



D6.1

Dissemination, communication, and exploitation plan

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Abstract	D6.1 outlines how XRECO plans to validate exploitation pathways and covers market analysis, communication, and standardization. Our exploitation strategy involves customer analysis, Joint Business Clinics, and IP management. XRECO has two potential exploitation layers: as an integrator and infrastructure ecosystem.
Keywords	Extended Reality, XR content creation, news media, tourism, automotive industry, data sharing, search and discovery, market analysis, exploitation, communication, dissemination, standardization, value chains, ecosystems, keystone contribution, tollgate mechanism, renewal mechanism, human-centered design, Business Model Canvas.

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Glossary

ABBREVIATION	MEANING
AhG	Ad-hoc Group (standardization work group)
AR	Augmented Reality
ASIC	Application-Specific Integrated Circuit
B2B	Business to Business
BMC	Business Model Canvas
CAGR	Compounded Annual Growth Rate
CAVE	Computerized Automatic Virtual Environment
CGI	Computer-Generated Imagery
CMS	Content Management System
CPU	Central Processing Unit
FVV	Free Viewpoint Videosystem
GPU	Graphics Processing Unit
GTI-UPM	Grupo de Tratamiento de Imágenes (GTI) [Image Processing Group] at Universidad Politecnica de Madrid (UPM)
HCD	Human-Centered Design
HMDs	Head-Mounted Displays
IAP	In-App Purchase
IP	Intellectual Property
ISO	International Organization of Standardization (https://www.iso.org/)
ITU	International Telecommunication Union (https://www.itu.int/)
JBC	Joint Business Clinic
KPI	Key Performance Indicator(s)
MR	Mixed Reality
MVP	Minimum Viable Product
NeRF	Neural Radiance Field
NMR	Neural Media Repository
OS	Operating System
ROI	Return on Investment
SDO	Standard Development Organization
SME	Small and Medium-sized Enterprises
VPC	Value Proposition Canvas
VR	Virtual Reality
XR	Extended Reality



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Executive summary

XRECO stands for eXtended Reality mEdia eCOsystem. The project intends to provide media distributors, consumers, and creators with better access to content, as well as help ease the process of XR content creation for them. Therefore, it also seeks to support the creation of novel news and entertainment content in the XR realm. Our newly developed and refined technologies will be tested in use cases which are anchored in the news media, tourism, and automotive industry.

The overall goal is to help pave the way for the use of XR media content from being occasionally involved in the media industry to being regularly integrated. Therefore, XRECO also aims to create a new data driven ecosystem among different media organizations - speaking in technical terms, to develop a platform that facilitates data sharing, search, and discovery. The data in question will be 2D and 3D content, respectively XR experiences. Providers of content will benefit from distributing their data (e.g., via monetization) and media creators will benefit from increased access to it, with, as added benefit, the ability to offer and sell their content within the ecosystem. Naturally, providers of content can also be media creators themselves.

The current deliverable D6.1 presents the first version of the Dissemination, Communication, and Exploitation plan/strategy. D6.1 will present the reader with an overview and plan of the steps XRECO will take during the project lifetime to (in)validate exploitation pathways and guarantee successful dissemination and communication of the project.

As such, D6.1 covers all current and future activities related to market analysis, exploitation, communication and dissemination, and standardization. These 4 topics cover the four core sections of the deliverable you are currently reading.

The **section on Market analysis** provides the reader with a first overview of the XR market at large, a plan for the continuous analysis of the XR market, and an analysis of the XR value chain to understand in which way or ways XRECO generates value for its users.

Based on market research, XRECO's growth prospects are favorable, and despite the impact of COVID-19, the European XR market is projected to see significant growth, reaching a market size of between EUR 35 billion to EUR 65 billion by 2025, with continued growth projected into the 2030s. This positive forecast is driven by global trends in XR, such as advancements in hardware and software that are expected to drive adoption and innovation in the sector. While there may be temporary barriers to growth, they are not considered permanent roadblocks.

XRECO's focus is currently on media, tourism, and mobility, which are sectors experiencing exciting trends. However, there are three challenges that need to be addressed, including validating these sectors as customer segments, conducting a deep-dive sectorial market analysis based on validated customer segments, and continuously monitoring the market as XR is a rapidly advancing sector with market expectations subject to revisions on a permanent basis.

Through an analysis of the VR value chain and a mapping of XRECO's core functionalities, we aimed to demonstrate that multiple value chains exist within XRECO's conceptual design. The theory of ecosystems specifically addresses situations of these types of multi-sided platforms whereby multiple value chains intersect.

According to the theory of ecosystems, an ecosystem is categorized based on its main functions as Aggregator, Integrator, or Infrastructure. After applying this theory to analyze XRECO's design, we



have come to a preliminary conclusion that XRECO serves users in two ways: (1) as an integrator ecosystem that manages content and aids in the exchange of 3D models, and (2) as an infrastructure ecosystem that allows users to convert input data into 3D assets.

