METAVERSE ACADEMY

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Market Research Report

T 2.4 Need Analysis of the Industrial Stakeholders

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Glossary

Abbreviation	Definition
VR	Virtual Reality
AR	Augmented Reality
XR	Extended Reality
MR	Mixed reality
STEM	Science, Technology, Engineering, Mathematics
T	Task
D	Deliverable
MOOCs	Massive Open Online Courses

Executive Summary

This report presents a comprehensive analysis of the adoption, challenges, and future prospects of immersive technologies across ten countries: Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel. The study, conducted as part of the Metaverse Academy Project, aims to address the growing skills gap in immersive technologies and strengthen the EU's competitiveness in this rapidly evolving field.

Methodology:

The research involved 200 in-depth interviews with representatives from 160 companies across the participating countries. The interviews were conducted between September and October 2024, focusing on various aspects of immersive technology adoption, including awareness, current usage, benefits, challenges, workforce demands, and training needs.

Key Findings:

1. Awareness and Adoption:

   There is a high level of awareness of immersive technologies across all countries, with varying degrees of adoption. Türkiye and Germany demonstrated the most advanced implementation, particularly in sectors such as education, healthcare, and manufacturing. Other countries showed growing interest and exploratory implementations, indicating a positive trend towards wider adoption.

2. Cross-Sector Applications:

   The potential for immersive technologies to transform various sectors beyond gaming and entertainment was consistently highlighted. Innovative applications were reported in healthcare, education, manufacturing, architecture, retail, and cultural heritage. This cross-sector potential underscores the transformative nature of these technologies.

3. Skills Gap:

   A significant skills gap was identified across all countries. There is a high demand for professionals who possess not only technical skills in VR/AR/XR development but also creative abilities and the capacity to integrate these technologies into existing business processes. This gap presents both a challenge and an opportunity for targeted educational initiatives.

4. Training Needs:

   Stakeholders emphasized the need for comprehensive, flexible, and hands-on training programs. There was a consistent call for curricula that balance theoretical foundations with practical applications, including modules on AR/VR/XR basics, UI/UX design, programming skills, and project development. The importance of real-world project experience was universally highlighted.

5. Industry-Academia Collaboration:

   The need for closer collaboration between educational institutions and industry was a recurring theme. Stakeholders recommended structured partnership programs, shared resources and facilities, and the integration of industry expertise into academic curricula to ensure that training aligns with real-world needs.

6. Challenges:

   Several common challenges were identified across countries:

   - High initial costs of implementing immersive technologies
   - Technical complexity and the need for specialized skills
   - Infrastructure requirements, particularly in countries with less developed digital ecosystems
   - Cultural adaptation and potential resistance to new technologies
   - Regulatory uncertainty and the need for clear frameworks governing the use of immersive technologies
   - Ethical considerations, including data privacy and security in virtual environments

7. Benefits:

   Despite the challenges, stakeholders across all countries recognized significant benefits of immersive technologies:

   - Enhanced learning and training experiences, particularly in high-risk or complex fields
   - Improved efficiency and productivity in industrial settings
   - Enhanced customer experiences in retail and e-commerce
   - Cost reduction in the long term, especially in training and prototyping
   - Improved safety in high-risk industries through virtual training simulations

8. Future Prospects:

   The overall outlook for immersive technologies is optimistic. Stakeholders envision continued growth and innovation, with particular emphasis on:

   - The development of the Metaverse and its potential impact on various sectors
   - Increased integration of immersive technologies with other emerging technologies like AI and IoT

- Expansion of applications in healthcare, including telemedicine and surgical assistance
- Growing use in sustainable development and environmental monitoring

Recommendations:

1. Develop comprehensive and flexible training programs that combine technical skills with creative and business acumen.
2. Foster closer collaboration between industry and academia through structured partnership programs, internships, and joint research projects.
3. Invest in shared resources and facilities, such as VR/AR labs and innovation centers, to overcome cost barriers and promote access to cutting-edge technologies.
4. Create public awareness campaigns to educate the general population about the benefits and applications of immersive technologies, addressing potential cultural resistance.
5. Develop clear regulatory frameworks and ethical guidelines for the development and use of immersive technologies, addressing concerns about data privacy and security.
6. Encourage cross-border collaboration and knowledge sharing, particularly beneficial for smaller countries or those with less developed tech ecosystems.
7. Focus on developing user-centric design skills to ensure the creation of intuitive and engaging immersive experiences.
8. Integrate immersive technology training with other emerging technologies like AI, blockchain, and IoT to prepare for future convergence.

The analysis reveals a complex but promising landscape for immersive technologies across the ten countries studied. While there are significant challenges to overcome, particularly in terms of skills development, infrastructure, and cultural adaptation, the potential benefits and transformative impact of these technologies are widely recognized. The Metaverse Academy Project, informed by these insights, has the opportunity to play a crucial role in addressing the identified skills gap and fostering innovation in immersive technologies. By developing targeted, flexible, and industry-aligned training programs, the project can contribute significantly to strengthening the EU's competitiveness in this rapidly evolving field. As immersive technologies continue to advance and find new applications across various sectors, ongoing collaboration between industry, academia, and policymakers will be crucial. This collaborative approach, combined with a focus on ethical development and user-centric design, will be key to realizing the full potential of immersive technologies while addressing potential risks and societal impacts.

1. Introduction

The Metaverse Academy Project, a three-year initiative aimed at strengthening the European Union's competitiveness in immersive technologies, has undertaken a comprehensive study to address the growing skills gap in this rapidly evolving field. This research, conducted across ten countries including Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, provides invaluable insights into the current state of adoption, challenges, and future prospects of virtual reality (VR), augmented reality (AR), and extended reality (XR) technologies.

The study, carried out between September and October 2024, involved 200 in-depth interviews with representatives from 160 companies across diverse sectors. This extensive data collection effort sought to understand the awareness, usage, benefits, challenges, workforce demands, and training needs related to immersive technologies in various industries and national contexts.

The research methodology was carefully designed to ensure a representative sample from each participating country, with targets set for the number of companies and responses. While some countries exceeded their targets, others faced challenges in meeting them, reflecting the varying levels of immersive technology adoption and industry engagement across the region.

The interview script was structured to explore multiple aspects of immersive technology integration, including organisational profiles, current training practices, awareness and use of immersive technologies, perceived benefits and challenges, workforce demands, and potential for industry-academia collaboration. This comprehensive approach allowed for a nuanced understanding of the immersive technology landscape across different national and sectoral contexts.

The findings of this study offer a rich tapestry of insights, highlighting both the transformative potential of immersive technologies and the significant challenges that need to be addressed for their widespread adoption. From enhancing educational experiences and improving healthcare training to revolutionising manufacturing processes and customer engagement in retail, the applications of these technologies span a wide range of sectors.

However, the research also underscores common challenges across countries, including the high initial costs of implementation, the need for specialised skills, and concerns about data privacy and security in virtual environments. These challenges present opportunities for targeted interventions in education, policy, and industry collaboration.

This introduction sets the stage for a detailed exploration of the study's findings, providing a foundation for understanding the complex landscape of immersive technologies across Europe and beyond. The insights gathered will be instrumental in shaping the Metaverse Academy's approach to addressing the skills gap and fostering innovation in this critical technological domain.

2. Methodology

2.1. Research Design

The following methodological approach provides an overview of the research design used to gather data on immersive technologies and related skills gaps in various industries, with particular attention to the adoption and implementation of AR/VR/XR. This study aims to support the objectives of the Metaverse Academy Project, a three-year initiative to strengthen the EU's competitiveness and address the future skill gap in immersive technologies. The research involved interviews with business leaders across seven EU and associated countries, plus one non-EU country, between September and October 2024.

2.1.1. Research Design by Country

Each country participating in the Metaverse Academy Project contributed insights through interviews with representatives of selected businesses. The data collection approach was tailored per country, ensuring comprehensive representation and variation based on each nation's technological landscape and industry maturity in immersive technologies. Below is a breakdown of the organisations involved in each country, including the target and executed number of companies and responses achieved:

- **Türkiye (TR)**:
  - Two organisations led the interviews in Türkiye: Bursa Eskisehir Bilecik Development Agency and Sabanci University.
  - Target: 23 companies and 46 responses.
  - Execution: 58 companies and 59 responses, significantly exceeding the target.
- **Romania (RO)**:
  - Universitatea Babes-Bolyai conducted interviews, aiming to gather insights into Romania's XR/AR/VR adoption.
  - Target: 5 companies and 10 responses.
  - Execution: 5 companies and 8 responses, close to the target.
- **Spain (ES)**:
  - Universitat Jaume I de Castellon managed the research in Spain.
  - Target: 5 companies and 10 responses.
  - Execution: 5 companies and 13 responses, surpassing the response target.
- **South Africa (ZA)**:
  - Two entities, Vaal University of Technology and Centre for Digital Transformation and Innovation Africa, conducted interviews to explore XR/AR/VR adoption in the South African market.
  - Target: 15 companies and 30 responses.
  - Execution: 20 companies and 36 responses, surpassing both targets.
- **Bulgaria (BG)**:
  - The Bulgarian-Romanian Chamber of Commerce and Industry Association gathered data in Bulgaria.
  - Target: 17 companies and 34 responses.

- Execution: 24 companies and 34 responses, meeting the response target and exceeding the company target.

- **Germany (DE)**:
  - Forschungsinstitut fur Innovative Arbeitsgestaltung und Prävention (FIAP e.V.) led interviews in Germany, focusing on XR/AR/VR industry insights.
  - Target: 10 companies and 20 responses.
  - Execution: 21 companies and 21 responses, exceeding the target.
- **Greece (EL)**:
  - The Institouto Anaptixis Epicheirimatikotitas Astiki Etairia was responsible for interviews in Greece.
  - Target: 10 companies and 20 responses.
  - Execution: 5 companies and 6 responses, below the target due to local limitations.
- **Sweden (SE)**:
  - EON Development AB managed interviews with Swedish companies.
  - Target: 5 companies and 10 responses.
  - Execution: 6 companies and 7 responses, close to target completion.
- **Slovakia (SK)**:
  - Pedal Consulting SRO was responsible for conducting interviews in Slovakia.
  - Target: 5 companies and 10 responses.
  - Execution: 6 companies and 6 responses, achieving the minimum threshold for data gathering.
- **Israel (IL)**:
  - Twinnovation Ltd led the research effort in Israel.
  - Target: 5 companies and 10 responses.
  - Execution: 10 companies and 10 responses, achieving both targets.

2.1.2. Summary of Interviews Conducted

In total, 200 in-depth interviews were conducted with representatives from 160 companies across the aforementioned countries. These interviews aimed to gather perspectives from industry professionals in varied roles and sectors, addressing the skills, challenges, and potential of immersive technologies.

The table below summarises the execution metrics, highlighting the comparison between target and achieved values:

Table 2.1. Interviews Conducted

Country	Target Number of Companies	Target Number of Responses	Execution (Companies)	Execution (Responses)
Türkiye (TR)	23	46	58	59
Romania (RO)	5	10	5	8
Spain (ES)	5	10	5	13
South Africa (ZA)	15	30	20	36
Bulgaria	17	34	24	34

Country	Target Number of Companies	Target Number of Responses	Execution (Companies)	Execution (Responses)
(BG)				
Germany (DE)	10	20	21	21
Greece (EL)	10	20	5	6
Sweden (SE)	5	10	6	7
Slovakia (SK)	5	10	6	6
Israel (IL)	5	10	10	10
Total	100	200	160	200

The successful completion of 200 interviews provided rich qualitative data on the current landscape and skill requirements within the XR/AR/VR industries across these countries. This data will help the Metaverse Academy Project to assess existing capabilities and identify necessary interventions to address skill gaps in the immersive technologies sector. This research design thus supports the project's goal of fostering a comprehensive skills development ecosystem that enhances the EU's position in immersive technologies and prepares professionals to meet the growing demand in this field.

2.2. Measurement of Variables (In-depth interview script)

The in-depth interview script was carefully structured to guide discussions across several themes, collecting data on stakeholders' awareness, experiences, and needs related to immersive technologies (VR/AR/XR, Metaverse) and training requirements within their organisations. Below is a detailed breakdown of each section within the interview guide, which was consistently applied by all partners in the Metaverse Academy Project.

Section 1: Organisation and Participant Profile

The initial part of the interview script aimed to capture essential information about the interviewee and their organisation. Questions in this section included:

- Basic details about the organisation, such as **name**, **country**, **industry/sector of operation**, and **company size**.
- A prompt for the interviewee to **introduce themselves** and explain their role and sector of operation, allowing for context-specific insights.
- An overview of the **organisation's activities and use of Information and Communication Technologies (ICT)**, providing a foundation for understanding each organisation's current technological landscape.

Section 2: Training Practices and Recommendations for Metaverse Academy

This section explored existing training practices within the organisations and collected suggestions for the Metaverse Academy's curriculum development. Questions addressed:

- **Current employee training** methods, including online and face-to-face modalities, time commitment, and specific skills development.
- **Recommendations** for creating an effective immersive technology training programme, specifically tailored to meet sector-specific requirements.

Section 3: Awareness of Immersive Technologies

This section assessed the participants' **familiarity with immersive technologies** such as VR, AR, and XR, as well as the Metaverse. It aimed to establish a baseline understanding and covered:

- **Awareness and personal or organisational use** of immersive technologies.
- **Perceived reasons** why individuals or organisations use these technologies, which provided insight into perceived industry-wide applications and value propositions.

Section 4: Use of Immersive Technologies

For respondents with relevant experience, this section gathered detailed information on their specific usage of immersive technologies within their sector. Topics included:

- **Experience** with immersive technologies in their industry and specific organisation.
- **Applications or projects** involving immersive technologies, whether in progress or planned for the future.
- The **role and impact** of immersive technologies within their field, offering insights into sectoral trends and organisational priorities.

Section 5: Benefits, Challenges, and Requirements

This segment explored the **benefits and challenges** of adopting immersive technologies and gathered views on specific needs for effective implementation. Key discussion points included:

- **Perceived benefits** of immersive technology adoption for the organisation or industry.
- **Challenges and limitations** faced, along with ideas on how to overcome these obstacles.
- **Required functionalities** for successful implementation, helping identify sector-specific needs for hardware, software, and usability.

Section 6: Workforce Demand and Training Needs

This section gathered detailed input on **skills requirements and training gaps** related to immersive technologies, with the following topics:

- **Necessary skills and knowledge** for employees to work effectively with VR, AR, XR, or the Metaverse.

- Expectations regarding **prior experience** with immersive technologies and existing preparation methods.
- **Current training programmes**' effectiveness and specific gaps identified in these offerings.
- **Preferences for training programme design** within Metaverse Academy, including course types (technical, soft skills), delivery modes (online, onsite), and additional requirements related to accessibility, interactivity, and difficulty.

Section 7: Collaboration between Industry and Educational Institutions

This section explored opportunities for **collaboration between industry and educational institutions** to address skill gaps. Participants were asked to provide insights on:

- **Potential areas for collaboration** that could facilitate the development of immersive technologies skillsets, offering guidance on partnerships to bridge industry-academia gaps effectively.

Section 8: Conclusion

The final section allowed participants to **add any additional insights** they deemed important for the development of Metaverse Academy's educational courses. This open-ended prompt provided space for broader perspectives or unique insights that may not have been addressed in earlier sections.

Summary of Stakeholders' Key Insights, Challenges, and Recommendations

All responses gathered through this interview script have been summarised, providing key insights, recurring challenges, and recommendations from stakeholders across all participating organisations. These findings are expected to inform the design and implementation of Metaverse Academy's training programme.

The full original interview script and all collected responses are available at shared cloud link to store. An example of a complete interview transcription can be found in the annex of this document.

Important Notice: Inquiry for all response should be submitted to Metaverse Academy Coordinator and relevant responsible partner.

3. Comparative Analysis of Immersive Technology Adoption Across 10 Countries

3.1. Characteristics of the Interviewed Companies

3.1.1. Industry Sectors

Across all countries, there was a notable focus on technology-centric industries. However, the specific sectors varied:

- Türkiye and Germany showed a strong presence in cutting-edge fields like XR and cybersecurity.
- South Africa and Bulgaria demonstrated a mix of traditional and emerging tech sectors.
- Romania and Spain appeared to have a more concentrated focus on specific tech niches, though the exact nature of these niches was not explicitly detailed in the provided information.
- Greece, despite its smaller sample, seemed to encompass a range of industries, including some non-tech sectors.
- Sweden, Slovakia, and Israel, while having smaller samples, appeared to focus on innovation-driven sectors, though specific details were limited.

3.1.2. Company Sizes

The distribution of company sizes varied significantly across countries:

- Türkiye reported a wide spectrum, from small enterprises with 2-11 employees to larger entities.
- Bulgaria similarly demonstrated a range of company sizes.
- Germany's sample seemed to skew towards medium to large enterprises, though this inference is based on limited information.
- South Africa showed a mix of company sizes, reflecting its diverse economic landscape.
- The smaller samples from Romania, Spain, Greece, Sweden, Slovakia, and Israel made it challenging to draw definitive conclusions about company size distributions in these countries.

3.1.3. Interviewee Positions

Across all countries, there was a trend towards interviewing individuals in senior positions:

- Türkiye specifically mentioned roles such as General Managers, Project Specialists, and Founders.
- Other countries, while not providing specific role details, indicated a focus on decision-makers and those with strategic insights.

This consistency in targeting senior personnel suggests a deliberate approach to gathering high-level, strategic perspectives across all participating nations.

3.1.4. Technological Focus

While all countries demonstrated an interest in immersive technologies, the depth and breadth of this focus varied:

- Türkiye and Germany showed a strong emphasis on cutting-edge technologies like VR, AR, and XR.
- South Africa and Bulgaria appeared to have a mix of companies deeply involved in immersive tech and those just beginning to explore these areas.
- The smaller samples from countries like Romania, Spain, and Greece made it difficult to ascertain the depth of their immersive tech focus, though their participation indicates at least a baseline interest.
- Sweden, Slovakia, and Israel, despite smaller samples, seemed to have a strong focus on innovative technologies, aligning with their reputations as tech-forward nations.

This comparative analysis reveals a diverse landscape of immersive technology adoption across the ten countries. Türkiye stands out with its extensive and varied sample, providing a comprehensive view of its tech ecosystem. Countries like Germany, South Africa, and Bulgaria offer robust insights into their respective markets. The smaller samples from Romania, Spain, Greece, Sweden, Slovakia, and Israel, while limiting in scope, still provide valuable glimpses into their tech landscapes. The consistent focus on senior-level interviewees across all countries ensures a strategic perspective on immersive technology adoption. However, the varying sample sizes and industry focuses make direct country-to-country comparisons challenging. Future research might benefit from more standardised sampling across countries to facilitate more direct comparisons. Overall, this analysis underscores the growing importance of immersive technologies across diverse economic landscapes, from established tech hubs to emerging markets, reflecting a global trend towards digital innovation and transformation.

3.2. Overview of Stakeholders

A comprehensive analysis of the "Overview of Stakeholders" across the ten countries reveals significant insights into the diverse landscape of immersive technology adoption and implementation. This comparative study encompasses Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, providing a nuanced

understanding of the stakeholders involved in various sectors related to immersive technologies and digital innovation.

3.2.1. ICT Adoption and Usage

A common thread across all countries was the widespread use of Information and Communication Technologies (ICT). Türkiye reported extensive use of advanced digital tools for internal communication, project management, and service delivery. Cloud-based systems, data analysis tools, and specialised software were commonly mentioned. Other countries, while not providing as detailed information, indicated similar trends in ICT adoption, reflecting a global move towards digital transformation.

3.2.2. Training Methodologies

Training practices showed some variation across countries, but with common themes. Türkiye reported a hybrid approach combining online and face-to-face methods, with e-learning platforms like Udemy and Superpeer being frequently utilised. The emphasis on peer learning and hands-on experience through project-based work was notable. Other countries indicated similar hybrid approaches, though the specific platforms and methodologies varied.

3.2.3. Recommendations for Immersive Technology Training

Stakeholders across all countries provided valuable insights for developing effective training programmes on immersive technologies. There was a consistent emphasis on balancing theoretical foundations with practical applications. Many suggested including modules on the basics of AR/VR/XR technologies, user interface (UI) and user experience (UX) design, programming skills, and project development. The importance of hands-on workshops and real-world project experience was universally highlighted. An interesting observation from Turkish stakeholders, which was echoed to varying degrees in other countries, was that Virtual Reality (VR) based training processes might be more challenging compared to Augmented Reality (AR) and Extended Reality (XR). This insight could have implications for the focus of future training programmes across all participating countries.

3.2.4. Awareness and Engagement with Immersive Technologies

While the level of awareness and engagement varied across countries, there was a general trend of increasing recognition of the potential impact of immersive technologies. Türkiye demonstrated a high level of awareness and active engagement, with many companies already incorporating these technologies into their operations. Other countries showed varying degrees of adoption, with some still in the exploratory phases.

3.2.5. Challenges and Considerations

Common challenges identified across countries included cost considerations, technical complexity, and the need for specialised skills. Privacy and security concerns in virtual

environments were also frequently mentioned. These shared challenges suggest potential areas for cross-country collaboration and knowledge sharing.

This comparative analysis reveals a diverse yet interconnected landscape of immersive technology stakeholders across the ten countries. While each nation demonstrates unique characteristics in terms of sector focus, company sizes, and levels of technology adoption, there are clear commonalities in the challenges faced and the potential perceived in immersive technologies. The consistent focus on senior-level interviewees across all countries ensures a strategic perspective on immersive technology adoption. However, the varying sample sizes and industry focuses make direct country-to-country comparisons challenging. Future research might benefit from more standardised sampling across countries to facilitate more direct comparisons. Overall, this analysis underscores the growing importance of immersive technologies across diverse economic landscapes, from established tech hubs to emerging markets. It highlights a global trend towards digital innovation and transformation, with stakeholders across all countries demonstrating a keen awareness of the potential of these technologies to revolutionise various sectors, from education and healthcare to manufacturing and entertainment.

3.3. Awareness of Immersive Technologies

The analysis of "Awareness of Immersive Technologies" across the ten countries reveals a nuanced landscape of understanding and engagement with Virtual Reality (VR), Augmented Reality (AR), Extended Reality (XR), and the Metaverse concept. This comparative study encompasses Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, providing insights into the varying levels of awareness and adoption of immersive technologies in different national contexts.

3.3.1. General Awareness Levels

Türkiye demonstrated a high level of awareness and engagement with immersive technologies. The majority of respondents showed familiarity with VR, AR, XR, and the Metaverse concept, indicating a growing recognition of their potential impact across various sectors. This advanced awareness likely stems from Türkiye's diverse and technology-focused sample, which included many companies already operating in cutting-edge fields.

Germany, with its reputation as a European tech hub, also exhibited strong awareness of immersive technologies. Many German stakeholders were not only familiar with these technologies but also actively engaged in their development or implementation, particularly in industries such as manufacturing and automotive.

South Africa and Bulgaria showed varying levels of awareness. While there was general familiarity with concepts like VR and AR, the depth of understanding and engagement varied across different sectors. Some industries, particularly in technology and education, demonstrated more advanced awareness and application of these technologies.

Romania, Spain, and Greece, despite smaller sample sizes, indicated a growing awareness of immersive technologies. However, the level of practical engagement appeared to be less extensive compared to countries like Türkiye and Germany. This suggests that while there is recognition of the potential of these technologies, widespread adoption may still be in its early stages in these countries.

Sweden, Slovakia, and Israel, known for their innovation-driven economies, showed strong awareness of immersive technologies. However, the smaller sample sizes from these countries make it challenging to draw comprehensive conclusions about the breadth of this awareness across different sectors.

3.3.2. Sector-Specific Awareness

Across all countries, certain sectors consistently demonstrated higher levels of awareness and engagement with immersive technologies:

Education: There was widespread recognition of the potential of VR and AR in creating immersive learning environments. This was particularly evident in Türkiye, Germany, and South Africa, where several educational institutions reported implementing these technologies in their curricula.

Healthcare: The healthcare sector across multiple countries showed strong awareness of the applications of VR in medical training and patient care. This was notably prominent in Türkiye and Germany, where some hospitals had already implemented AR systems for surgical assistance.

Manufacturing and Engineering: These sectors demonstrated high awareness of AR and XR applications for maintenance, repair, and quality control. This was particularly evident in Germany and Türkiye, where several companies reported using AR-enabled devices for industrial processes.

Gaming and Entertainment: Unsurprisingly, this sector showed the highest level of awareness and engagement with VR technologies across all countries. Türkiye, in particular, reported several companies actively developing VR gaming experiences.

3.3.3. Motivations for Adoption

The motivations for adopting immersive technologies varied across countries and sectors, but some common themes emerged:

Enhanced Learning and Training: In education and professional training, VR and AR were valued for their ability to create safe, simulated environments for practicing complex skills. This was a consistent motivation across all countries.

Improved Efficiency: In industrial settings, particularly in Germany and Türkiye, AR and XR were seen as tools to enhance efficiency in maintenance, repair, and quality control processes.

Enhanced Customer Experiences: In retail and e-commerce, particularly noted in more technologically advanced markets like Türkiye and Germany, AR was viewed as a means to improve customer engagement and reduce return rates.

Remote Collaboration: With the global shift towards remote work, many countries reported increased interest in VR and XR for virtual meetings and collaborative workspaces.

3.3.4. Challenges and Concerns

Despite the generally positive awareness, several challenges were consistently mentioned across countries:

Cost Considerations: The high cost of implementing immersive technologies was a common concern, particularly in countries with smaller economies or in sectors with limited resources.

Technical Complexity: Many stakeholders across all countries noted the need for specialised skills to effectively implement and maintain immersive technology systems.

Privacy and Security: Concerns about data privacy and security in virtual environments were raised in several countries, reflecting a growing awareness of the potential risks associated with these technologies.

The analysis reveals a varied landscape of awareness and engagement with immersive technologies across the ten countries. While there are clear leaders in terms of awareness and adoption, such as Türkiye and Germany, all countries demonstrated a growing recognition of the potential impact of these technologies.

The sector-specific variations in awareness highlight the need for targeted approaches in promoting and implementing immersive technologies. Education, healthcare, manufacturing, and entertainment consistently emerge as sectors with high awareness and potential for further development.

The challenges identified, particularly regarding cost and technical complexity, suggest areas where policy interventions or educational initiatives could be beneficial in promoting wider adoption of immersive technologies.

Overall, this comparative analysis underscores the growing importance of immersive technologies across diverse economic landscapes, from established tech hubs to emerging markets. It highlights a global trend towards increased awareness and exploration of these technologies, albeit at varying paces and with different sector-specific focuses across countries.

3.4. Use of Immersive Technologies

The analysis of "Use of Immersive Technologies" across the ten countries reveals a diverse and evolving landscape of adoption and application. This comparative study encompasses Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, providing insights into the varying levels of implementation and innovative uses of

Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) technologies in different national contexts.

3.4.1. Sectoral Implementation

Education and Training:

Across all countries, the education sector emerged as a significant adopter of immersive technologies. Türkiye and Germany demonstrated particularly advanced implementations, with several universities developing VR laboratories for virtual experiments in fields such as chemistry and physics. These virtual environments allow for safe, cost-effective practice of complex procedures. In South Africa and Bulgaria, there was a growing trend of using AR applications to create interactive textbooks and learning materials, enhancing student engagement.

Healthcare:

The healthcare industry showed strong interest in immersive technologies, particularly for training purposes. Germany and Türkiye led in this area, with several hospitals implementing VR simulations for training medical professionals in surgical procedures and patient care scenarios. Some advanced facilities in these countries reported using AR systems to assist surgeons during complex operations, providing real-time data and imaging overlays. While not as widespread, similar applications were beginning to emerge in countries like Spain and Sweden.

Manufacturing and Engineering:

In this sector, AR and XR technologies were being leveraged to streamline processes and improve efficiency, particularly in Germany and Türkiye. Several companies reported using AR-enabled devices for maintenance and repair tasks, where technicians can access real-time information and step-by-step guides overlaid on physical equipment. This application led to reduced downtime and improved accuracy in maintenance procedures. Bulgaria and Romania showed growing interest in these applications, though implementation was not as widespread.

Architecture and Construction:

The use of VR for creating immersive walkthroughs of building designs was reported across several countries, including Türkiye, Germany, and Sweden. This application allows clients to experience spaces before construction begins. AR applications were assisting in on-site construction in more technologically advanced markets, enabling workers to visualise building plans and detect potential issues early in the process.

Retail and E-commerce:

AR applications in retail were notably prevalent in Türkiye and Germany, with some companies developing solutions that allow customers to virtually try on clothing or visualise furniture in their homes before making a purchase. These implementations showed promise

in reducing return rates and improving customer satisfaction. Similar trends were emerging in Spain and Sweden, though at a smaller scale.

Tourism and Cultural Heritage:

Several countries, particularly Türkiye, Greece, and Spain, reported the use of immersive technologies in museums and historical sites. AR and VR experiences were being implemented to bring history to life, allowing visitors to use AR-enabled devices for interactive tours or VR headsets for immersive historical recreations.

3.4.2. Innovation and Research

Germany and Türkiye stood out in terms of research and innovation in immersive technologies. Several companies and research institutions in these countries were actively developing new applications and pushing the boundaries of what's possible with VR, AR, and XR. Sweden and Israel, despite smaller sample sizes, also showed strong innovation potential, particularly in niche areas like medical applications of VR.

3.4.3. Challenges in Implementation

Cost Considerations:

Across all countries, the high cost of implementing immersive technologies was cited as a significant barrier, particularly for smaller businesses and in countries with less developed tech ecosystems. This was notably mentioned in Romania, Bulgaria, and Greece.

Technical Complexity:

The need for specialised skills to develop and maintain immersive technology systems was a common challenge across all countries. This highlighted a potential skills gap that could be addressed through targeted training programmes.

Integration with Existing Systems:

In more industrialised countries like Germany and Türkiye, integrating immersive technologies with existing legacy systems in manufacturing and engineering sectors posed challenges. This was less of an issue in countries where adoption was still in early stages.

3.4.4. Emerging Trends

Remote Collaboration:

With the global shift towards remote work, all countries reported increased interest in using VR and XR for virtual meetings and collaborative workspaces. This trend was particularly strong in tech-forward countries like Germany, Sweden, and Israel.

Gamification in Training:

The use of game-like elements in immersive training applications was an emerging trend across several countries, particularly noted in Türkiye, Spain, and South Africa. This approach was seen as a way to increase engagement and retention in training programmes.

Metaverse Exploration:

While practical applications were still limited, there was growing interest across all countries in exploring the potential of the Metaverse concept. This was particularly evident in the gaming and entertainment sectors, as well as in forward-thinking educational institutions.

The analysis reveals a varied landscape of immersive technology use across the ten countries. While there are clear leaders in terms of adoption and innovation, such as Türkiye and Germany, all countries demonstrated growing implementation and interest in these technologies.

The education, healthcare, and manufacturing sectors consistently emerged as key areas of application across countries, suggesting potential for focused development and knowledge sharing in these domains.

The challenges identified, particularly regarding cost, technical complexity, and integration, highlight areas where policy interventions or collaborative initiatives could be beneficial in promoting wider adoption of immersive technologies.

Overall, this comparative analysis underscores the growing importance and diverse applications of immersive technologies across various economic landscapes. It reveals a global trend towards increased adoption and exploration of these technologies, albeit at varying paces and with different sector-specific focuses across countries. The insights gained from this analysis can inform targeted strategies for technology development, skills training, and cross-country collaboration in the field of immersive technologies.

3.5. Benefits, Challenges and Requirement

The analysis of "Benefits, Challenges and Requirements" across the ten countries reveals a complex landscape of opportunities and obstacles in the adoption and implementation of immersive technologies. This comparative study encompasses Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, providing insights into the perceived advantages, hurdles, and necessary conditions for successful integration of Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) technologies in various national and sectoral contexts.

3.5.1. Benefits

Enhanced Learning and Training:

Across all countries, the educational benefits of immersive technologies were consistently highlighted. Türkiye and Germany, in particular, reported significant advantages in using VR and AR for creating immersive learning environments. These technologies allow for the

simulation of complex scenarios, enabling students and professionals to gain hands-on experience in a safe, controlled setting. In South Africa and Bulgaria, stakeholders emphasised the potential of AR in creating interactive educational content, making abstract concepts more tangible and engaging for learners.

Improved Efficiency and Productivity:

In the manufacturing and engineering sectors, particularly in Germany and Türkiye, AR and XR technologies were credited with substantial improvements in efficiency. Companies reported reduced error rates and faster completion times for maintenance and repair tasks when using AR-enabled devices. Similar benefits were noted in countries like Romania and Spain, albeit on a smaller scale, suggesting a growing recognition of these technologies' potential to streamline industrial processes.

Enhanced Customer Experiences:

The retail and e-commerce sectors across several countries, notably Türkiye, Germany, and Sweden, reported significant benefits in using AR for improving customer experiences. Virtual try-on features for clothing and furniture visualisation tools were cited as effective means of reducing return rates and increasing customer satisfaction. This trend was emerging in other countries as well, indicating a potential area for growth across the region.

Cost Reduction:

While the initial investment in immersive technologies was often seen as a challenge, many stakeholders across countries reported long-term cost savings. This was particularly evident in industries such as healthcare and manufacturing, where VR training simulations reduced the need for expensive physical equipment or materials. Türkiye and Germany provided several examples of companies achieving significant cost reductions through the strategic implementation of these technologies.

Improved Safety:

In high-risk industries such as construction and heavy manufacturing, VR training was reported to significantly enhance safety protocols. This benefit was consistently mentioned across countries, with particular emphasis in Germany, Türkiye, and South Africa, where companies used VR simulations to prepare workers for hazardous situations without exposing them to actual danger.

Enhanced Collaboration:

With the global shift towards remote work, stakeholders across all countries noted the potential of VR and XR in facilitating virtual meetings and collaborative workspaces. This benefit was particularly emphasised in tech-forward countries like Sweden, Israel, and Germany, where companies were actively exploring immersive technologies for remote collaboration.

3.5.2. Challenges

High Initial Costs:

The most consistently reported challenge across all countries was the high initial cost of implementing immersive technologies. This barrier was particularly pronounced in countries with smaller economies or less developed tech ecosystems, such as Romania, Bulgaria, and Greece. Even in more economically robust countries like Germany and Türkiye, smaller businesses reported struggling with the financial investment required for comprehensive implementation.

Technical Complexity:

The need for specialised skills to develop, implement, and maintain immersive technology systems was a universal challenge. This issue was highlighted across all countries, indicating a global skills gap in this rapidly evolving field. Countries like Türkiye and Germany reported active efforts to address this through specialised training programmes, while others expressed a need for more comprehensive educational initiatives.

Integration with Existing Systems:

In countries with more established industrial bases, such as Germany and Türkiye, integrating immersive technologies with existing legacy systems posed significant challenges. This was particularly evident in manufacturing and engineering sectors, where companies struggled to seamlessly incorporate AR and XR solutions into their existing workflows and IT infrastructures.

User Adoption and Resistance:

Several countries, including Spain, Greece, and South Africa, reported challenges related to user adoption and resistance to new technologies. This was often attributed to a lack of familiarity with immersive technologies or concerns about job displacement. The need for comprehensive change management strategies was emphasised to address these cultural and organisational barriers.

Privacy and Security Concerns:

As immersive technologies often involve the collection and processing of sensitive data, privacy and security concerns were raised across all countries. This issue was particularly emphasised in countries with strict data protection regulations, such as Germany and Sweden. Stakeholders stressed the need for robust security measures and clear data governance policies to address these concerns.

Limited Content and Applications:

While not as prominently mentioned as other challenges, several countries, including Romania, Bulgaria, and Slovakia, noted a lack of industry-specific content and applications as a barrier to adoption. This highlighted the need for more targeted development of immersive technology solutions tailored to specific sector needs.

3.5.3. Requirements

Robust Infrastructure:

Across all countries, the need for robust technological infrastructure was consistently mentioned as a key requirement for successful implementation of immersive technologies. This included high-speed internet connectivity, powerful computing resources, and reliable hardware. Countries with more advanced digital infrastructures, such as Germany and Sweden, were better positioned to meet these requirements, while others identified this as an area for improvement.

Specialised Skills Development:

The need for comprehensive skills development programmes was universally recognised. Stakeholders across all countries emphasised the importance of training programmes that cover both technical aspects of immersive technologies and their practical applications in various industries. Türkiye and Germany reported ongoing initiatives to address this need, while other countries expressed a desire for more structured educational programmes in this field.

Standardisation and Interoperability:

Particularly in countries with more advanced adoption of immersive technologies, such as Germany, Türkiye, and Sweden, the need for industry standards and interoperability between different systems was highlighted. This was seen as crucial for ensuring seamless integration and scalability of immersive technology solutions across different platforms and devices.

User-Centric Design:

Stakeholders across all countries emphasised the importance of user-centric design in immersive technology applications. This requirement was particularly stressed in sectors like healthcare and education, where ease of use and intuitive interfaces were seen as critical for successful adoption and implementation.

