who (would) proactively deal with projects in the Metaverse? Is there a fundamental consensus within the company that digital transformation is necessary?

### 5. Identify Metaverse Partners

Go to conferences and ask people across industries who, for example, has already successfully carried out initial use cases in the Metaverse. In this way, you can identify possible sparring partners and organizations which could be inspired for explorative, interdisciplinary Metaverse projects. This also raises the question: For which companies along the value chain could the Metaverse be interesting? Suppliers and customers may already be dealing with elements of the Metaverse and could complement their capabilities. Thinking in the medium term, it has to be assessed which partners can be involved in more complex Metaverse projects and which stakeholders are worth to be addressed who have not been considered so far.

## 5 Outlook

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The results published in this whitepaper on the differences in usage preferences only cover a section of the data set on which this whitepaper is based, so that more in-depth analyses are possible. In this respect, the whitepaper represents the starting point for further research activities which are intended to support companies in being successfully active in the Metaverse. In addition, companies will be scientifically accompanied in their approach to and the exploitation of the Metaverse in order to determine the best possible strategy for accessing and using the Metaverse for each type of organization. Furthermore, the causes of the described differences in usage preferences between the countries under consideration will be investigated from a social science perspective. In addition, scenarios for the future usage of the Metaverse will be developed, changes in the economic system will be highlighted and implications for concrete companies will be derived.



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