We believe that different types of ecosystems require different business models. The theory of monetizing an ecosystem identifies three key elements regardless of ecosystem type: a keystone contribution, a tollgate mechanism and a mechanism for innovation and renewal. We have demonstrated with examples that different types of ecosystems will need to establish different keystone contributions, tollgates, and renewal mechanisms to be successful. In the coming months we will focus on validating different options for XRECO in terms of keystone contributions and tollgates.

The **section on Exploitation** describes the approach the XRECO project will take to create a promising value proposition and the components in place to design, research, co-create, and (in)validate potential exploitation pathways on a joint and individual level. Six core components for successful exploitation have been defined, influenced by Human-Centered Design methodology. The following six components are essential to identifying key project outcomes with potential for exploitation: market and customer analysis, creation of exploitation strategies, Joint Business Clinics, value proposition and commercial strategy, IP management, and results consolidation with a user-centered approach.

Furthermore, two initial ecosystem layers with exploitation potential, beyond the project lifetime, have been identified as basis for the XRECO ecosystem:

- XRECO, as an **integrator ecosystem**, manages B2B ecosystem interactions and as such acts as a bridge between the supply-side and demand-side players within the XR landscape, providing a seamless integration of product provisioning and distribution environments. XRECO has a switchboard function in which interactions are managed using APIs between content creators, producers, and distributors. The data repository, search and retrieval, and the rights and monetization modules are geared towards this ecosystem layer.
- XRECO, as an **infrastructure ecosystem**, can support and facilitate production activities within organizations. Functionalities like volumetric capture, delighting and relighting, and NeRF are geared towards this layer, as it allows the user to perform (parts of) its production process with XRECO infrastructure.

Based on our market analysis, a Business Model Canvas, yet to be validated during Joint Business Clinics, has been designed that has these two ecosystem layers at its core. The mapping of a first potential business model has led to the creation of a preliminary value proposition that will guide the exploitation activities in the period to come till D6.2. The value proposition that will serve as the basis for co-creation and (in)validation is as follows:

XRECO is an ecosystem for frictionless and permissioned 2D and 3D content transformation, creation, curation, and transaction, a streamlined and efficient integration of technology results in improved content creation and search, and thus a more efficient pipeline for customers and users.

Planned customer and consortium interaction, in the form of focus groups, Joint Business Clinics, user interviews, and individual exploitation plans will use the above insights to create a compelling MVP definition in the coming period, thus giving XRECO ever better, stronger, and iteratively improved exploitation options over the coming years.



The **section on Communication and Dissemination** activities presents a plan designed to attract and engage a wide range of audiences, including research institutions, consortium partners, XR industry representatives, and news media industry. The strategy aims to inform and educate different industries about XR technologies through various communication channels. The target groups include news media, tourism, and the automotive industry. Social media platforms such as Instagram, YouTube, LinkedIn, and Twitter, as well as newsletters and scientific publications, will be used to disseminate project content. The project will also be represented at public events to showcase progress. Regular evaluation against KPIs will ensure that the strategy is in line with the project's objectives.

Overall, the communication strategy for XRECO is aimed at creating an interdisciplinary audience and communicating the connection between the XR industry, science, and culture/entertainment as a holistic XR ecosystem. The project aims to inspire and engage its target audience through multiple communication platforms and channels, by introducing consortium members, announcing planning meetings, events, research and innovation, and sharing materials and content suitable for publication.

The **section on Standardization** shows an overview of standardization activities XRECO consortium partners are involved in.



1 Introduction

XRECO will create a new data-driven ecosystem for the media industry, focusing on facilitating data sharing, search and discovery and supporting creation of news and entertainment content. The focus will be on the creation and (re-)use of location-related 2D and 3D assets and the creation of XR experiences. While media organizations increasingly support non-linear experiences for the consumer, those are still limited to single channels and media domains. Although several media organizations have recently succeeded in breaking data silos, data sharing is mostly limited to the organization.

XRECO will build enabling technology and pave the way for lifting the use of XR media content from being occasionally involved in media production to being regularly integrated in the media industry.

20 partners from 12 countries combine their competences and visions to enable efficient media data sharing, discovery, recommendations, and transformations, involving different types and sizes of media organizations. The full list of consortium members can be found on the XRECO website, where you also find information on how to subscribe to our Newsletter.

The ecosystem's core, represented by a Neural Media Repository (NMR), will foster inter-organization content sharing and provide increased access to content for media creators, considering novel data monetization and rights management policies. A set of AI-based media transformation services are built around the NMR to produce novel media- and XR experiences, including 3D neural reconstructions, neural-based device localization, image stitching, de-/re-lighting and holoportation.

The project has been designed in a way that the technology involved in the platform will be improved iteratively, while in parallel, the advisors and business experts validate, evaluate, and assess the evolution in two different demonstrators with different use case scenarios:

- News media, XR-based broadcasting and automatic and customized multitarget news publishing,
- Location-based information and entertainment content, with applications that also work in tourism and the automotive industry.