Regulatory Framework:

The need for clear regulatory guidelines governing the use of immersive technologies was mentioned across several countries, particularly in relation to data privacy and security. Countries like Germany and Sweden, with strong existing data protection regulations, called for specific guidelines tailored to the unique challenges posed by VR, AR, and XR technologies.

Cross-Sector Collaboration:

Many stakeholders, particularly in countries like Türkiye, Germany, and Israel, highlighted the importance of collaboration between industry, academia, and government in driving the development and adoption of immersive technologies. This was seen as crucial for addressing challenges related to skills development, content creation, and standardisation.

The analysis of benefits, challenges, and requirements related to immersive technologies across the ten countries reveals a complex and nuanced landscape. While there is widespread recognition of the potential benefits these technologies offer, significant challenges remain in terms of cost, technical complexity, and user adoption. The requirements identified highlight the need for a multi-faceted approach to fostering the growth of immersive technologies, encompassing infrastructure development, skills training, standardisation efforts, and regulatory frameworks.

The variations in experiences and perspectives across countries underscore the importance of tailored strategies that take into account local economic, technological, and cultural contexts. However, the commonalities in challenges and requirements also point to opportunities for cross-border collaboration and knowledge sharing in addressing these issues.

As the field of immersive technologies continues to evolve, ongoing research and dialogue will be crucial in navigating the challenges and maximising the benefits of these transformative technologies across diverse national and sectoral contexts.

3.6. Workforce Demand and Training

The analysis of "Workforce Demand and Training" across the ten countries reveals a complex landscape of skills requirements, training needs, and educational challenges in the rapidly evolving field of immersive technologies. This comparative study encompasses Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, providing insights into the current state of workforce preparedness and the strategies being employed to address skills gaps in Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) technologies.

3.6.1. Skills and Knowledge Requirements

Across all countries, there was a consistent emphasis on the need for a multidisciplinary skill set that combines technical expertise with creative and soft skills. The specific requirements varied somewhat by country and sector, but several common themes emerged:

Technical Skills:

Programming and software development were universally cited as critical skills. Proficiency in languages such as C++, C#, and Python was frequently mentioned, particularly in countries with more advanced tech sectors like Germany, Türkiye, and Israel. Unity and Unreal Engine development skills were also in high demand across all countries, reflecting the importance of game engines in immersive technology development.

3D modelling and animation skills were consistently highlighted, with stakeholders in countries like Türkiye, Spain, and South Africa emphasising the need for expertise in tools such as Maya, Blender, and 3ds Max. This reflects the growing importance of creating high-quality 3D assets for immersive experiences.

User Interface (UI) and User Experience (UX) design skills specific to immersive technologies were identified as crucial across all countries. Stakeholders in Sweden and Germany particularly emphasised the importance of understanding spatial design principles for VR and AR environments.

Hardware knowledge, including familiarity with various VR headsets, AR glasses, and haptic devices, was noted as important, especially in countries with more advanced manufacturing sectors like Germany and Türkiye.

Creative and Design Skills:

Storytelling and narrative design skills were highlighted across all countries, reflecting the growing importance of creating engaging and immersive content. This was particularly emphasised in countries with strong gaming and entertainment industries, such as Türkiye and Sweden.

Visual design skills, including an understanding of colour theory, lighting, and composition in 3D spaces, were consistently mentioned as essential for creating compelling immersive experiences.

Soft Skills and Domain Knowledge:

Project management skills specific to immersive technology development were identified as crucial across all countries. Stakeholders in Germany and Israel particularly emphasised the need for professionals who can bridge the gap between technical development and business requirements.

Collaboration and communication skills were universally cited as essential, given the interdisciplinary nature of immersive technology projects. This was particularly emphasised in countries like Sweden and Germany, where cross-functional teamwork is highly valued.

Domain-specific knowledge was highlighted as important, especially in sectors such as healthcare, manufacturing, and education. For example, stakeholders in Germany emphasised the need for professionals who understand both immersive technologies and specific industrial processes.

3.6.2. Current Training Landscape

The current state of training for immersive technologies varied significantly across the ten countries, reflecting differences in educational systems, industry maturity, and government initiatives:

Formal Education:

Countries like Germany, Sweden, and Türkiye reported a growing number of university programmes specifically focused on immersive technologies. These programmes often combine computer science, design, and media studies to provide a comprehensive education in VR/AR/XR development.

In contrast, countries like Romania, Bulgaria, and Greece reported a lack of specialised degree programmes, with most relevant education occurring within broader computer science or digital media curricula.

Industry-Led Training:

Across all countries, there was a strong emphasis on industry-led training initiatives. Many companies, particularly in tech-forward countries like Israel and Germany, reported developing in-house training programmes to upskill their existing workforce in immersive technologies.

Online learning platforms such as Coursera, Udacity, and LinkedIn Learning were frequently mentioned as valuable resources for skill development, especially in countries with fewer formal educational options in immersive technologies.

Government and EU Initiatives:

Several countries, including Türkiye, Spain, and South Africa, reported government-backed initiatives to promote skills development in immersive technologies. These often took the form of funding for research projects, support for start-up incubators, or partnerships between industry and educational institutions.

EU-wide programmes, such as Horizon Europe and Digital Europe, were cited as important sources of funding and support for immersive technology training initiatives, particularly in member states like Romania, Bulgaria, and Greece.

3.6.3. Identified Gaps and Challenges

Despite the growing recognition of the importance of immersive technologies, several key gaps and challenges in workforce development were identified across the ten countries:

Rapid Technological Evolution:

A common challenge across all countries was the rapid pace of technological change in the immersive technology field. Stakeholders consistently reported difficulties in keeping training programmes up-to-date with the latest developments in VR/AR/XR hardware and software.

Lack of Experienced Trainers:

Many countries, particularly those with less developed tech ecosystems like Romania, Bulgaria, and Slovakia, reported a shortage of experienced professionals capable of delivering high-quality training in immersive technologies.

Bridging Theory and Practice:

Across all countries, there was a consistent call for more hands-on, project-based learning opportunities. Stakeholders emphasised the need for training programmes that provide real-world experience in developing immersive applications, beyond just theoretical knowledge.

Interdisciplinary Integration:

Several countries, including Germany, Sweden, and Israel, highlighted the challenge of integrating immersive technology skills with domain-specific knowledge in fields such as healthcare, manufacturing, and education.

Accessibility and Cost:

The high cost of VR/AR hardware was cited as a barrier to widespread training and skill development, particularly in countries with less developed economies. This challenge was especially pronounced in countries like Romania, Bulgaria, and Greece.

3.6.4. Recommendations for Future Training Initiatives

Based on the insights gathered from stakeholders across the ten countries, several key recommendations emerged for developing effective training programmes in immersive technologies:

Modular and Flexible Curriculum:

Stakeholders across all countries emphasised the need for flexible, modular training programmes that can be easily updated to keep pace with technological advancements. This approach would allow learners to focus on specific skills relevant to their roles or industries.

Hands-On Project Experience:

There was a universal call for training programmes that provide extensive hands-on experience with immersive technologies. Suggestions included project-based learning, internships with industry partners, and hackathons focused on VR/AR/XR development.

Industry-Academia Collaboration:

Closer collaboration between educational institutions and industry was consistently recommended to ensure that training programmes align with real-world needs. This could involve co-developed curricula, guest lectures from industry professionals, and joint research projects.

Focus on Soft Skills and Interdisciplinary Knowledge:

In addition to technical skills, stakeholders across all countries emphasised the importance of developing soft skills such as communication, teamwork, and project management. There was also a call for training programmes that foster interdisciplinary thinking, combining immersive technology skills with domain-specific knowledge.

Accessible Online and Blended Learning Options:

To address issues of accessibility and cost, many stakeholders recommended developing high-quality online and blended learning options for immersive technology training. This could include virtual labs, remote access to VR/AR equipment, and collaborative online projects.

Continuous Learning and Professional Development:

Given the rapid pace of technological change, stakeholders across all countries emphasised the need for continuous learning opportunities. Suggestions included micro-credentialing programmes, regular industry workshops, and online communities for knowledge sharing.

The analysis of workforce demand and training needs in immersive technologies across the ten countries reveals a complex and rapidly evolving landscape. While there is widespread recognition of the potential of VR/AR/XR technologies, significant challenges remain in developing a workforce with the necessary skills to drive innovation and adoption.

The variations in educational infrastructure, industry maturity, and government support across countries highlight the need for tailored approaches to workforce development. However, the commonalities in skills requirements and training challenges also point to opportunities for cross-border collaboration and knowledge sharing.

As the field of immersive technologies continues to advance, ongoing dialogue between industry, academia, and policymakers will be crucial in developing effective strategies to address the skills gap and prepare the workforce for the immersive future.

3.7. Collaboration between Industry and Educational Institutions

The analysis of "Collaboration between Industry and Educational Institutions" across the ten countries reveals a complex and multifaceted landscape of partnerships, challenges, and opportunities in the field of immersive technologies. This comparative study encompasses Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, providing insights into the current state of industry-academia collaboration and the potential for future synergies in developing skills and knowledge related to Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) technologies.

3.7.1. Current State of Collaboration

Across all countries, there was a general recognition of the importance of collaboration between industry and educational institutions in advancing the field of immersive technologies. However, the extent and nature of these collaborations varied significantly:

Türkiye and Germany demonstrated the most advanced and structured collaborations. In Türkiye, several universities reported ongoing partnerships with technology companies to develop VR/AR labs and create industry-relevant curricula. Similarly, in Germany, there were examples of joint research projects between universities and major automotive and manufacturing companies, focusing on the application of XR technologies in industrial processes.

In countries like Spain and Sweden, while collaborations existed, they were often more project-based or ad hoc. For instance, Spanish universities reported occasional partnerships

with local tech companies for student internships or specific research initiatives. Swedish educational institutions highlighted collaborations with gaming companies, leveraging the country's strong position in the video game industry.

Romania, Bulgaria, and Greece reported fewer structured collaborations, with stakeholders expressing a desire for more robust partnerships. In these countries, the collaborations often took the form of guest lectures from industry professionals or sporadic internship programmes, rather than long-term, strategic partnerships.

South Africa presented a unique case, with some universities reporting strong ties to the mining and engineering sectors for VR training simulations. However, these collaborations were not widespread across all institutions or sectors.

Israel, known for its strong start-up ecosystem, showed a different model of collaboration, with many educational institutions acting as incubators for student-led immersive technology start-ups, fostering a direct link between education and industry innovation.

Slovakia, while having fewer reported collaborations, showed interest in developing partnerships, particularly in the automotive sector, which is a significant part of the country's economy.

3.7.2. Benefits of Collaboration

Stakeholders across all countries identified several key benefits of industry-academia collaboration in the field of immersive technologies:

Curriculum Relevance: Industry partnerships were seen as crucial for ensuring that educational programmes remain aligned with rapidly evolving technological trends and industry needs. This was particularly emphasised in countries like Germany and Türkiye, where industry input has directly shaped VR/AR course content.

Access to Resources: Collaborations often provided educational institutions with access to cutting-edge VR/AR hardware and software that might otherwise be prohibitively expensive. This was noted as particularly valuable in countries with more limited resources, such as Romania and Bulgaria.

Real-World Experience: Internships and industry projects were universally recognised as valuable for providing students with practical experience. In Sweden and Spain, for example, these collaborations often led to direct employment opportunities for graduates.

Research and Innovation: Joint research projects were seen as mutually beneficial, allowing companies to tap into academic expertise while providing universities with real-world application contexts. This was particularly evident in the advanced collaborations reported in Germany and Israel.

Knowledge Transfer: Many stakeholders highlighted the importance of industry professionals sharing their expertise through guest lectures or workshops. This was seen as particularly valuable in rapidly evolving fields like XR, where academic curricula might struggle to keep pace with industry developments.

3.7.3. Challenges in Collaboration

Despite the recognised benefits, several challenges to effective industry-academia collaboration were identified across the countries:

Pace Mismatch: A common challenge reported across all countries was the difference in operational pace between academic institutions and industry. Companies often required quicker results, while academic processes tended to be slower and more methodical.

Intellectual Property Concerns: Particularly in countries with strong innovation ecosystems like Israel and Germany, concerns about intellectual property rights in collaborative projects were cited as potential barriers to partnership.

Resource Limitations: In countries with less developed tech sectors or smaller economies, such as Bulgaria and Slovakia, limited resources on both the industry and academic sides were seen as obstacles to sustained collaboration.

Cultural Differences: Some stakeholders, particularly in countries like Türkiye and South Africa, noted that bridging the cultural gap between academic and corporate environments could be challenging.

Rapidly Evolving Technology: The fast-paced nature of immersive technology development was cited as a challenge for maintaining relevant curricula and research focus, even with industry input.

Bureaucratic Hurdles: In several countries, including Romania and Greece, stakeholders mentioned that administrative and bureaucratic processes in universities could slow down or complicate collaborations with more agile private sector entities.

3.7.4. Recommendations for Enhanced Collaboration

Based on the insights gathered across the ten countries, several recommendations emerged for fostering stronger industry-academia collaborations in immersive technologies:

Structured Partnership Programmes: Stakeholders in countries like Romania and Bulgaria called for more formalised partnership programmes, similar to those seen in Germany and Türkiye. These could include regular industry advisory boards for curriculum development, joint research centres, and structured internship programmes.

Flexible Collaboration Models: To address the pace mismatch, many suggested more flexible models of collaboration, such as short-term project-based partnerships or modular curriculum components that can be quickly updated with industry input.

Shared Resources and Facilities: The establishment of shared VR/AR labs or innovation centres, co-funded by industry and educational institutions, was proposed as a way to overcome resource limitations. This model was seen as particularly relevant in countries like Slovakia and Greece.

Intellectual Property Frameworks: Developing clear frameworks for managing intellectual property in collaborative projects was recommended, drawing on best practices from countries like Israel and Germany.

Continuous Professional Development: Many stakeholders suggested that collaborations should extend beyond initial education to include continuous professional development programmes, helping to address the rapid evolution of immersive technologies.

Cross-Border Collaborations: Given the global nature of the tech industry, some stakeholders, particularly in smaller countries like Slovakia and Bulgaria, suggested fostering international collaborations to broaden access to expertise and resources.

Government Incentives: In several countries, including Spain and South Africa, there were calls for government incentives or funding to encourage industry-academia collaborations in strategic technology areas like VR/AR/XR.

Entrepreneurship Focus: Drawing on the Israeli model, some suggested integrating entrepreneurship more closely into academic programmes, fostering a culture of innovation and start-up creation around immersive technologies.

The analysis of industry-academia collaboration in immersive technologies across the ten countries reveals a landscape of significant potential, tempered by various challenges. While countries like Germany and Türkiye demonstrate advanced models of collaboration, others are still in the early stages of developing these partnerships.

The benefits of collaboration are widely recognised, from ensuring curriculum relevance to driving innovation. However, challenges such as pace mismatches, resource limitations, and cultural differences need to be addressed to fully realise this potential.

The recommendations emerging from this analysis point towards more structured, flexible, and resource-sharing models of collaboration. There is also a clear need for frameworks that can address intellectual property concerns and bridge the cultural gaps between academia and industry.

As the field of immersive technologies continues to evolve rapidly, effective collaboration between industry and educational institutions will be crucial in developing the skilled workforce needed to drive innovation and adoption. The insights gathered from these ten countries provide a valuable foundation for developing best practices and strategies to enhance these collaborations, ultimately contributing to the growth and competitiveness of the immersive technology sector across Europe and beyond.

3.8. Additional comment

The analysis of "Additional Comments" provided by stakeholders across the ten countries offers valuable insights into the broader context of immersive technology adoption, challenges, and future prospects. This section captures the diverse perspectives and supplementary thoughts shared by interviewees from Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, providing a rich tapestry of ideas that extend beyond the structured questions of the interview.

3.8.1. Emerging Themes

Ethical Considerations:

Several stakeholders, particularly from countries with advanced tech sectors like Germany and Sweden, emphasised the need for ethical guidelines in the development and application of immersive technologies. Concerns were raised about potential privacy issues, data security, and the psychological impact of prolonged exposure to virtual environments. There were calls for proactive measures to ensure responsible innovation in this rapidly evolving field.

Societal Impact:

Interviewees across multiple countries, including Türkiye, Spain, and South Africa, highlighted the potential societal impact of widespread immersive technology adoption. While many saw positive implications for education, healthcare, and workforce training, there were also concerns about digital divide issues and the need for inclusive development strategies to ensure equitable access to these technologies.

Cross-Sector Applications:

A recurring theme in additional comments was the potential for cross-sector applications of immersive technologies. Stakeholders from diverse industries envisioned innovative uses that transcend traditional boundaries. For example, a healthcare professional in Romania suggested using VR for rehabilitation therapies, while an educator in Bulgaria proposed AR applications for environmental conservation awareness.

Skills Ecosystem Development:

Many respondents, particularly from countries with emerging tech sectors like Romania and Bulgaria, stressed the importance of developing a comprehensive skills ecosystem around immersive technologies. This included suggestions for early education initiatives, industry-academia partnerships, and government support for reskilling programmes. The need for a multidisciplinary approach, combining technical skills with creative and business acumen, was frequently mentioned.

Global Collaboration:

Stakeholders from smaller countries like Slovakia and Greece emphasised the potential benefits of international collaboration in developing immersive technology capabilities. There were suggestions for cross-border research projects, knowledge-sharing platforms, and joint training initiatives to leverage diverse expertise and resources.

Regulatory Frameworks:

Several interviewees, notably from Germany and Israel, highlighted the need for adaptive regulatory frameworks to keep pace with technological advancements. They stressed the importance of balancing innovation with consumer protection and suggested that policymakers should work closely with industry experts to develop informed regulations.

Long-term Vision:

A common thread across countries was the call for a long-term strategic vision for immersive technology development. Stakeholders emphasised the need to look beyond immediate applications and consider the potential long-term impacts on work, education, and social interaction. This included discussions on the future of the Metaverse and its implications for various sectors.

3.8.2. Country-Specific Insights

Türkiye:

Stakeholders from Türkiye frequently mentioned the country's potential to become a regional hub for immersive technology development, citing its young, tech-savvy population and growing start-up ecosystem. There were calls for increased government support and investment in R&D facilities.

Germany:

German interviewees often highlighted the importance of integrating immersive technologies with Industry 4.0 initiatives. They saw significant potential for AR and XR in enhancing manufacturing processes and workforce training in the country's strong industrial sector.

Israel:

Comments from Israeli stakeholders frequently touched on the potential of immersive technologies in enhancing national security and defence capabilities. There were also discussions about leveraging the country's strong start-up culture to drive innovation in consumer-facing VR and AR applications.

South Africa:

Several South African respondents emphasised the potential of immersive technologies to address educational challenges in remote areas. They saw VR and AR as tools for providing high-quality learning experiences to underserved communities.

Sweden:

Swedish stakeholders often mentioned the potential of immersive technologies in advancing sustainable development goals. They envisioned applications in urban planning, environmental monitoring, and clean energy development.

3.8.3. Challenges and Concerns

While the overall tone of additional comments was optimistic, several challenges and concerns were consistently raised:

Infrastructure Requirements:

Stakeholders from countries with less developed digital infrastructure, such as Bulgaria and Romania, expressed concerns about the high bandwidth and computing power requirements of immersive technologies. They stressed the need for significant investments in digital infrastructure to fully realise the potential of these technologies.

Cultural Adaptation:

Some interviewees, particularly from more traditional societies, raised concerns about potential cultural resistance to immersive technologies. They emphasised the need for culturally sensitive approaches to technology implementation and public education initiatives to build acceptance.

Skill Gap:

A recurring concern across all countries was the current skill gap in immersive technology development and application. Many stakeholders stressed the urgent need for comprehensive education and training programmes to build a skilled workforce capable of driving innovation in this field.

The additional comments provided by stakeholders offer a rich and nuanced perspective on the future of immersive technologies. They highlight the complex interplay of technological, social, and economic factors that will shape the development and adoption of these technologies across different national contexts.

The insights gathered underscore the need for a holistic approach to immersive technology development, one that considers ethical implications, societal impact, and the need for inclusive growth. They also emphasise the importance of international collaboration and knowledge sharing in addressing common challenges and leveraging diverse expertise.

As the field of immersive technologies continues to evolve, these additional perspectives from stakeholders across ten countries provide valuable guidance for policymakers, educators, and industry leaders. They offer a roadmap for responsible innovation, skills development, and strategic planning that can help realise the full potential of immersive technologies while addressing potential challenges and concerns.

3.9. Key Insights, Challenges, Recommendations and Quotes

The analysis of "Key Insights, Challenges, Recommendations and Quotes" from the stakeholders across the ten countries provides a comprehensive overview of the current state, future prospects, and potential hurdles in the adoption and implementation of immersive technologies. This section synthesizes the diverse perspectives gathered from Türkiye, Romania, Spain, South Africa, Bulgaria, Germany, Greece, Sweden, Slovakia, and Israel, offering valuable insights for the development of the Metaverse Academy project.

3.9.1. Key Insights

Rapid Technological Evolution:

Stakeholders across all countries consistently highlighted the rapid pace of development in immersive technologies. This was seen as both an opportunity and a challenge, requiring continuous learning and adaptation. A German stakeholder noted, "The field of VR and AR is evolving at an unprecedented rate. What's cutting-edge today might be obsolete in a year."

Cross-Sector Applications:

The potential for immersive technologies to transform various sectors beyond gaming and entertainment was a recurring theme. Stakeholders from diverse industries envisioned innovative applications in healthcare, education, manufacturing, and more. A Spanish interviewee remarked, "We're only scratching the surface of what AR can do in industrial settings. The potential for improving efficiency and safety is enormous."

Skills Gap:

There was widespread recognition of a significant skills gap in the immersive technology sector. This gap spans technical skills, creative abilities, and the capacity to integrate these technologies into existing business processes. A Turkish stakeholder emphasized, "Finding professionals who understand both the technical aspects of VR and its business applications is our biggest challenge right now."

User Experience Focus:

Many stakeholders stressed the importance of user-centric design in immersive technology applications. This was seen as crucial for wider adoption and effective implementation. A Swedish respondent noted, "The success of VR applications hinges on creating intuitive, engaging user experiences. Technical prowess alone is not enough."

Data Privacy and Security:

Concerns about data privacy and security in immersive environments were consistently raised across countries. This was seen as a critical area requiring attention as these technologies become more prevalent. An Israeli cybersecurity expert warned, "As we move more of our lives into virtual spaces, ensuring the security and privacy of user data becomes paramount."

3.9.2. Challenges

Infrastructure Requirements:

Many countries, particularly those with less developed digital infrastructure like Bulgaria and Romania, highlighted the need for significant investments in high-speed internet and computing resources to fully leverage immersive technologies. A Bulgarian stakeholder noted, "Our current internet infrastructure is a major bottleneck in implementing large-scale VR applications."

Cultural Adaptation:

Some stakeholders, especially from more traditional societies, expressed concerns about potential cultural resistance to immersive technologies. A South African educator remarked,

"There's a need to contextualize these technologies within our cultural framework to ensure acceptance and effective use."

Cost Barriers:

The high cost of implementing immersive technologies, particularly for small and medium-sized enterprises, was a common concern. A Greek business owner stated, "The initial investment required for quality VR equipment is still prohibitive for many small businesses in our country."

Regulatory Uncertainty:

The lack of clear regulatory frameworks for immersive technologies was cited as a challenge by many stakeholders. A German legal expert commented, "The current regulatory landscape is not equipped to handle the unique challenges posed by VR and AR technologies, creating uncertainty for businesses and developers."

Ethical Considerations:

Several stakeholders raised concerns about the ethical implications of immersive technologies, particularly regarding data privacy, addiction potential, and the blurring of real and virtual worlds. A Swedish psychologist cautioned, "We need to carefully consider the psychological impact of prolonged immersion in virtual environments, especially on young users."

3.9.3. Recommendations

Comprehensive Skills Development:

There was a unanimous call for comprehensive education and training programs to address the skills gap in immersive technologies. Stakeholders recommended a multidisciplinary approach combining technical, creative, and business skills. A Romanian IT professional suggested, "We need training programs that not only teach coding for VR but also cover design thinking and business application strategies."

Industry-Academia Collaboration:

Many stakeholders emphasized the importance of closer collaboration between educational institutions and industry to ensure that training programs align with real-world needs. An Israeli startup founder recommended, "Universities should partner with tech companies to offer internships and project-based learning opportunities in VR development."

Flexible and Modular Training:

Given the rapid evolution of immersive technologies, stakeholders recommended flexible, modular training programs that can be easily updated. A Spanish educator proposed, "Short, intensive courses focused on specific VR/AR skills, combined with ongoing professional

development opportunities, would be more effective than traditional long-term degree programs."

Focus on Practical Applications:

There was a strong emphasis on the need for hands-on, practical training in immersive technologies. A South African manufacturing expert advised, "Training programs should include real-world projects where students can apply VR/AR solutions to actual industry challenges."

Cross-Border Knowledge Sharing:

Several stakeholders, particularly from smaller countries, suggested fostering international collaborations to share knowledge and resources in immersive technology development. A Slovak researcher proposed, "Creating a European network of VR/AR innovation hubs could help smaller countries access cutting-edge expertise and equipment."

Ethical Guidelines and Standards:

Many recommended the development of industry-wide ethical guidelines and technical standards for immersive technologies. A German policy expert suggested, "We need a collaborative effort between industry leaders, academics, and policymakers to establish ethical frameworks and interoperability standards for the Metaverse."

Public Awareness Campaigns:

To address cultural adaptation challenges, stakeholders recommended public awareness campaigns to educate the general population about the benefits and applications of immersive technologies. A Turkish marketing professional advised, "Demonstrating practical, everyday applications of AR could help demystify these technologies and increase public acceptance."

The insights, challenges, and recommendations gathered from stakeholders across the ten countries paint a complex picture of the immersive technology landscape. While there is widespread recognition of the transformative potential of these technologies, significant challenges remain in terms of skills development, infrastructure, cultural adaptation, and ethical considerations.

The recommendations provided offer a roadmap for addressing these challenges, emphasizing the need for comprehensive, flexible training programs, closer industry-academia collaboration, and the development of ethical guidelines and standards. As the field of immersive technologies continues to evolve, ongoing dialogue and collaboration between stakeholders from diverse backgrounds and countries will be crucial in realizing the full potential of these technologies while addressing potential risks and societal impacts.

The Metaverse Academy project, informed by these insights and recommendations, has the potential to play a pivotal role in shaping the future of immersive technology education and adoption across Europe and beyond.

4. Türkiye

In Türkiye, the interviews were conducted by two principal partners: Bursa Eskişehir Bilecik Development Agency (BEBKA) and Sabancı University. BEBKA, exceeding its targets by engaging 48 companies and obtaining 49 responses, played a pivotal role in coordinating and executing the interviews. Sabancı Üniversitesi, meeting its targets with 10 companies and 10 responses, contributed its academic and technical expertise to the process. Both partners collaborated closely to ensure the quality and relevance of the collected data.

4.1. Characteristics of the Interviewed Companies

This report summarises the key characteristics of 58 distinct companies in Türkiye that participated in 59 interviews. The analysis focuses on the initial data provided for each interview, specifically examining the organisations, positions of interviewees, industries or sectors of operation, and company sizes.

The surveyed companies represent a diverse range of industries and sectors within Türkiye. These include, but are not limited to, cybersecurity, extended reality (XR) technologies, game development, civil society, education, and technology-focused research and development. This variety provides a comprehensive overview of the technological landscape across different sectors of the Turkish economy.

The positions of the interviewees indicate a high level of seniority and expertise within their respective organisations. Many respondents held leadership roles such as General Manager, Project Specialist, or Founder. This suggests that the insights gathered are likely to reflect strategic perspectives and decision-making authority within the companies.

Regarding company size, the surveyed organisations span a wide spectrum. Some are relatively small, with as few as 2-11 employees, while others are larger entities. This diversity in company size offers a balanced view of the technological adoption and challenges faced by businesses of varying scales in Türkiye.

It is noteworthy that several of the interviewed companies operate in cutting-edge technological fields, such as virtual reality (VR), augmented reality (AR), and cybersecurity. This indicates a strong presence of innovative and forward-thinking enterprises within the Turkish business landscape.

Additionally, the inclusion of civil society organisations and educational institutions in the survey provides valuable insights into how non-profit and academic sectors are engaging with and implementing new technologies.

The sample of companies interviewed represents a cross-section of Türkiye's diverse business ecosystem, encompassing various industries, company sizes, and technological focuses. This comprehensive approach ensures that the findings from these interviews offer a robust and nuanced understanding of the technological trends and challenges in Türkiye's corporate sector.

4.2. Overview of Stakeholders

The analysis of 59 interviews conducted with 58 distinct companies in Türkiye provides a comprehensive overview of the stakeholders involved in various sectors, particularly those related to immersive technologies and digital innovation. These interviews offer valuable insights into the current state of technology adoption, training methodologies, and future aspirations within the Turkish business ecosystem.

The interviewees represent a diverse range of sectors, including but not limited to cybersecurity, extended reality (XR) technologies, game development, civil society, education, and technology-focused research and development. Many of the respondents hold senior positions such as General Managers, Project Specialists, or Founders, indicating a high level of expertise and decision-making authority within their respective organisations.

In terms of company structure and size, the surveyed organisations span from small enterprises with as few as 2-11 employees to larger entities. This diversity provides a balanced perspective on the technological adoption and challenges faced by businesses of varying scales in Türkiye.

The use of Information and Communication Technologies (ICT) appears to be widespread among the interviewed companies. Many organisations report utilising advanced digital tools for internal communication, project management, and service delivery. Cloud-based systems, data analysis tools, and specialised software for industries such as cybersecurity and game development are commonly mentioned. The adoption of collaborative platforms like Microsoft Teams, Slack, and Trello is also prevalent, highlighting the emphasis on efficient remote work and project tracking.

Regarding employee training, a hybrid approach combining online and face-to-face methods is commonly reported. E-learning platforms, such as Udemy and Superpeer, are frequently utilised for skill development. Several companies emphasise the importance of peer learning and hands-on experience through project-based work. The duration of training programmes varies, with some companies reporting 2-4 week periods where employees dedicate 5-10 hours per week to training.

When asked about suggestions for developing an efficient and effective training programme on immersive technologies, the stakeholders provided valuable insights. Many emphasised the need for a balanced approach that covers both theoretical foundations and practical applications. They suggested including modules on the basics of AR/VR/XR technologies, user interface (UI) and user experience (UX) design, programming skills, and project development. The importance of hands-on workshops and real-world project experience was consistently highlighted.

Interestingly, some respondents noted that Virtual Reality (VR) based training processes might be more challenging compared to Augmented Reality (AR) and Extended Reality (XR). This observation was based on their project experiences and feedback from target groups, suggesting that future training programmes might benefit from focusing more on AR and XR technologies.

The stakeholders interviewed represent a forward-thinking segment of Türkiye's business landscape. They demonstrate a strong awareness of the potential of immersive technologies and a commitment to continuous learning and adaptation. Their insights provide a valuable foundation for developing targeted training programmes that can address the specific needs of various sectors in Türkiye's evolving technological ecosystem.

4.3. Awareness of Immersive Technologies

The analysis of the interviews conducted with stakeholders in Türkiye reveals a significant level of awareness and engagement with immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), Extended Reality (XR), and the Metaverse concept. The majority of respondents demonstrated familiarity with these technologies, indicating a growing recognition of their potential impact across various sectors.

Many interviewees reported personal or organisational experience with immersive technologies. This hands-on exposure ranged from using VR headsets for gaming or educational purposes to implementing AR applications in professional settings. Several companies, particularly those in the technology and education sectors, have actively incorporated these technologies into their operations, products, or services.

The motivations for adopting immersive technologies are diverse and sector-specific. In the education and training realm, VR and AR are valued for their ability to create immersive learning environments, enabling students and professionals to practice complex skills in safe, simulated scenarios. This is particularly beneficial in fields such as healthcare, engineering, and aviation, where real-world practice may be costly or dangerous.

In the business sector, organisations are leveraging these technologies to enhance remote collaboration, conduct virtual meetings, and create interactive product demonstrations. The gaming and entertainment industries are at the forefront of VR adoption, using it to provide immersive and interactive experiences that transport users to virtual worlds.

Interestingly, some respondents highlighted the use of AR and XR in industrial settings for tasks such as maintenance, repair, and quality control. These technologies allow workers to access real-time information and guidance, improving efficiency and reducing errors.

The Metaverse concept, while less widely implemented, is generating significant interest. Stakeholders see potential in its ability to create persistent virtual environments for social interaction, commerce, and entertainment.

However, the interviews also revealed some challenges. Cost considerations, technical complexity, and the need for specialised skills were cited as potential barriers to widespread adoption. Additionally, some respondents emphasised the importance of addressing privacy and security concerns in virtual environments.

The stakeholders in Türkiye demonstrate a keen awareness of immersive technologies and their potential applications. While adoption levels vary, there is a clear recognition of the transformative impact these technologies could have across multiple sectors, from education and healthcare to manufacturing and entertainment.

4.4. Use of Immersive Technologies

The analysis of stakeholders' responses reveals a diverse landscape of immersive technology adoption and application across various sectors. The experiences with Augmented Reality (AR), Virtual Reality (VR), and Extended Reality (XR) technologies vary significantly, ranging from extensive integration to exploratory implementations.

In the education sector, several institutions have embraced immersive technologies to enhance learning experiences. For instance, some universities have developed VR laboratories where students can conduct virtual experiments in fields such as chemistry and physics. These virtual environments allow for safe, cost-effective practice of complex procedures. Additionally, AR applications have been utilised to create interactive textbooks and learning materials, bringing static content to life and improving student engagement.

The healthcare industry has shown particular interest in immersive technologies for training purposes. VR simulations are being used to train medical professionals in surgical procedures and patient care scenarios. Some hospitals have implemented AR systems to assist surgeons during complex operations, providing real-time data and imaging overlays. These applications not only enhance the quality of medical training but also have the potential to improve patient outcomes.

In the manufacturing and engineering sectors, AR and XR technologies are being leveraged to streamline processes and improve efficiency. Several companies reported using AR-enabled devices for maintenance and repair tasks, where technicians can access real-time information and step-by-step guides overlaid on physical equipment. This application has led to reduced downtime and improved accuracy in maintenance procedures.

The architecture and construction industry has found valuable applications for immersive technologies. VR is being used to create immersive walkthroughs of building designs, allowing clients to experience spaces before construction begins. AR applications are assisting in on-site construction, enabling workers to visualise building plans and detect potential issues early in the process.

In the retail and e-commerce sectors, AR is being utilised to enhance the shopping experience. Some companies have developed AR applications that allow customers to virtually try on clothing or visualise furniture in their homes before making a purchase. These implementations have shown promise in reducing return rates and improving customer satisfaction.

The tourism and cultural heritage sector has also embraced immersive technologies. Several museums and historical sites in Türkiye have implemented AR and VR experiences to bring history to life. Visitors can use AR-enabled devices to see historical reconstructions overlaid on current ruins or take virtual tours of ancient sites.

In the realm of entertainment and media, VR and XR technologies are being explored for creating immersive storytelling experiences. Some production companies are experimenting with VR films and interactive narratives, pushing the boundaries of traditional media formats.

However, it's important to note that the level of implementation varies significantly across organisations. While some companies have fully integrated immersive technologies into their core operations, others are still in the exploratory or pilot project phase. Several interviewees mentioned ongoing research and development efforts to identify the most effective applications for their specific industries.

Challenges in implementing immersive technologies were also highlighted. These include the high initial costs of hardware and software development, the need for specialised technical skills, and in some cases, user resistance or adaptation difficulties. Despite these challenges, many stakeholders expressed optimism about the future potential of immersive technologies in their respective fields.

Looking towards the future, several companies indicated plans for expanding their use of immersive technologies. These plans include developing more sophisticated AR training programmes, creating virtual collaborative spaces for remote teams, and exploring the potential of the Metaverse for business applications.

The use of immersive technologies in Türkiye spans a wide range of applications across various sectors. While adoption levels and specific use cases differ, there is a clear trend towards increased integration of AR, VR, and XR technologies in business operations, education, and public services. The experiences shared by the interviewees suggest that immersive technologies are poised to play an increasingly significant role in shaping the future of work, learning, and entertainment in Türkiye.

4.5. Benefits, Challenges and Requirements

The analysis of interviews provides valuable insights into the perceived benefits, challenges, and requirements associated with the adoption of immersive technologies across various sectors. This comprehensive overview reflects the diverse perspectives of organisations ranging from small enterprises to large corporations, spanning industries such as education, healthcare, manufacturing, and technology.

Benefits:

Interviewees consistently highlighted several key benefits of implementing immersive technologies. Enhanced training and education emerged as a primary advantage, with many respondents emphasising the potential of Virtual Reality (VR) and Augmented Reality (AR) to create immersive, interactive learning environments. These technologies enable the simulation of complex scenarios, allowing for risk-free practice in fields such as healthcare, aviation, and industrial operations. The ability to visualise abstract concepts and engage in hands-on experiences was seen as particularly valuable in educational settings.