These use cases to be created over the project's lifetime will help to test the essential XRECO components and to showcase the platform's essential characteristics in testing environments. The project's outcomes may be applied to a variety of markets, as detailed in [Section 2 Market Analysis](#), rather than only the use case scenarios specified above.

Considering the recommendations resulting from the preliminary Market Analysis, this current deliverable describes and defines how XRECO, as well as further key results generated within the project, could be exploited after the end of the project economically at joint and individual partner level.

1.1 An overview of WP6

As described in the XRECO grant proposal, the main objective of workpackage 6 (WP6) is to maximize the impact of the project through dissemination, communication, and exploitation. Stakeholders' identification, together with target audience and communities will be all addressed



within WP6. An important focus will be given to market analysis, innovation transfer and joint exploitation strategies.

More in-depth, the WP6 objectives entail:

- Strategic and business guidance to consortium
- Problem-solution fit.
- Product-market fit.
- Business model fit.
- Outreach

These objectives described above are managed in four different Tasks:

- T6.1 - Dissemination & Communication (M1-M36) [Lead: VRBB]
- T6.2 - Exploitation & Business planning (M1-M36) [Lead: Sound]
- T6.3 - Community & Capacity-Building (M1-M36) [Lead: Sound]
- T6.4 - Orchestration with other initiatives (M1-M36) [Lead: DW]

To ensure the successful exploitation of the XRECO collaborative European research and innovation project, the consortium has adopted a Human-Centered Design (HCD) approach that prioritizes the needs of its stakeholders and maximizes the impact of its outcomes. The exploitation plan comprises a clear strategy of specific activities, measures, and processes to be implemented in three phases.

- Phase 1 (Year 1): The focus of this phase is to assess the market evolution and evaluate the initial exploitation plan by each partner. By considering the human needs and market trends, the consortium will refine their approach and make necessary adjustments.
- Phase 2 (Year 2): Building on the insights gathered in phase 1, the objective in this phase is to develop business models that are tailored to the technological components with the most potential for technology transfer and exploitation. The focus is on delivering added value to stakeholders and ensuring the project aligns with their needs.
- Phase 3 (Year 3): In the final phase, the exploitation strategy is fully revised, and a joint strategy is defined to sustain human efforts and financial investments made in XRECO. The consortium will work towards ensuring that their approach is inclusive, equitable, and reflects the diverse perspectives of their stakeholders.

By adopting HCD, the XRECO consortium is committed to maximizing the impact of our project and ensuring our outcomes are aligned with the needs of the stakeholders. For further insights into what the human-centered design method entails for XRECO see [Section 3.3 The Human Centered Design process](#).



2 Market analysis

Market analysis is an important tool used to gain a deeper understanding of a market, its trends, and the various factors that drive its growth. Its ultimate goal is to provide insights into the current and future state of the market, identify opportunities and threats, and determine the potential for success of a product, service, or business initiative. By conducting a comprehensive market analysis, businesses can make informed decisions about how to allocate their resources, target their marketing efforts, and position themselves for success in a competitive environment. Whether you are looking to enter a new market, expand your business, or make strategic investments, market analysis is a critical step in the decision-making process.

Part 1 of this deliverable consists of two sections. First, we present an overview of XR (Extended Reality). In this section, we define what XR is and examine its geographical market structure. We will then delve into the global trends that drive or hinder the adoption of XR technologies. To gain a better understanding of the future of the XR market, we will review a range of market research studies that provide insights into the total market size, as well as the projected growth rates for each market segment.

The second section focuses on Business Models and the Value Chain. In this section, we utilize the Value Chain framework as a tool to analyze XRECO as a business opportunity. XRECO is defined as an ecosystem for frictionless and permissioned 2D and 3D content transformation, creation, curation, and transaction, and we will explore the theories surrounding business ecosystems and strategies for monetizing such ecosystems.

2.1 XR overview

2.1.1 What is XR?

Extended Reality (XR) refers to a set of technologies that are used to create immersive experiences that merge the physical and digital worlds. These technologies include Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), which are used to create simulations, overlays, and other interactive experiences that are designed to be viewed through devices such as headsets, glasses, or smartphones.

Extended Reality is a catch-all term that encompasses various immersive technologies, including¹:

- Virtual Reality (VR): VR is a completely artificial, computer-generated environment that users can interact with in a seemingly real way. VR experiences are typically delivered through a headset that completely covers the user's field of view, creating a sense of being physically present in a virtual world.
- Augmented Reality (AR): AR enhances the real world with digital information and media, such as graphics, text, and sound, overlaid onto the user's view of the physical world. AR can be experienced through a smartphone camera, a tablet, or specialized AR headsets.