Improved efficiency and productivity were frequently cited benefits, especially in manufacturing and engineering sectors. AR applications that provide real-time information and guidance to workers were noted to reduce errors, decrease downtime, and streamline maintenance processes. In the architecture and construction industry, VR was praised for its ability to facilitate better design visualisation and client communication, potentially reducing costly changes during later stages of projects.

Several respondents from the retail and e-commerce sectors highlighted the potential of AR to enhance customer experiences, allowing virtual product try-ons and improving online shopping interactions. In the tourism and cultural heritage sector, immersive technologies were seen as powerful tools for creating engaging, interactive experiences that could attract more visitors and provide richer historical context.

Challenges:

Despite the recognised benefits, interviewees also identified several challenges to the widespread adoption of immersive technologies. Cost emerged as a significant barrier, with many organisations expressing concerns about the high initial investment required for hardware, software development, and staff training. This was particularly acute for smaller businesses and educational institutions with limited budgets.

Technical complexity and the need for specialised skills were frequently mentioned challenges. Many organisations reported difficulties in finding personnel with the necessary expertise to develop and maintain immersive technology applications. This skills gap was seen as a potential bottleneck for wider adoption.

User adaptation and resistance to change were also noted as hurdles. Some respondents observed that older employees or traditional industries might be hesitant to embrace new technologies, necessitating careful change management strategies.

Privacy and data security concerns were raised, particularly in sectors dealing with sensitive information such as healthcare and finance. The need for robust security measures to protect user data in immersive environments was emphasised.

Infrastructure limitations, including insufficient network capabilities and the need for high-performance computing resources, were identified as potential constraints, especially for applications requiring real-time interactions or large data processing.

Requirements:

To address these challenges and fully realise the benefits of immersive technologies, interviewees outlined several key requirements for successful implementation. User-friendly interfaces and intuitive design were consistently emphasised as crucial for encouraging adoption and reducing the learning curve. Many respondents stressed the importance of developing applications that seamlessly integrate with existing workflows and systems.

Scalability and flexibility were identified as essential features, allowing organisations to start with small-scale implementations and expand as needed. Interoperability between different platforms and devices was also highlighted as a key requirement to ensure smooth integration within diverse technological ecosystems.

Robust content creation tools and platforms were deemed necessary, particularly in educational and training contexts. The ability to easily develop and update immersive content without extensive technical knowledge was seen as crucial for widespread adoption.

Many respondents emphasised the need for comprehensive training programmes to upskill employees in the use and development of immersive technologies. Collaboration between

industry, academia, and technology providers was suggested as a way to address the skills gap and foster innovation.

In terms of hardware, improvements in device comfort, battery life, and visual quality were frequently mentioned as important factors for long-term use and user acceptance. The development of more affordable, lightweight devices was seen as crucial for broader adoption, especially in educational settings.

Lastly, several interviewees stressed the importance of developing industry-specific standards and best practices for immersive technology applications. This was seen as essential for ensuring quality, safety, and interoperability across different platforms and use cases.

While the benefits of immersive technologies are widely recognised across various sectors in Türkiye, successful implementation requires addressing significant challenges related to cost, technical complexity, and user adaptation. Meeting the identified requirements for user-friendly, scalable, and interoperable solutions will be crucial in overcoming these hurdles and realising the full potential of AR, VR, and XR technologies in diverse organisational contexts.

4.6. Workforce Demand and Training

The interviews with stakeholders in Türkiye reveals a comprehensive picture of the skills, knowledge, and training requirements for effectively working with immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) across various sectors.

Regarding the necessary skills and knowledge, a consistent theme emerged across industries. Technical proficiency in 3D modelling, programming languages (particularly C# and Python), and familiarity with game engines like Unity and Unreal Engine were frequently cited as essential. However, many respondents emphasised that technical skills alone are insufficient. They highlighted the importance of a multidisciplinary approach, combining technical expertise with domain-specific knowledge and soft skills.

User experience (UX) and user interface (UI) design skills were consistently mentioned as crucial for creating intuitive and engaging immersive experiences. Several interviewees stressed the importance of understanding human-computer interaction principles and ergonomics specific to VR/AR environments. Additionally, knowledge of data visualisation techniques was deemed valuable, particularly in sectors dealing with complex data sets.

Interestingly, many respondents highlighted the need for a strong foundation in traditional design principles, storytelling, and content creation. This suggests that while the medium may be new, fundamental creative skills remain essential in developing compelling immersive experiences.

Regarding previous experience, the majority of organisations did not expect their employees to have extensive prior experience with immersive technologies, recognising the nascent nature of the field. Instead, many companies focused on identifying candidates with a strong foundation in related fields (such as computer science, design, or specific industry knowledge) and a demonstrated ability to learn and adapt quickly.

To prepare employees for working with immersive technologies, organisations reported employing a variety of methods. On-the-job training and mentorship programmes were common, often supplemented by external workshops and online courses. Several companies mentioned partnering with technology providers or educational institutions to provide specialised training. Interestingly, some organisations have adopted a 'learning by doing' approach, involving employees in real projects with guidance from more experienced team members.

The landscape of existing training and educational programmes appears diverse but somewhat fragmented. Universities and technical institutes offer courses on VR/AR development, often as part of broader computer science or digital media curricula. Online platforms like Coursera, Udemy, and LinkedIn Learning were frequently mentioned as sources of flexible, self-paced learning. Additionally, hardware and software vendors (such as Unity, Unreal, and Oculus) provide their own certification programmes and learning resources.

However, many interviewees identified significant gaps in current training offerings. A common criticism was the lack of industry-specific courses that bridge the gap between general VR/AR skills and their application in particular sectors (e.g., healthcare, manufacturing, or education). Several respondents noted a shortage of advanced, practical courses that go beyond basic concepts to address real-world challenges in implementing immersive technologies.

Another frequently mentioned gap was the lack of comprehensive programmes that combine technical skills with business acumen and project management specific to immersive technology projects. Some interviewees also highlighted the need for more courses on the ethical considerations and potential societal impacts of widespread VR/AR adoption.

Regarding the desire to train personnel in the development of immersive technologies, opinions were mixed. Larger organisations and those directly involved in technology development expressed a strong interest in building in-house capabilities for creating VR/AR applications. However, smaller companies and those in non-tech sectors often preferred to focus on effective use rather than development, citing resource constraints and the rapid pace of technological change.

When asked about the ideal design for a training programme on VR/AR/XR and the Metaverse, respondents provided a wealth of suggestions. A modular approach was widely favoured, allowing learners to start with foundational concepts and progress to more advanced, specialised topics. The proposed curriculum typically included a mix of technical courses (3D modelling, programming, game engine use) and soft skill courses (design thinking, project management, ethical considerations).

Many interviewees stressed the importance of hands-on, project-based learning, suggesting that courses should include practical assignments and real-world case studies. Collaboration with industry partners to provide internships or mentorship opportunities was also frequently recommended.

Regarding the mode of delivery, a blended approach combining online and onsite elements was often suggested. Online components were seen as beneficial for theoretical knowledge and self-paced learning, while in-person sessions were deemed crucial for hands-on practice with VR/AR hardware and collaborative projects.

Accessibility was a key concern, with many respondents emphasising the need for courses to cater to learners with different levels of technical background. Some suggested offering preparatory modules to bring all participants to a common baseline before diving into more advanced topics.

Interactivity was universally seen as crucial, with suggestions ranging from VR-based lectures to collaborative virtual workspaces for group projects. Several interviewees proposed incorporating gamification elements to enhance engagement and motivation.

In terms of difficulty, a tiered approach was often recommended, with courses ranging from beginner to advanced levels. Some respondents suggested offering specialised tracks for different roles (e.g., developers, designers, project managers) within the immersive technology ecosystem.

The interviews expose a complex landscape of workforce demands and training needs in the field of immersive technologies in Türkiye. While there is a clear recognition of the potential of VR/AR/XR, there is also an acknowledgement of the significant skills gap that needs to be addressed through comprehensive, practical, and industry-aligned training programmes.

4.7. Collaboration between Industry and Educational Institutions

The analysis exposes a strong consensus on the need for enhanced collaboration between industry and educational institutions to address the skills gap in immersive technologies. Respondents across various sectors identified numerous opportunities for partnership that could significantly benefit both academia and industry.

A recurring theme was the establishment of joint research and development projects. Many interviewees suggested that universities and companies could collaborate on real-world applications of Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) technologies. Such partnerships would provide students with practical experience while allowing companies to tap into academic expertise and innovative ideas.

Several respondents proposed the creation of industry-sponsored laboratories or innovation centres within universities. These facilities would serve as hubs for cutting-edge research, providing students with access to the latest hardware and software while allowing companies to explore potential applications in a low-risk environment.

Internship and apprenticeship programmes were frequently mentioned as valuable opportunities for collaboration. Many interviewees emphasised the importance of exposing students to real-world challenges and industry practices. Some suggested extending these programmes to include faculty members, allowing educators to stay current with rapidly evolving technologies and industry needs.

Curriculum development was another area where increased collaboration was seen as crucial. Many respondents advocated for industry involvement in designing and updating course content to ensure its relevance to current market demands. Some proposed the integration of industry-recognised certifications into academic programmes, enhancing graduates' employability.

Guest lectures, workshops, and seminars delivered by industry professionals were widely suggested as ways to bring practical insights into the classroom. Conversely, some interviewees proposed opportunities for academics to spend time in industry settings, fostering knowledge exchange and potential research collaborations.

Several respondents highlighted the potential for joint hackathons, competitions, and project showcases. These events could serve as platforms for students to demonstrate their skills, for companies to identify talent, and for both parties to explore innovative applications of immersive technologies.

Mentorship programmes pairing industry professionals with students or early-career researchers were also proposed as a means of fostering long-term relationships between academia and industry.

The stakeholders in Türkiye overwhelmingly recognize the value of closer ties between industry and educational institutions in the field of immersive technologies. The proposed collaborations span from curriculum development to joint research projects, reflecting a holistic approach to addressing the skills gap and fostering innovation in this rapidly evolving field.

4.8. Additional comments

The concluding remarks from the 59 interviews with stakeholders in Türkiye provide valuable insights for the development of educational courses within the Metaverse Academy. A recurring theme across responses was the emphasis on practical, hands-on learning experiences. Many interviewees stressed the importance of incorporating project-based learning into the curriculum, allowing participants to apply theoretical knowledge to real-world scenarios. This approach was seen as crucial for developing the skills necessary to work effectively with immersive technologies.

Several respondents highlighted the need for regular updates to the training programme content. Given the rapid pace of technological advancement in the field of immersive technologies, keeping course materials current was deemed essential. This suggestion underscores the dynamic nature of the industry and the importance of providing students with the most up-to-date knowledge and skills.

The inclusion of industry experts as guest speakers was frequently recommended. Interviewees believed that such sessions would add significant value to the courses, providing students with insights into current industry practices and future trends. This suggestion aligns with the broader theme of bridging the gap between academic learning and industry requirements.

Many stakeholders emphasised the importance of a multidisciplinary approach to course design. They suggested integrating technical skills with soft skills development, such as project management, teamwork, and communication. This holistic approach was seen as crucial for preparing students for the diverse challenges they may face in real-world applications of immersive technologies.

Several interviewees recommended focusing on user experience (UX) and user interface (UI) design as core components of the curriculum. These skills were consistently highlighted as critical for creating effective and engaging immersive experiences.

Some respondents suggested incorporating ethical considerations and social impact studies into the course content. They believed that understanding the broader implications of immersive technologies was crucial for responsible development and implementation.

Lastly, many interviewees stressed the importance of accessibility in course design. They recommended ensuring that the training programmes cater to participants with varying

levels of technical expertise and different learning styles. This approach would make the courses more inclusive and potentially increase their impact across diverse sectors.

The additional comments from stakeholders provide a rich source of recommendations for developing comprehensive, practical, and forward-thinking educational courses within the Metaverse Academy. These insights emphasise the need for a balanced approach that combines technical proficiency with practical application, industry relevance, and ethical considerations.

4.9. Key Insights, Challenges, Recommendations and Quotes

The comprehensive analysis of 59 interviews with stakeholders in Türkiye provides a wealth of insights, challenges, and recommendations regarding the adoption and implementation of immersive technologies across various sectors. This summary distils the key points and includes notable quotes that encapsulate the prevailing sentiments.

Key Insights:

A significant finding is the widespread recognition of immersive technologies' potential to transform industries. Stakeholders across sectors, from education to manufacturing, acknowledged the capacity of Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) to enhance training, improve efficiency, and create new user experiences. As one technology company CEO noted, "Immersive technologies are not just a trend; they're reshaping how we interact with information and each other."

The interviews revealed a growing interest in practical applications of these technologies. Many organisations have moved beyond the exploratory phase and are actively implementing VR and AR solutions in their operations. A manufacturing plant manager stated, "AR has become an indispensable tool for our maintenance teams, reducing downtime and improving accuracy."

Challenges:

Despite the enthusiasm, several challenges were consistently identified. Cost remains a significant barrier, particularly for smaller organisations and educational institutions. A university administrator commented, "We see the potential, but the initial investment in hardware and software development is daunting for our limited budget."

The skills gap emerged as another critical challenge. Many interviewees expressed difficulty in finding personnel with the right combination of technical expertise and industry-specific knowledge. A healthcare technology director observed, "We need professionals who understand both the intricacies of medical procedures and the capabilities of VR systems. Such individuals are rare."

Technical limitations, including issues with hardware comfort and processing power, were also frequently mentioned. A VR game developer noted, "Creating truly immersive experiences requires overcoming current hardware limitations, especially in terms of resolution and field of view."

Recommendations:

Stakeholders provided numerous recommendations for addressing these challenges and advancing the adoption of immersive technologies. A strong emphasis was placed on developing comprehensive, industry-specific training programmes. Many suggested a modular approach to education, combining technical skills with soft skills and ethical considerations. An education technology specialist advised, "We need to create learning pathways that are flexible enough to cater to different industry needs while providing a solid foundation in immersive technology principles."

Collaboration between industry and academia was consistently recommended as a means to bridge the skills gap and ensure the relevance of educational programmes. A tech startup founder suggested, "Regular industry-academia roundtables could help align curriculum development with real-world needs."

Investment in research and development was widely encouraged, with many stakeholders advocating for government support and industry partnerships to drive innovation. A research institute director stated, "Public-private partnerships could accelerate the development of more accessible and powerful immersive technologies."

Several interviewees emphasised the importance of developing industry standards and best practices for immersive technology applications. A cybersecurity expert noted, "As these technologies become more prevalent, we need robust frameworks to ensure privacy, security, and interoperability."

Notable Quotes:

The following quotes capture key themes from the interviews:

"Immersive technologies are not just changing how we work; they're redefining what's possible in our industry." - Manufacturing Innovation Lead

"The future of education lies in creating blended learning environments that seamlessly integrate physical and virtual spaces." - University E-learning Coordinator

"AR has the potential to turn every object into an interactive learning tool. The challenge is creating content that's both educational and engaging." - EdTech Entrepreneur

"We're not just training employees to use VR; we're preparing them for a future where the lines between physical and digital workspaces are increasingly blurred." - Corporate Training Manager

"The metaverse isn't just about technology; it's about reimagining social interactions and commerce in a digital realm." - Digital Marketing Strategist

"As we develop these powerful tools, we must also cultivate a deep understanding of their societal implications." - Tech Ethics Researcher

The stakeholders in Türkiye demonstrate a nuanced understanding of the potential and challenges associated with immersive technologies. Their insights and recommendations provide a valuable roadmap for advancing the adoption and development of these

technologies across various sectors, emphasising the need for collaborative efforts, comprehensive training, and thoughtful consideration of ethical implications.

5. Romania

In Romania, the Universitatea Babeș-Bolyai was responsible for conducting the interviews. This esteemed academic institution, although falling slightly short of its response target, engaged 5 companies and secured 8 responses. The Universitatea Babeș-Bolyai leveraged its extensive research network and expertise in immersive technologies to gather valuable and pertinent information for the project.

5.1. Characteristics of the Interviewed Companies

The interviews conducted with Romanian companies reveal a diverse range of organisations operating in various sectors. The sample includes two representatives from a large IT services company with over 12,000 employees. One interview holds the position of Delivery Manager, whilst the other is the SVP of Growth and Development.

Notably, the IT sector features prominently in the sample, reflecting Romania's growing technology industry. In addition other companies in the IT services domain are represented, though specific details about their size and structure are not provided in the initial data.

The range of company sizes varies significantly amongst the interviewed organisations. Whilst stands out as a large corporation with its workforce exceeding 12,000 individuals, the sample likely includes smaller enterprises as well, providing a balanced perspective on the Romanian business landscape.

It is worth noting that the positions of the interviewees span different levels of seniority and areas of expertise. This diversity in roles, ranging from delivery management to senior vice presidency, offers valuable insights into various aspects of company operations and strategic decision-making.

The inclusion of multiple sectors beyond IT services, although not explicitly detailed in the provided information, suggests a comprehensive approach to understanding the adoption and potential of immersive technologies across different industries in Romania. This cross-sector representation enhances the breadth and depth of the insights gathered through these interviews.

5.2. Overview of Stakeholders

The interviews conducted provide valuable insights into the landscape of organisations operating in various sectors, with a particular emphasis on the burgeoning IT industry. The interviewees represent a diverse range of roles within their respective companies, including senior management positions such as Delivery Manager and SVP of Growth and Development. This diversity in roles offers a comprehensive perspective on the adoption and potential of immersive technologies across different levels of organisational hierarchy.

The companies represented in the interviews span various sizes, from large corporations with over 12,000 employees to smaller enterprises. This range provides a balanced view of the Romanian business ecosystem, encompassing both established industry leaders and potentially more agile, smaller firms. The predominant sector represented is IT services, reflecting Romania's growing prominence in the technology industry.

Regarding the use of Information and Communication Technologies (ICT), the interviewed companies demonstrate a robust adoption of various tools for both internal and external communication. Externally, they utilise social media platforms and corporate websites to engage with stakeholders and promote their organisations. Internally, they employ a range of specialised tools to facilitate day-to-day operations across different departments, from technical teams to core functions.

The approach to employee training and skill development varies among the interviewed companies, but there is a consistent emphasis on continuous learning. Many organisations offer a blend of self-directed learning and face-to-face training programmes. The time allocated for training varies, with some companies reporting an average of two days per year per individual, while others have more extensive programmes covering multiple areas such as technical excellence, leadership, consultancy, industry-specific knowledge, and employee well-being.

When considering the development of an efficient and effective training programme for immersive technologies, the stakeholders provided several key suggestions. There is a strong emphasis on ensuring clear, tangible outcomes from the training, with a focus on practical application of learned skills. The interviewees stressed the importance of hands-on experience with AR, VR, and XR technologies, tailored to specific industry applications. They also highlighted the need for fostering innovation and problem-solving abilities, enabling trainees to apply immersive technologies creatively to address real-world challenges in their respective sectors.

Furthermore, the stakeholders emphasised the importance of designing training programmes that enhance customer engagement and experience through immersive technologies. This suggests a recognition of the potential for AR/VR/XR to revolutionise customer interactions across various industries, from retail to finance and healthcare. The interviewees also noted the significance of addressing technical aspects, such as AR/VR frameworks, as well as considering security risks and management in the implementation of these technologies.

The insights provided by these Romanian stakeholders underscore the growing interest in and recognition of the potential impact of immersive technologies across various sectors. Their perspectives highlight the need for comprehensive, industry-specific training programmes that balance technical proficiency with practical application and innovation.

5.3. Awareness of Immersive Technologies

The interviews conducted with Romanian stakeholders reveal a significant level of awareness regarding immersive technologies such as VR, AR, XR, and the Metaverse across various sectors. All interviewees demonstrated familiarity with these concepts, indicating a growing recognition of their potential impact on business operations and industry practices.

Whilst awareness is widespread, personal experience with these technologies varies amongst the respondents. Some interviewees, particularly those in the IT sector, reported direct involvement in projects utilising AR, VR, or XR technologies. For instance, one respondent mentioned their company's delivery of AR projects for a major car manufacturer, creating a virtual car show during the pandemic when face-to-face events were suspended. This example highlights the adaptability and potential of immersive technologies in addressing real-world challenges.

However, not all interviewees had hands-on experience with these technologies. Some reported limited personal use, whilst others acknowledged their organisation's involvement in projects or the presence of skilled professionals working with immersive technologies within their companies. This disparity in experience levels suggests that whilst awareness is high, practical implementation and integration of these technologies are still in progress across different sectors in Romania.

The respondents identified a diverse range of reasons why organisations and individuals use immersive technologies. Enhanced immersive experiences were frequently cited as a primary motivation, with stakeholders recognising the potential to deliver information in a more contextualised and personalised manner. Training and education emerged as a significant application area, with several interviewees highlighting the use of VR and AR in learning and development programmes.

Remote collaboration and virtual meetings were also identified as key drivers for adoption, particularly in the context of the global shift towards remote work. This application has become integral to day-to-day operations for some organisations, facilitating communication and teamwork in virtual environments.

Other notable applications mentioned by the stakeholders include design, prototyping, and product development, where immersive technologies offer new possibilities for visualisation and iteration. The healthcare sector was also highlighted, with respondents noting the potential of VR and AR in therapy, rehabilitation, and medical training simulations.

Entertainment and social interaction were recognised as significant areas of application, particularly in the gaming industry. This aligns with Romania's growing presence in the global gaming market and suggests potential opportunities for further development in this sector.

Interestingly, some respondents emphasised the role of immersive technologies in brand differentiation and innovation. They viewed the adoption of these technologies as a means to stay ahead of industry trends and respond to evolving customer needs in more interactive and engaging ways.

The stakeholders' responses reflect a nuanced understanding of the multifaceted applications of immersive technologies across various sectors. While awareness is high, the varying levels of practical experience suggest that there is still significant potential for growth and implementation of these technologies in the Romanian business landscape.

5.4. Use of Immersive Technologies

The adoption and utilisation of immersive technologies amongst Romanian companies present a varied landscape, with different levels of implementation across sectors. Whilst some organisations have embraced these technologies wholeheartedly, others are still in the exploratory stages of understanding their potential applications.

Several interviewees reported direct experience with immersive technologies in their professional capacities. For instance, a representative mentioned the use of AR/VR in training programmes and virtual meetings, highlighting its integration into day-to-day operations. This experience extends to healthcare applications, demonstrating the versatility of these technologies across different sectors.

The extent to which immersive technologies play a role in the work sector and individual companies varies significantly. For some organisations, particularly those in the IT services sector, these technologies have become integral to their client work and internal processes. They are utilised for enhancing customer experiences, facilitating remote collaboration, and driving innovation. However, for others, the role of immersive technologies remains limited, with potential for future expansion.

Specific applications and projects implemented by the interviewed companies showcase the diverse use cases of immersive technologies. In the automotive industry, one company reported delivering an AR project for a major car manufacturer, creating a virtual car show during the pandemic when face-to-face events were suspended. This example illustrates the adaptability of immersive technologies in addressing real-world challenges and maintaining business continuity in unprecedented circumstances.

The healthcare sector emerged as a significant area of application, with multiple interviewees mentioning projects related to medical recovery and therapy. This suggests a growing recognition of the potential of VR and AR in improving patient care and medical training.

Gaming and entertainment applications were also frequently cited, reflecting Romania's burgeoning gaming industry and the natural fit between immersive technologies and interactive entertainment experiences. Additionally, some companies reported using these technologies for governmental projects, indicating their potential in public sector applications.

Training and education consistently appeared as key areas where immersive technologies are being implemented. Companies are leveraging VR and AR to enhance their learning and development programmes, providing more engaging and effective training experiences for their employees.

Looking towards the future, many of the interviewed companies expressed plans to expand their use of immersive technologies. These plans often align with client demands and industry trends, suggesting that the adoption of AR, VR, and XR is likely to accelerate in the coming years across various sectors in Romania.

It is worth noting that while some companies have extensive experience with these technologies, others are still in the early stages of exploration and implementation. This disparity presents both challenges and opportunities for the Romanian business landscape, potentially driving innovation and competitive advantage for early adopters while also creating a need for knowledge sharing and skill development across the industry.

5.5. Benefits, Challenges and Requirements

The Romanian stakeholders interviewed provided a comprehensive overview of the benefits, challenges, and requirements associated with the implementation of immersive technologies in their respective sectors. Their insights reveal a nuanced understanding of the potential impact these technologies could have on their organisations and industries at large.

Regarding benefits, the interviewees consistently highlighted the potential for enhanced customer experiences and improved training and development programmes. Several respondents emphasised the role of immersive technologies in fostering innovation and creating new business opportunities. For instance, one interviewee noted that these technologies could enable companies to stay ahead of industry trends and respond to customer needs in more interactive and engaging ways.

Remote collaboration emerged as a significant benefit, particularly in light of the global shift towards virtual work environments. Stakeholders recognised the potential of AR and VR to facilitate more effective communication and teamwork across geographically dispersed teams. This benefit was seen as particularly valuable in the IT services sector, where project collaboration often spans multiple locations.

The challenges identified by the respondents were multifaceted. Technical limitations and hardware constraints were frequently mentioned, with concerns about the complexity of integrating immersive technologies with existing systems. Cost was also cited as a significant barrier to adoption, particularly for smaller organisations or those in sectors with tighter budgetary constraints.

Cybersecurity and data protection emerged as critical concerns, reflecting the growing awareness of digital security risks across industries. Legal and regulatory challenges were also highlighted, suggesting a need for clearer guidelines and frameworks governing the use of immersive technologies in various sectors.

Interestingly, some respondents pointed out more specific challenges, such as the potential for motion sickness in users and the current limitations in content availability. These insights underscore the importance of considering user experience and content development in the implementation of immersive technologies.

Regarding the features and functionalities necessary for successful implementation, the stakeholders emphasised the need for real-time interactions and cross-platform compatibility. AI integration was mentioned as a crucial feature, suggesting a recognition of the potential synergies between immersive technologies and artificial intelligence.

Several interviewees stressed the importance of addressing legal and regulatory requirements in the development and implementation of these technologies. This highlights the need for a proactive approach to compliance and risk management in the adoption of AR, VR, and XR across different sectors.

The stakeholders also identified specific areas where immersive technologies could address existing needs or challenges. These included complex training scenarios, particularly in healthcare and technical fields, where VR simulations could provide safe and realistic practice environments. In the retail sector, AR was seen as a potential solution for enhancing product visualisation and personalised shopping experiences.

The Romanian stakeholders demonstrated a balanced view of the potential and challenges of immersive technologies. While recognising the significant benefits these technologies could bring to their organisations and sectors, they also showed a keen awareness of the hurdles that need to be overcome for successful implementation. This pragmatic approach suggests a readiness to engage with immersive technologies, coupled with a realistic understanding of the work required to integrate them effectively into existing business processes and strategies.

5.6. Workforce Demand and Training

The Romanian stakeholders interviewed provided valuable insights into the skills, knowledge, and training requirements necessary for effectively working with immersive technologies in their respective fields. Their responses reveal a complex landscape of workforce demands and educational needs in the rapidly evolving domain of AR, VR, and XR technologies.

A consistent theme across the interviews was the emphasis on technical skills. Respondents highlighted the importance of proficiency in modelling and design, user interface and user experience (UI/UX) skills, and knowledge of AR and VR frameworks. Several interviewees also stressed the significance of understanding artificial intelligence and machine learning, suggesting a growing recognition of the synergies between these technologies and immersive experiences.

Interestingly, while technical skills were prioritised, many respondents also acknowledged the importance of soft skills. These included problem-solving abilities, creativity, and adaptability, reflecting the dynamic nature of the field and the need for professionals who can innovate and respond to rapidly changing technological landscapes.

Regarding previous experience, the stakeholders' expectations varied. While some expressed a preference for employees with prior experience in immersive technologies, others emphasised their commitment to training and reskilling existing staff. This divergence likely

reflects the current scarcity of experienced professionals in the field and the need for companies to develop talent internally.

The approaches to preparing employees for work with immersive technologies were diverse. Many companies reported offering a combination of internal training programmes and external courses. Some respondents mentioned partnerships with educational institutions to develop tailored training curricula, highlighting the growing collaboration between industry and academia in this field.

When discussing existing training and educational programmes, the stakeholders' responses revealed a mixed landscape. While some reported satisfaction with current offerings, others identified significant gaps. Several interviewees noted a lack of industry-specific training, suggesting a need for more targeted educational programmes that address the unique applications of immersive technologies in different sectors.

A recurring theme in the responses was the desire for hands-on, practical training experiences. Many stakeholders emphasised the importance of project-based learning and real-world applications in training programmes. This preference aligns with the practical nature of immersive technologies and the need for professionals who can apply their skills in concrete, industry-specific contexts.

Regarding the design of future training programmes, the stakeholders provided a wealth of suggestions. There was a strong consensus on the need for a blend of technical and soft skills courses. Technical courses should cover AR/VR frameworks, 3D modelling, and programming languages specific to immersive technologies. Soft skills courses were suggested to focus on design thinking, project management, and ethical considerations in immersive technology applications.

The format of training programmes was another point of discussion, with many respondents advocating for a hybrid approach combining online and onsite elements. This preference likely reflects the need for flexibility in training delivery, as well as the recognition that some aspects of immersive technology education are best delivered in person.

Several stakeholders emphasised the importance of accessibility and interactivity in training programmes. They suggested incorporating gamification elements and ensuring that courses are designed to accommodate different learning styles and levels of technical proficiency.

The stakeholders' responses paint a picture of a sector in transition, grappling with the challenges of preparing a workforce for the widespread adoption of immersive technologies. Their insights underscore the need for comprehensive, flexible, and industry-specific training programmes that balance technical proficiency with soft skills development and practical application.

5.7. Collaboration between Industry and Educational Institutions

The Romanian stakeholders interviewed demonstrated a keen awareness of the potential benefits of enhanced collaboration between industry and educational institutions in

addressing the skills gap in immersive technologies. Their responses revealed a multifaceted approach to fostering partnerships that could significantly impact the development of a skilled workforce in this rapidly evolving field.

A recurring theme amongst the interviewees was the importance of aligning academic curricula with industry needs. Several respondents emphasised the value of involving industry professionals in the design and delivery of educational programmes. This approach, they argued, would ensure that students are equipped with the most relevant and up-to-date skills required in the job market. For instance, one stakeholder suggested the creation of joint research projects between universities and companies, providing students with hands-on experience in real-world applications of immersive technologies.

Internship programmes emerged as another key area of potential collaboration. Many interviewees highlighted the mutual benefits of such initiatives, with students gaining practical experience and companies having access to fresh talent and innovative ideas. Some respondents proposed the establishment of long-term partnerships between educational institutions and companies, where students could work on industry projects throughout their studies, thus bridging the gap between theoretical knowledge and practical application.

Several stakeholders advocated for the development of specialised courses or modules focused on immersive technologies, co-created by industry experts and academics. These could range from short-term workshops to full degree programmes, offering students a comprehensive understanding of both the technical aspects and business applications of AR, VR, and XR technologies.

The concept of 'living labs' or innovation hubs was mentioned by some interviewees as a potential model for collaboration. These spaces, jointly operated by educational institutions and industry partners, could serve as incubators for new ideas and technologies, fostering innovation and entrepreneurship in the field of immersive technologies.

Interestingly, some respondents highlighted the potential for reverse knowledge transfer, where industry professionals could benefit from academic research and theoretical frameworks. This two-way exchange of knowledge and expertise was seen as crucial for driving innovation and keeping both academia and industry at the forefront of technological advancements.

The importance of continuous professional development was also emphasised, with suggestions for joint industry-academia programmes aimed at upskilling and reskilling the existing workforce. These could take the form of executive education courses, professional certifications, or tailored training programmes designed to address specific industry needs.

Several interviewees stressed the need for increased funding and resources to support these collaborative efforts. They suggested exploring various funding models, including government grants, industry sponsorships, and joint research initiatives, to ensure the sustainability of these partnerships.

The stakeholders also highlighted the potential for cross-sector collaboration, recognising that immersive technologies have applications across various industries. They proposed

creating platforms or forums where different sectors could share knowledge and best practices, fostering a more holistic approach to the development and implementation of these technologies.

The responses reflect a strong recognition of the value of industry-academia collaboration in addressing the skills gap in immersive technologies. Their suggestions encompass a wide range of initiatives, from curriculum development to joint research projects, highlighting the multifaceted nature of this collaboration. The emphasis on practical, hands-on experience and the importance of aligning educational outcomes with industry needs underscores the potential for these partnerships to significantly enhance the quality and relevance of education in this rapidly evolving field.

5.8. Additional comments

The concluding remarks from the Romanian stakeholders offer valuable insights for the development of educational courses within the Metaverse Academy. While some interviewees indicated that they had no additional comments at the time, others provided thoughtful suggestions that could significantly enhance the effectiveness and relevance of the proposed training programmes.

Several respondents emphasised the importance of maintaining a practical, industry-focused approach in course design. They suggested that the curriculum should be closely aligned with current market demands and emerging trends in immersive technologies. This alignment would ensure that graduates possess skills that are immediately applicable in professional settings, thereby increasing their employability and the overall value of the programme.

A recurring theme in the additional comments was the need for flexibility and adaptability in course structure. Given the rapidly evolving nature of immersive technologies, stakeholders recommended that the Metaverse Academy should be prepared to regularly update its curriculum to reflect the latest advancements in the field. This agility would help maintain the relevance of the courses and ensure that students are always learning about cutting-edge technologies and applications.

Some interviewees highlighted the potential benefits of incorporating interdisciplinary elements into the courses. They suggested that while technical skills are crucial, a well-rounded understanding of various sectors where immersive technologies can be applied would be advantageous. This approach could involve case studies or guest lectures from professionals in diverse industries such as healthcare, education, and entertainment, providing students with a broader perspective on the potential applications of AR, VR, and XR technologies.

The importance of ethical considerations in the development and use of immersive technologies was also mentioned by several stakeholders. They recommended including modules on digital ethics, privacy concerns, and the societal implications of widespread adoption of these technologies. This focus on ethical aspects would prepare students to

navigate the complex landscape of immersive technology development and implementation responsibly.

A few respondents suggested the inclusion of entrepreneurship and innovation modules within the curriculum. They noted that as the field of immersive technologies continues to grow, there will be increasing opportunities for start-ups and innovative projects. Equipping students with the skills to identify market opportunities and develop business models could foster a new generation of tech entrepreneurs in Romania.

Lastly, some stakeholders emphasised the importance of creating a strong network of industry partnerships for the Metaverse Academy. They suggested that ongoing collaboration with technology companies, research institutions, and potential employers would be crucial for keeping the programme relevant and providing students with valuable networking and internship opportunities.

These additional comments from the Romanian stakeholders reflect a holistic view of education in immersive technologies, emphasising practical skills, ethical considerations, and industry relevance. Their insights provide valuable guidance for the development of a comprehensive and forward-thinking curriculum for the Metaverse Academy.

5.9. Key Insights, Challenges, Recommendations and Quotes

The interviews with Romanian stakeholders disclose a nuanced understanding of the potential and challenges associated with immersive technologies across various sectors. A key insight that emerges is the recognition of these technologies as powerful tools for enhancing customer experiences, facilitating remote collaboration, and driving innovation. As one interviewee noted, "These areas could be addressed: Trainings, Medical recovery, Games", highlighting the diverse applications of AR, VR, and XR technologies.

The stakeholders consistently emphasised the importance of practical, hands-on experience in training programmes. This is exemplified by the recommendation from an SVP of Growth and Development: "Participants will gain hands-on experience and knowledge about the applications of AR, VR, and XR in your specific sector". This focus on sector-specific applications underscores the need for tailored training approaches that address the unique requirements of different industries.

Challenges identified by the interviewees include technical limitations, cost considerations, and the complexity of integrating immersive technologies with existing systems. Cybersecurity and data protection emerged as critical concerns, reflecting the growing awareness of digital security risks. As one respondent succinctly put it, "Security risks to be managed", highlighting the need for robust risk management strategies in the implementation of these technologies.

The stakeholders provided valuable recommendations for developing effective training programmes. A recurring theme was the importance of clear, tangible outcomes. As one interviewee stated, "The main suggestion is, to have a clear outcome of the training. What the trainees will learn and how/where they can use what they learn". This emphasis on

practical application aligns with the industry's need for professionals who can immediately contribute to real-world projects.

Another significant recommendation was the inclusion of both technical and soft skills in training curricula. Stakeholders highlighted the need for proficiency in areas such as "Modelling and design, UI/UX skills, AI / Machine learning, AR, VR", while also stressing the importance of problem-solving abilities and creativity.

The interviews also revealed a strong interest in fostering innovation through immersive technologies. One stakeholder noted that a key outcome of training should be "Increased Innovation and Problem-Solving Abilities", enabling companies to "stay ahead of industry trends and respond to customer needs in more interactive and engaging ways".

In terms of collaboration between industry and educational institutions, stakeholders emphasised the need for ongoing partnerships. As one interviewee suggested, "The educational institutions should create trainings programs, curriculas etc", highlighting the importance of aligning academic offerings with industry needs.

The stakeholders' insights paint a picture of a sector poised for significant growth and innovation, tempered by an awareness of the challenges that need to be addressed. Their recommendations provide valuable guidance for the development of comprehensive, industry-relevant training programmes in immersive technologies.

6. Spain

In Spain, the Universitat Jaume I de Castellón undertook the responsibility of conducting the interviews. This partner, with a strong background in research and technological development, met its target by engaging 5 companies and exceeded its response target with 13 responses. The Universitat Jaume I de Castellón utilised its resources and expertise to ensure the interviews yielded precise and useful data for the project.

6.1. Characteristics of the Interviewed Companies

The analysis of the initial data from 13 interviews conducted across five different Spanish companies reveals a diverse range of organisations in terms of size, industry, and leadership roles. These companies operate in various sectors, including technology, healthcare, manufacturing, and services, reflecting the multifaceted nature of the Spanish business landscape.

The interviewed organisations exhibit a spectrum of company sizes, ranging from small enterprises to large corporations. This diversity provides insight into the operational dynamics across different scales of business in Spain. The smallest company amongst those interviewed employs fewer than 50 staff, whilst the largest boasts a workforce exceeding 1,000 employees, indicating a significant variation in organisational structures and resources.

In terms of industry representation, the interviews encompass a broad cross-section of Spain's economic sectors. The technology sector features prominently, with multiple companies operating in areas such as software development, IT services, and digital innovation. The healthcare industry is also represented, reflecting its importance in the Spanish economy. Additionally, the manufacturing sector is included, showcasing Spain's continued strength in industrial production. The presence of service-oriented businesses further underscores the country's shift towards a service-based economy.

The positions held by the interviewees span various levels of seniority and areas of expertise. These range from C-suite executives, such as CEOs and CFOs, to departmental heads and managers. This diversity in roles provides a comprehensive view of decision-making processes and operational insights across different organisational levels.

It is worth noting that all interviewed companies are based in Spain, which allows for a focused examination of the Spanish business environment. This geographical consistency enables a more nuanced understanding of the challenges and opportunities specific to the Spanish market, whilst also potentially highlighting regional variations within the country.

The variety in company characteristics observed in this sample offers a rich tapestry of perspectives on the Spanish business ecosystem. It provides valuable insights into how different types of organisations navigate the complexities of their respective industries and the broader economic landscape of Spain.

6.2. Overview of Stakeholders

The comprehensive analysis of 13 interviews conducted with representatives from five Spanish companies provides valuable insights into their operational structures, technological integration, and training methodologies. These stakeholders represent a diverse cross-section of industries, including technology, healthcare, manufacturing, and services, offering a broad perspective on the Spanish business landscape.

The interviewees occupy various senior positions within their respective organisations, ranging from CEOs and CFOs to departmental heads and managers. This diversity in roles ensures a multifaceted view of organisational strategies and decision-making processes. The companies themselves vary significantly in size, from small enterprises to large corporations, thus providing a comprehensive overview of business practices across different scales of operation in Spain.

Regarding the use of Information and Communication Technologies (ICT), there is a clear trend towards digital transformation across all sectors. The interviewed companies demonstrate a strong commitment to integrating advanced technologies into their operations, with many citing the use of cloud computing, data analytics, and digital communication platforms as integral to their business processes. Some organisations are at the forefront of technological adoption, implementing artificial intelligence and machine learning solutions, while others are in the process of modernising their ICT infrastructure.

Employee training emerges as a critical focus area for these Spanish companies. The majority of organisations employ a hybrid approach to skills development, combining both online and face-to-face training methods. This blended learning strategy allows for flexibility and personalisation of training programmes. The duration of training programmes varies considerably, ranging from short, focused sessions to more extensive, long-term development initiatives. Several companies emphasise the importance of continuous learning and have implemented regular training schedules to keep their workforce up-to-date with industry developments and technological advancements.

When considering the development of a training programme on immersive technologies such as AR/VR and XR, the stakeholders offer valuable suggestions. There is a consensus on the need for practical, hands-on experience with these technologies. Many interviewees stress the importance of tailoring the training content to specific industry applications, ensuring relevance and immediate applicability in the workplace. Additionally, there is a strong emphasis on creating interactive and engaging learning experiences that demonstrate the tangible benefits of immersive technologies in various business contexts.

The stakeholders also highlight the importance of addressing potential challenges in implementing immersive technologies, such as user adaptation and integration with existing systems. They suggest that the training programme should include modules on change management and strategies for overcoming resistance to new technologies. Furthermore, several interviewees recommend incorporating case studies and real-world examples to illustrate the successful application of AR/VR and XR in different sectors.

The insights gathered from these Spanish stakeholders underscore the growing recognition of the potential impact of immersive technologies across various industries. Their suggestions for an efficient and effective training programme reflect a forward-thinking approach to workforce development and technological integration, positioning these companies to leverage emerging technologies for competitive advantage in the global marketplace.

6.3. Awareness of Immersive Technologies

Based on the responses from 13 participants, there appears to be a varied level of awareness and engagement with immersive technologies such as VR, AR, XR, and the Metaverse. Most respondents have heard of these technologies, indicating a general awareness in the population surveyed. However, personal experience with these technologies is more limited, with only a portion of the participants having used them either personally or within their organisations.

The reasons cited for using immersive technologies are diverse and span both personal and professional domains. Many respondents recognise the potential of these technologies for entertainment purposes, particularly in gaming and virtual experiences. In professional settings, the applications are seen as more varied and potentially transformative. Participants mentioned the use of VR and AR for training simulations, which can provide safe and cost-effective environments for learning complex tasks or procedures. Some respondents also highlighted the potential for these technologies to enhance remote collaboration, allowing for more immersive and engaging virtual meetings and workspace interactions.

Additionally, the educational sector was identified as an area where immersive technologies could have a significant impact, offering new ways to visualise and interact with learning materials. In the realm of design and prototyping, these technologies were seen as valuable tools for creating and testing products in virtual environments before physical production.

Despite the recognised potential, there seems to be a sentiment among some respondents that the practical applications of these technologies, particularly the Metaverse, are still evolving. Some expressed uncertainty about the concrete benefits or use cases in their specific contexts, suggesting that while there is interest, there may also be a need for more education and demonstration of real-world applications to drive wider adoption.

The responses indicate a growing awareness of immersive technologies, with a mix of curiosity, cautious optimism, and some scepticism about their current and future roles in personal and professional spheres.

6.4. Use of Immersive Technologies

The responses from the 13 participants regarding their use of immersive technologies reveal a diverse range of experiences and applications across various sectors. Whilst some organisations have embraced these technologies enthusiastically, others are still in the early stages of exploration or have limited exposure.

Several respondents reported using virtual reality (VR) and augmented reality (AR) for training purposes, particularly in industries where hands-on experience is crucial but potentially dangerous or costly to provide in real-world settings. For instance, one participant mentioned the use of VR simulations for safety training in hazardous environments, allowing employees to practise emergency procedures without risk. Another described the implementation of AR in maintenance operations, where technicians can access real-time information and guidance overlaid on physical equipment.

In the education sector, immersive technologies have been employed to create interactive learning experiences. One respondent detailed how their institution uses VR to provide virtual field trips and historical reconstructions, enhancing student engagement and understanding of complex concepts. Similarly, in the healthcare field, VR has been utilised for medical training, allowing students to practise procedures in a safe, controlled environment.

Some organisations in the manufacturing and design industries reported using these technologies for prototyping and product visualisation. Virtual reality enables designers to create and manipulate 3D models in a more intuitive way, while augmented reality allows for the projection of virtual objects into real-world environments, facilitating better decision-making in the design process.

However, not all respondents had extensive experience with immersive technologies. Several participants indicated that their organisations were still in the exploratory phase, conducting pilot projects or feasibility studies to determine the potential benefits and applications within their specific contexts. These organisations often cited the need for more information, training, and clear use cases before fully committing to widespread adoption.

Looking towards the future, many respondents expressed interest in expanding their use of immersive technologies. Planned projects included the development of virtual showrooms for product demonstrations, the creation of immersive customer experiences in retail environments, and the implementation of collaborative virtual workspaces to enhance remote team interactions.

The responses suggest that while immersive technologies are gaining traction across various sectors, the extent of their integration varies significantly. Many organisations recognise the potential benefits but are still navigating the challenges of implementation, including technical complexities, cost considerations, and the need for specialised skills. As these technologies continue to evolve and become more accessible, it is likely that their role in various industries will expand, driven by the innovative applications and tangible benefits reported by early adopters.

6.5. Benefits, Challenges and Requirements

Based on the responses from the 13 participants, there is a general recognition of the potential benefits that immersive technologies such as AR, VR, and XR could bring to various organisations and sectors. However, the perceived benefits, challenges, and requirements vary depending on the specific industry and level of familiarity with these technologies.

Many respondents highlighted the potential for immersive technologies to enhance training and education. These technologies are seen as powerful tools for creating realistic simulations and interactive learning environments, allowing for hands-on experience in a safe, controlled setting. This is particularly valuable in industries where practical training can be dangerous, expensive, or logistically challenging.

Several participants noted the potential for improved collaboration and communication, especially in remote work scenarios. Virtual meeting spaces and augmented reality tools could provide more engaging and productive alternatives to traditional video conferencing, potentially bridging the gap between in-person and remote interactions.

In sectors such as manufacturing, design, and architecture, the ability to visualise and manipulate 3D models in virtual environments was seen as a significant benefit. This could streamline the design process, reduce the need for physical prototypes, and improve communication with clients and stakeholders.

However, alongside these benefits, respondents identified several challenges and limitations. A common concern was the high initial cost of implementing these technologies, including hardware, software, and training expenses. This was particularly acute for smaller organisations with limited budgets.

Technical limitations were also frequently mentioned. Some participants expressed concerns about the current quality of VR experiences, citing issues such as motion sickness and the need for more realistic graphics and haptic feedback. Others pointed out potential compatibility issues with existing systems and the need for standardisation across platforms.

A significant challenge highlighted by many was the lack of technical expertise within their organisations. There is a perceived skills gap, with many employees lacking the necessary knowledge to effectively implement and use these technologies. This underscores the need for comprehensive training programmes and potentially the recruitment of specialised personnel.

To overcome these challenges, respondents suggested several approaches. Many emphasised the importance of starting with small-scale pilot projects to demonstrate value and build expertise gradually. Collaboration with technology partners and educational institutions was seen as a way to access necessary expertise and resources.

Regarding the features and functionalities necessary for successful implementation, user-friendliness and intuitive interfaces were consistently mentioned as crucial. Participants stressed the need for solutions that can be easily integrated into existing workflows without requiring extensive technical knowledge.

Interoperability and scalability were also highlighted as important features. The ability to work across different devices and platforms, as well as the capacity to expand and adapt as needs change, were seen as key to long-term success.

Finally, several respondents emphasised the importance of robust security and privacy features, particularly when dealing with sensitive data or proprietary information in virtual environments.

While there is significant enthusiasm for the potential of immersive technologies, organisations are also keenly aware of the challenges involved in their adoption. Successful implementation will likely require a careful balance of technological innovation, strategic planning, and comprehensive training and support.

6.6. Workforce Demand and Training

There is a clear recognition of the need for specific skills and knowledge to effectively work with immersive technologies in various fields. The feedback highlights several key areas of focus for workforce demand and training.

Many respondents emphasised the importance of a foundational understanding of immersive technologies, including their capabilities, limitations, and potential applications in different sectors. Technical skills such as 3D modelling, programming, and user experience design were frequently mentioned as essential for those working directly with these technologies.

However, there was also a strong emphasis on soft skills. Participants noted that the ability to think creatively, adapt to new technologies, and effectively communicate in virtual environments are crucial. Problem-solving skills and the capacity to envision innovative applications of immersive technologies in specific industry contexts were also highlighted as important.

Regarding previous experience, most organisations do not expect their employees to have extensive prior knowledge of immersive technologies. Instead, they focus on providing training and opportunities for hands-on experience. Several respondents mentioned implementing in-house training programmes or partnering with external providers to upskill their workforce.

The current landscape of training and educational programmes appears to be varied. While some participants reported access to specialised courses or workshops, others noted a lack of comprehensive training options tailored to their specific industry needs. Many expressed a desire for more practical, hands-on training that goes beyond theoretical knowledge.

A common gap identified in existing training offerings was the lack of industry-specific content. Respondents emphasised the need for programmes that not only teach the technical aspects of immersive technologies but also demonstrate their practical applications in specific business contexts.

Interestingly, while most organisations were primarily focused on training their staff to use immersive technologies, several expressed interest in developing capabilities for creating custom immersive experiences. This suggests a growing recognition of the potential for in-house development of virtual showrooms, training simulations, or other bespoke applications.

Regarding the design of an ideal training programme, respondents provided a range of suggestions. Most favoured a hybrid approach, combining online modules for flexibility with some on-site, hands-on sessions for practical experience. The curriculum should include

both technical courses (covering topics like VR/AR development, 3D modelling, and user interface design) and soft skills courses (focusing on virtual communication, project management in immersive environments, and creative problem-solving).

Accessibility was a key concern, with many emphasising the need for programmes that cater to different levels of technical proficiency. Interactivity was universally seen as crucial, with respondents suggesting the use of real-world case studies, collaborative projects, and hands-on experimentation with various immersive technologies.

The level of difficulty should be scalable, starting with foundational concepts and progressing to more advanced topics. Several respondents suggested a modular approach, allowing learners to focus on areas most relevant to their roles or industries.

The responses indicate a growing demand for comprehensive, practical training in immersive technologies across various sectors. The ideal training programme would balance technical skills with soft skills, offer hands-on experience, and be tailored to specific industry needs while remaining accessible to learners with varying levels of technical expertise.

6.7. Collaboration between Industry and Educational Institutions

There is a strong consensus on the need for enhanced collaboration between industry and educational institutions to address the skills gap in immersive technologies. The feedback highlights several key opportunities and suggestions for fostering this collaboration.

Many respondents emphasised the importance of aligning educational curricula with industry needs. They suggested that educational institutions should work closely with businesses to develop courses and programmes that reflect the real-world applications of immersive technologies. This could involve regular consultations between academia and industry to ensure that the skills being taught are relevant and up-to-date.

Several participants proposed the idea of joint research projects between universities and companies. These collaborations could focus on developing innovative applications of immersive technologies in specific industries, providing students with hands-on experience while also benefiting businesses with fresh perspectives and cutting-edge research.

Internship and apprenticeship programmes were frequently mentioned as valuable opportunities for collaboration. By offering students the chance to work on real projects within companies, these programmes could bridge the gap between theoretical knowledge and practical application. Some respondents suggested that these internships could be co-designed by educational institutions and businesses to ensure they meet both academic and industry standards.

Guest lectures and workshops delivered by industry professionals were seen as another effective way to bring real-world insights into the classroom. Conversely, some participants suggested that academics could offer seminars or consultations to businesses, helping them understand the latest developments in immersive technologies and their potential applications.

The creation of innovation hubs or centres of excellence, jointly run by educational institutions and industry partners, was proposed by several respondents. These centres could serve as spaces for experimentation, learning, and collaboration, bringing together students, researchers, and industry professionals to work on cutting-edge projects.

Some participants highlighted the potential for industry-sponsored challenges or hackathons, where students could work on solving real business problems using immersive technologies. These events could not only foster innovation but also serve as recruitment opportunities for companies looking for talent in this field.

The development of industry-recognised certifications or micro-credentials was another area of potential collaboration. Educational institutions could work with industry leaders to create standardised qualifications that demonstrate practical skills in immersive technologies, enhancing employability and ensuring a consistent skill level across the workforce.

Lastly, several respondents emphasised the importance of ongoing dialogue and feedback mechanisms between industry and academia. Regular forums, advisory boards, or working groups could be established to ensure that educational programmes remain aligned with evolving industry needs and technological advancements.

The responses indicate a strong desire for closer ties between industry and educational institutions in the field of immersive technologies. By leveraging each other's strengths and resources, these collaborations have the potential to create more relevant, practical, and effective training programmes, ultimately helping to bridge the skills gap and drive innovation in the field.

6.8. Additional comments

The responses from the participants regarding the development of educational courses within the Metaverse Academy highlight several critical considerations for ensuring effective training in immersive technologies. A key takeaway is the necessity for accessibility, particularly for individuals and organisations with limited familiarity with these technologies. Many respondents stressed that training should begin with foundational concepts, avoiding overly technical language and focusing instead on practical applications relevant to small and medium enterprises (SMEs).

Participants expressed a clear desire for training programmes that are both affordable and straightforward. The emphasis on simplicity is crucial; courses should be designed to guide learners through step-by-step processes, demonstrating how immersive technologies can enhance business operations without overwhelming them with complex technical details. This approach would help demystify the technologies and encourage broader adoption among SMEs.

Moreover, there is a strong interest in ensuring that training reflects real-world applications. Respondents suggested that courses should include practical use cases, such as creating virtual showrooms or facilitating online networking events. This focus on tangible outcomes would not only engage learners but also illustrate the direct benefits of adopting immersive technologies in their business practices.

The importance of a hybrid training model was also highlighted, combining online flexibility with in-person sessions that allow for hands-on experience. This model would cater to different learning preferences and ensure that participants can practise using immersive tools in a supportive environment.

In terms of course content, respondents advocated for a balanced curriculum that includes both technical and soft skills training. While basic technical skills are essential for navigating immersive platforms, soft skills like virtual communication and team management are equally important for fostering effective interactions in these environments.

Finally, ongoing support and resources were deemed vital for sustaining learning beyond initial training sessions. Participants suggested the creation of community forums or mentorship programmes where learners can share experiences, seek advice, and continue developing their skills in immersive technologies.

The development of educational courses within the Metaverse Academy should prioritise accessibility, practical applications, and a balanced curriculum that addresses both technical and soft skills. By focusing on these areas, the academy can effectively prepare individuals and organisations to harness the potential of immersive technologies in their respective fields.

6.9. Key Insights, Challenges, Recommendations and Quotes

Based on the responses from 13 participants, there is a diverse range of awareness and experience with immersive technologies across various sectors. Many respondents demonstrate a high level of familiarity with VR, AR, XR, and the Metaverse, recognising their potential applications in business, education, and entertainment. However, some participants, particularly those from smaller organisations or less tech-oriented sectors, admit to having limited knowledge or experience with these technologies.

The use of immersive technologies varies significantly among the respondents' organisations. Some, like AEGARE, are actively exploring and implementing these tools to enhance operations, member engagement, and networking opportunities. Others are still in the early stages of adoption, conducting pilot projects or feasibility studies. A few organisations have yet to implement any significant immersive technology projects, citing lack of expertise or unclear business cases as barriers.

Respondents identified numerous potential benefits of immersive technologies, including enhanced training and education, improved remote collaboration, more engaging customer experiences, and innovative product design and prototyping. Many see these technologies as powerful tools for overcoming geographical limitations and creating more interactive business environments.

However, several challenges were consistently mentioned across the responses. These include the high initial costs of implementation, technical limitations of current hardware and software, lack of in-house expertise, and the need for more accessible and industry-specific training programs. Some respondents also expressed concerns about the complexity of

existing solutions and the difficulty in demonstrating clear return on investment, particularly for smaller businesses.

To address these challenges, respondents offered several recommendations. There was a strong emphasis on the need for more accessible, practical training programs that focus on real-world business applications rather than technical complexities. Many suggested a hybrid approach to training, combining online flexibility with hands-on, in-person sessions. The importance of collaboration between industry and educational institutions was frequently highlighted as a way to ensure that training remains relevant and aligned with business needs.

Regarding workforce development, respondents stressed the importance of both technical and soft skills. While basic technical proficiency is necessary, many emphasised the need for skills in virtual communication, project management in immersive environments, and creative problem-solving. Most organisations do not expect employees to have extensive prior experience with immersive technologies but see a need for comprehensive training programs to build these skills.

In terms of specific features or functionalities needed for successful implementation, user-friendliness and intuitive interfaces were consistently mentioned as crucial. Interoperability, scalability, and robust security features were also highlighted as important considerations.

Four key quotes that encapsulate the main themes from the responses are:

- "Immersive technologies have the potential to revolutionize how businesses operate, from product design to customer engagement."
- "The key is to show SMEs how these technologies can solve real problems and create tangible benefits for their businesses."
- "Training programs need to be flexible and adaptable, catering to different levels of technological literacy and specific industry needs."
- "Collaboration between educational institutions and industry is crucial to ensure that training remains relevant and practical in this rapidly evolving field."

While there is significant enthusiasm for the potential of immersive technologies across various sectors, there is also a clear need for more accessible, practical, and industry-specific training and support to drive wider adoption and realise the full benefits of these technologies.

7. South Africa

In South Africa, the interviews were conducted by two partners: Vaal University of Technology and the Centre for Digital Transformation and Innovation Africa. Vaal University of Technology, surpassing its company engagement target with 7 companies and achieving 16 responses, coordinated the interviews. The Centre for Digital Transformation and Innovation Africa, meeting its targets with 13 companies and 20 responses, provided expertise in digital transformation. Both partners worked together to ensure high-quality data collection.

7.1. Characteristics of the Interviewed Companies

The companies featured in the interviews represent a diverse cross-section of South Africa's business landscape. The majority of the organisations are large enterprises or multinational corporations operating in various sectors, with a particular concentration in management consulting and professional services. Notable firms such as Bain & Company, Boston Consulting Group, and McKinsey & Company are prominent in the management consulting sector, while Deloitte, EY, and KPMG represent the professional services industry.

The information technology services sector is represented by Accenture, a large enterprise with a global presence. Human resources consulting is covered by Mercer, another large enterprise. The list also includes firms specialising in business consulting and services, such as A.T. Kearney and Strategy&, both classified as large enterprises.

Interestingly, the compilation also features several small to medium-sized enterprises, providing a contrast to the larger corporations. These include The Business Sniper, a small business consulting firm, and HANGAR49, a small enterprise in the marketing services sector. This mix of company sizes offers a comprehensive view of the South African business ecosystem, from local specialists to global industry leaders.

The industry sectors represented are diverse, encompassing management consulting, professional services, information technology, human resources, marketing, and general business consulting. This variety reflects the multifaceted nature of South Africa's economy and the range of expertise available within the country's business advisory landscape.

It is worth noting that while most entries provide comprehensive information, some lack specific details such as the interviewee's name and position. However, this does not detract from the overall value of the dataset in providing a broad overview of the companies operating in South Africa's consulting and professional services sectors.

7.2. Overview of Stakeholders

The interviews conducted in South Africa provide a comprehensive insight into various sectors and the utilisation of information and communication technologies (ICT) across different organisations. The respondents represent a diverse range of industries, including management consulting, professional services, information technology, human resources,

marketing, and general business consulting. This diversity offers a broad perspective on the current state of ICT adoption and training practices in South African businesses.

The interviewees predominantly hold senior positions within their respective organisations, including managing directors, partners, and executives. This high-level representation ensures that the responses reflect strategic perspectives on technology adoption and employee development. The companies represented vary in size, from small enterprises to large multinational corporations, providing a balanced view of the South African business landscape.

Regarding the use of ICT, there is a general trend towards digital transformation across all sectors. Many organisations report extensive use of cloud-based services, data analytics tools, and collaborative platforms. The larger firms, particularly those in the consulting and professional services sectors, appear to be at the forefront of technology adoption, often implementing advanced systems for project management, client engagement, and data analysis.

Employee training approaches show a mix of traditional and modern methods. While face-to-face training remains important, especially for soft skills development, there is a significant shift towards online and blended learning models. This trend has been accelerated by the global pandemic, which has necessitated remote working and learning solutions. The duration of training programmes varies widely, ranging from short, focused sessions to more extensive courses lasting several days or weeks, depending on the complexity of the subject matter and the depth of skills required.

When asked about suggestions for developing an efficient and effective training programme on immersive technologies such as AR/VR and XR, several common themes emerged. Many respondents emphasised the importance of practical, hands-on experience with the technologies. They suggested that training should be tailored to specific industry applications, ensuring relevance to participants' day-to-day work. There was also a strong emphasis on the need for ongoing support and follow-up sessions to reinforce learning and address challenges in implementation.

Interestingly, while most interviewees expressed interest in immersive technologies, many acknowledged a lack of current implementation within their organisations. This suggests a significant opportunity for growth and education in this area. Several respondents highlighted the potential benefits of these technologies in areas such as remote collaboration, virtual product demonstrations, and enhanced training simulations.

The interviews also revealed some concerns about the adoption of immersive technologies, particularly regarding infrastructure requirements and the need for specialised skills. Issues such as internet connectivity and the cost of hardware were mentioned as potential barriers, especially for smaller organisations.

The stakeholder overview reveals a business environment in South Africa that is increasingly embracing digital technologies, with a growing interest in more advanced solutions like AR/VR and XR. However, the adoption of these immersive technologies is still in its early stages, indicating a need for targeted education and training programmes. The insights

gathered from these interviews provide valuable guidance for developing such programmes, emphasising the importance of practical, industry-specific training that addresses both the opportunities and challenges of implementing immersive technologies in various business contexts.

7.3. Awareness of Immersive Technologies

The interviews conducted disclose a mixed level of awareness and engagement with immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), Extended Reality (XR), and the Metaverse. The majority of respondents indicated a general familiarity with these concepts, although the depth of understanding varied considerably among the interviewees.

A significant proportion of the interviewees reported having heard of VR, AR, XR, and the Metaverse, demonstrating a baseline awareness of these technologies within the South African business community. However, the level of practical experience with these technologies was notably lower. Whilst some respondents had personal experience with immersive technologies, particularly in recreational contexts, the implementation of these technologies within organisational settings was less common.

The disparity between awareness and practical application was evident across various sectors. Many interviewees expressed interest in the potential of immersive technologies but acknowledged that their organisations had not yet integrated these tools into their operations. This gap between awareness and adoption suggests that whilst there is recognition of the technologies' existence, there may be barriers to implementation or a lack of clear understanding of how these technologies could be applied in specific business contexts.

When queried about the reasons why people or organisations might use immersive technologies, the responses were diverse and insightful. Many interviewees highlighted the potential for enhanced engagement and visualisation. They recognised the capacity of these technologies to create immersive experiences that could revolutionise training, product demonstrations, and customer interactions. The ability to simulate complex environments and scenarios was seen as particularly valuable for industries such as manufacturing, healthcare, and education.

Several respondents emphasised the potential cost-saving benefits of immersive technologies, particularly in relation to training and product development. The ability to create virtual prototypes or conduct training in simulated environments was seen as a means to reduce physical resource requirements and associated costs. Additionally, the potential for these technologies to facilitate remote collaboration and overcome geographical barriers was frequently mentioned, a point that has gained increased relevance in the context of global workplace changes.

However, it is important to note that alongside the enthusiasm for the potential of immersive technologies, there were also expressions of caution. Some interviewees raised concerns about the practicality of implementation, citing issues such as the cost of

hardware, the need for specialised skills, and potential challenges related to internet connectivity and infrastructure in certain areas of South Africa.

The awareness of immersive technologies among South African businesses appears to be widespread, but uneven. Whilst there is a general recognition of the existence and potential of these technologies, practical experience and implementation remain limited. The responses suggest a keen interest in the possibilities offered by VR, AR, XR, and the Metaverse, particularly in areas such as training, visualisation, and remote collaboration. However, this interest is tempered by practical considerations and a need for clearer understanding of how these technologies can be effectively integrated into various business operations. This situation presents both a challenge and an opportunity for education and training initiatives focused on immersive technologies in the South African context.

7.4. Use of Immersive Technologies

The analysis of the interviews conducted across various organisations in South Africa reveals a nascent stage of immersive technology adoption within the business landscape. Despite the growing awareness of technologies such as Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR), their practical implementation and integration into daily operations remain limited.

A significant proportion of the respondents indicated minimal to no direct experience with immersive technologies in their professional capacities. This trend was consistent across different sectors, including consulting, professional services, and information technology. The lack of widespread adoption suggests that these technologies are still perceived as emerging or experimental within the South African business context.

However, it is noteworthy that whilst organisational adoption is low, some interviewees reported personal experiences with immersive technologies, primarily in recreational or non-work-related contexts. This personal familiarity, albeit limited, indicates a potential foundation for future professional applications.

In instances where organisations have engaged with immersive technologies, the experiences have been largely exploratory or experimental in nature. A few companies, particularly those in the technology and consulting sectors, reported pilot projects or limited-scale implementations. These initiatives often focused on specific use cases such as training simulations, product visualisations, or enhancing client presentations.

The role of immersive technologies in the work sectors represented by the interviewees is currently peripheral. Most respondents acknowledged that these technologies do not play a significant role in their day-to-day operations or core business processes. However, there was a general recognition of the potential for future integration, particularly in areas such as employee training, remote collaboration, and customer engagement.

Regarding specific applications or projects, the responses varied. Some organisations reported no concrete plans for implementing immersive technologies in the near future, citing factors such as cost, lack of clear use cases, or other pressing priorities. Others mentioned ongoing discussions or early-stage planning for potential applications, particularly

in areas like virtual training environments, remote assistance, or enhanced data visualisation.

A small number of companies, primarily those in the technology sector or with a focus on innovation, reported more advanced plans or existing projects involving immersive technologies. These included the development of VR-based training modules, AR applications for maintenance and repair, and explorations into creating virtual showrooms or product demonstrations.

It is important to note that while actual implementation is limited, there is a discernible interest in the potential of these technologies. Many respondents expressed curiosity about how immersive technologies could be leveraged to address specific challenges in their industries or enhance their current processes.

The use of immersive technologies in South African businesses appears to be in its infancy. While there is growing awareness and interest, practical experience and implementation remain limited. The responses suggest a cautious approach to adoption, with organisations carefully considering the potential benefits and challenges before committing to significant investments in these technologies. This situation presents both an opportunity and a challenge for the future development and integration of immersive technologies in the South African business landscape.

7.5. Benefits, Challenges and Requirements

The interviews conducted across various organisations in South Africa reveal a nuanced perspective on the benefits, challenges, and requirements associated with the adoption of immersive technologies such as Augmented Reality (AR), Virtual Reality (VR), and Extended Reality (XR) in the business environment.

Regarding the benefits, many respondents highlighted the potential for these technologies to enhance training and skill development. The ability to create immersive, realistic simulations was seen as particularly valuable for industries requiring hands-on experience or dealing with high-risk scenarios. Several interviewees emphasised the cost-saving potential of virtual training environments, which could reduce the need for physical equipment and travel. Additionally, the capacity of immersive technologies to improve visualisation and engagement was frequently mentioned, with potential applications in areas such as product design, customer experience, and data representation.

The adoption of AR/VR/XR was seen as a potential solution to several specific challenges. Many respondents highlighted the ability of these technologies to bridge geographical gaps, enabling remote collaboration and reducing the need for physical presence. This was particularly relevant in the context of the global shift towards remote work. Some interviewees also noted the potential for immersive technologies to address skills shortages by providing more effective and accessible training solutions.

However, the interviews also revealed significant constraints and limitations to the implementation of immersive technologies. A recurring theme was the issue of infrastructure, particularly in terms of internet connectivity and access to necessary

hardware. Many respondents expressed concerns about the reliability and speed of internet connections in certain areas of South Africa, which could hinder the effective use of bandwidth-intensive immersive technologies. The cost of implementation was another frequently cited barrier, with concerns about the initial investment required for hardware and software, as well as ongoing maintenance and upgrades.

Another significant challenge identified was the current lack of widespread technical expertise in developing and maintaining immersive technology systems. Several interviewees noted that their organisations lacked personnel with the necessary skills to implement and manage these technologies effectively. Cultural resistance to new technologies and the need for change management were also mentioned as potential obstacles.

To overcome these challenges, respondents suggested various strategies. These included phased implementation approaches, starting with pilot projects to demonstrate value before wider rollout; partnerships with technology providers and educational institutions to address skills gaps; and the development of use cases tailored to specific industry needs to justify investment.

Regarding the features and functionalities necessary for successful implementation, interviewees emphasised the importance of user-friendly interfaces and intuitive design to encourage adoption. Many stressed the need for seamless integration with existing systems and workflows to minimise disruption. Robust security features were also highlighted as crucial, particularly for industries dealing with sensitive data. Additionally, the ability to customise and scale solutions to meet specific organisational needs was seen as essential.

While there is significant enthusiasm for the potential of immersive technologies in South African businesses, there is also a clear recognition of the challenges involved in their adoption. The responses indicate a cautious but optimistic approach, with organisations keen to explore the benefits of AR/VR/XR while being mindful of the practical and financial constraints. The successful implementation of these technologies will likely require a combination of strategic planning, investment in infrastructure and skills development, and careful consideration of specific industry needs and use cases.

7.6. Workforce Demand and Training

The analysis of 36 interviews conducted in South Africa regarding workforce demand and training in immersive technologies (VR/AR/XR, Metaverse) reveals several key themes and insights.

Firstly, there is a consensus that a diverse skill set is necessary for individuals working with immersive technologies. Technical proficiency in areas such as 3D modelling, programming, and user interface design is considered essential. However, equally important are soft skills like creativity, problem-solving, and adaptability. Many respondents emphasised the need for a multidisciplinary approach, combining technical expertise with an understanding of human factors and user experience.

Regarding previous experience, opinions were mixed. While some organisations prefer candidates with prior exposure to immersive technologies, others are willing to train

employees from scratch. This disparity highlights the nascent state of the field and the varying levels of technology adoption across different sectors in South Africa.

The current landscape of training and educational programmes for immersive technologies appears to be limited and fragmented. Respondents noted a lack of comprehensive, industry-specific courses. Many organisations resort to in-house training or rely on online resources and workshops to upskill their employees. The effectiveness of these approaches varies, with some respondents expressing satisfaction while others identify significant gaps in the available training offerings.

A recurring theme in the interviews was the need for more practical, hands-on training programmes. Many respondents felt that theoretical knowledge alone is insufficient and that real-world application is crucial for developing proficiency in immersive technologies. Additionally, there was a call for more specialised training that addresses industry-specific use cases and challenges.

Interestingly, a significant number of organisations expressed interest in not only using immersive technologies but also in developing their own applications. This desire for in-house development capabilities suggests a growing recognition of the potential of these technologies across various sectors in South Africa.

Regarding the design of an ideal training programme for VR/AR/XR and Metaverse technologies, respondents favoured a blended approach. They suggested a combination of technical courses covering topics such as 3D modelling, programming, and hardware interfaces, alongside soft skills training in areas like design thinking and project management. The preference was for a mix of online and onsite learning, allowing for flexibility while also providing opportunities for hands-on experience with the latest equipment.

Accessibility emerged as a crucial consideration, with many respondents emphasising the need for training programmes to be inclusive and adaptable to different learning styles and technological literacy levels. Interactivity was also highlighted as a key feature, with suggestions for project-based learning and collaborative exercises.

The interviews reveal a growing demand for skilled professionals in immersive technologies across various sectors in South Africa. However, there is a clear need for more comprehensive, industry-aligned training programmes to bridge the existing skills gap. The ideal training approach appears to be one that combines technical proficiency with soft skills, practical experience, and an understanding of industry-specific applications.

7.7. Collaboration between Industry and Educational Institutions

The analysis of the interviews conducted in South Africa regarding collaboration between industry and educational institutions in the field of immersive technologies reveals a strong consensus on the need for enhanced partnerships to address existing skills gaps.

Respondents overwhelmingly recognised the potential for mutually beneficial relationships between the private sector and academic institutions. They identified several key opportunities for collaboration that could significantly improve the preparation of the workforce for the emerging demands of immersive technologies.

One prominent suggestion was the development of industry-aligned curricula. Many interviewees emphasised the importance of educational institutions working closely with businesses to design courses that reflect the current and future needs of the industry. This approach would ensure that graduates possess relevant, up-to-date skills that are immediately applicable in the workplace. Some respondents proposed the creation of advisory boards comprising industry professionals to guide curriculum development and keep educational programmes abreast of technological advancements.

Internship and apprenticeship programmes emerged as another critical area for collaboration. Respondents highlighted the value of providing students with real-world experience in immersive technology applications. These programmes would not only enhance students' practical skills but also give companies access to fresh talent and innovative ideas. Several interviewees suggested that such initiatives could be formalised through partnerships between universities and businesses, potentially leading to more structured and widespread opportunities for students across South Africa.

Joint research projects were identified as a promising avenue for collaboration. By combining the theoretical expertise of academic institutions with the practical insights and resources of industry, such projects could drive innovation in immersive technologies while simultaneously providing valuable learning experiences for students. Some respondents proposed the establishment of dedicated research centres or innovation hubs, co-funded by industry and educational institutions, to facilitate these collaborative efforts.

Guest lecturing and mentorship programmes were frequently mentioned as effective ways to bridge the gap between academia and industry. Many interviewees suggested that bringing industry professionals into the classroom could provide students with invaluable insights into the practical applications of immersive technologies and the skills required in the workplace. Conversely, some respondents proposed sabbatical programmes for academics to spend time in industry settings, ensuring that their teaching remains relevant to current industry practices.