¹ Adapted from: Marr, B. (2019). What Is Extended Reality Technology? A Simple Explanation For Anyone. *Forbes*. Retrieved from: <https://www.forbes.com/sites/bernardmarr/2019/08/12/what-is-extended-reality-technology-a-simple-explanation-for-anyone/> (last visited on February 22 2023)



- Mixed Reality (MR): MR is a hybrid of VR and AR that merges virtual objects and information with the physical world. Unlike AR, which overlays digital content on the real world, MR allows virtual objects to interact with the physical world and vice versa.

Extended reality technologies are used in a variety of contexts, including gaming, entertainment, education, training, and research. They are also used in many different industries, such as healthcare, manufacturing, retail, and transportation. XR technologies are often used to create simulations that allow users to experience or interact with virtual environments or objects in ways that are not possible in the physical world. For example, in education, XR can provide students with highly interactive and engaging learning experiences, simulating real-world scenarios and allowing them to explore complex concepts in a way that is both fun and educational. In healthcare, XR can be used for training and simulations, helping medical professionals to prepare for and practice complex procedures in a safe, controlled environment.

XR is a rapidly evolving field, with new technologies and applications being developed all the time. As these technologies continue to improve and become more widely available, they are likely to have an increasing impact on many aspects of our lives.

As a set of technologies, XR offers potential solutions for addressing challenges imposed by the rapidly changing world, which changes the way we work, live, and interact with each other. During the COVID-19 pandemic the demand for remote products and services rose drastically, both in the private and the professional sphere.² These products and services will increasingly be digital. In their personal life, people will start incorporating XR technology for entertainment, communication, and education purposes. In their professional life, people need solutions for remote collaboration applications and for digitalizing work processes, boosted by several policy initiatives aimed at creating a physical infrastructure (e.g., rollout of 5G networks) and a legal framework (e.g., privacy, data protection). As XR technology continues to evolve and mature, it is likely that new and innovative uses for XR will emerge.

For example, the use of XR technology in the automotive industry is expanding to include features that can be used while driving. Several companies are developing augmented reality (AR) solutions that integrate the vehicle's onboard cameras and sensors to help drivers identify important road and vehicle information in real-time. The technology displays upcoming lane recommendations and turn maneuvers directly on the car's central information display.³

Similarly, the application of AR in tourism creates the possibility for an enriched experience when visiting tourism destinations, like cultural heritage sites. An interesting study by Kleftodimos et al.⁴ presents two examples of location-based, augmented-reality applications that utilize gamification and storytelling to provide cultural heritage knowledge about a prehistoric lake settlement.

Finally, in a world with increased focus on sustainability as an organizing principle, XR is well positioned to provide niche solutions. XR could be a direct tool to decrease the environmental footprint, or it could act as an enabler. By using XR technologies users can reduce waste and

² Ecorys (2021). XR and its potential for Europe. page 13, 14. Retrieved from: <https://xreuropepotential.com/assets/pdf/ecorys-xr-2021-report.pdf> (last visited on February 22, 2023)

³ XR Today (2023). Mixed Reality: The Future of Automotive? Retrieved from: <https://www.xrtoday.com/mixed-reality/what-impact-is-mr-having-on-the-automotive-sector/> (last visited on February 22, 2023)

⁴ Kleftodimos, A.; Moustaka, M.; Evagelou, A. (2023). Location-Based Augmented Reality for Cultural Heritage Education: Creating Educational, Gamified Location based AR Applications for the Prehistoric Lake Settlement of Dispilio. Digital 2023, 3, 18–45. Retrieved from: <https://doi.org/10.3390/digital3010002>



optimize resource utilization, for example in design and prototyping or in training. XR can also reduce the need for travel, by enabling remote work and collaboration. Historically, certain types of journeys, like maintenance inspections or journeys to retail outlets can be replaced by XR technologies.

XR could also function as an enabler “[.] to promote better understanding of nature and give people empathetic insight into environmental challenges”⁵. The two main challenges around climate change communication are scale and proximity. The public at large has difficulties understanding the widespread effects of climate change on the one hand and the time horizon by which these effects will be felt. By using XR technologies, users may be transported into a future reality where they can experience these effects. Research suggests that this form of immersion might lead to change of habits on the part of such users, although longer-term impacts are uncertain as of yet.