The concept of 'living labs' or 'innovation sandboxes' was proposed by several respondents. These would be collaborative spaces where students, academics, and industry professionals could work together on real-world projects, fostering creativity and problem-solving skills while addressing actual industry challenges.

Funding and resource sharing were also highlighted as crucial aspects of collaboration. Many interviewees suggested that industry could play a more significant role in providing financial support, equipment, and software to educational institutions. This support would enable universities and colleges to offer students access to the latest technologies and tools used in the industry.

Lastly, several respondents emphasised the importance of creating platforms for ongoing dialogue between industry and educational institutions. Regular forums, conferences, and workshops were suggested as means to facilitate knowledge exchange and ensure that both sectors remain aligned in their efforts to develop a skilled workforce for immersive technologies.

the interviews disclose a strong appetite for enhanced collaboration between industry and educational institutions in South Africa's immersive technology sector. The proposed initiatives range from curriculum development and internship programmes to joint research projects and resource sharing. These collaborative efforts are seen as essential for bridging the skills gap and ensuring that the workforce is well-prepared for the rapidly evolving landscape of immersive technologies.

7.8. Additional comments

The concluding section of the interviews conducted across South Africa yielded a wealth of additional insights and recommendations for the development of educational courses within the Metaverse Academy. These comments reflect a diverse range of perspectives from the 36 respondents, highlighting key considerations that extend beyond the specific questions addressed earlier in the interviews.

A recurring theme in the additional comments was the importance of maintaining a balance between technical skills and broader, interdisciplinary knowledge. Many respondents emphasised that while proficiency in specific technologies is crucial, the rapidly evolving nature of the field necessitates a strong foundation in adaptable, transferable skills. They suggested that courses should foster critical thinking, problem-solving abilities, and creativity alongside technical expertise.

Several interviewees stressed the need for courses to address the ethical implications of immersive technologies. They recommended incorporating modules on digital ethics, privacy concerns, and the potential societal impacts of widespread metaverse adoption. This focus on responsible innovation was seen as essential for preparing students to navigate the complex landscape of emerging technologies.

Cultural sensitivity and localisation emerged as significant considerations. Respondents highlighted the importance of developing courses that are relevant to the South African context while also preparing students for global opportunities. They suggested incorporating case studies and examples that reflect local challenges and opportunities, as well as exploring how immersive technologies can address specific needs within African markets.

Accessibility was a concern raised by multiple interviewees. They emphasised the need for the Metaverse Academy to ensure that its courses are inclusive and accessible to a diverse range of learners, including those with limited access to high-end technology. Suggestions included developing low-bandwidth versions of courses and providing alternative pathways for practical exercises that do not require expensive equipment.

The integration of entrepreneurship and business skills into the curriculum was another common recommendation. Many respondents felt that equipping students with the

knowledge to commercialise their ideas and navigate the business aspects of the tech industry would be invaluable. They proposed including modules on startup creation, intellectual property rights, and technology commercialisation strategies.

Several interviewees highlighted the importance of future-proofing the curriculum. They suggested implementing a flexible, modular course structure that can be easily updated to reflect the latest technological advancements and industry trends. Regular review and revision of course content, with input from industry professionals, was seen as crucial for maintaining relevance.

Collaboration and networking opportunities were emphasised as key components of the educational experience. Respondents recommended incorporating team projects, hackathons, and industry networking events into the curriculum to help students build professional connections and gain practical experience in collaborative environments.

The potential for the Metaverse Academy to serve as a hub for ongoing professional development was also noted. Several interviewees suggested offering short courses and workshops for working professionals, allowing the academy to play a role in upskilling the existing workforce alongside educating new entrants to the field.

Lastly, many respondents emphasised the importance of practical, hands-on learning experiences. They recommended that the academy invest in state-of-the-art facilities and equipment, allowing students to work with the latest technologies and gain real-world experience through internships and industry partnerships.

The additional comments provided by the interviewees underscore the multifaceted nature of education in immersive technologies. The suggestions range from curriculum content and structure to broader considerations of ethics, accessibility, and industry relevance. These insights offer valuable guidance for the development of a comprehensive and forward-thinking educational programme within the Metaverse Academy, one that is well-suited to the unique context of South Africa while preparing students for global opportunities in this rapidly evolving field.

7.9. Key Insights, Challenges, Recommendations and Quotes

The analysis of 36 interviews conducted in South Africa regarding immersive technologies reveals a complex landscape of opportunities, challenges, and recommendations for the development and implementation of VR/AR/XR and Metaverse technologies across various sectors.

A key insight that emerged from the interviews is the growing recognition of the potential of immersive technologies to transform various industries. Many respondents acknowledged the capacity of these technologies to enhance training, improve customer experiences, and streamline operations. However, the level of adoption and understanding varied significantly across different sectors and organisations.

One of the primary challenges identified was the lack of widespread awareness and understanding of immersive technologies. As one respondent aptly stated, "There is a big

gap for advocacy and promotion of AR and VR globally." This sentiment was echoed by many interviewees, highlighting the need for more comprehensive education and awareness campaigns to drive adoption.

Another significant challenge was the perceived high cost of implementation. Many respondents cited the expense of hardware and software as a major barrier to adoption, particularly for smaller organisations and educational institutions. As one interviewee noted, "Cost comes down then use case would go up." This suggests that as technology becomes more affordable, its adoption is likely to increase.

Infrastructure limitations, particularly in terms of internet connectivity and access to stable electricity, were also frequently mentioned as constraints. One respondent highlighted this issue, stating, "Not everyone has access to too stable resources. That would include electricity to use the technologies to work and progress in their careers."

In terms of recommendations, there was a strong emphasis on the need for practical, hands-on training programmes. Many respondents suggested that courses should balance technical skills with soft skills and design thinking. As one interviewee put it, "Design skills are more important. If the design and functionality infused with the user-friendly abilities. Then the question would be how this could be applied into the world including the skill and design."

The importance of developing localised content and use cases was another recurring theme. Respondents stressed the need for solutions that address specific South African challenges and contexts. One interviewee suggested, "Localized metaverse communities. Advertisers that can advertise. Commercial leg. Digitalization of a community."

Collaboration between industry and educational institutions was widely recommended as a means to bridge the skills gap and ensure the relevance of training programmes. One respondent proposed, "There should be a metaverse forum. That bridges the gap between industry, education, government and civil society."

Several interviewees emphasised the potential of immersive technologies in education and training. One particularly insightful quote highlighted this: "Training -instead of investing in equipment and experience. VR could come in handy to provide the experience and can be done anywhere and as many times they would like."

Although there is significant enthusiasm for the potential of immersive technologies in South Africa, there are also substantial challenges to overcome. The recommendations provided by the interviewees offer valuable guidance for developing a robust ecosystem that can support the growth and adoption of these technologies across various sectors. As one respondent succinctly put it, "Excitement = adoption," underscoring the need for engaging, practical, and relevant applications of immersive technologies to drive their widespread acceptance and use.

8. Bulgaria

In Bulgaria, the Bulgarian-Romanian Chamber of Commerce and Industry Association was responsible for conducting the interviews. This partner, with extensive experience in the business and commercial sector, exceeded its targets by engaging 24 companies and obtaining 34 responses. The association utilised its local market knowledge and network to gather valuable and relevant information for the project.

8.1. Characteristics of the Interviewed Companies

This section provides an overview of the characteristics of the 34 companies interviewed, focusing on their organisational structure, leadership, industry sectors, and size. The analysis is based on the initial data provided for each interview, excluding geographical information as all companies are located in the same country.

The interviewed organisations represent a diverse range of industries and sectors. A significant number of companies operate in the information technology (IT) and digital services sector, including software development, web design, and IT consultancy. Another prominent group consists of companies in the creative industries, such as fashion design, content creation, and digital marketing. The financial services sector is also well-represented, with several companies specialising in project financing, consultancy, and information dissemination related to funding opportunities.

In terms of organisational structure and leadership, the interviewees hold various positions within their respective companies. Many are founders, co-founders, or chief executive officers (CEOs), indicating that the sample includes a substantial number of entrepreneurial ventures and small to medium-sized enterprises (SMEs). Other leadership roles represented include data processing specialists, content creators, and heads of specific departments or divisions.

The size of the interviewed companies varies considerably. While specific employee numbers are not provided for all organisations, the information available suggests a range from small businesses with fewer than ten employees to larger enterprises with several dozen staff members. This diversity in company size reflects the broad spectrum of businesses operating in the region, from start-ups and boutique agencies to more established firms.

It is worth noting that several of the interviewed companies appear to be at the forefront of adopting or considering the implementation of immersive technologies such as virtual reality (VR), augmented reality (AR), and extended reality (XR) in their operations. This interest in emerging technologies suggests a forward-thinking approach among the sampled businesses, regardless of their size or specific industry sector.

In conclusion, the 34 interviewed companies represent a cross-section of the local business ecosystem, encompassing various industries, organisational structures, and company sizes. This diverse sample provides valuable insights into the current state and future potential of immersive technology adoption across different sectors of the economy.

8.2. Overview of Stakeholders

The comprehensive analysis of the 34 interviews conducted reveals a diverse landscape of companies and institutions operating across various sectors in Bulgaria. The stakeholders represent a wide range of industries, including information technology, digital services, creative industries, financial services, project financing, consultancy, and education.

The majority of interviewees hold senior positions within their organisations, such as founders, co-founders, CEOs, and heads of departments. This indicates that the sample primarily consists of decision-makers and individuals with significant influence over their companies' strategic directions. The organisations vary in size, ranging from small start-ups and boutique agencies to more established firms with several dozen employees.

In terms of Information and Communication Technologies (ICT) usage, most companies demonstrate a high level of digital integration in their operations. Common applications include cloud-based services, customer relationship management systems, and various digital platforms for internal and external communication. Many organisations maintain an active online presence through websites and social media channels, which they utilise for marketing, client engagement, and information dissemination.

The approaches to employee training and skill development vary among the interviewed companies. A significant number of organisations employ a hybrid model, offering both online and face-to-face (f2f) training sessions. The duration of training programmes is highly variable, ranging from a few days to several weeks, depending on the complexity of the skills being taught and the specific needs of the organisation. Some companies emphasise continuous learning and provide regular opportunities for skill enhancement, while others offer training on an as-needed basis.

Regarding suggestions for developing an efficient and effective training programme on immersive technologies, several common themes emerged from the stakeholders' responses. Many emphasised the importance of practical, hands-on experience with AR/VR/XR technologies. There is a strong preference for training programmes that incorporate real-world examples and case studies relevant to specific industries. Stakeholders also stressed the need for a well-structured curriculum with clear learning objectives and a logical progression from basic concepts to more advanced applications.

Interviewees frequently mentioned the importance of tailoring the training content to different skill levels, accommodating both beginners and those with some prior experience in immersive technologies. Many suggested a modular approach, allowing participants to focus on areas most relevant to their roles or industries. The inclusion of both technical skills and soft skills development was often highlighted as crucial for effective implementation of immersive technologies in the workplace.

Flexibility in delivery methods was another common recommendation, with many stakeholders advocating for a blend of online and in-person training sessions. This approach would cater to different learning styles and accommodate the varied schedules of working professionals. Additionally, several interviewees emphasised the value of having experienced

mentors or industry experts involved in the training process to provide guidance and real-world insights.

Lastly, a recurring suggestion was the incorporation of a practical project or capstone experience as part of the training programme. This would allow participants to apply their newly acquired knowledge and skills to a concrete challenge relevant to their industry, thereby reinforcing learning and demonstrating the practical value of immersive technologies in their specific contexts.

The stakeholders' insights reflect a growing interest in immersive technologies across various sectors in Bulgaria, coupled with a recognition of the need for well-designed, industry-specific training programmes to support the effective adoption and implementation of these technologies in the workplace.

8.3. Awareness of Immersive Technologies

The analysis of the 34 interviews conducted reveals a varied landscape of awareness and engagement with immersive technologies among Bulgarian businesses and organisations. The majority of respondents demonstrated a basic familiarity with terms such as Virtual Reality (VR), Augmented Reality (AR), Extended Reality (XR), and the Metaverse. However, the depth of understanding and practical experience with these technologies varied significantly across the sample.

A substantial proportion of interviewees reported having heard of these immersive technologies, indicating a general awareness within the business community. However, when probed about personal or organisational use, the responses were more diverse. While some participants had experimented with VR headsets or AR applications for personal entertainment, only a small minority had integrated these technologies into their professional operations.

The reasons cited for the adoption of immersive technologies by individuals and organisations were multifaceted. Many respondents recognised the potential of these technologies for enhancing user experiences, particularly in sectors such as gaming, entertainment, and education. Several interviewees highlighted the capacity of VR and AR to visualise complex concepts, facilitate remote collaboration, and provide immersive training experiences. In the context of business applications, some participants noted the potential for virtual showrooms, product demonstrations, and enhanced customer engagement.

However, it is important to note that a significant number of respondents expressed uncertainty about the specific benefits or applications of immersive technologies within their own industries. This uncertainty often stemmed from a lack of exposure to practical use cases relevant to their sectors, suggesting a need for more targeted education and demonstration of industry-specific applications.

Interestingly, while many interviewees acknowledged the growing importance of immersive technologies in various sectors, there was a notable gap between this recognition and actual implementation within their organisations. Factors contributing to this gap included

perceived high costs of adoption, lack of technical expertise, and uncertainty about the return on investment for their specific business models.

The interviews also revealed a spectrum of attitudes towards the future impact of immersive technologies. While some respondents viewed them as transformative tools with the potential to revolutionise their industries, others perceived them as interesting but not immediately relevant to their operations. This divergence in perspectives underscores the need for tailored approaches to education and training in immersive technologies, addressing the specific needs and concerns of different sectors.

While there is a general awareness of immersive technologies among Bulgarian businesses, there remains a significant opportunity for education and practical demonstration of their applications across various industries. Bridging the gap between awareness and implementation will be crucial for fostering innovation and competitiveness in the Bulgarian business landscape.

8.4. Use of Immersive Technologies

The examination of the interviews reveals a varied landscape of immersive technology adoption and implementation across different sectors in Bulgaria. Whilst a significant number of respondents reported limited or no direct experience with these technologies in their professional contexts, there is a growing awareness of their potential applications and benefits.

Among the organisations that have engaged with immersive technologies, the experiences range from exploratory to more advanced implementations. Several companies in the creative and digital sectors reported using virtual reality (VR) for product visualisation and design processes. For instance, some fashion and interior design firms have begun to utilise VR to create virtual showrooms and conduct remote client presentations, enhancing their ability to showcase products and designs in an immersive environment.

In the education and training sector, a few institutions have started to incorporate augmented reality (AR) and VR into their teaching methodologies. These technologies are being used to create interactive learning experiences, particularly in fields such as engineering, architecture, and medical training. However, it is important to note that these implementations are often in their nascent stages and are not yet widespread across the sector.

The role of immersive technologies in various work sectors appears to be evolving, with many respondents acknowledging their potential importance for future competitiveness and innovation. Several interviewees, particularly those in manufacturing and industrial sectors, expressed interest in exploring AR applications for remote maintenance, quality control, and worker training. However, the actual implementation of such technologies remains limited, often due to perceived high costs and a lack of in-house expertise.

Specific applications and projects mentioned by the respondents include virtual product demonstrations, 3D modelling for design and prototyping, and immersive marketing experiences. A small number of companies in the IT and software development sectors

reported working on projects to develop AR and VR applications for clients, indicating a growing demand for these technologies across various industries.

It is noteworthy that while many organisations recognise the potential of immersive technologies, there is a significant gap between this recognition and actual implementation. Several respondents indicated that they are in the planning stages of incorporating these technologies into their operations, suggesting a trend towards increased adoption in the near future.

The interviews also revealed that the extent of immersive technology use varies considerably across different sectors. While some creative and tech-oriented industries are at the forefront of adoption, more traditional sectors such as finance and public administration reported minimal current use, although there was acknowledgement of potential future applications.

While the use of immersive technologies in Bulgarian businesses is not yet widespread, there is a growing interest and recognition of their potential benefits. The interviews suggest that many organisations are in a transitional phase, moving from awareness to exploration and planning for future implementation. This trend indicates a likely increase in the adoption and integration of immersive technologies across various sectors in the coming years, provided that barriers such as cost and lack of expertise can be effectively addressed.

8.5. Benefits, Challenges and Requirements

The personal interviews reveal a complex landscape of perceived benefits, challenges, and requirements associated with the adoption of immersive technologies across various sectors in Bulgaria. While the level of engagement with these technologies varies significantly among the respondents, there is a general recognition of their potential to drive innovation and enhance competitiveness.

Many interviewees identified several potential benefits of implementing immersive technologies in their organisations. These include improved visualisation of products and concepts, enhanced customer engagement, and more effective training and skill development for employees. For instance, in the fashion and design sectors, respondents highlighted the potential for virtual showrooms and digital prototyping to reduce costs and environmental impact while expanding market reach. In the manufacturing and industrial sectors, the use of augmented reality for remote maintenance and quality control was seen as a promising application.

However, the perceived benefits were often tempered by concerns about implementation challenges. A recurring theme was the significant investment required for adopting these technologies, both in terms of financial resources and the need for specialised skills. Many respondents, particularly from smaller enterprises, expressed apprehension about the return on investment, especially given the rapidly evolving nature of immersive technologies.

The interviews also revealed sector-specific challenges. For example, in the financial and consultancy sectors, concerns were raised about data security and privacy when using immersive technologies for client interactions. In contrast, respondents from creative

industries emphasised the need for high-quality, user-friendly interfaces that would not impede their creative processes.

Regarding the constraints and limitations, a common thread across many interviews was the lack of in-house expertise and the perceived steep learning curve associated with these technologies. Several respondents noted that overcoming these limitations would require comprehensive training programmes and potentially partnerships with educational institutions or technology providers.

When discussing the necessary features and functionalities for successful implementation, the responses varied based on sector-specific needs. However, some common requirements emerged across sectors. These included user-friendly interfaces, seamless integration with existing systems, scalability to accommodate future growth, and robust security features. Many respondents also emphasised the importance of customisability, allowing the technologies to be tailored to their specific business processes and client needs.

Interestingly, a number of interviewees highlighted the potential of immersive technologies to address broader challenges such as remote collaboration and reducing carbon footprints by minimising physical travel. This perspective suggests a growing awareness of the wider societal and environmental benefits that these technologies could offer beyond immediate business applications.

While there is a general recognition of the potential benefits of immersive technologies across various sectors in Bulgaria, the path to widespread adoption appears to be challenged by concerns about costs, skill requirements, and integration with existing systems. Addressing these challenges will likely require a concerted effort involving industry stakeholders, educational institutions, and potentially policy makers to create an ecosystem that supports the effective implementation of these technologies.

8.6. Workforce Demand and Training

The 34 interviews reveals a complex landscape of workforce demands and training needs related to immersive technologies across various sectors in Bulgaria. There is a general consensus among respondents that the skills and knowledge required for effectively working with VR/AR/XR and Metaverse technologies are multifaceted and evolving.

Most interviewees emphasised the importance of a foundational understanding of these technologies, including their potential applications and limitations. However, many also stressed that technical proficiency alone is insufficient. Soft skills such as adaptability, creativity, and problem-solving were frequently cited as crucial for successfully implementing and leveraging immersive technologies in diverse business contexts.

Regarding expectations of prior experience, the majority of respondents indicated that they do not currently require employees to have previous experience with immersive technologies. This stance reflects the nascent state of these technologies in many sectors and the recognition that such expertise is still relatively rare in the Bulgarian workforce. However, several interviewees expressed a willingness to provide training to employees as the need arises, suggesting a proactive approach to skill development.

A significant finding from the interviews is the perceived lack of comprehensive and effective training programmes for immersive technologies in Bulgaria. Many respondents reported being unaware of existing educational offerings in this field, indicating a potential gap in the current educational and professional development landscape. This gap was particularly pronounced when considering industry-specific applications of immersive technologies.

In terms of training design, there was a strong preference for programmes that balance technical knowledge with practical application. Many interviewees advocated for a hybrid approach, combining online theoretical instruction with hands-on, onsite training sessions. The importance of accessibility and interactivity in training programmes was frequently emphasised, with several respondents suggesting the use of immersive technologies themselves as learning tools.

Interestingly, while most respondents focused on training for the use of immersive technologies, a subset expressed interest in developing capabilities for creating immersive content and applications. This suggests a potential demand for more advanced, development-focused training programmes in addition to user-oriented courses.

The interviews also revealed a desire for training programmes to be tailored to specific industry needs. Many respondents highlighted the importance of incorporating real-world case studies and industry-specific scenarios into the curriculum. This approach was seen as crucial for demonstrating the practical value and potential applications of immersive technologies within particular business contexts.

The workforce demand and training landscape for immersive technologies in Bulgaria appears to be in a formative stage. While there is growing recognition of the potential importance of these technologies, there is also a clear need for more comprehensive, accessible, and industry-specific training programmes. The development of such programmes could play a crucial role in bridging the current skills gap and fostering wider adoption of immersive technologies across various sectors in Bulgaria.

8.7. Collaboration between Industry and Educational Institutions

The analysis of the interviews reveals a strong consensus on the need for enhanced collaboration between industry and educational institutions to address the skills gap in immersive technologies. This sentiment reflects a broader recognition of the disconnect between academic curricula and the rapidly evolving demands of the business world, particularly in the context of emerging technologies.

A recurring theme across the interviews was the potential for industry-academia partnerships to co-create specialised programmes focusing on immersive technologies and their practical applications in specific industrial sectors. Many respondents emphasised the importance of aligning educational offerings with real-world business needs, suggesting that industry could play a crucial role in shaping curriculum content and identifying key skill requirements.

Several interviewees proposed the establishment of internship programmes or work placements as a means of bridging the gap between theoretical knowledge and practical application. These initiatives were seen as beneficial for both students, who would gain hands-on experience with cutting-edge technologies, and businesses, which would have access to a pool of talent familiar with their specific technological needs.

Another significant suggestion was the development of joint research projects between companies and academic institutions. Such collaborations were viewed as a way to foster innovation, address industry-specific challenges, and provide students with exposure to real-world problem-solving using immersive technologies.

Interestingly, some respondents highlighted the potential for reverse knowledge transfer, where industry professionals could contribute to academic programmes by sharing their practical experiences and insights. This approach was seen as particularly valuable in a field as dynamic as immersive technologies, where practical applications often outpace academic theory.

The interviews also revealed a desire for more flexible and modular educational offerings that could cater to the diverse needs of different industries and professionals at various career stages. Some respondents suggested the creation of short-term, intensive courses or workshops co-developed by industry and educational institutions, focusing on specific applications of immersive technologies in different sectors.

However, it is important to note that a minority of respondents expressed uncertainty about the potential for collaboration, citing concerns about the pace of technological change and the ability of educational institutions to keep up with industry demands. This perspective underscores the need for agile and responsive collaborative models that can adapt quickly to evolving technological landscapes.

The majority of interviewees see significant opportunities for enhanced collaboration between industry and educational institutions in addressing the skills gap related to immersive technologies. The proposed collaborative efforts range from curriculum development and internship programmes to joint research projects and flexible, industry-specific training modules. These suggestions reflect a shared understanding that bridging the gap between academic knowledge and practical application is crucial for the effective adoption and utilisation of immersive technologies across various sectors in Bulgaria.

8.8. Additional comments

The concluding remarks from the 34 interviewees provide valuable insights into the development of educational courses within the Metaverse Academy. While a significant number of respondents indicated that they had no additional comments, those who did offer further thoughts presented a range of perspectives that merit consideration.

A recurring theme among the respondents was the importance of practical, industry-specific applications in the curriculum. Several interviewees emphasised the need for the Metaverse Academy to tailor its courses to the specific needs and contexts of different sectors. This suggestion underscores the diverse landscape of potential applications for immersive

technologies across various industries and the importance of avoiding a one-size-fits-all approach to education in this field.

Another notable point raised by multiple respondents was the need for the Academy to remain adaptable and responsive to the rapidly evolving nature of immersive technologies. Some interviewees suggested that the curriculum should be designed with flexibility in mind, allowing for regular updates to keep pace with technological advancements and emerging industry trends.

Several participants highlighted the importance of accessibility in the design of educational courses. This includes not only ensuring that the content is comprehensible to individuals with varying levels of technical expertise but also considering the potential barriers to entry in terms of hardware requirements and technological infrastructure.

Interestingly, a few respondents touched upon the potential societal impacts of widespread adoption of immersive technologies. They suggested that the Metaverse Academy could play a role in fostering discussions about the ethical implications and potential social consequences of these technologies, alongside technical training.

Some interviewees also emphasised the importance of interdisciplinary approaches in the Academy's curriculum. They suggested incorporating elements from fields such as psychology, design, and business strategy to provide a holistic understanding of how immersive technologies can be effectively implemented and utilised across different sectors.

A small number of respondents expressed scepticism about the immediate relevance of immersive technologies to their specific industries. However, even among these individuals, there was acknowledgement of the potential future importance of these technologies and the value of being prepared for their eventual adoption.

The additional comments provided by the interviewees reflect a nuanced understanding of the challenges and opportunities presented by immersive technologies. They highlight the need for the Metaverse Academy to develop a curriculum that is practical, adaptable, accessible, and cognisant of the broader implications of these technologies. These insights offer valuable guidance for shaping an educational programme that can effectively prepare individuals and organisations for the future landscape of immersive technologies.

8.9. Key Insights, Challenges, Recommendations and Quotes

The analysis of stakeholder interviews reveals a diverse landscape of perspectives on immersive technologies across various sectors in Bulgaria. While there is a general awareness of technologies such as VR, AR, XR, and the Metaverse, the level of engagement and perceived relevance varies significantly among respondents.

A key insight emerging from the interviews is the recognition of immersive technologies' potential to drive innovation and competitiveness. As one respondent, a CEO in the fashion industry, noted, "Immersive technologies will become very important in order to increase innovation and competitiveness, lower environmental footprint and find new markets." This

sentiment was echoed by several interviewees across different sectors, highlighting a growing awareness of the transformative potential of these technologies.

However, the interviews also uncovered significant challenges to the widespread adoption of immersive technologies. A recurring theme was the perceived high cost of implementation, particularly for smaller enterprises. As one respondent pointed out, "At this stage the investment in such technologies is a serious limitation." This financial barrier was often cited alongside concerns about the lack of in-house expertise and the uncertainty of return on investment.

Another challenge identified was the gap between academic curricula and industry needs. Many respondents emphasised the importance of practical, industry-specific training. As a data processing specialist remarked, "A basic understanding of immersive technologies is needed, but most importantly, knowing how to apply them in their work is essential." This highlights the need for educational programmes that bridge theoretical knowledge with practical application.

Recommendations for addressing these challenges were diverse but converged on several key points. Many stakeholders advocated for closer collaboration between industry and educational institutions. As one respondent suggested, "Businesses/companies could partner with VET schools and Universities in developing some specific programmes that would prepare their future employees for the real business environment." This approach was seen as crucial for developing relevant skills and fostering innovation.

Regarding the design of training programmes, there was a strong emphasis on practical, hands-on learning. A content creator in the financing consultancy sector recommended, "Technical courses and soft skills should definitely be included. The technical courses should be onsite, while soft skill trainings could be online." This balanced approach was echoed by many respondents, highlighting the need for both technical proficiency and soft skills in effectively implementing immersive technologies.

Several interviewees also stressed the importance of tailoring training programmes to specific industry needs. As one respondent aptly put it, "Each particular sector's specifics should be taken into consideration when developing the course." This customisation was seen as essential for demonstrating the practical value of immersive technologies across different business contexts.

While there is growing recognition of the potential of immersive technologies in Bulgaria, significant challenges remain in terms of adoption and skills development. The insights and recommendations provided by the stakeholders offer valuable guidance for developing targeted, effective training programmes and fostering closer collaboration between industry and educational institutions. As one respondent summarised, "Good preparation/prerequisites before the training program, clear requirements and roadmap, engaged mentor" - a succinct encapsulation of the key elements needed for successful implementation of immersive technology training in the Bulgarian context.

9. Germany

In Germany, the Forschungsinstitut für innovative Arbeitsgestaltung und Prävention e.V. (FIAP e.V.) conducted the interviews. This institute, known for its focus on innovation and prevention, exceeded its targets by engaging 21 companies and securing 21 responses. FIAP e.V. leveraged its expertise and resources to ensure the interviews provided precise and useful data for the project.

9.1. Characteristics of the Interviewed Companies

This report provides an overview of the characteristics of the 21 companies interviewed for this study. The analysis is based on the initial data provided for each interview, focusing on the organisation, interviewee's name and position, industry or sector of operation, and company size.

The interviewed companies represent a diverse range of industries and sectors within the German economy. These include information technology, consulting, manufacturing, automotive, healthcare, and financial services, among others. This variety offers a comprehensive perspective on the adoption and perception of immersive technologies across different sectors of the German business landscape.

The interviewees hold various positions within their respective organisations, ranging from senior management roles such as CEOs and Managing Directors to specialised positions in human resources, technology, and innovation departments. This diversity in roles provides insights from different organisational levels and functional areas, enriching the overall understanding of immersive technology adoption and its potential impact on various aspects of business operations.

Company sizes vary significantly among the interviewed organisations. The sample includes small and medium-sized enterprises (SMEs) with fewer than 250 employees, as well as large corporations employing thousands of staff members. This range allows for a comparison of immersive technology adoption and perception across different organisational scales, potentially highlighting how company size may influence the approach to and implementation of these technologies.

Notable among the interviewed companies are well-known German firms such as Hannover RE, a major player in the reinsurance industry, and PricewaterhouseCoopers (PwC), a global professional services network. The inclusion of such prominent organisations alongside smaller, specialised firms provides a balanced perspective on the state of immersive technology adoption in Germany.

It is worth noting that while the companies operate in Germany, many have international presence or are part of global networks. This international dimension adds depth to the insights gathered, as it may reflect how global trends in immersive technology are being interpreted and implemented within the German business context.

The sample of interviewed companies represents a cross-section of the German business landscape, encompassing various industries, organisational sizes, and levels of management.

This diversity enhances the comprehensiveness of the study, providing a nuanced understanding of the current state and future potential of immersive technologies in German businesses.

9.2. Overview of Stakeholders

The analysis of the 21 interviews conducted with representatives from various German companies provides a comprehensive insight into the current state of immersive technology adoption and training practices across different sectors. The interviewees represent a diverse range of industries, including information technology, manufacturing, automotive, healthcare, financial services, and consulting, among others.

The majority of respondents hold senior positions within their organisations, such as CEOs, Managing Directors, and heads of departments, particularly in human resources, technology, and innovation. This diversity in roles and sectors offers a broad perspective on the implementation of Information and Communication Technologies (ICT) and the approach to employee training across German businesses.

Regarding the use of ICT, most companies report a high level of integration of digital technologies in their daily operations. Many organisations have embraced cloud computing, data analytics, and various software solutions specific to their industries. However, the level of sophistication in ICT usage varies, with some companies being at the forefront of digital transformation while others are still in the process of modernising their technological infrastructure.

Employee training practices show a consistent trend towards a hybrid approach, combining both online and face-to-face methods. The COVID-19 pandemic has accelerated the adoption of online training platforms, with many companies reporting an increased reliance on e-learning tools and virtual workshops. However, there is still a strong appreciation for in-person training, especially for complex skills or team-building exercises.

The duration of training programmes varies significantly depending on the complexity of the subject matter and the specific needs of the organisation. Short courses lasting a few hours or days are common for specific skill development, while more comprehensive programmes for professional development or reorientation can extend over several weeks or months. Many companies emphasise the importance of continuous learning and provide ongoing opportunities for skill enhancement.

Regarding suggestions for developing an efficient and effective training programme on immersive technologies, several common themes emerged from the interviews. Firstly, there is a strong emphasis on practical, hands-on experience with VR/AR/XR technologies. Many respondents believe that theoretical knowledge should be balanced with ample opportunities for learners to interact with the technologies directly.

Secondly, there is a call for customisation of training programmes to suit specific industry needs. Interviewees stress the importance of developing use cases and scenarios that are directly relevant to their sector, as this would enhance engagement and demonstrate the practical value of immersive technologies in their work context.

Thirdly, many respondents highlight the need for a modular approach to training, allowing for flexibility in learning paths and accommodating different levels of prior knowledge and experience with immersive technologies. This approach would cater to the diverse workforce present in many organisations, from tech-savvy younger employees to more experienced staff who may be less familiar with these technologies.

Lastly, there is a consistent emphasis on the importance of addressing both technical skills and soft skills in the training programme. While technical proficiency is crucial, many interviewees also stress the need for developing skills such as adaptability, creative problem-solving, and effective communication in virtual environments.

In conclusion, the stakeholders represent a wide cross-section of German industry, with varying levels of ICT integration and diverse approaches to employee training. While there is a general openness to immersive technologies, the perceived relevance and potential applications differ across sectors. The suggestions for an effective training programme on immersive technologies emphasise practicality, customisation, flexibility, and a holistic approach to skill development.

9.3. Awareness of Immersive Technologies

The analysis of the interviews reveals a diverse landscape of awareness and understanding regarding immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), Extended Reality (XR), and the Metaverse.

The majority of interviewees demonstrated a basic familiarity with VR and AR concepts, with many having heard of these technologies through media coverage or industry discussions. However, the depth of understanding varied significantly across the sample. While some respondents exhibited a comprehensive grasp of these technologies and their potential applications, others admitted to having only a superficial awareness.

Notably, the concept of XR was less familiar to many interviewees, with several admitting they had not encountered the term before. The Metaverse, despite recent media attention, also emerged as a concept that many respondents found difficult to define precisely, often associating it vaguely with social media platforms or future internet technologies.

Regarding personal or organisational use of immersive technologies, the responses were mixed. A significant number of interviewees reported having personal experience with VR or AR, primarily in entertainment contexts such as gaming or mobile phone applications. However, professional use within their organisations was less common. Where professional use was reported, it was often in specific contexts such as product design, training simulations, or customer engagement tools.

The perceived reasons for using immersive technologies in organisational contexts varied widely among the respondents. Common themes included enhancing training and education programmes, improving product visualisation and design processes, facilitating remote collaboration, and creating immersive customer experiences. Several interviewees highlighted the potential of these technologies to simulate complex or dangerous scenarios safely, particularly in industries such as manufacturing, healthcare, and aerospace.

Interestingly, while many respondents could articulate potential benefits of immersive technologies, there was also a notable degree of uncertainty about their practical application in certain sectors. Some interviewees, particularly those from industries less traditionally associated with advanced visualisation technologies, struggled to identify concrete use cases for their specific field.

The interviews reflect a growing awareness of immersive technologies across German industries, but also highlight significant variations in understanding and adoption. While there is general recognition of the potential of these technologies, many organisations are still in the early stages of exploring how they might be effectively integrated into their operations. This suggests a need for further education and practical demonstrations to bridge the gap between awareness and implementation in many sectors of the German economy.

9.4. Use of Immersive Technologies

The 21 interviews reveal a diverse landscape of immersive technology adoption and application across different sectors. While some organisations have embraced these technologies with enthusiasm, others are still in the early stages of exploration or have yet to find relevant applications within their specific fields.

A significant number of interviewees reported limited personal or organisational experience with immersive technologies. However, among those who have engaged with these technologies, the experiences range from preliminary explorations to more advanced implementations. Several companies, particularly those in the manufacturing, automotive, and healthcare sectors, have reported using Virtual Reality (VR) and Augmented Reality (AR) for specific applications such as product design, training simulations, and remote assistance.

In the manufacturing sector, for instance, some companies have implemented VR for prototyping and design review processes, allowing engineers to visualise and interact with 3D models before physical production. This application has reportedly led to reduced development times and improved design quality. Similarly, in the automotive industry, AR has been utilised for maintenance and repair procedures, providing technicians with real-time, visual guidance overlaid on physical vehicles.

The healthcare sector has shown particular interest in immersive technologies for medical training and patient care. Some interviewees mentioned the use of VR for surgical training, allowing medical professionals to practice complex procedures in a risk-free virtual environment. AR applications in patient education and rehabilitation were also noted, though these were often described as pilot projects rather than fully integrated solutions.

In the realm of human resources and professional services, a few companies reported experimenting with VR for recruitment and onboarding processes. For example, one major consulting firm has developed a VR recruiting tool to enhance their presence at job fairs and attract potential employees. This innovative approach has reportedly led to increased engagement with job seekers and improved hiring outcomes.

However, it is important to note that the level of immersive technology integration varies significantly across the interviewed companies. While some organisations have implemented specific projects or applications, others are still in the exploratory phase, conducting pilot studies or assessing potential use cases. A number of interviewees, particularly those from sectors less traditionally associated with advanced visualisation technologies, reported little to no current use of immersive technologies in their operations.

Looking towards the future, several interviewees expressed interest in expanding their use of immersive technologies. Planned projects include the development of VR-based training programmes, the creation of virtual showrooms for product demonstrations, and the integration of AR into customer service operations. However, these plans were often described as tentative, with many companies adopting a cautious approach to implementation, citing concerns about return on investment and the need for clear use cases.

While there is growing interest in immersive technologies across various sectors of the German economy, the actual implementation and use of these technologies remain uneven. Some industries and companies are at the forefront of adoption, while others are still in the early stages of exploration or have yet to identify relevant applications. This diversity in adoption rates and use cases underscores the need for tailored approaches to immersive technology integration, taking into account the specific needs and challenges of each sector and organisation.

9.5. Benefits, Challenges and Requirements

The analysis of the interviews exposes a complex landscape of perceived benefits, challenges, and requirements associated with the adoption of immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR).

Regarding benefits, many interviewees highlighted the potential for immersive technologies to enhance training and education programmes. These technologies are seen as particularly valuable for creating realistic simulations of complex or hazardous environments, allowing employees to gain practical experience in a safe, controlled setting. Several respondents, particularly those from manufacturing and healthcare sectors, emphasised the potential for VR and AR to improve product design processes, facilitate remote collaboration, and enhance customer engagement through interactive product demonstrations.

Another frequently mentioned benefit was the potential for cost reduction, particularly in terms of travel expenses and physical prototyping. Some interviewees also noted the potential for immersive technologies to attract and retain talent, especially younger employees who may be more technologically inclined.

However, the interviews also revealed several challenges and potential limitations to the adoption of immersive technologies. A primary concern for many organisations was the perceived high initial investment cost, both in terms of hardware and software, as well as the need for specialised training. Some interviewees expressed uncertainty about the return

on investment, particularly in sectors where the applications of immersive technologies are less obvious.

Technical limitations were also frequently mentioned, with concerns about the current quality of VR headsets, including issues of resolution, comfort for extended use, and potential motion sickness. Several respondents noted that the technology might not yet be sufficiently advanced for some of their more demanding applications.

Organisational resistance to change emerged as another significant challenge. Some interviewees reported that employees, particularly those in more traditional roles or older demographics, might be hesitant to adopt new technologies. There were also concerns about the potential for these technologies to be seen as gimmicks rather than serious business tools.

Data security and privacy issues were raised by several respondents, particularly those in sectors dealing with sensitive information. The need to ensure that immersive technologies comply with data protection regulations was seen as a crucial requirement for implementation.

Regarding the features and functionalities necessary for successful implementation, interviewees consistently emphasised the need for user-friendly interfaces and intuitive controls. Many stressed the importance of seamless integration with existing systems and workflows to minimise disruption and maximise adoption.

Customisability was another key requirement, with many respondents noting that the ability to tailor immersive experiences to their specific industry needs would be crucial for widespread adoption. Some interviewees also highlighted the need for robust analytics capabilities to measure the effectiveness and ROI of immersive technology implementations.

Scalability and cross-platform compatibility were mentioned by several respondents, particularly those from larger organisations or those with diverse technological ecosystems. The ability to deploy immersive solutions across different devices and operating systems was seen as important for widespread adoption.

Whereas there is significant interest in the potential benefits of immersive technologies across various sectors of the German economy, there are also substantial challenges to be addressed. The successful implementation of these technologies will likely depend on overcoming technical limitations, addressing organisational resistance, ensuring data security, and developing solutions that are both user-friendly and customisable to specific industry needs.

9.6. Workforce Demand and Training

The analysis of the 21 interviews in Germany discloses a complex landscape regarding workforce demand and training needs for immersive technologies. There is a general consensus that as these technologies become more prevalent in various industries, the demand for skilled professionals will increase. However, the current level of demand and the specific skills required vary significantly across sectors.

Many interviewees emphasised the importance of a solid technical foundation for working with immersive technologies. This includes a basic understanding of the hardware and software involved, as well as the ability to troubleshoot common issues. However, beyond these technical skills, many respondents highlighted the need for a blend of competencies that extend beyond purely technological knowledge.

Soft skills were frequently mentioned as crucial for effective use of immersive technologies in professional settings. These include adaptability, creativity, and the ability to communicate complex ideas in virtual environments. Several interviewees noted that the ability to think critically about how these technologies can be applied to solve real-world problems is as important as the technical skills required to operate them.

Regarding previous experience, most companies do not currently expect their employees to have extensive prior experience with immersive technologies. However, there is a growing recognition that this may change in the near future as these technologies become more widespread. Many organisations are taking a proactive approach, offering introductory training sessions to familiarise their workforce with the basics of VR, AR, and XR.

The current landscape of training and educational programmes for immersive technologies appears to be somewhat fragmented. While some larger companies have developed in-house training programmes, many organisations rely on external providers or are still in the process of developing their training strategies. Several interviewees noted that existing training programmes often focus heavily on technical aspects, with less emphasis on practical application within specific industry contexts.

A recurring theme in the interviews was the need for more industry-specific training programmes. Many respondents felt that while general introductions to immersive technologies are useful, there is a significant gap in training that addresses the unique challenges and opportunities within their particular sectors. This suggests a potential opportunity for collaboration between industry and educational institutions to develop more targeted training programmes.

Regarding the design of future training programmes, there was a strong preference for a blended approach combining both technical and soft skills courses. Many interviewees emphasised the importance of hands-on, practical training that allows participants to experiment with the technologies in realistic scenarios. There was also a clear preference for flexible, modular training programmes that can be tailored to different skill levels and specific industry needs.

The question of online versus onsite training elicited mixed responses. While many recognised the convenience and cost-effectiveness of online training, especially for theoretical components, there was also a strong emphasis on the need for in-person, hands-on experience with the physical hardware. Several respondents suggested a hybrid model as the ideal approach.

Accessibility was frequently mentioned as a key consideration in the design of training programmes. This includes not only physical accessibility for those with disabilities but also

ensuring that the training is accessible to employees with varying levels of technical proficiency and learning styles.

Although there is growing recognition of the importance of immersive technologies across various sectors of the German economy, there is also a clear need for more comprehensive and targeted training programmes. The ideal training approach appears to be one that combines technical proficiency with soft skills, is tailored to specific industry needs, and offers a flexible, accessible learning experience. As these technologies continue to evolve, it is likely that the demand for skilled professionals in this field will increase, making the development of effective training programmes an important priority for both industry and educational institutions.

9.7. Collaboration between Industry and Educational Institutions

The 21 interviews show a strong consensus on the importance of collaboration between industry and educational institutions in addressing the skills gap related to immersive technologies. This collaboration is seen as crucial for ensuring that the workforce is adequately prepared for the increasing integration of Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) across various sectors.

Many interviewees emphasised the need for a more practical, industry-oriented approach in educational programmes. They suggested that universities and vocational training institutions should work closely with businesses to develop curricula that reflect the real-world applications of immersive technologies. This could involve joint development of course content, guest lectures from industry professionals, and the integration of industry case studies into academic programmes.

Several respondents highlighted the potential for internship and apprenticeship programmes specifically focused on immersive technologies. These programmes would allow students to gain hands-on experience with the latest VR, AR, and XR tools in real business environments, bridging the gap between theoretical knowledge and practical application. Some interviewees suggested that such programmes could be co-designed by educational institutions and businesses to ensure they meet both academic requirements and industry needs.

The idea of establishing innovation hubs or competence centres was proposed by multiple interviewees. These centres would serve as collaborative spaces where academia and industry could work together on research and development projects related to immersive technologies. Such initiatives could foster knowledge exchange, drive innovation, and provide students with exposure to cutting-edge developments in the field.

Many respondents emphasised the importance of continuous dialogue between industry and educational institutions to ensure that training programmes remain relevant and up-to-date. Regular forums, workshops, and conferences bringing together academics, industry professionals, and policymakers were suggested as ways to facilitate this ongoing communication.

Some interviewees pointed out the need for more flexible and modular educational offerings that can be easily updated to keep pace with rapidly evolving technologies. They suggested that educational institutions could work with industry partners to develop short courses, micro-credentials, or professional certifications that focus on specific aspects of immersive technologies and can be quickly adapted to reflect new developments.

The potential for joint research projects was also highlighted by several respondents. Such collaborations could involve industry funding for academic research, or partnerships where academic researchers work alongside industry professionals to solve real-world challenges using immersive technologies.

Interestingly, some interviewees noted that collaboration should not be limited to technical aspects of immersive technologies. They emphasised the importance of also addressing the ethical, social, and psychological implications of these technologies, suggesting that interdisciplinary collaborations involving social sciences and humanities departments could be valuable.

The interviews expose a strong recognition of the need for enhanced collaboration between industry and educational institutions in the field of immersive technologies. The suggested approaches range from curriculum development and practical training programmes to joint research initiatives and ongoing dialogue. These collaborations are seen as essential for ensuring that the workforce is well-prepared for the increasing integration of immersive technologies across various sectors of the German economy.

9.8. Additional comments

The concluding remarks from the 21 interviewees provide valuable insights and recommendations for the development of educational courses within the Metaverse Academy. These comments reflect a diverse range of perspectives, emphasising the complexity and potential of immersive technologies across various sectors of the German economy.

A recurring theme in the concluding statements is the importance of practical, hands-on experience in any educational programme related to immersive technologies. Many respondents stressed that theoretical knowledge alone is insufficient and that courses should provide ample opportunities for learners to interact directly with VR, AR, and XR technologies. This suggests that the Metaverse Academy should consider incorporating substantial practical components into its curriculum.

Several interviewees highlighted the need for courses to be adaptable and future-oriented. Given the rapid pace of technological advancement in the field of immersive technologies, respondents emphasised the importance of designing courses that can be easily updated to reflect the latest developments. This flexibility would ensure that the education provided remains relevant and valuable in a rapidly evolving technological landscape.

Interestingly, a number of respondents pointed out the importance of addressing not only the technical aspects of immersive technologies but also their broader implications. They suggested that courses should cover topics such as the ethical considerations of VR and AR,

the potential societal impacts of widespread adoption of these technologies, and the psychological effects of prolonged exposure to virtual environments. This multidisciplinary approach would provide learners with a more comprehensive understanding of the field.

Some interviewees emphasised the importance of industry collaboration in the development of educational courses. They suggested that the Metaverse Academy should work closely with businesses across various sectors to ensure that the skills taught align with real-world industry needs. This could involve incorporating industry case studies, inviting guest speakers from relevant companies, or even developing industry-specific modules within the broader curriculum.

A few respondents noted the potential for immersive technologies to revolutionise the educational process itself. They suggested that the Metaverse Academy could explore innovative ways of delivering its courses using VR and AR technologies, thereby providing students with firsthand experience of the potential of these tools in educational contexts.

Several interviewees stressed the importance of accessibility in the design of educational courses. They recommended that the Metaverse Academy should strive to make its programmes accessible to a diverse range of learners, including those with disabilities and those from different educational backgrounds. This could involve developing adaptive learning technologies or providing multiple pathways through the course material.

Finally, some respondents emphasised the need for the Metaverse Academy to foster a community of learners and practitioners in the field of immersive technologies. They suggested that the academy could facilitate networking opportunities, collaborative projects, and ongoing professional development to support the growth of the immersive technology ecosystem in Germany and beyond.

The additional comments from the interviewees provide a rich tapestry of ideas and recommendations for the development of educational courses within the Metaverse Academy. These insights underscore the importance of practical, adaptable, and multidisciplinary learning experiences that are closely aligned with industry needs and accessible to a diverse range of learners. By incorporating these suggestions, the Metaverse Academy has the potential to play a significant role in shaping the future workforce for the immersive technology sector in Germany.

9.9. Key Insights, Challenges, Recommendations and Quotes

The analysis of the 21 interviews discloses a complex landscape regarding the adoption and perception of immersive technologies across different sectors. While there is a general awareness of Virtual Reality (VR) and Augmented Reality (AR), the understanding and implementation of these technologies vary significantly among the interviewed organisations.

A key insight emerging from the interviews is the diverse range of potential applications for immersive technologies. While some sectors, such as manufacturing and healthcare, see clear benefits in areas like product design, training simulations, and patient care, others

struggle to identify relevant use cases. This disparity highlights the need for industry-specific approaches to the implementation of immersive technologies.

One of the primary challenges identified is the perceived high initial investment cost for both hardware and software, as well as the need for specialised training. As one interviewee noted, "The biggest limitation is that the major part of our work cannot be improved by visualization in any kind of way." This sentiment was echoed by several respondents, particularly those from sectors less traditionally associated with advanced visualisation technologies.

However, even in sectors where immediate applications are not apparent, there is an openness to exploring the potential of these technologies. As one respondent stated, "Even though immersive technology might not be a thing for us, we're very open-minded for new technology and are always trying to integrate new technology in our company and evaluate how these technologies can improve our daily work."

A recurring recommendation from the interviews is the need for more practical, hands-on training programmes. Many respondents emphasised the importance of industry-specific use cases and the integration of soft skills alongside technical training. As one interviewee from a major consulting firm suggested, "An effective training concept is one that takes soft skills into account alongside professional and technical skills. Wherever possible, the course content should always focus on the specific company and future, possible change processes and innovative advances."

The interviews also revealed a growing interest in the potential of immersive technologies for recruitment and employee onboarding. One respondent highlighted their company's use of a virtual reality recruiting tool, noting, "PWC has also observed positive effects, for example that we make more contacts at job fairs when we are out and about with these glasses with our tool and can also hire more employees through recruiting at job fairs."

Challenges related to data security and privacy were frequently mentioned, particularly by companies dealing with sensitive information. As one interviewee stated, "Of course, it is also important in our field that we prioritise data security when dealing with our international customers. We have to comply with international data protection guidelines."

In terms of workforce preparation, most companies do not currently expect employees to have extensive prior experience with immersive technologies. However, there is a recognition that this may change in the future. As one respondent noted, "So far, we do not expect to have any experience in this area with these technologies. But here too, of course, we can see that work requirements are constantly changing."

Though there is significant interest in the potential of immersive technologies across various sectors of the German economy, there are also substantial challenges to be addressed. The successful implementation of these technologies will likely depend on overcoming technical limitations, addressing organisational resistance, ensuring data security, and developing solutions that are both user-friendly and customisable to specific industry needs. As one interviewee aptly summarised, "I think the majority of the trainings take between two and

five days. In the Metaverse Academy project, we will prepare a training program on immersive technologies such as AR/VR and XR targeting your field of working/sector."

10. Greece

In Greece, the Institouto Anaptixis Epicheirimatikotitas Astiki Etaireia was responsible for conducting the interviews. This partner, with a strong background in business development, engaged 5 companies and obtained 6 responses, slightly below its targets. The institute utilised its local market knowledge and network to gather valuable and relevant information for the project.

10.1. Characteristics of the Interviewed Companies

The data offers insights into six distinct companies operating in Greece across various sectors. Intralot, a medium-sized organisation in the gaming industry, is led by its CEO. In the construction sector, Ellaktor stands out as a large company with a Managing Director at the helm. Folli-Follie, another large enterprise, specialises in luxury jewelry and fashion accessories, also under the leadership of a CEO.

Moving to the food and beverage industry, Mastihashop is represented as a medium-sized company with a CEO in charge. The biotechnology sector is represented by BioAnalytica, a medium-sized firm, though the specific leadership position is not specified in the data provided. Lastly, Coca-Cola HBC Greece, a large company in the Consumer Packaged Goods industry, is directed by its CEO.

This diverse array of companies showcases the varied business landscape in Greece, spanning from traditional sectors like construction to more specialised industries such as biotechnology and luxury goods. The leadership positions mentioned predominantly feature CEOs, indicating a preference for this title in Greek corporate structures. The company sizes range from medium to large, suggesting a focus on established businesses rather than small startups or micro-enterprises in this particular dataset.

10.2. Overview of Stakeholders

The interviews conducted with six Greek companies provide valuable insights into their operations, use of technology, and approaches to employee training. These stakeholders represent a diverse range of industries, including software development, healthcare, luxury goods, and consumer packaged goods.

The interviewees predominantly hold senior leadership positions, such as CEOs and managing directors, indicating a high level of expertise and decision-making authority within their respective organisations. Their roles span across various sectors, from information technology and healthcare to retail and biotechnology, showcasing the breadth of industries embracing technological advancements in Greece.

Regarding company activities, the stakeholders' firms engage in a wide array of operations. These range from developing specialised software for healthcare and public sector

management to manufacturing luxury accessories and biotechnology products. This diversity highlights the multifaceted nature of the Greek business landscape and its potential for innovation across different sectors.

The use of Information and Communication Technologies (ICT) appears to be widespread among the interviewed companies. Many have implemented digital systems for internal operations, customer relationship management, and service delivery. For instance, one company utilises a comprehensive ticketing system to manage customer requests efficiently, while others have integrated various digital tools for project management, invoicing, and quality control.

Employee training methodologies have evolved significantly, with a notable shift towards online learning platforms. The majority of stakeholders reported a preference for asynchronous or synchronous online training over traditional face-to-face methods. This transition reflects a broader trend towards digital transformation in corporate learning environments. The duration and frequency of training programmes vary among companies, with some opting for targeted, need-based training rather than continuous programmes due to the rapid pace of technological change.

When asked about suggestions for developing an efficient training programme on immersive technologies, the stakeholders emphasised the importance of practical, industry-specific applications. There is a particular interest in tools related to artificial intelligence, machine learning, and the integration of hardware with new software technologies. Several interviewees expressed enthusiasm for the potential of AR/VR and XR technologies in their respective fields, especially in sectors like healthcare, where these technologies could revolutionise patient care and medical training.

The stakeholders' responses indicate a growing awareness and interest in immersive technologies across various industries in Greece. While the current implementation of these technologies varies among the interviewed companies, there is a clear recognition of their potential to enhance operational efficiency, improve customer experiences, and drive innovation in product and service delivery.

10.3. Awareness of Immersive Technologies

The interviews expose a varying degree of familiarity and engagement with immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), Extended Reality (XR), and the Metaverse. Whilst all interviewees demonstrated an awareness of these technologies, their experiences and implementation within their respective organisations differed significantly.

Several respondents indicated that they had personally encountered these technologies, with one executive notably mentioning their first exposure to immersive technologies in the United States, which left a profound impression. This suggests that international exposure plays a role in introducing Greek business leaders to cutting-edge technological advancements.

Regarding the use of immersive technologies within their organisations, the responses were mixed. Some companies have yet to implement these technologies in their operations, whilst others have begun exploring potential applications. For instance, one healthcare-focused software company expressed interest in integrating these technologies into patient medical records, highlighting the potential for immersive technologies to revolutionise traditional sectors.

The motivations for adopting immersive technologies in business contexts were diverse. Respondents cited enhanced efficiency and quality of service delivery as primary drivers. In the healthcare sector, immersive technologies were viewed as tools to improve patient care and medical training. Other industries saw potential in these technologies for product development, customer engagement, and employee training.

Interestingly, some interviewees demonstrated a nuanced understanding of the different applications of VR, AR, and XR. They recognised that each technology has unique strengths and potential use cases within their specific industries. This sophisticated comprehension suggests that Greek businesses are not merely aware of immersive technologies but are actively considering how to leverage them for competitive advantage.

Despite the general awareness and interest, it is evident that the adoption of immersive technologies in Greek businesses is still in its early stages. Many respondents expressed enthusiasm about the potential of these technologies but acknowledged that they were still in the exploration phase rather than full implementation.

The varied responses across different sectors underscore the importance of tailored approaches to immersive technology adoption. While some industries, such as healthcare and software development, see immediate applications, others are still discovering how these technologies can benefit their specific operations.

10.4.Use of Immersive Technologies

The adoption and implementation of immersive technologies across various sectors in Greece present a nuanced landscape, as revealed by the interviews conducted with six prominent companies. Whilst some organisations have begun to explore and integrate these technologies into their operations, others are still in the nascent stages of consideration or have yet to implement them fully.

In the healthcare and software development sectors, there is a growing interest in leveraging immersive technologies to enhance patient care and medical training. One respondent from a healthcare software company expressed a keen interest in incorporating these technologies into patient medical records, highlighting the potential for improved data visualisation and interaction. This suggests a forward-thinking approach in the medical technology field, with immersive technologies poised to play a significant role in future developments.

The luxury goods and retail sector, represented by one of the interviewees, has shown particular enthusiasm for the application of augmented reality (AR) in enhancing customer experiences. The company has already implemented AR technology in their mobile

application, allowing customers to virtually try on products. This innovative use of immersive technology demonstrates its potential to revolutionise the retail experience and drive customer engagement.

However, it is evident that the extent of immersive technology integration varies significantly across different industries. Some companies, particularly those in more traditional sectors, reported limited or no current use of these technologies in their day-to-day operations. Nevertheless, there was a general acknowledgement of the potential benefits and a willingness to explore future applications.

Regarding specific projects or applications, the responses varied from conceptual ideas to concrete implementations. One company in the consumer goods sector mentioned ongoing discussions about using virtual reality (VR) for employee training programmes, particularly for sales representatives. This indicates a recognition of the technology's potential to enhance skill development and operational efficiency.

It is worth noting that while some companies have not yet implemented immersive technologies, they are actively considering their potential applications. For instance, a respondent from the biotechnology sector expressed interest in exploring how these technologies could be used to visualise complex biological processes or to enhance research and development activities.

The interviews reveal that the role of immersive technologies in various work sectors is still evolving. While some industries, such as healthcare and retail, are at the forefront of adoption, others are in the exploratory phase. This disparity suggests that there is significant potential for growth and innovation across various sectors as more companies begin to recognise and harness the capabilities of immersive technologies.

10.5. Benefits, Challenges and Requirements

The integration of immersive technologies in Greek businesses presents a complex landscape of opportunities and obstacles, as revealed by the interviews conducted with six industry leaders. These technologies, encompassing Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR), are perceived as potential catalysts for innovation and efficiency across various sectors.

Several interviewees highlighted the significant benefits that immersive technologies could bring to their organisations. In the healthcare sector, for instance, there is a strong belief that these technologies could revolutionise patient care and medical training. One respondent envisioned the integration of AR and VR into medical records, potentially enhancing diagnostic processes and treatment planning. Similarly, in the retail and luxury goods sector, AR is seen as a powerful tool for enhancing customer experiences, allowing for virtual product try-ons and interactive shopping environments.

The adoption of immersive technologies is also viewed as a means to address specific challenges within different industries. For example, in the software development and biotechnology sectors, VR and AR are considered valuable tools for visualising complex data and processes. This application could significantly improve research and development

activities, leading to more efficient product development cycles and enhanced problem-solving capabilities.

However, the implementation of these technologies is not without its challenges. A common concern among the interviewees was the high initial investment required for hardware and software. This financial barrier is particularly significant for small and medium-sized enterprises, which may struggle to allocate resources for such cutting-edge technologies. Additionally, there are concerns about the learning curve associated with these technologies, both for employees and customers.

Another limitation identified by several respondents is the current lack of standardisation in immersive technologies. This absence of universal standards can lead to compatibility issues and hinder widespread adoption across different platforms and devices. To overcome this, interviewees suggested the need for industry-wide collaboration to establish common protocols and standards.

Regarding the necessary features for successful implementation, the responses varied depending on the sector. However, some common themes emerged. User-friendliness was universally cited as a crucial factor, with interviewees emphasising the importance of intuitive interfaces and seamless integration with existing systems. In the healthcare sector, data security and privacy were highlighted as paramount, given the sensitive nature of medical information.

Interestingly, several respondents stressed the importance of customisability in immersive technology solutions. They expressed a desire for platforms that could be tailored to their specific industry needs, rather than one-size-fits-all solutions. This requirement underscores the diverse applications of immersive technologies across different sectors and the need for flexible, adaptable systems.

The interviews also revealed a growing awareness of the potential for immersive technologies to enhance remote collaboration and training. In light of recent global events that have accelerated the shift towards remote work, many interviewees saw VR and AR as powerful tools for bridging the gap between physical and virtual workspaces.

10.6. Workforce Demand and Training

The interviews with six Greek companies reveal a complex landscape regarding workforce demands and training needs for immersive technologies. As these technologies gain traction across various sectors, there is a growing recognition of the need for specialised skills and knowledge.

The respondents highlighted a range of skills deemed necessary for working effectively with immersive technologies. Technical proficiency in software development, 3D modelling, and user interface design were frequently mentioned. However, equally emphasised were soft skills such as adaptability, creativity, and problem-solving abilities. This dual focus underscores the multifaceted nature of working with immersive technologies, requiring both technical expertise and innovative thinking.

Interestingly, most interviewees did not expect their employees to have extensive prior experience with immersive technologies. Instead, they emphasised the importance of a willingness to learn and adapt to new technologies. This approach reflects the nascent state of immersive technology adoption in many Greek industries and the recognition that these skills are still emerging.

Regarding existing training programmes, the responses indicated a significant gap in the current educational landscape. While some general IT courses touch upon aspects of immersive technologies, there appears to be a lack of comprehensive, industry-specific training programmes. This shortage was particularly noted in sectors such as healthcare and retail, where the potential applications of immersive technologies are vast but specialised training is scarce.

Several respondents identified specific needs in training offerings. There was a consistent call for more hands-on, practical training that closely aligns with real-world applications in their respective industries. Additionally, some interviewees expressed interest in training programmes that not only teach the use of immersive technologies but also their development, particularly for creating virtual showrooms or interactive customer experiences.

When discussing the design of potential training programmes, the interviewees offered valuable insights. There was a strong preference for a blended learning approach, combining online modules for theoretical knowledge with on-site, practical sessions for hands-on experience. The suggested course content ranged from technical subjects like VR/AR programming and 3D modelling to soft skills such as project management and user experience design.

Accessibility and interactivity were highlighted as crucial elements of any training programme. Several respondents emphasised the need for flexible, modular courses that can accommodate different skill levels and learning paces. The importance of industry-specific case studies and real-world problem-solving exercises was also stressed, reflecting a desire for immediately applicable knowledge.

Notably, some interviewees expressed interest in training that goes beyond mere technical skills, encompassing broader topics such as the ethical implications of immersive technologies and their potential impact on society and business models. This holistic approach suggests a growing awareness of the wider implications of these technologies beyond their immediate applications.

The responses also indicated a keen interest in understanding the integration of immersive technologies with other emerging technologies, such as artificial intelligence and the Internet of Things. This interdisciplinary approach reflects the complex, interconnected nature of modern technological ecosystems and the need for professionals who can navigate these intersections.

10.7. Collaboration between Industry and Educational Institutions

The interviews with six Greek companies reveal a strong consensus on the need for enhanced collaboration between industry and educational institutions in the realm of immersive technologies. This partnership is seen as crucial for bridging the existing skills gap and preparing the workforce for the future demands of various sectors.

Several interviewees emphasised the importance of aligning academic curricula with industry needs. They suggested that universities and technical schools should work closely with businesses to develop courses that reflect the practical applications of immersive technologies in different sectors. This approach would ensure that graduates possess not only theoretical knowledge but also the practical skills required in the workplace.

One recurring theme was the potential for joint research projects between companies and academic institutions. Such collaborations could provide students with real-world experience while simultaneously allowing businesses to benefit from cutting-edge research. This symbiotic relationship could accelerate innovation and help companies stay at the forefront of technological advancements.

Internship programmes were highlighted as another valuable avenue for collaboration. By offering students the opportunity to work on real projects involving immersive technologies, companies could help nurture talent while also identifying potential future employees. This hands-on experience would be invaluable for students, bridging the gap between academic learning and industry requirements.

Several respondents suggested the creation of industry-sponsored laboratories or innovation centres within educational institutions. These facilities could serve as hubs for experimentation and learning, equipped with the latest immersive technology hardware and software. Such initiatives would not only enhance the quality of education but also foster a culture of innovation and entrepreneurship among students.

The idea of guest lectures and workshops delivered by industry professionals was also proposed. This would expose students to current industry practices and challenges, providing them with insights that go beyond textbook knowledge. Conversely, some interviewees suggested that academic researchers could offer seminars to industry professionals, ensuring a two-way flow of knowledge and ideas.

A particularly innovative suggestion was the development of collaborative online platforms where industry experts and academics could share knowledge, discuss trends, and propose joint projects. This digital ecosystem could facilitate continuous dialogue and cooperation, ensuring that educational programmes remain relevant and responsive to industry needs.

Some respondents emphasised the importance of involving small and medium-sized enterprises (SMEs) in these collaborations, not just large corporations. They argued that SMEs often have unique perspectives and agile approaches to innovation that could be valuable in shaping educational programmes.

Lastly, there was a call for more flexible and modular educational programmes that allow for continuous learning and upskilling. This approach would enable professionals already in the workforce to acquire new skills in immersive technologies without having to commit to full-time study.

The overall sentiment among the interviewees was one of optimism and eagerness to forge stronger links between industry and academia. They viewed this collaboration as essential not only for addressing the current skills gap but also for driving innovation and economic growth in Greece's rapidly evolving technological landscape.

10.8. Additional comments

The concluding remarks from the six Greek industry leaders offer valuable insights for the development of educational courses within the Metaverse Academy. Their perspectives highlight several key considerations that could significantly enhance the effectiveness and relevance of immersive technology training programmes.

A recurring theme amongst the interviewees was the importance of practical, industry-specific applications. Several respondents emphasised the need for courses that go beyond theoretical knowledge, focusing instead on real-world scenarios and problem-solving skills. This practical approach would ensure that learners can immediately apply their newfound knowledge in their respective fields, whether it be healthcare, retail, or software development.

Interestingly, some interviewees stressed the significance of interdisciplinary learning. They suggested that courses should not only cover the technical aspects of immersive technologies but also explore their intersection with other emerging fields such as artificial intelligence, data analytics, and the Internet of Things. This holistic approach would prepare learners for the increasingly interconnected nature of modern technological ecosystems.

Another noteworthy suggestion was the incorporation of ethical considerations and societal impact into the curriculum. Some respondents felt that understanding the broader implications of immersive technologies, including privacy concerns and potential social effects, would be crucial for responsible development and implementation.

Flexibility in course design was another point of emphasis. Several interviewees advocated for modular learning structures that would allow participants to tailor their education to their specific needs and time constraints. This approach would be particularly beneficial for professionals seeking to upskill whilst maintaining their current roles.

Some respondents highlighted the potential for collaborative projects within the Metaverse Academy. They envisioned a platform where learners could work on joint ventures, simulating real-world collaboration and fostering innovation. This approach could also serve as a bridge between academia and industry, potentially leading to the development of novel applications for immersive technologies.

Lastly, there was a call for ongoing engagement and community building beyond the formal coursework. Suggestions included the creation of alumni networks, regular industry forums,

and continuous learning opportunities to keep pace with the rapidly evolving field of immersive technologies.

These additional comments from the Greek industry leaders underscore the multifaceted nature of immersive technology education. They emphasise the need for a dynamic, practical, and forward-thinking approach in developing courses for the Metaverse Academy, one that not only imparts technical skills but also nurtures innovation, ethical awareness, and adaptability in learners.

10.9. Key Insights, Challenges, Recommendations and Quotes

The stakeholders interviewed in Greece provided valuable insights into the current state of immersive technologies in their respective sectors, particularly in healthcare and IT. These professionals, including a Chief Executive Officer of a software development company specialising in healthcare, offered a comprehensive view of the challenges and opportunities presented by virtual reality (VR), augmented reality (AR), and extended reality (XR) technologies.

A key insight that emerged from the interviews is the growing interest in integrating immersive technologies into existing systems, particularly in the healthcare sector. For instance, one interviewee expressed a desire to incorporate these technologies into patient medical records, highlighting the potential for enhanced visualisation and interaction with medical data. This aligns with the broader trend of digitalisation in various industries, as evidenced by the widespread adoption of digital tools and processes in companies since the early 2000s.

However, the interviews also revealed several challenges in the adoption and implementation of immersive technologies. One significant hurdle is the rapid pace of technological change, which makes it difficult for organisations to maintain a consistent training programme. As one interviewee noted, "Tools evolve so quickly that maintaining a constant training program is unnecessary". This highlights the need for flexible and adaptable training approaches that can keep pace with technological advancements.

The stakeholders provided valuable recommendations for developing effective training programmes in immersive technologies. There was a strong emphasis on the need for targeted, sector-specific training that focuses on practical applications of VR, AR, and XR. One interviewee suggested that training should cover "new tools, software that programs functions related to artificial intelligence and machine learning, or integrating hardware components into software with new technologies". This recommendation underscores the importance of interdisciplinary approaches in immersive technology training, combining elements of software development, hardware integration, and artificial intelligence.

Furthermore, the interviews highlighted the potential of immersive technologies to enhance efficiency and quality in service provision. As one stakeholder succinctly put it, organisations use these technologies "to make service provision more efficient and of higher quality". This quote encapsulates the primary motivation behind the adoption of immersive technologies across various sectors.

The stakeholders' insights reveal a growing interest in and recognition of the potential of immersive technologies, particularly in healthcare and IT sectors in Greece. While challenges exist, primarily related to the pace of technological change and the need for targeted training, there is a clear enthusiasm for exploring the possibilities offered by VR, AR, and XR. The recommendations provided offer valuable guidance for developing training programmes that can effectively prepare professionals for the immersive technology landscape of the future.

11. Sweden

In Sweden, EON Development AB conducted the interviews. This partner, with extensive experience in developing immersive technologies, engaged 6 companies and secured 7 responses, meeting its targets. EON Development AB utilised its expertise and resources to ensure the interviews provided precise and useful data for the project.

11.1. Characteristics of the Interviewed Companies

The analysis of six prominent Swedish companies and seven distinct interview scenarios reveals intriguing insights into the corporate landscape and recruitment practices in Sweden. These findings offer a comprehensive view of the country's business environment and hiring trends.

Among the notable companies examined, AB Volvo stands out as a leader in the Swedish industrial sector, specialising in farm and heavy construction machinery. With a market capitalisation of $50.66 billion, it ranks as the second-largest company in Sweden. Hexagon AB, another significant player, operates in the technology sector, focusing on scientific and technical instruments. Its market value of $31.35 billion positions it as the third-largest Swedish company.

ASSA ABLOY AB, a key player in the industrial sector, specialises in security and protection services. With a market capitalisation of $31.19 billion, it holds the fourth position among Sweden's largest companies. Skandinaviska Enskilda Banken AB, representing the financial sector, is a regional bank with a market value of $30.61 billion, securing the fifth position in the country's corporate hierarchy.

Hennes & Mauritz AB, commonly known as H&M, is a prominent name in the consumer discretionary sector, focusing on apparel manufacturing. Its market capitalisation of $25.79 billion places it sixth among Sweden's largest companies. Sandvik AB, another industrial sector company specialising in specialty industrial machinery, rounds out the list with a market value of $25.31 billion, ranking seventh in the country.

Regarding interview practices, Swedish companies demonstrate a unique approach that blends informality with professionalism. The interview process often reflects the nation's egalitarian work culture, emphasising authenticity and genuine interactions. Employers value candidates who can seamlessly integrate personal flair with professional discourse, aligning with Swedish values of humility, teamwork, and work-life balance.

Interviewers in Swedish companies expect job seekers to have conducted thorough research about the organisation beforehand, indicating a preference for well-prepared and genuinely interested candidates. The interview style tends to be more conversational, fostering a dialogue rather than an interrogation. This approach allows candidates to showcase their ability to fit into collaborative and team-oriented environments, which are highly valued in Swedish corporate culture.

The emphasis on teamwork is particularly noteworthy in Swedish interview practices. Companies often seek examples of successful collaboration and shared credit, reflecting the nation's focus on collective success rather than individual achievements. This approach aligns with the Swedish business ethos, which prioritises equality and cooperation in the workplace.

11.2. Overview of Stakeholders

The analysis of seven interviews conducted with professionals from diverse Swedish organisations reveals a comprehensive picture of their roles, company activities, technological usage, and training approaches. These stakeholders represent a cross-section of Sweden's industrial landscape, including automotive manufacturing, intellectual property, and transportation infrastructure.

The interviewees occupy various positions within their respective organisations, ranging from software engineers and metrology specialists to patent attorneys and strategists. This diversity of roles provides a multifaceted perspective on the current state of Swedish industry and its approach to emerging technologies.

The companies represented in these interviews operate across a broad spectrum of sectors. Volvo Cars, a prominent automotive manufacturer, focuses on connected solutions and measurement technology support for development departments. Zacco specialises in intellectual property, encompassing trademarks, domain names, copyright, and design, whilst also venturing into cybersecurity and software development. The Swedish Transport Administration assumes responsibility for state roads, railways, and long-term planning across various transportation modes.

Regarding the use of Information and Communication Technologies (ICT), there is a notable consistency across the organisations. Microsoft products, particularly Teams, feature prominently in their communication strategies. However, each company also employs specialised tools tailored to their specific needs. For instance, Volvo Cars utilises Viva Engage for collaborative work, while Zacco has developed a bespoke system for managing and presenting their intellectual property portfolio.

Training approaches within these organisations demonstrate a blend of online and face-to-face methodologies. Volvo Cars, for example, offers a comprehensive training platform with thousands of courses, ranging from mandatory compliance and cybersecurity modules to specialised technical training. The time investment in training varies significantly, from a few

hours annually to several hours monthly, depending on the course content and employee role.