2.1.2 Market structure

The global market for extended reality (XR) technology is composed of several players operating in different regions, with the United States, Europe, and Asia specifically being the three hotspots.⁶

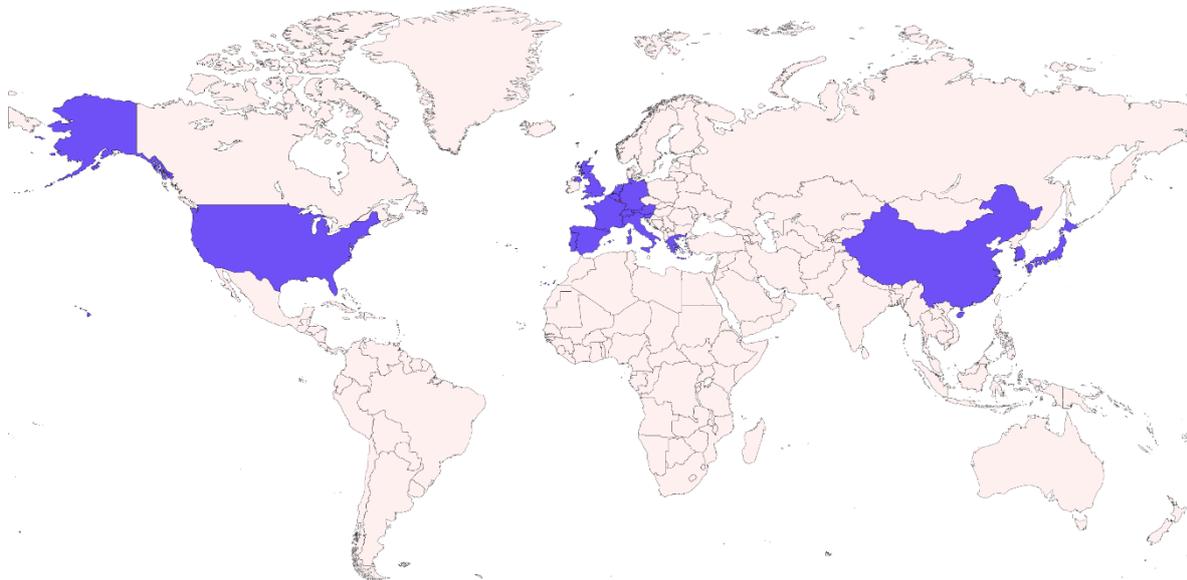


Figure 1: Global hotspots of the XR market

The United States is a dominant player in the XR market, with some of the largest and most advanced technology companies based in the country. Companies such as Microsoft, Facebook, and Apple are investing heavily in XR technology and have a strong presence in the market. The US is also home to a number of startups and smaller companies operating in the XR space, and the country has a strong ecosystem for innovation and entrepreneurship. Due to the presence of Hollywood, the United States is very strong in creating content for the entertainment industry.

⁵ Ecorys (2021). XR and its potential for Europe. page 61. Retrieved from: <https://xreuropepotential.com/assets/pdf/ecorys-xr-2021-report.pdf> (last visited on February 22, 2023)

⁶ EC (2017) - Bezegová, E. et al. Virtual Reality and Its Potential for Europe. *Ecorys International B.V. Holland*. Retrieved from: https://ec.europa.eu/futurium/en/system/files/ged/vr_ecosystem_eu_report_0.pdf (last visited on February 22, 2023)



Europe has also emerged as a significant player in the XR market, with a number of companies based in countries such as the United Kingdom, France, and Germany. Europe has a strong tradition of (academic) research and innovation in technology, and this is reflected in the region's XR industry, with companies developing cutting-edge products and solutions. Europe is also home to several universities and research institutions that are working on XR technology, and the region has a supportive regulatory environment for XR businesses.

Asia, particularly China and to a lesser extent Korea and Japan, is also playing an increasingly important role in the XR market. Companies in China are investing heavily in XR technology, especially in the production of XR hardware, and are producing high-quality products at competitive prices. China is also home to a large and rapidly growing consumer market for XR products, which is driving demand for the technology and for content in the region.

Each of these regions has its own strengths and advantages in the XR market. The US has a strong technology ecosystem and startup culture, and Asia has a strong hardware production base and a large and growing consumer market. The European region also has a number of unique strengths that make it a significant player in the global XR industry.

Since the 1970s, European universities and research centers have been experimenting and developing successful XR applications. From the early 1990s and onwards the European Union has provided a major boost, having since provided over €1 billion in total funding for more than 450 VR and AR projects.

One of the founding principles of the European Union is respect for its diversity. The upheavals of European history show the importance of protecting national minorities and allowing different religious, cultural, linguistic, and ethnic identities to flourish. Such cultural diversity enables rich storytelling that provides an excellent basis and inspiration for VR content, ranging from films to gaming. This makes European content stand out on the global VR scene. European creativity in VR has been described as rivalling USA and is promoted by public broadcasters who are already actively exploring the artistic and educational potential of VR/AR.

Cities in Europe offer a unique and culturally diverse environment, which is conducive to the development of XR technologies that can be applied to different aspects of work, living, and creation. Collaboration is emphasized in the XR communities in Europe, with funding available for collaborative research as well as the increasing number of associations, incubators, accelerators, and events. The unique multidisciplinary and culturally diverse nature of cities in Europe is an important asset. VR and AR applications arise when creative people meet with engineers, programmers, and editors, who in turn meet with people from application domains in industry who work closely with marketing and business experts.