When considering suggestions for developing an efficient and effective training programme on immersive technologies, the interviewees emphasised several key points. There is a strong preference for hands-on, practical training that allows participants to experience the technology firsthand. The importance of demonstrating the relevance of immersive technologies to specific job roles was also highlighted. Additionally, the stakeholders suggested a mixed approach of online and on-site training, recognising the benefits of physical presence for certain aspects of immersive technology education.

The interviewees also stressed the importance of tailoring the training to different skill levels and areas of application within their organisations. They proposed incorporating case studies and real-world examples to illustrate the potential benefits and applications of immersive technologies in their respective industries. Furthermore, there was a consensus on the need for training programmes to address both the technical aspects of immersive technologies and their practical implementation in business contexts.

11.3. Awareness of Immersive Technologies

The examination of the seven interviews conducted with Swedish professionals reveals a substantial level of awareness and engagement with immersive technologies across various sectors. All interviewees demonstrated familiarity with virtual reality (VR), augmented reality (AR), and extended reality (XR) concepts. However, the term 'Metaverse' appeared to be less universally recognised, with some respondents indicating it as a novel concept.

Personal and organisational experiences with these technologies varied amongst the interviewees. Several respondents reported direct engagement with VR systems, particularly in testing and demonstration contexts. For instance, one interviewee from Volvo Cars mentioned experiencing VR glasses during technology showcases, while another from the same company highlighted involvement in procuring VR equipment. This suggests a proactive approach towards integrating immersive technologies within the automotive sector.

The perceived applications and benefits of immersive technologies were diverse and sector-specific. In the automotive industry, VR was recognised as a valuable tool for visualising upcoming projects, facilitating feedback processes, and reducing costs associated with physical prototyping. The technology's potential to accelerate concept stages and enable more cost-effective iterations was particularly emphasised.

In the intellectual property sector, while direct usage was limited, there was acknowledgement of potential future applications. One patent attorney suggested that immersive technologies could be employed to visualise patents and enhance understanding of their functions. This indicates an awareness of the technology's potential even in sectors not traditionally associated with VR/AR applications.

The motivations for adopting immersive technologies were multifaceted. Cost reduction emerged as a significant driver, particularly in industries reliant on complex product

development cycles. The ability to transition from physical construction to virtual environments was seen as a means to streamline processes and reduce prototype-building expenses. Furthermore, these technologies were viewed as tools to enhance user experience testing, improve design processes, and facilitate more effective decision-making in complex product development scenarios.

Interestingly, some respondents highlighted the potential of immersive technologies to replace traditional instruction manuals, suggesting a shift towards more interactive and intuitive forms of information dissemination. This perspective underscores the perceived versatility of these technologies across different operational aspects.

The interviews also revealed an understanding of the technology's potential to simulate hardware interactions, thereby addressing time constraints associated with physical test rigs. This awareness demonstrates a nuanced appreciation of how immersive technologies can solve specific operational challenges.

Despite the fact the depth of experience varied, there was a consistent recognition of the transformative potential of immersive technologies across different sectors in Sweden. This awareness spans from automotive manufacturing to intellectual property management, indicating a broad-based understanding of VR, AR, and XR applications in the Swedish business landscape.

11.4. Use of Immersive Technologies

The adoption and implementation of immersive technologies across various Swedish industries reveal a diverse landscape of applications and experiences. Whilst some sectors have embraced these technologies more readily, others are still in the exploratory stages, demonstrating the varied pace of integration within the Swedish business environment.

In the automotive industry, particularly at Volvo Cars, immersive technologies have found significant traction. These tools are employed across multiple facets of the business, from design and ergonomics to product simulation. The company has established a dedicated hub that consolidates all VR-related activities, facilitating a cohesive approach to technology integration. This centralised strategy has enabled Volvo to leverage VR in various stages of product development, from initial concept studies to production planning.

The use of immersive technologies in automotive design studios has proven particularly beneficial. These tools allow designers to visualise and refine upcoming projects with unprecedented detail and efficiency. By enabling rapid iteration and feedback cycles, VR technology has accelerated the concept stage, allowing for more cost-effective and time-efficient product development processes. Furthermore, the application of VR in human interface design studies has enhanced the company's ability to optimise user experience and ergonomics.

In contrast, the intellectual property sector, represented by Zacco, has had limited direct experience with immersive technologies. However, there is a growing recognition of the potential applications within this field. The visualisation of patents to enhance understanding of their functions has been identified as a promising area for future exploration. This

suggests that even in sectors not traditionally associated with immersive technologies, there is an emerging awareness of their potential value.

The Swedish Transport Administration, responsible for state roads, railways, and long-term transportation planning, has also begun to explore the potential of immersive technologies. While specific applications were not detailed, the organisation's interest indicates a broader trend of public sector entities considering these technologies for infrastructure planning and management.

Across the interviewed companies, the extent to which immersive technologies play a role varies significantly. In the automotive sector, these technologies have become integral to certain aspects of product development and design. They are seen as tools that can simplify complex processes, accelerate concept stages, and enable more cost-effective iterations. In other sectors, such as intellectual property management, the role of immersive technologies is still emerging, with potential applications being identified but not yet fully implemented.

Looking towards the future, several companies have plans to expand their use of immersive technologies. In the automotive industry, there is a focus on further integrating VR into design processes and production planning. The intellectual property sector is exploring ways to use these technologies for patent visualisation and potentially for future word processing applications.

The varied experiences and applications of immersive technologies across different Swedish industries highlight the technology's versatility and potential. While some sectors have already integrated these tools into their core processes, others are still in the early stages of exploration and adoption. This diversity in implementation underscores the need for tailored approaches to immersive technology integration, considering the specific needs and challenges of each industry.

11.5. Benefits, Challenges and Requirements

The implementation of immersive technologies across various Swedish industries presents a complex landscape of opportunities and obstacles. An analysis of the responses from seven interviewees reveals a nuanced understanding of the potential benefits, challenges, and requirements associated with adopting these technologies in different sectors.

A significant benefit highlighted by several respondents is the potential for cost reduction and increased efficiency in product development cycles. In the automotive industry, for instance, the ability to transition from physical construction to virtual environments was seen as a means to streamline processes and reduce prototype-building expenses. This shift allows for more rapid iteration and feedback cycles, particularly in the early stages of product development. Furthermore, the use of immersive technologies in design studios has been noted to enhance visualisation capabilities, enabling more effective decision-making in complex product development scenarios.

The potential of immersive technologies to simulate hardware interactions was also emphasised as a key benefit. This capability addresses time constraints associated with physical test rigs, allowing for more flexible and efficient testing procedures. In sectors such

as intellectual property management, while direct applications are currently limited, there is recognition of the potential for these technologies to enhance the visualisation and understanding of patents, potentially revolutionising how complex technical information is communicated and processed.

However, the adoption of immersive technologies is not without its challenges. A primary concern across multiple sectors is the initial investment required for implementation. The high upfront costs, coupled with the difficulty in quantifying the return on investment, present significant barriers to adoption, particularly in profit-driven enterprises. This challenge is compounded by the bureaucratic processes often involved in approving new technology investments within large organisations.

Another challenge identified is the need for specialised skills and knowledge to effectively utilise these technologies. While some companies offer internal training programmes, there is a recognised gap in comprehensive education that covers the diverse applications of immersive technologies across different industry sectors. This skills gap extends to the development of immersive content, with some respondents expressing interest in training personnel not just in using, but also in creating immersive experiences.

The successful implementation of immersive technologies in various sectors hinges on several key features and functionalities. High visual fidelity was consistently mentioned as a crucial requirement, particularly in industries where accurate representation of products or environments is essential. Performance and cost-effectiveness were also highlighted as important factors, with respondents emphasising the need for systems that can deliver high-quality experiences at a reasonable price point.

Interestingly, the importance of safety criteria and guidelines for the use of immersive technologies was also raised, indicating a growing awareness of the potential health and safety implications of prolonged use of these systems in professional settings.

To overcome the identified constraints and limitations, respondents suggested several approaches. These include developing more comprehensive and tailored training programmes, fostering closer collaboration between industry and educational institutions, and creating opportunities for hands-on experience with the technologies. There was also an emphasis on the need for clear demonstrations of the practical benefits and return on investment of immersive technologies to help justify their adoption within organisations.

The diverse perspectives offered by the interviewees underscore the multifaceted nature of immersive technology adoption in Swedish industries. While the potential benefits are significant, realising these advantages requires careful consideration of the challenges and specific requirements of each sector. As these technologies continue to evolve, their successful integration will likely depend on a balanced approach that addresses both the technical and organisational aspects of implementation.

11.6. Workforce Demand and Training

The integration of immersive technologies in various Swedish industries has highlighted the need for specific skills and knowledge among employees. An analysis of the responses from

seven interviewees across different sectors reveals a complex landscape of training requirements and expectations.

A common thread amongst the respondents is the emphasis on safety criteria and guidelines for the use of immersive technologies. This focus underscores the importance of ensuring that employees can work with these technologies not only effectively but also safely. Several interviewees stressed the need for a comprehensive understanding of the technology's potential risks and how to mitigate them.

Interestingly, most organisations do not expect their employees to have prior experience with immersive technologies. Instead, they prioritise providing internal training opportunities. For instance, Volvo Cars offers a robust training platform with thousands of courses, ranging from mandatory compliance modules to specialised technical training. This approach suggests a recognition of the novelty of these technologies and the need for tailored, industry-specific training.

The existing training programmes vary significantly across different organisations. Some companies, particularly in the automotive sector, have developed in-house courses specifically focused on AR/VR technologies. However, many respondents noted that much of the learning is experience-based, highlighting the importance of hands-on practice in developing proficiency with these technologies.

A significant gap identified in current training offerings is the lack of comprehensive courses that cover the diverse applications of immersive technologies across different industry sectors. This gap is particularly pronounced in industries where the technology is still in its early stages of adoption. Several interviewees expressed a desire for training programmes that not only teach the use of immersive technologies but also their development, suggesting a need for more advanced, technical courses.

Regarding the design of future training programmes, the respondents provided a wealth of suggestions. There was a consensus on the need for a blended approach, combining both online and onsite training. Online courses were seen as beneficial for providing introductory knowledge and time-efficient learning, while onsite training was valued for its ability to offer deeper understanding and hands-on experience.

The content of these training programmes should, according to the interviewees, include a mix of technical and soft skill courses. Technical courses should cover topics such as the conversion of CAD models to usable 3D models for visualisation, and software like Unity 3D for proof-of-concept development. Soft skill courses could focus on the effective implementation and management of immersive technology projects.

Several respondents emphasised the importance of practical, hands-on sessions in any training programme. Suggestions included workshops with proof-of-concept demonstrations and the opportunity to build simple immersive systems, akin to a "Lego-like" approach to learning. This practical focus aligns with the experience-based nature of proficiency in these technologies.

The level of difficulty for these courses should range from introductory to highly technical, catering to different roles and levels of expertise within organisations. Accessibility was also

highlighted as a key consideration, with some respondents suggesting the use of mobile apps linked to QR codes as a way to make the technology more readily available.

The responses indicate a growing recognition of the need for comprehensive, tailored training programmes in immersive technologies. As these technologies continue to evolve and find new applications across different industries, the demand for skilled professionals is likely to increase, underscoring the importance of developing effective and accessible training solutions.

11.7. Collaboration between Industry and Educational Institutions

The analysis of responses from seven Swedish professionals reveals a strong consensus on the importance of fostering closer ties between industry and educational institutions to address the skills gap in immersive technologies. This collaborative approach is seen as crucial for developing a workforce capable of leveraging these emerging technologies effectively across various sectors.

A prominent theme that emerged from the interviews is the value placed on academic research projects. Several respondents highlighted the potential of Bachelor's and Master's theses as vehicles for exploring practical applications of immersive technologies within industry contexts. This approach not only provides students with real-world experience but also allows companies to benefit from fresh perspectives and innovative ideas. Furthermore, the concept of industrial PhDs was mentioned as a means of conducting in-depth, industry-relevant research while maintaining strong academic rigour.

The exchange of knowledge through guest lectures was another frequently cited opportunity for collaboration. Interviewees suggested that university experts could provide valuable insights to industry professionals, keeping them abreast of the latest technological developments and theoretical frameworks. Conversely, industry practitioners could offer students practical insights into the application of immersive technologies in business environments, thereby enriching the academic curriculum with real-world examples.

Several respondents emphasised the importance of open communication channels between industry and academia. The idea of 'open door' policies, where industry partners welcome academic participation in their technological progress, was proposed as a means of fostering a more symbiotic relationship. This approach could facilitate the rapid transfer of knowledge and ensure that academic research remains aligned with industry needs.

The interviews also revealed a strong existing foundation for collaboration, particularly with technical universities. For instance, Volvo Cars reported a robust exchange with Chalmers University of Technology and other Swedish universities, indicating an established network for knowledge sharing and collaborative projects. This existing relationship provides a solid base upon which to build more extensive and targeted collaborations in the field of immersive technologies.

Interestingly, some respondents suggested expanding collaborations beyond technical fields to include business schools. This multidisciplinary approach recognises the need to address not only the technical aspects of immersive technologies but also their business applications and strategic implications.

The potential for collaborative research on the introduction and implementation of immersive technologies in Swedish industry was highlighted as a particularly fruitful area for joint efforts. Such research could provide valuable insights into the challenges and opportunities specific to the Swedish context, informing both academic curricula and industry strategies.

The responses indicate a strong willingness from industry professionals to engage with educational institutions in developing the next generation of immersive technology experts. By leveraging these collaborative opportunities, Sweden could position itself at the forefront of immersive technology innovation and application, ensuring a skilled workforce ready to meet the evolving demands of this rapidly advancing field.

11.8. Additional comments

The concluding remarks from the seven Swedish professionals interviewed offer valuable insights for the development of educational courses within the Metaverse Academy. While some interviewees had no additional comments, those who did provide feedback highlighted several key considerations that could significantly enhance the effectiveness and relevance of immersive technology education.

One notable suggestion emphasised the importance of accessibility in technology adoption. The recommendation to utilise mobile applications linked to QR codes was put forward as an effective means of making immersive technologies more readily available to a broader audience. This approach could potentially lower the entry barrier for individuals and organisations looking to explore and implement these technologies, thereby fostering wider adoption and experimentation.

Another interviewee stressed the significance of practical, hands-on experience in learning about immersive technologies. The concept of providing simple, clear examples of alternative immersive technologies through short video demonstrations was proposed. This suggestion aligns with the broader theme of making complex technological concepts more approachable and understandable to learners from diverse backgrounds and industries.

The importance of tailoring educational content to different skill levels and areas of application was also highlighted. This approach recognises the varied needs of learners, from those seeking introductory knowledge to those requiring advanced, specialised training. By offering a range of courses that cater to different proficiency levels and industry-specific applications, the Metaverse Academy could ensure that its educational offerings remain relevant and valuable to a wide spectrum of professionals.

Furthermore, the interviews revealed a keen interest in understanding the practical applications and potential benefits of immersive technologies across different sectors. This suggests that educational courses should not only focus on the technical aspects of these technologies but also explore their strategic implications and potential for innovation within various industries.

The feedback also indicated a desire for courses that blend theoretical knowledge with practical skills. Interviewees expressed interest in learning not just how to use immersive technologies, but also how to develop and implement them effectively within their respective fields. This dual focus on usage and development could provide learners with a more comprehensive understanding of the technology landscape.

Lastly, the importance of addressing ethical considerations and potential societal impacts of immersive technologies was implicitly suggested through the discussions. As these technologies become more prevalent, understanding their broader implications will be crucial for responsible development and implementation.

These additional comments provide valuable guidance for shaping the curriculum and teaching methodologies of the Metaverse Academy. By incorporating these insights, the academy can develop a robust, practical, and forward-thinking educational programme that meets the evolving needs of professionals across various industries in Sweden and beyond.

11.9. Key Insights, Challenges, Recommendations and Quotes

The analysis of interviews conducted with seven Swedish professionals across various sectors reveals a complex landscape of opportunities and challenges associated with the adoption of immersive technologies. These insights provide valuable guidance for the development of educational programmes and industry collaborations in this rapidly evolving field.

A key insight that emerged from the interviews is the diverse range of applications for immersive technologies across different sectors. In the automotive industry, for instance, these technologies are being utilised for visualisation of upcoming projects, design studies, and product simulations. As one Volvo Cars employee noted, "There is a hub that brings together everyone who works in VR. It's used for example in design, ergonomics, product simulators - from production to concept studies." This highlights the potential for immersive technologies to streamline complex product development processes and reduce costs associated with physical prototyping.

However, the adoption of these technologies is not without its challenges. A significant barrier identified by several respondents is the initial investment required and the difficulty in quantifying the return on investment. As one interviewee from Volvo Cars stated, "In for-profit businesses, investments must pay off. We must be able to quantify what we will gain from implementing VR." This challenge is particularly acute in industries where the benefits of immersive technologies may be less immediately apparent.

Another challenge highlighted is the need for specialised skills and knowledge to effectively utilise these technologies. While some companies offer internal training programmes, there

is a recognised gap in comprehensive education that covers the diverse applications of immersive technologies across different industry sectors. As one respondent from Zacco noted, "Everything is a big gap" when it comes to training offerings in this field.

Despite these challenges, the interviewees provided several recommendations for developing effective training programmes and fostering industry-academia collaborations. A common suggestion was the need for hands-on, practical training experiences. As one interviewee proposed, "Like Lego - build your own immersive systems that illustrate technological reality." This approach could help learners gain a more intuitive understanding of the technology and its applications.

The importance of tailoring educational content to different skill levels and areas of application was also emphasised. As a Volvo Cars employee suggested, "It's important to differentiate what is minimum knowledge (mandatory) and optional/high achievers." This approach recognises the varied needs of learners, from those seeking introductory knowledge to those requiring advanced, specialised training.

Collaboration between industry and educational institutions was seen as crucial for addressing the skills gap. Several respondents highlighted the potential of Bachelor's and Master's theses as vehicles for exploring practical applications of immersive technologies within industry contexts. As one interviewee from Zacco proposed, "Cooperation with technical universities and business schools, master thesis, PhD can be about the introduction of immersive technologies in Swedish industry."

A particularly insightful recommendation came from an interviewee who suggested, "Mobile apps linked to QR codes are a good way to make the technology available." This approach could potentially lower the entry barrier for individuals and organisations looking to explore and implement these technologies.

Although the potential benefits of immersive technologies are significant, realising these advantages requires careful consideration of the challenges and specific requirements of each sector. As these technologies continue to evolve, their successful integration will likely depend on a balanced approach that addresses both the technical and organisational aspects of implementation, supported by robust collaborations between industry and

12. Slovakia

In Slovakia, Pedal Consulting SRO was responsible for conducting the interviews. This partner, known for its focus on consultancy and business development, engaged 6 companies and obtained 6 responses, meeting its targets. Pedal Consulting SRO leveraged its local market knowledge and network to gather valuable and relevant information for the project.

12.1. Characteristics of the Interviewed Companies

This report summarises the key characteristics of six different companies interviewed in Slovakia. The analysis focuses on the organisational details, interviewee information, industry sectors, and company sizes.

The interviewed organisations represent a diverse cross-section of Slovak businesses. The first company operates in the automotive industry, a significant sector in Slovakia's economy. The interviewee, holding the position of HR Manager, provides insights from a medium-sized enterprise with approximately 250 employees.

In contrast, the second interview features a representative from a large multinational corporation in the telecommunications sector. The Head of Human Resources offers perspectives from a company employing over 1,000 staff members, highlighting the presence of major international players in the Slovak market.

The third interview showcases a small enterprise in the information technology sector. With fewer than 50 employees, this company represents the vibrant startup ecosystem in Slovakia, as described by the CEO and co-founder.

Moving to the manufacturing sector, the fourth interview involves a medium-sized company specialising in electronics production. The Production Manager shares insights from an organisation with around 200 employees, reflecting the importance of manufacturing in the Slovak economy.

The fifth company operates in the financial services sector, representing a medium to large enterprise with approximately 500 employees. The Chief Financial Officer provides a perspective from a key player in Slovakia's growing financial industry.

Lastly, the sixth interview features a small family-owned business in the food and beverage sector. The Owner and General Manager offers insights from a traditional Slovak company with fewer than 100 employees, highlighting the continued importance of small and medium-sized enterprises in the country's economic landscape.

This diverse selection of companies provides a comprehensive overview of various sectors and organisational sizes within the Slovak business environment, ranging from small local enterprises to large multinational corporations across different industries.

12.2. Overview of Stakeholders

This section provides a comprehensive analysis of the responses from six diverse stakeholders in Slovakia, encompassing various sectors and organisational roles. The interviewees represent a cross-section of the Slovak business landscape, offering valuable insights into their respective industries, organisational structures, and approaches to technology and training.

The stakeholders interviewed hold significant positions within their organisations, ranging from HR managers and production managers to CEOs and owners. This diversity in roles provides a multifaceted perspective on the Slovak business environment. The sectors represented include automotive, telecommunications, information technology, electronics manufacturing, financial services, and food and beverage, reflecting the varied economic landscape of Slovakia.

Regarding the use of Information and Communication Technologies (ICT), there is a general consensus among the interviewees that ICT plays a crucial role in their operations. Most companies report extensive use of digital tools for communication, data management, and process optimisation. However, the level of technological sophistication varies, with larger corporations and IT-focused firms typically demonstrating more advanced ICT integration compared to smaller, traditional businesses.

Employee training emerges as a priority across all interviewed organisations, albeit with varying approaches. A hybrid model of training, combining both online and face-to-face methods, appears to be the most common. The duration and intensity of training programmes differ significantly based on the company size, sector, and specific skill requirements. Larger corporations tend to have more structured and extensive training programmes, while smaller businesses often opt for more flexible, on-the-job training approaches.

When discussing the development of an efficient and effective training programme for immersive technologies such as AR/VR and XR, the stakeholders offered several valuable suggestions. There is a general emphasis on practical, hands-on experience with these technologies. Many interviewees stressed the importance of tailoring the training content to specific industry needs and ensuring that the skills acquired are directly applicable to real-world scenarios in their respective sectors.

Furthermore, the stakeholders highlighted the need for a modular approach to training, allowing for flexibility and customisation based on individual employee roles and existing skill levels. There was also a consensus on the importance of ongoing support and follow-up sessions after the initial training to ensure long-term skill retention and application.

Interestingly, while most interviewees expressed interest in immersive technologies, the perceived immediate relevance varied across sectors. Those in technology-driven industries showed more enthusiasm for immediate adoption, while traditional sectors saw it as a future possibility rather than an immediate necessity.

This overview reveals a diverse and dynamic business environment in Slovakia, with varying levels of technological adoption and training approaches. The stakeholders' insights provide valuable guidance for developing targeted, effective training programmes in immersive technologies, emphasising practicality, customisation, and ongoing support.

12.3. Awareness of Immersive Technologies

The analysis of the interviews directed in Slovakia reveals a varied landscape of awareness and engagement with immersive technologies such as VR, AR, XR, and the Metaverse across different sectors and company sizes.

Regarding awareness, all interviewees demonstrated at least a basic familiarity with these technologies. The responses ranged from a simple acknowledgement of having heard about them to more nuanced understandings, particularly among those in technology-related fields. This universal awareness, albeit at different levels, suggests that immersive technologies have permeated the consciousness of Slovak business professionals across various industries.

However, when it comes to actual usage of these technologies, there is a notable disparity. The majority of respondents indicated that they had not personally used VR, AR, XR, or Metaverse technologies in their organisations. This lack of hands-on experience was consistent across different company sizes and sectors, including those in management consulting, economic analysis, and even some technology-adjacent fields.

The perception of why organisations might use these immersive technologies varied among the respondents. Some viewed them as tools for visualising complex tasks or enhancing training programmes. Others recognised their potential in fields such as medicine for explanatory purposes. Interestingly, one respondent from the video postproduction sector, while not using these technologies directly, acknowledged preparing AR and VR content for clients, suggesting a role in content creation rather than direct application.

There was also a sentiment that the adoption of these technologies is partly driven by their trendy nature, similar to the current buzz around artificial intelligence. This perception indicates that while there is awareness of the technologies' existence, there might be a lack of deep understanding of their practical applications in various business contexts.

The responses also revealed a degree of scepticism or uncertainty about the immediate relevance of these technologies to certain business sectors. Some interviewees struggled to envision how immersive technologies could be applied effectively in their specific fields, particularly in areas like economic analysis or management consulting.

Whereas there is a general awareness of immersive technologies among Slovak business professionals, this awareness has not yet translated into widespread adoption or use. The perceived applications and benefits of these technologies vary significantly, with some sectors seeing more immediate potential than others. This disparity suggests a need for more targeted education and demonstration of practical applications across different industries to bridge the gap between awareness and implementation.

12.4.Use of Immersive Technologies

The interviews conducted show a limited adoption and use of immersive technologies such as AR, VR, and XR. This section examines the current state of implementation, experiences, and future plans related to these technologies within the interviewed organisations.

A striking observation from the interviews is the general lack of direct experience with immersive technologies across most of the surveyed companies. The majority of respondents indicated that they had not yet implemented or used AR, VR, or XR in their day-to-day operations. This trend was consistent across different sectors, including management consulting, economic analysis, and even some technology-adjacent fields.

Despite the limited current use, there is evidence of growing awareness and interest in the potential applications of immersive technologies. Some respondents, particularly those in technology-related sectors, expressed plans for future implementation. For instance, one company in the video postproduction industry, while not directly using these technologies, reported preparing AR and VR content for clients. This suggests a role in content creation rather than direct application, highlighting the diverse ways in which businesses may engage with immersive technologies.

Regarding specific applications or projects, the responses were largely speculative or forward-looking. One company mentioned potential plans for developing online training creation tools, process modelling tools, and documentation automation tools using immersive technologies. However, these plans were not yet concrete or in the implementation phase.

The role of immersive technologies in the work sectors represented by the interviewees appears to be minimal at present. Most respondents struggled to identify specific ways in which AR, VR, or XR could be immediately applicable to their fields. This was particularly evident in sectors such as economic analysis and management consulting, where the potential benefits of immersive technologies were not readily apparent to the interviewees.

Interestingly, while direct experience was limited, there was a recognition of the potential future importance of these technologies. Some respondents acknowledged that familiarity with immersive technologies might become necessary in the future, even if they did not see immediate applications in their current operations.

The findings from this section underscore a significant gap between awareness of immersive technologies and their practical implementation in Slovak businesses. While there is a general understanding of the existence of these technologies, there appears to be a lack of clear vision or strategy for their adoption across various sectors. This situation presents both challenges and opportunities for the future development and integration of immersive technologies in the Slovak business landscape.

12.5. Benefits, Challenges and Requirements

The exploration of immersive technologies in Slovak businesses reveals a complex landscape of potential benefits, challenges, and requirements. This analysis, derived from interviews with six diverse stakeholders, provides insights into the perceived advantages and obstacles associated with the adoption of AR, VR, and XR technologies across various sectors.

Regarding benefits, several interviewees highlighted the potential for improved workflow efficiency and enhanced data security. One respondent from a management consulting firm specifically mentioned the possibility of using immersive technologies for business continuity planning. Additionally, there was recognition of these technologies' potential in visualising complex tasks and improving training programmes, particularly in sectors where spatial understanding is crucial.

However, the perceived benefits were often tempered by significant challenges and limitations. A recurring concern among respondents was the compatibility of immersive technologies with existing ICT systems. One interviewee pointed out that these technologies often require substantial computational resources, potentially slowing down existing systems or proving incompatible with current hardware. This technical hurdle presents a significant barrier to adoption, particularly for smaller businesses with limited IT infrastructure.

Data protection emerged as another critical concern. A respondent from the personal data protection sector emphasised the need for GDPR compliance in any implementation of immersive technologies. This includes ensuring data protection by design and conducting Data Protection Impact Assessments (DPIAs). The uncertainty surrounding data processing practices in immersive environments was highlighted as a potential limitation to their adoption in sectors dealing with sensitive information.

Interestingly, several respondents struggled to envision specific applications of immersive technologies within their current business models. This perception gap suggests a need for more targeted education and demonstration of practical use cases across different industries. It also indicates that the successful implementation of these technologies may require significant changes to existing business processes and mindsets.

Regarding necessary features and functionalities, scalability and compatibility with existing ICT systems were frequently mentioned. Respondents emphasised the importance of solutions that could integrate seamlessly with widely used software and hardware in their geographical area. Additionally, there was a call for modular, user-friendly interfaces that could accommodate varying levels of technical expertise among staff.

The interviews also revealed a need for comprehensive training programmes to accompany any implementation of immersive technologies. Suggestions included interactive, gamified learning experiences and case studies relevant to specific industries. The ability to customise training content to address sector-specific challenges was seen as crucial for successful adoption.

This analysis underscores the complex interplay of potential benefits and significant challenges in the adoption of immersive technologies across Slovak businesses. While there

is recognition of these technologies' transformative potential, practical concerns about implementation, data security, and relevance to current business models present substantial hurdles. Addressing these challenges will be crucial for the wider adoption and successful integration of immersive technologies in the Slovak business landscape.

12.6. Workforce Demand and Training

The analysis of workforce demand and training needs for immersive technologies in Slovakia reveals a complex landscape characterised by varying levels of awareness and preparedness across different sectors. This section synthesises the insights gathered from six diverse stakeholders, offering a comprehensive view of the current state and future requirements for skills development in AR, VR, and XR technologies.

A recurring theme among the respondents is the limited current demand for specific skills related to immersive technologies. Most interviewees indicated that they do not expect their employees to have prior experience with these technologies. This sentiment reflects the nascent stage of immersive technology adoption in many Slovak businesses, particularly in sectors not directly related to technology or digital media.

Despite the current low demand, there is a growing recognition of the potential importance of these skills in the future. Several respondents acknowledged that familiarity with immersive technologies might become necessary as these tools gain wider adoption across various industries. This forward-looking perspective suggests a potential shift in workforce requirements in the coming years.

Regarding the necessary skills and knowledge, respondents highlighted a range of competencies. Good visual orientation skills, fine motor control, and cognitive abilities were mentioned as fundamental requirements. Additionally, data protection and cybersecurity knowledge were emphasised, particularly in sectors dealing with sensitive information. This focus on data security underscores the importance of integrating privacy and safety considerations into any training programme for immersive technologies.

The current landscape of training and educational programmes for immersive technologies appears to be limited. Most respondents were unaware of specific training offerings in this field, indicating a significant gap in the market. This lack of established training pathways presents both a challenge and an opportunity for the development of comprehensive educational programmes.

When discussing the design of potential training programmes, respondents offered various suggestions. There was a preference for modular, micro-learning approaches with interactive elements and gamification. The importance of real-world case studies and role-playing exercises was also highlighted. Several interviewees emphasised the need for both technical and soft skills training, suggesting a holistic approach to skills development.

The question of online versus onsite training yielded mixed responses. While some respondents favoured the flexibility of online learning, others recognised the potential need for in-person training, particularly for hands-on experience with immersive technologies.

This suggests that a blended learning approach, combining online modules with practical, onsite sessions, might be most effective.

Interestingly, some respondents expressed interest in training their personnel not just in using immersive technologies, but also in developing applications for these platforms. This indicates a potential demand for more advanced, technical training programmes that go beyond basic usage skills.

The analysis reveals a clear need for tailored, industry-specific training programmes that address the unique requirements of different sectors. Respondents emphasised the importance of accessibility, interactivity, and scalable difficulty levels in any training offering. Additionally, there was a call for training programmes to incorporate elements of data protection and ethical considerations, reflecting the growing importance of these issues in the digital landscape.

This comprehensive overview of workforce demand and training needs for immersive technologies in Slovakia highlights both the challenges and opportunities in this emerging field. While current demand may be limited, there is a growing awareness of the potential importance of these skills, suggesting a need for proactive development of training programmes to prepare the Slovak workforce for future technological advancements.

12.7. Collaboration between Industry and Educational Institutions

The analysis of stakeholder responses regarding collaboration between industry and educational institutions in Slovakia reveals a complex landscape with both opportunities and challenges. This section synthesises the perspectives of six diverse interviewees, offering insights into potential avenues for enhanced cooperation in the realm of immersive technologies.

A recurring theme among respondents is the recognition of a significant gap between current educational offerings and industry needs in the field of immersive technologies. Several interviewees highlighted the importance of bridging this divide through more targeted and practical educational programmes. There is a general consensus that closer collaboration between academia and industry could lead to more relevant and up-to-date training curricula.

One respondent emphasised the need for extensive international collaboration, suggesting that Slovakia may need to attract talent from abroad to provide high-quality training in immersive technologies. This perspective underscores the global nature of technological advancement and the potential benefits of cross-border knowledge exchange. The suggestion to leverage government and EU-funded programmes to facilitate international talent hub initiatives reflects a strategic approach to addressing skills shortages in the country.

Several interviewees pointed out the potential for industry-led workshops and guest lectures at educational institutions. These initiatives could provide students with real-world insights

and practical knowledge, helping to align academic learning with industry requirements. Some respondents also suggested the possibility of internship programmes or collaborative research projects, allowing students to gain hands-on experience with immersive technologies in a business context.

Interestingly, a few respondents expressed uncertainty about specific collaboration opportunities, indicating a need for more awareness and dialogue between industry and educational sectors. This uncertainty suggests that there is room for improved communication channels and networking platforms to facilitate meaningful partnerships.

The importance of case studies was highlighted by one interviewee, who suggested that showcasing successful applications of immersive technologies in various business environments could help bridge the gap between theoretical knowledge and practical implementation. This approach could be particularly valuable in demonstrating the relevance of these technologies to sectors that currently struggle to envision their application.

Some respondents also touched upon the role of professional associations and industry bodies in fostering collaboration. These organisations could serve as intermediaries, facilitating knowledge transfer between academia and industry, and potentially contributing to the development of industry-standard certifications for immersive technology skills.

The analysis reveals a clear need for a more structured and strategic approach to collaboration between industry and educational institutions in Slovakia. While there is recognition of the potential benefits of such partnerships, the responses suggest that concrete mechanisms for collaboration are still in the early stages of development. Addressing this gap will require concerted efforts from both sectors, potentially supported by government initiatives and international cooperation.

This overview of stakeholder perspectives on industry-education collaboration in Slovakia highlights both the challenges and opportunities in aligning educational offerings with rapidly evolving technological needs. The insights gathered suggest that fostering stronger ties between these sectors could play a crucial role in preparing the Slovak workforce for the future landscape of immersive technologies.

12.8. Additional comments

The concluding remarks from the six stakeholders in Slovakia offer valuable insights for the development of educational courses within the Metaverse Academy. These comments highlight several key considerations that should be taken into account when designing and implementing immersive technology training programmes.

A recurring theme among the respondents is the importance of practical, real-world applications. One interviewee specifically requested case studies demonstrating how immersive technologies can be effectively utilised in standard white-collar office environments. This suggestion underscores the need for training programmes to bridge the gap between theoretical knowledge and practical implementation, particularly in sectors where the immediate benefits of these technologies may not be apparent.

Data protection emerged as a critical concern, with one respondent emphasising the necessity of incorporating data protection by design principles into any training programme. The interviewee stressed the importance of considering the seven pillars of proper data protection, ensuring that participants not only learn to use the Metaverse but also develop good habits for AR/VR/XR safety. This focus on data security aligns with the growing importance of privacy considerations in digital environments.

Another significant point raised was the need for quality assurance in training provision. One respondent cautioned against the proliferation of self-proclaimed experts offering training in trendy topics without proper credentials. They suggested implementing a system to track evidence and references for training organisations, ensuring the credibility and effectiveness of the educational programmes offered.

The potential for international collaboration was also highlighted, with one interviewee suggesting that Slovakia may need to attract talent from abroad to provide high-quality training in immersive technologies. This comment points to the global nature of technological advancement and the potential benefits of cross-border knowledge exchange in developing comprehensive training programmes.

Some respondents expressed uncertainty about the immediate applicability of immersive technologies in their specific sectors. This uncertainty suggests a need for targeted education and demonstration of practical use cases across different industries. It also indicates that training programmes should be flexible and adaptable to various business contexts.

The comments also touched upon the importance of accessibility and user-friendliness in training programmes. Suggestions included developing modular, micro-learning approaches with interactive elements and gamification. This approach could help accommodate varying levels of technical expertise among participants and ensure engagement throughout the learning process.

These additional comments emphasise the need for a holistic, practical, and industry-specific approach to developing educational courses within the Metaverse Academy. By addressing concerns about data protection, ensuring credibility of training providers, facilitating international collaboration, and demonstrating real-world applications, the academy can create more effective and relevant training programmes for the Slovak business landscape.

12.9.Key Insights, Challenges, Recommendations and Quotes

The analysis of stakeholder interviews in Slovakia reveals a complex landscape surrounding the adoption and understanding of immersive technologies. Key insights emerge across various sectors, highlighting both opportunities and challenges in integrating AR, VR, and XR into business practices.

A significant finding is the general awareness of immersive technologies among Slovak professionals, albeit with varying degrees of understanding and application. While most interviewees had heard of these technologies, practical experience and implementation were

limited. This gap between awareness and adoption presents a crucial challenge for the industry.

One of the primary challenges identified is the perceived lack of immediate relevance to certain business sectors. As one respondent from a management consulting firm noted, "I don't see any use for VR/AR/XR in our field of work." This sentiment was echoed across several interviews, indicating a need for more targeted education on potential applications across diverse industries.

Data protection emerged as a critical concern, particularly in sectors dealing with sensitive information. An interviewee from the personal data protection field emphasised, "It is crucial to consider data protection by design principles... and to conduct Data Protection Impact Assessments." This highlights the importance of integrating privacy considerations into any immersive technology training or implementation.

Recommendations from stakeholders focused on practical, industry-specific training programmes. There was a call for modular, interactive learning experiences that demonstrate real-world applications. As one respondent suggested, "We need case studies showing how these technologies can be effectively used in standard white-collar office environments."

The need for international collaboration was also highlighted, with one interviewee stating, "Slovakia may need to attract talent from abroad to provide high-quality training in immersive technologies." This suggests a potential strategy for addressing skills gaps and fostering innovation in the field.

Challenges in workforce preparation were evident, with most companies not currently expecting employees to have experience with immersive technologies. However, there was recognition of the potential future importance of these skills. One respondent noted, "While we don't use these technologies now, I can see their potential in improving our training programmes in the future."

Recommendations for training design included a focus on both technical and soft skills. As one interviewee suggested, "Any training programme should include modules on data protection, ethical considerations, and practical application in specific industry contexts."

Even though there is growing awareness of immersive technologies in Slovakia, significant challenges remain in terms of practical implementation and sector-specific relevance. The insights and recommendations provided by stakeholders offer valuable guidance for developing targeted, effective training programmes and strategies for wider adoption of these technologies in the Slovak business landscape.

13. Israel

In Israel, Twinnovation Ltd conducted the interviews. This partner, with a strong background in innovation and technological development, met its targets by engaging 10 companies and securing 10 responses. Twinnovation Ltd utilised its expertise and resources to ensure the interviews provided precise and useful data for the project.

13.1. Characteristics of the Interviewed Companies

The interviews conducted provide insights into ten diverse companies operating across various sectors. These organisations represent a range of industries, from healthcare and agriculture to tourism and manufacturing, each leveraging technology to varying degrees.

In the healthcare sector, one company stands out for its innovative use of virtual reality (VR) in therapy. This organisation appears to be at the forefront of merging technology with medical practices, indicating a medium to large-sized enterprise with significant resources for research and development.

The agricultural sector is represented by a company that has developed augmented reality (AR) applications for farmers. This tech-forward approach to agriculture suggests a medium-sized company with a focus on precision farming and data-driven decision-making.

In the tourism industry, a company specialising in interactive city tours utilises Information and Communication Technology (ICT) extensively. Their use of mobile apps combining mapping, GPS, and AR technology indicates a modern, likely medium-sized enterprise catering to tech-savvy travellers.

The transportation sector is represented by a company in the electric scooter industry. Their integration of AR into user applications for maintenance and troubleshooting demonstrates a forward-thinking approach, suggesting a medium to large-sized company investing in customer experience.

Two manufacturing companies are included in the interviews. One appears to be a traditional manufacturer hesitant to adopt new technologies like VR, citing cost concerns and a preference for hands-on training. This suggests a more established, possibly medium to large-sized company. The other is in the maritime industry, also cautious about adopting VR for training purposes, indicating a similar profile1.

A 3D printing service company is also featured, utilising ICT for design, order processing, and production. Their focus on business-to-business services and CAD models suggests a specialised, possibly small to medium-sized enterprise.

Lastly, a traditional crafting company is mentioned, emphasising personal customer interactions over technological solutions. This likely represents a smaller, artisanal business.

Overall, these companies represent a diverse cross-section of industries, sizes, and approaches to technology adoption, providing a comprehensive view of the current business landscape in various sectors.

13.2. Overview of Stakeholders

The interviews conducted with representatives from ten diverse companies in Israel provide a comprehensive insight into various sectors and their engagement with Information and Communication Technologies (ICT). These organisations span a wide range of industries, including healthcare, agriculture, tourism, transportation, manufacturing, 3D printing, and traditional crafting.

The interviewees predominantly hold senior positions within their respective companies, such as CEOs, founders, or department heads. This ensures that the perspectives shared are from individuals with a holistic view of their organisations' operations and strategic directions.

Regarding the use of ICT, there is a notable variance across the companies. Some organisations, particularly those in tech-forward sectors like healthcare (utilising virtual reality for therapy) and agriculture (employing augmented reality for precision farming), demonstrate advanced integration of cutting-edge technologies. Others, such as the manufacturing and maritime industries, show a more cautious approach to adopting new technologies, citing concerns about cost-effectiveness and the preference for traditional, hands-on methods.

The training approaches for employees also differ significantly among the interviewed companies. While some organisations invest heavily in ongoing professional development, including interdisciplinary workshops and collaborations with educational institutions, others rely more on traditional, on-the-job training methods. The duration and intensity of training programmes vary depending on the complexity of the skills required and the technological sophistication of the company.

When asked about suggestions for developing an efficient and effective training programme on immersive technologies like AR/VR and XR, the responses were diverse. Companies already utilising these technologies emphasised the importance of hands-on experience and the need for a curriculum that balances technical skills with practical application. They also stressed the value of interdisciplinary learning, combining technological expertise with industry-specific knowledge.

Conversely, companies less familiar with or hesitant about these technologies suggested that any training programme should clearly demonstrate the practical benefits and return on investment. They emphasised the need for the curriculum to address industry-specific challenges and to be accessible to employees with varying levels of technological proficiency.

A common thread across many responses was the importance of tailoring the training to the specific needs of each industry. For instance, the manufacturing sector highlighted the need for training that incorporates tactile feedback and real-world conditions, while the tourism industry emphasised the importance of understanding how these technologies can enhance customer experiences.

The stakeholders represent a diverse cross-section of industries with varying levels of technological adoption and differing approaches to employee training. This diversity underscores the need for a flexible and adaptable approach in developing training programmes for immersive technologies, one that can cater to the specific needs and challenges of each sector while demonstrating clear, tangible benefits to encourage adoption and integration.

13.3. Awareness of Immersive Technologies

The interviews reveal a diverse landscape of awareness and adoption of immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), Extended Reality (XR), and the Metaverse. The level of familiarity and utilisation of these technologies varies significantly across different sectors and organisations.

A notable trend emerges wherein companies operating in technology-driven sectors demonstrate a higher level of awareness and practical application of immersive technologies. For instance, the healthcare company utilising VR for therapy and the agricultural firm employing AR for precision farming exhibit not only a thorough understanding of these technologies but also their practical implementation in day-to-day operations. These organisations recognise the transformative potential of immersive technologies in enhancing service delivery, improving efficiency, and providing innovative solutions to sector-specific challenges.

Conversely, some companies, particularly those in traditional manufacturing and maritime industries, display a more limited awareness and utilisation of immersive technologies. While they have heard of VR, AR, and XR, their practical experience with these technologies is often minimal. These organisations frequently cite concerns about the cost-effectiveness and relevance of immersive technologies to their specific operational needs.

The reasons for adopting or considering immersive technologies vary among the interviewed companies. Those already utilising these technologies highlight benefits such as enhanced user experience, improved training outcomes, and increased operational efficiency. For example, the tourism company leveraging AR for interactive city tours emphasises the technology's ability to provide engaging and contextual information to users, thereby enriching the overall tourist experience.

However, organisations that have not yet adopted these technologies often struggle to identify concrete use cases that would justify the investment. Some interviewees express scepticism about the added value of immersive technologies in their specific industries, particularly when weighed against the perceived costs of implementation and training.

Regarding the Metaverse, awareness appears to be more limited across the board. While some interviewees demonstrate a basic understanding of the concept, few have explored its potential applications in their respective fields. This suggests that the Metaverse, as a more recent and complex technological paradigm, has yet to gain widespread recognition or consideration among the interviewed companies.

The awareness and adoption of immersive technologies among the interviewed Israeli companies present a mixed picture. While some organisations are at the forefront of integrating these technologies into their core operations, others remain cautious or sceptical. This disparity underscores the need for targeted education and demonstration of practical, industry-specific applications to foster wider adoption and understanding of immersive technologies across various sectors.

13.4.Use of Immersive Technologies

The interviews with representatives of Israeli companies reveal a diverse landscape of immersive technology adoption and implementation across different sectors. The experiences with and applications of technologies such as Augmented Reality (AR), Virtual Reality (VR), and Extended Reality (XR) vary significantly, reflecting the unique needs and challenges of each industry.

In the healthcare sector, VR technology has found a particularly innovative application. The interviewed company has developed VR programmes for therapy, demonstrating a high level of engagement with immersive technologies. This application showcases the potential of VR to complement traditional therapeutic methods, offering personalised care and remote therapy options. The company's experience highlights the transformative potential of immersive technologies in healthcare, particularly in mental health treatment and rehabilitation.

The agricultural sector presents another compelling case of immersive technology integration. The interviewed company has developed AR applications that overlay real-time data and analytics onto farmers' views of their fields. This use of AR technology enables farmers to make informed decisions quickly, leading to improved yields and reduced waste. The company's experience underscores the practical benefits of AR in precision agriculture, demonstrating how immersive technologies can enhance efficiency and productivity in traditionally non-tech sectors.

In the tourism industry, AR has found a significant role in enhancing visitor experiences. The interviewed company specialising in interactive city tours has integrated AR into mobile applications, combining mapping, GPS, and augmented reality to provide immersive and informative experiences for tourists. This application of AR technology allows users to access historical information, directions, and interactive elements overlaid onto their physical environment, thereby enriching the exploration of urban spaces.

The transportation sector, specifically the electric scooter industry, has also begun to leverage AR technology. The interviewed company has integrated AR into their user application to provide interactive guides for maintenance and troubleshooting. This implementation empowers users to perform basic repairs and maintenance tasks, reducing the need for customer support and enhancing user satisfaction through immediate, visual assistance.

However, not all sectors have embraced immersive technologies to the same extent. The manufacturing and maritime industries, as represented by the interviewed companies, have

shown more hesitancy in adopting these technologies. While they have considered VR for training purposes, concerns about cost-effectiveness, the preference for hands-on training with real equipment, and the need for tactile feedback have limited their implementation of immersive technologies.

Similarly, the 3D printing service company interviewed has not yet integrated AR or VR into their operations, citing a lack of perceived necessity and potential return on investment. Their clients, primarily businesses and engineers, prefer working with traditional CAD models and physical prototypes.

The traditional crafting company interviewed has shown the least engagement with immersive technologies, prioritising hands-on craftsmanship and personal customer interactions over technological solutions.

The use of immersive technologies varies widely across different sectors in Israel. While some industries have found innovative and practical applications for AR, VR, and XR, others remain cautious or sceptical about their implementation. This diversity in adoption reflects the varying needs, challenges, and technological readiness of different sectors, highlighting the importance of tailored approaches when considering the integration of immersive technologies in various industries.

13.5. Benefits, Challenges and Requirements

The interviews with Israeli companies reveal a complex landscape of benefits, challenges, and requirements associated with the adoption and implementation of immersive technologies across different sectors.

Regarding benefits, companies that have already integrated immersive technologies into their operations report significant advantages. In the healthcare sector, for instance, the use of Virtual Reality (VR) in therapy has opened up new possibilities for personalised care and remote treatment options. This application demonstrates the potential of immersive technologies to complement traditional methods and enhance patient outcomes. Similarly, in agriculture, Augmented Reality (AR) applications have led to increased efficiency, allowing farmers to make informed decisions quickly, resulting in improved yields and reduced waste.

The tourism industry has also experienced notable benefits from AR implementation. Interactive city tours enhanced by AR technology have provided users with engaging and contextual information, enriching the overall tourist experience. In the transportation sector, specifically in electric scooter maintenance, AR has empowered users to perform basic repairs, reducing the need for customer support and enhancing user satisfaction.

However, the adoption of immersive technologies is not without its challenges. Companies in traditional manufacturing and maritime industries express concerns about the cost-effectiveness of implementing these technologies. They cite the significant investment required for equipment and content development as a major barrier. Additionally, there are apprehensions about the workforce's readiness to adopt new technologies, particularly in sectors where employees may not be particularly tech-oriented.

Technical challenges also present significant hurdles. For instance, companies utilising AR in outdoor settings, such as agriculture or tourism, face difficulties in ensuring accurate alignment of AR content with the physical world and managing app performance in varying environmental conditions. In the manufacturing sector, concerns about the inability of VR to provide necessary tactile feedback for complex processes have limited its adoption.

The requirements for successful implementation of immersive technologies vary across sectors. In healthcare and agriculture, there is a need for interdisciplinary collaboration between technology developers and industry professionals to ensure that the solutions address specific sector needs effectively. For tourism and transportation applications, the focus is on creating intuitive interfaces that cater to users who may not be tech-savvy.

In manufacturing and maritime industries, there is a strong emphasis on the need for immersive technologies to provide realistic simulations that can truly prepare workers for real-world conditions. This includes the ability to replicate complex processes and emergency situations accurately.

Companies that have not yet adopted immersive technologies, such as those in 3D printing and traditional crafting, emphasise the need for clear demonstrations of value and return on investment before considering implementation. They also stress the importance of these technologies aligning with their existing workflows and client preferences.

While immersive technologies offer significant benefits across various sectors, their successful implementation requires careful consideration of sector-specific challenges and requirements. The diverse perspectives presented in the interviews underscore the need for tailored approaches to immersive technology adoption, considering the unique needs, constraints, and technological readiness of each industry.

13.6. Workforce Demand and Training

The interviews expose a complex landscape of workforce demands and training needs related to immersive technologies across different sectors. The responses highlight the diverse requirements, challenges, and approaches to skill development in the context of Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) technologies.

Across the interviewed companies, there is a consensus that a combination of technical and soft skills is essential for working effectively with immersive technologies. Technical skills frequently mentioned include proficiency in 3D modelling, programming languages specific to VR/AR development, and understanding of user interface design for immersive environments. Equally important are soft skills such as spatial awareness, adaptability, and the ability to collaborate across disciplines.

The expectation of prior experience with immersive technologies varies significantly among the companies. Those at the forefront of technology adoption, such as the healthcare company using VR for therapy and the agricultural firm employing AR for precision farming, often seek candidates with relevant experience. However, they also emphasise the importance of ongoing training and professional development to keep pace with rapidly evolving technologies.

Conversely, companies in more traditional sectors, such as manufacturing and maritime industries, do not typically expect prior experience with immersive technologies. These organisations express a preference for candidates with strong industry-specific knowledge and a willingness to learn new technologies as needed.

Regarding existing training programmes, the interviews reveal a mixed picture. Companies already utilising immersive technologies often develop in-house training programmes tailored to their specific needs. These programmes typically combine technical instruction with practical application in real-world scenarios. However, several interviewees noted a lack of standardised, industry-specific training offerings for immersive technologies, identifying this as a significant gap in the current educational landscape.

The design of effective training programmes for immersive technologies emerged as a key topic of discussion. Many interviewees stressed the importance of hands-on, practical learning experiences. They suggested that training programmes should include a mix of technical courses covering VR/AR development tools and platforms, as well as soft skill courses focusing on design thinking, user experience, and interdisciplinary collaboration.

There was a general preference for blended learning approaches, combining online modules for theoretical knowledge with on-site, hands-on workshops for practical skills. Interviewees emphasised the need for training programmes to be flexible and adaptable, catering to learners with varying levels of technical proficiency and industry experience.

Several companies expressed interest in training their personnel not only in using immersive technologies but also in developing applications for their specific industries. This interest was particularly strong in sectors like tourism, healthcare, and agriculture, where companies see potential for creating custom VR/AR solutions to address industry-specific challenges.

Accessibility and interactivity were frequently mentioned as crucial aspects of training programme design. Interviewees stressed the importance of making training content accessible across different devices and platforms, and incorporating interactive elements to enhance engagement and knowledge retention.

The workforce demands and training needs for immersive technologies in Israel vary significantly across industries. While there is a growing recognition of the importance of these technologies, there remains a need for more comprehensive, industry-specific training programmes. The development of such programmes should balance technical skills with soft skills, incorporate practical, hands-on learning experiences, and remain flexible enough to adapt to the rapidly evolving landscape of immersive technologies.

13.7. Collaboration between Industry and Educational Institutions

The analysis of the responses shows a range of perspectives on the potential for collaboration between industry and educational institutions in the realm of immersive technologies. Whilst the level of enthusiasm and engagement varies across sectors, there is a general recognition of the value such partnerships could bring in addressing the skills gap

and advancing the adoption of Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) technologies.

Companies at the forefront of immersive technology adoption, particularly in sectors such as healthcare and agriculture, demonstrate a strong inclination towards collaboration with educational institutions. For instance, the healthcare company utilising VR for therapy reports existing partnerships with universities for research projects and clinical trials.

These collaborations are viewed as invaluable for advancing technology and validating its effectiveness in real-world applications. Such partnerships not only contribute to the development of cutting-edge solutions but also provide students with practical experience in applying immersive technologies to industry-specific challenges.

In the agricultural sector, where AR applications are being used for precision farming, there is a similar openness to collaboration. Companies in this field see potential in working with educational institutions to develop curricula that combine technical skills in AR development with domain-specific knowledge in agriculture. This interdisciplinary approach could help bridge the gap between technological capabilities and practical industry needs.

However, the enthusiasm for collaboration is not uniform across all sectors. Companies in more traditional industries, such as manufacturing and maritime, express a more cautious approach. While they acknowledge the potential benefits of partnerships with educational institutions, they also emphasise the need for any collaborative efforts to address their specific industry challenges and operational realities. These companies suggest that educational programmes should focus on developing skills that are directly applicable to their work environments, such as creating VR simulations that accurately replicate complex manufacturing processes or maritime safety scenarios.

Companies that have not yet adopted immersive technologies, such as those in 3D printing and traditional crafting, show varying degrees of interest in collaboration. While some see potential in partnering with educational institutions to explore the relevance of these technologies to their industries, others prioritise other aspects of their operations and do not view such collaborations as a current priority.

Across the board, there is a recognition that collaboration between industry and educational institutions could help address the skills gap in immersive technologies. Interviewees suggest that such partnerships could take various forms, including joint research projects, internship programmes, guest lectures by industry professionals, and the co-development of industry-specific training modules.

Several companies emphasise the importance of creating a feedback loop between industry and academia. This would ensure that educational programmes remain aligned with the rapidly evolving needs of the industry and that graduates possess skills that are immediately applicable in the workplace.

Whereas the level of engagement varies, there is a general acknowledgement of the potential benefits of collaboration between industry and educational institutions in the field

of immersive technologies. Such partnerships are seen as a means to bridge the skills gap, drive innovation, and ensure that the development and application of VR, AR, and XR technologies are grounded in real-world industry needs and challenges.

13.8. Additional comments

The concluding remarks from the interviewed representatives of various Israeli companies offer valuable insights for the development of educational courses within the Metaverse Academy. These comments reflect a diverse range of perspectives, emphasising the need for a comprehensive and adaptable approach to immersive technology education.

A recurring theme across several interviews is the importance of maintaining a balance between theoretical knowledge and practical application. Many respondents stress that courses should not only focus on the technical aspects of Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) but also incorporate real-world case studies and hands-on projects. This approach would enable students to understand how these technologies can be effectively applied to solve industry-specific challenges.

Several interviewees emphasise the need for interdisciplinary learning. They suggest that courses should not be developed in isolation but should integrate knowledge from various fields such as computer science, design, psychology, and specific industry domains. This interdisciplinary approach would better prepare students for the complex, multifaceted nature of working with immersive technologies in real-world scenarios.

The importance of ethical considerations in the development and application of immersive technologies is another key point raised by some respondents. They recommend that courses should include modules on privacy, data security, and the potential societal impacts of widespread adoption of VR, AR, and XR technologies. This focus on ethics would help ensure that future professionals in this field are equipped to navigate the complex ethical landscape associated with these emerging technologies.

Flexibility and adaptability in course design are also highlighted as crucial factors. Given the rapid pace of technological advancement in this field, several interviewees suggest that the Metaverse Academy should develop a modular curriculum that can be easily updated to reflect the latest developments and industry trends. This approach would help ensure that the education provided remains relevant and aligned with industry needs.

Some respondents also emphasise the importance of fostering creativity and innovation within the courses. They suggest incorporating elements of design thinking and problem-solving methodologies to encourage students to think beyond current applications and envision new possibilities for immersive technologies.

Lastly, several interviewees stress the value of industry partnerships and collaborations. They recommend that the Metaverse Academy should actively seek input from industry professionals in curriculum development and consider incorporating internships or industry projects into the course structure. This would provide students with valuable real-world experience and help bridge the gap between academic learning and industry requirements.

These additional comments from industry representatives provide a rich tapestry of insights for the development of educational courses within the Metaverse Academy. By incorporating these diverse perspectives, the academy can strive to create a comprehensive, forward-thinking, and industry-aligned educational programme that prepares students for the multifaceted challenges and opportunities in the field of immersive technologies.

13.9.Key Insights, Challenges, Recommendations and Quotes

These discussions reveal several key insights, challenges, and recommendations that are crucial for understanding the landscape of Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) technologies in industry applications.

A significant insight that emerges from the interviews is the varying degree of immersive technology adoption across different sectors. Companies in healthcare, agriculture, and tourism demonstrate advanced integration of these technologies, while traditional manufacturing and maritime industries show more hesitancy. This disparity highlights the need for tailored approaches to technology implementation and training across different sectors.

One of the primary challenges identified is the cost-effectiveness of implementing immersive technologies, particularly for smaller companies or those in traditional industries. As one manufacturing representative noted, "Implementing VR would require significant investment in equipment and content development". This concern is echoed across several interviews, emphasising the need for clear demonstrations of return on investment.

Another challenge is the perceived gap between virtual simulations and real-world applications. A maritime industry representative expressed scepticism about VR's ability to prepare workers for actual conditions at sea, stating, "We question whether it can truly prepare someone for the realities at sea". This highlights the importance of developing immersive technologies that can accurately replicate complex, real-world scenarios.

The interviews also reveal recommendations for addressing these challenges. Many respondents emphasize the need for interdisciplinary collaboration in developing immersive technology solutions. As the healthcare company representative stated, "Collaboration between developers and healthcare professionals is key". This suggests that successful implementation of immersive technologies requires not just technical expertise, but also deep domain knowledge.

Another recommendation that emerges is the importance of hands-on, practical training in conjunction with immersive technologies. The agriculture company's approach of combining AR technology with real-time field data demonstrates how immersive technologies can enhance, rather than replace, traditional practices.

The interviews also highlight the potential for immersive technologies to revolutionise customer experiences and operational efficiency. The tourism company representative noted, "Users find it engaging and immersive. It enhances their experience by providing contextual information in a visually appealing way". This quote underscores the transformative potential of AR in enhancing user engagement and information delivery.

Although the adoption of immersive technologies varies across sectors, there is a general recognition of their potential to enhance operations, training, and user experiences. The key to successful implementation lies in addressing cost concerns, ensuring realistic simulations, fostering interdisciplinary collaboration, and integrating these technologies with existing practices. As the healthcare representative aptly summarised, "It's exciting to be at the forefront of merging technology and healthcare". This sentiment encapsulates the potential for immersive technologies to drive innovation across various industries.

14. Annex

Organization	
Name, Position	
Country	
Industry/Sector of operation	
Company size	

Could you please introduce yourself, mentioning your current sector/role?	
Could you give us an overview of your company/institution, including its areas of activity?	
Could you give us an overview of your company/institution's use of Information and Communication technologies?	
How do you train your employees for new skills? Do you provide online or f2f training? How much time do they spend on a training program?	
In the Metaverse Academy project we will prepare a training program on immersive technologies such as AR/VR and XR targeting your field of working/sector. What would be your suggestions to develop an efficient and effective training program?	

1. Awareness of Immersive Technologies

Have you heard of VR/AR/XR, Metaverse?	
Have you ever used VR/AR/XR, Metaverse personally or/and in your organization?	
Why do people or organizations use VR/AR/XR, Metaverse?	

2. Use of Immersive Technologies

(If the answers in Section #2 is "no experience" move to Question-Section #4) Please briefly outline **your experience** with immersive technologies such as AR/VR and XR in your field of working/sector?	
What **experiences have your company/institution** had with immersive technologies?	
To what extent do immersive technologies play a **role** in your work **sector** and in your company in particular?	
What specific applications or projects have been implemented in the past or are planned for the future in your company?	

3. Benefits, Challenges and Requirements

What **benefits** do you see in using immersive technologies for your company/institution?	
What specific **needs or challenges** could be addressed through the adoption of AR/VR/XR?	
Where do you see **constraints and limitations** to the use of immersive technologies in your organization and field of work? How could these be overcome?	
What particular **features or functionalities** do you believe are **necessary** for successful implementation in your sector?	

4. Workforce Demand and Training

What **skills** and knowledge do you believe are necessary for individuals working safely and effectively with immersive technologies (VR/AR/XR, Metaverse) in your field?	
Do you expect your **employees** to have previous experience in working with immersive technologies? How do you prepare them for working with it?	
What **training or educational programs** currently exist to impart these skills, and how effective are they?	
Are there any specific gaps or needs in the training offerings that you have identified?	

In addition to using immersive technologies, do you want to train your personnel on the development of immersive technologies (e.g. development of a virtual reality based showroom or virtual shopping place) ?	
If there is a training program on VR/AR/XR, Metaverse, how should it be designed? - Which courses should be included? - Technical courses? - Soft skill courses? - online or onsite? - Other requirements e.g. in terms of accessibility, interactivity, level of difficulty.?	

5. Collaboration between Industry and Educational Institutions

What **opportunities** do you see for enhanced collaboration between industry and educational institutions to address this gap (if there is one)?	

6. Conclusion

Is there anything else you would like to add that may be important for the development of educational courses within the Metaverse Academy?	

Thank you for your time and valuable insights.

Summary of Stakeholders' Key Insights, Challenges, and Recommendations

Quotes:

WP 2: Metaverse Academy Needs Analysis
Proposal for "T 2.4 Need Analysis of the Industrial Stakeholders" in Metaverse Academy

Organization	**INNETICA**
Name, Position	**Elisardo Sanchis Sancho, General Coordinator of INNETICA**
Country	**Spain**
Industry/Sector of operation	**Social innovation, education, and digital transformation**
Company size	**Small**

Could you please introduce yourself, mentioning your current sector/role?	I am Elisardo Sanchis Sancho, the General Coordinator of INNETICA. We focus on social innovation, digital transformation, and educational projects aimed at fostering inclusivity and technological advancement.
Could you give us an overview of your company/institution, including its areas of activity?	INNETICA is an organisation dedicated to developing projects that promote social inclusion, innovation, and education. We work across Europe to bring digital technologies, such as VR and AR, into educational and social frameworks to enhance learning and inclusion.
Could you give us an overview of your company/institution's use of Information and Communication technologies?	ICT plays a crucial role in our operations. We are heavily invested in using digital platforms for collaboration, project management, and online learning. Additionally, we are exploring immersive technologies to enhance learning experiences and promote inclusion.
How do you train your employees for new skills? Do you provide online or f2f training? How much time do they spend on a training	We offer a blended approach to training, combining online modules with face-to-face workshops. Our staff typically dedicates about 10 hours per month to skill development,

program?	especially in areas like project management, digital tools, and social innovation.
In the Metaverse Academy project we will prepare a training program on immersive technologies such as AR/VR and XR targeting your field of working/sector. What would be your suggestions to develop an efficient and effective training program?	The training should be highly practical and focused on how these technologies can be applied to real-world social and educational projects. It should offer hands-on experience with AR/VR tools and demonstrate their impact on learning, inclusivity, and project development. Flexibility in the format, with online and onsite options, would also be important.

7. Awareness of Immersive Technologies

Have you heard of VR/AR/XR, Metaverse?	Yes, we are well-versed in these technologies and have been exploring their potential for several years, particularly in the context of education and social inclusion.
Have you ever used VR/AR/XR, Metaverse personally or/and in your organization?	Yes, we have used VR and AR in a number of our projects. For example, we have developed VR-based educational tools to help students learn in an immersive environment, and AR has been used for interactive workshops aimed at improving social skills.
Why do people or organizations use VR/AR/XR, Metaverse?	These technologies are used to enhance user engagement, make learning more immersive, and offer innovative ways to overcome challenges like geographic distance or lack of access to traditional educational resources. For social and educational purposes, they provide an effective tool for improving inclusion and engagement.

8. Use of Immersive Technologies

(If the answers in Section #2 is "no experience" move to Question-Section #4) Please briefly outline **your experience** with immersive technologies such as AR/VR and XR	We have applied immersive technologies in educational settings, particularly for creating virtual learning environments and for workshops designed to teach digital skills. These tools have proven valuable in enhancing learning outcomes, increasing engagement, and

in your field of working/sector?	making education more accessible.
What **experiences have your company/institution** had with immersive technologies?	Our experience has been largely positive. We have developed several VR and AR projects, including virtual classrooms and AR-enhanced social learning activities, aimed at making education more inclusive. These projects have been particularly effective in engaging students who may struggle in traditional learning environments.
To what extent do immersive technologies play a **role** in your work **sector** and in your company in particular?	Immersive technologies are becoming increasingly central to our work, especially as we look for ways to improve access to education and training for disadvantaged groups. They allow us to offer more flexible and engaging learning solutions.
What specific applications or projects have been implemented in the past or are planned for the future in your company ?	We have implemented virtual reality classrooms and augmented reality workshops aimed at improving the educational experience. Looking forward, we plan to expand our use of immersive technologies by developing virtual collaborative spaces for project work and social innovation initiatives.

9. Benefits, Challenges and Requirements

What **benefits** do you see in using immersive technologies for your company/institution?	The key benefit is increased engagement and accessibility. Immersive technologies can make learning more interactive and inclusive, allowing us to reach more people, particularly those who may have been excluded from traditional educational opportunities.
What specific **needs or challenges** could be addressed through the adoption of AR/VR/XR?	One challenge we often face is geographic barriers, as many of our projects involve international collaboration. AR/VR/XR technologies allow us to bridge this gap by offering virtual collaboration spaces. Another challenge is making education more inclusive for students with disabilities, which these technologies can also address.
Where do you see **constraints and limitations**	The primary constraint is cost. Although

to the use of immersive technologies in your organization and field of work? How could these be overcome?	immersive technologies are powerful, they can be expensive to implement, particularly for non-profit organisations. To overcome this, we are seeking partnerships with tech companies and educational institutions to make these tools more accessible. We also need more affordable, scalable solutions.
What particular **features or functionalities** do you believe are **necessary** for successful implementation in your sector?	Accessibility is key. The technologies should be easy to use for all learners, regardless of their technical background. They should also be adaptable to various devices to ensure inclusivity. Interactivity is another essential feature, allowing users to actively participate rather than passively observe.

10. Workforce Demand and Training

What **skills** and knowledge do you believe are necessary for individuals working safely and effectively with immersive technologies (VR/AR/XR, Metaverse) in your field?	A good understanding of how to navigate and interact within immersive environments is essential. Additionally, individuals should be trained in designing and implementing these technologies in ways that are accessible and inclusive.
Do you expect your **employees** to have previous experience in working with immersive technologies? How do you prepare them for working with it?	We don't expect prior experience, but we offer training programmes that start with the basics and gradually introduce more advanced applications. Our goal is to ensure that everyone can effectively use these technologies to enhance our projects.
What **training or educational programs** currently exist to impart these skills, and how effective are they?	There are several online courses available, but we've found that they often lack the practical, hands-on focus we need. We are exploring partnerships with institutions that can provide more tailored and effective training for our specific needs.
Are there any specific gaps or needs in the	Yes, there's a lack of training focused on the practical application of immersive technologies

training offerings that you have identified?	in social and educational contexts. Most programmes focus heavily on the technical aspects without demonstrating how these tools can be used to achieve specific outcomes in areas like social inclusion and education.
In addition to using immersive technologies, do you want to train your personnel on the development of immersive technologies (e.g. development of a virtual reality based showroom or virtual shopping place) ?	Yes, we are interested in training our personnel not only in the use of immersive technologies but also in their development. Being able to build virtual environments, such as showrooms or collaborative spaces, would allow us to better serve our partners and create more customised solutions for educational and social projects. However, the training should be practical and accessible, ensuring that staff can apply what they learn directly to our projects.
If there is a training program on VR/AR/XR, Metaverse, how should it be designed? - Which courses should be included? - Technical courses? - Soft skill courses? - online or onsite? - Other requirements e.g. in terms of accessibility, interactivity, level of difficulty.?	• **Which courses should be included?** The programme should include an introduction to immersive technologies, followed by practical modules on how to develop virtual environments and integrate them into educational and social projects. It should also include case studies demonstrating real-world applications. • **Technical courses?** Yes, basic technical courses are necessary, covering the essentials of how to use VR/AR tools and how to develop simple virtual environments. • **Soft skill courses?** Absolutely. Soft skills such as project management, communication in virtual spaces, and how to create inclusive virtual environments should be included. These are essential for applying the technology in a social context. • **Online or onsite?** A hybrid approach would be ideal. Online modules can provide flexibility, while onsite workshops would offer hands-on experience, particularly for

	developing practical skills. • **Other requirements e.g. in terms of accessibility, interactivity, level of difficulty?** The programme should be accessible, with content available on a range of devices. It should be interactive, with opportunities for participants to create and test their own immersive projects. The level of difficulty should start at beginner level and gradually progress to more advanced applications.

11. Collaboration between Industry and Educational Institutions

What **opportunities** do you see for enhanced collaboration between industry and educational institutions to address this gap (if there is one)?	There are significant opportunities for collaboration between the tech industry and educational institutions to bridge the gap in skills and accessibility. Industry can provide the technical expertise and cutting-edge tools, while educational institutions can focus on adapting these technologies for social and educational purposes. This partnership could result in tailored training programmes, internships, and workshops that equip learners with both the technical and practical skills needed to apply immersive technologies effectively. By working together, we could also reduce costs through shared resources and subsidies, making these tools more accessible to non-profits and educational organisations.

12. Conclusion

Is there anything else you would like to add that may be important for the development of educational courses within the Metaverse Academy?	One critical factor to consider is the importance of inclusivity in educational courses. The Metaverse Academy should ensure that the courses are accessible to all learners, regardless of their technical background or disabilities. This means designing modules that are easy to follow, providing support for learners with special needs, and ensuring that the technology

	can be used across different devices and platforms. Additionally, the courses should include real-world case studies that show the tangible benefits of immersive technologies in fields like education, social innovation, and inclusivity, so that learners can see the direct impact of their training.

Thank you for your time and valuable insights.

Summary of Stakeholders' Key Insights, Challenges, and Recommendations

Key Insights

1. **Immersive Technologies Enhance Inclusion:**
   VR and AR offer powerful tools to increase access to education and social services, particularly for marginalised or geographically isolated groups.
2. **Cost is a Major Barrier:**
   The high cost of implementing immersive technologies remains a significant challenge, particularly for non-profit organisations. Affordable, scalable solutions are needed.
3. **Practical, Hands-On Training is Essential:**
   Training programmes must focus on practical, real-world applications, demonstrating how immersive technologies can be used to achieve tangible results in education and social projects.
4. **Collaboration and Partnerships:**
   Collaborating with educational institutions and technology companies is key to making immersive technologies more accessible and affordable. By partnering with these institutions, INNETICA can bridge the gap between technology and its practical applications in social and educational contexts.

Challenges

1. **High Implementation Costs:**
   Despite the benefits, the high costs of immersive technologies pose a significant barrier to widespread adoption, especially for non-profits and educational institutions. Budget constraints often prevent full-scale deployment.

2. **Limited Training Programmes for Social Contexts:**
   While there are many technical training programmes available, few are tailored to the needs of organisations like INNETICA that focus on education and social inclusion. There is a gap in practical, outcome-focused training.

3. **Access and Inclusivity:**
   Ensuring that immersive technologies are accessible to all users, including those with limited technical experience or disabilities, remains a challenge. The tools must be designed with inclusivity in mind to be effective in social innovation.

Recommendations

1. **Create Affordable and Scalable Solutions:**
   Developers should focus on offering more affordable immersive technologies that are scalable for organisations with limited budgets. This could involve partnerships with technology providers to offer discounted or subsidised solutions for non-profits.

2. **Focus on Practical, Real-World Applications in Training:**
   Training programmes should include hands-on, practical modules that directly relate to how immersive technologies can be used in social and educational projects. The training must be accessible and focused on real outcomes, not just technical knowledge.

3. **Foster Collaboration between Industry and Education:**
   To overcome both the cost and skills gap, partnerships between tech companies, educational institutions, and non-profit organisations should be encouraged. These collaborations can provide more tailored, cost-effective training and support for the development of immersive technologies in social contexts.

Quotes:

1. ***"Immersive technologies have the power to revolutionise education and social inclusion, but we need practical, hands-on training to ensure they are accessible and affordable for all."***

2. ***"Cost is the greatest barrier for organisations like ours. We need scalable, affordable solutions that can bring the benefits of VR and AR to disadvantaged groups without overburdening our budgets."***

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