Europe stands out for its well established and robust development pipeline of high-end, emerging and niche technologies. Europe is particularly strong in middleware and software for XR, which are expected to be the areas of true value for XR. The European region is home to early adopters of XR technologies across several industries, including the automotive industry, machinery, and entertainment.

2.1.3 Enabling forces & barriers to overcome

Based on interviews with the experts present in our consortium, there is a consensus on a set of factors that either enable growth or create a barrier for adoption. These factors are not specific to



XRECO but should be considered as societal and technological trends and tendencies that influence the general XR market at large.

On the one hand, there are several factors that are enabling the growth and development of XR technologies, such as:

- Advances in hardware and software: XR technologies are made possible by advances in hardware, such as high-resolution displays, sensors, and tracking systems, as well as software, such as 3D modeling, rendering, and animation tools. These advances are enabling XR devices to provide more realistic, immersive, and interactive experiences.
- Increasing adoption of XR devices: The popularity of XR devices, such as VR headsets and AR glasses, is growing rapidly, as more people are using these devices for gaming, entertainment, and other applications. This is driving the development of new content and applications for XR devices and creating a growing market for XR technologies.
- Growing awareness and acceptance of XR: As more people become aware of the capabilities and potential of XR technologies, they are becoming more widely accepted and used in a variety of contexts. This is leading to an increasing number of businesses and organizations adopting XR technologies for training, education, marketing, and other purposes.
- Advances in other related technologies: XR technologies are also being enabled by advances in other related fields, such as artificial intelligence, robotics, and the Internet of Things. These technologies are providing new capabilities and opportunities for XR applications and are helping to create more immersive and interactive experiences.

Overall, these factors are enabling the growth and development of XR technologies and are helping to create a more vibrant and dynamic market for XR products and services.

On the other hand, there are several barriers to the widespread adoption of XR technology, including:

- Difficulty of implementing XR technology in day-to-day life (personal or professional): Employees' low digital savviness or general reluctance to change behavior and try new ways of working become obstacles in the adoption. Also, issues like motion sickness when using headsets or lack of comfort due to a headset being too bulky contribute to user hesitation in adopting XR technology.
- High cost: One of the main barriers to the adoption of XR technology is the high cost of hardware such as headsets and other equipment. This can make it difficult for individuals and businesses to invest in the technology, especially if they are unsure about its potential benefits.
- Lack of available content for XR devices: Without a wide range of engaging and immersive experiences, users may be less inclined to adopt the technology and continue using it.
- Technical challenges: The technology is still in its early stages and can be difficult to use and develop for, which can limit its appeal to both consumers and businesses.
- Mental health and social interactions: Some people worry that the technology could lead to addiction and social isolation, as well as other negative consequences.

These concerns could make it harder for XR technology to gain widespread acceptance.



These findings are consistent with external research. For the 2022 XR Report, Perkins Coie conducted an industry study⁷ where respondents were asked about the biggest obstacle to mass adoption of immersive technology (see Figure 2)

» *What are the top barriers to mass adoption of immersive technology (outside of gaming and entertainment)? (Select top two options.)*

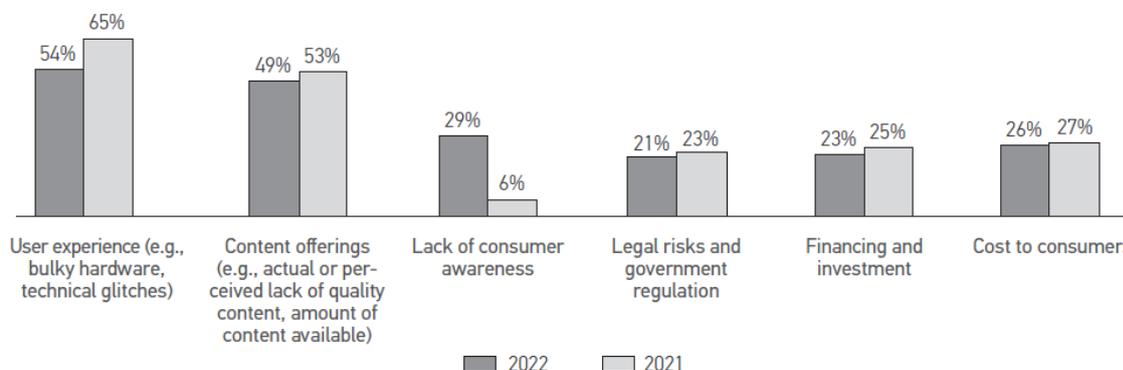


Figure 2: What is the biggest obstacle to mass adoption of immersive technology?

The top 3 most mentioned obstacles to embracing the technology in this study were user experience, content offerings and lack of consumer awareness. Also mentioned was the issue of high cost to consumers.

On the other hand, an article in Forbes⁸ in 2021 takes a dimmer look and argues that “Extended reality (XR) technologies, like virtual reality (VR) and augmented reality (AR), bring many benefits to us as consumers, and to the industries that adopt them. But we can’t ignore the fact that there are many personal and societal risks that come with XR, particularly at the more immersive end of the spectrum (i.e., VR).”

The article continues to cite legal, moral, socioeconomic, privacy, and health issues. The lack of clear laws on acceptable behavior in virtual environments raises questions about whether virtual acts can be considered a crime. The immersive nature of XR raises moral questions about the possibility of people acting out harmful or immoral acts without real-world consequences. The cost of XR hardware may also exacerbate social divisions and limit access to the technology. Personal data, including highly sensitive information, can be collected through XR technologies, leading to privacy and security concerns. Additionally, the use of XR can cause health problems, such as nausea, dizziness, and disorientation.

Overall, we are confident that the momentum of the driving factors behind the adoption and development of XR will be significantly stronger than the barriers that currently exist. Although there are specific concerns that need to be addressed, they are likely to act merely as a moderator to the pace of innovation. In the next section, we will examine various market research studies to determine the potential for growth in the XR market.

⁷ Coie, P. (2022) XR Report: Rise of the WEB3 technologies to accelerate XR. Retrieved from:

<https://www.perkinscoie.com/images/content/2/5/257103/2022-XR-Report.pdf> Last visited on February 22, 2023)

⁸ Marr, B. (2021) 5 Problems And Solutions Of Adopting Extended Reality Technologies Like VR And AR. *Forbes*. Retrieved from:

<https://www.forbes.com/sites/bernardmarr/2021/06/18/5-problems-and-solutions-of-adopting-extended-reality-technologies-like-vr-and-ar/?sh=33e16cc33f23> (last visited on February 22 2023)



2.1.4 Market outlook

The economic and strategy consulting firm Ecorys has issued a report in 2021 about the potential of XR in Europe. In this report, Ecorys lays out two scenarios for the future development of the XR market, a baseline scenario, and an optimistic scenario (see Figure 3: European XR market value (2020-2025)).

In the baseline scenario, a slowdown is expected compared to pre-COVID-19 expectations, although growth rates are still expected to be steady. The industry is expected to bounce back and approach pre-COVID growth rates by 2024, boosted by an expected growth in the market for consumer applications.



Figure 3: European XR market value (2020-2025) according to Ecorys

In the optimistic scenario, there will be a short-term setback, but by 2025 the market will approach pre-pandemic levels in terms of absolute growth⁹. In this scenario, “[...]optimal conditions exist for the growth of VR/AR that will stimulate the purchase of headsets by a wider number of consumers, induced by further advancements in (semi-)immersive experiences (e.g. better designed human-computer interactions and user interfaces, more user-friendly and comfortable hardware, software optimization and higher performance), breakthrough consumer applications and creation of new content.”¹⁰

⁹ as opposed to merely returning to the same growth rates by 2025 as in the baseline scenario

¹⁰ Ecorys (2021). XR and its potential for Europe. page 18. Retrieved from: <https://xreuropepotential.com/assets/pdf/ecorys-xr-2021-report.pdf> (last visited on February 22, 2023)



The baseline and the optimistic scenario set an interval for expected total market value of between EUR 35 billion and EUR 65 billion, creating employment for between 440,000 and 860,000 people directly. Furthermore, due to indirect impacts in the value chain, another 780,000 to 1.5 million jobs might be generated.

There will have to be a fortuitous confluence of developments for the optimistic scenario to come to fruition, but even assuming the best estimate is the baseline scenario, we can conclude that the market for XR technology solutions will be an attractive market segment, both in terms of economic value and in terms of employment opportunities.

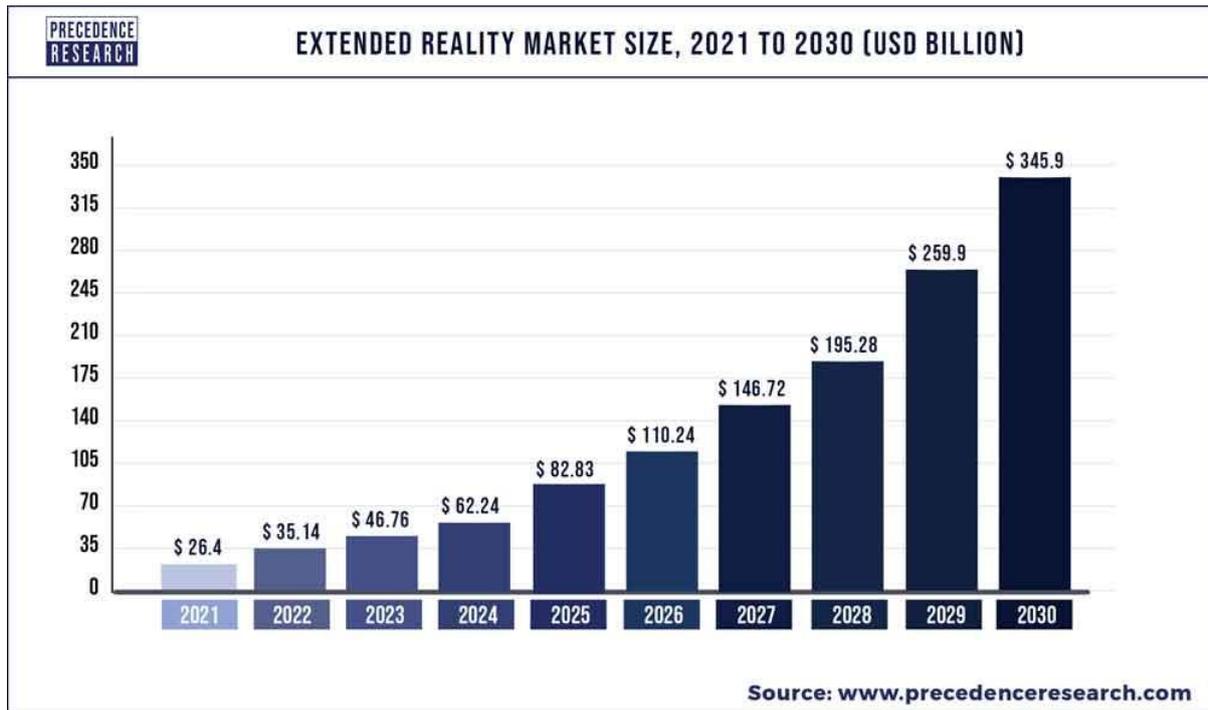


Figure 4: Forecasted XR Market Size. 2021-2030

This conclusion is consistent with other sources. For example, the XR4ALL Revised Landscape report 2020¹¹ concludes: “Market research experts all agree on the tremendous growth potential for the XR market.” For the longer term, the market size (baseline scenario) is projected to hit around USD 346 billion (EUR 323 billion) by 2030, growing at a CAGR of 33.1% during the forecast period 2022 to 2030, according to Precedence Research¹². Allied Market Research establishes a scenario for total market value to reach \$446.6 billion (EUR 418 billion) by 2031, exhibiting a CAGR of 30.1% from 2022 to 2031¹³.

On the other hand, Transparency Market Research forecasts for the period 2020-2030 that the XR market will expand at a CAGR of 45% and will reach a total global market size of US\$ 1.1 trillion (EUR

¹¹ Schreer, O. Et al. (2020). Revised Landscape Report 2020. XR4ALL. Retrieved from: https://xr4all.eu/wp-content/uploads/xr4all_revisedlandscapereport_2020_public-1.pdf (last visited on February 22, 2023)

¹² Precedence Research (2022). Extended Reality Market. Retrieved from: <https://www.precedenceresearch.com/extended-reality-market> (last visited on February 22, 2023)

¹³ Akanksha, P. et al. (2023). XR Global Opportunity Analysis and Industry Forecast, 2021-2031. Allied Market Research. Retrieved from: <https://www.alliedmarketresearch.com/extended-reality-market-A06940> (last visited on February 22, 2023)



1 trillion) by 2030 (optimistic scenario)¹⁴, and an extended reality (XR) market growth report by Emergen Research predicts the global XR market value should reach USD 1,247 billion (EUR 1,166 billion) in size by 2035. According to this report the XR market will grow by a CAGR of 24.2% until 2035.¹⁵

Different studies reach different conclusions about the potential growth rate and the total market size. Some research establishes a scenario closer to the baseline scenario as detailed by Ecorys. Others are more bullish and forecast results closer to the optimistic scenario. There is, however, a broad consensus about the potential for XR in both the near-term and the medium-term. All studies point to sustained growth rates of around 30% annually until at least 2030 and probably beyond.

The XR industry is rapidly evolving, which means that market expectations are constantly changing. As part of our project, we plan to monitor the market continuously and update our forecasts, as necessary. This includes reviewing the latest market information on a quarterly basis to ensure that our projections are up to date.

2.1.5 XR customer segments and outlook

The XR market is made up of a diverse group of customer segments, each with its own unique needs and demands. Moreover, a 2022 EU Strategic Paper on The Virtual and Augmented Reality Industrial Coalition¹⁶ argues that a key aspect of XR technologies is its cross-sectoral nature, before going into more detail for each of the following sectors: Manufacturing, Healthcare, Construction and Architecture, Learning, Retail and Media. When assessing the different industrial sectors in 2021 according to this paper's estimates, gaming is capturing a higher share of the VR/AR market in Europe (29%), followed by media and entertainment (19%), retail (15%), healthcare (11%), manufacturing (7%), and military and defense (7%).

While all the XR customer segments are experiencing growth, there are a few that stand out as the hottest in 2023. These include¹⁷:

- Gaming and Entertainment: XR technology has revolutionized the gaming and entertainment industry, providing users with immersive experiences that were once impossible.
- Healthcare and Medicine: XR is being used in the healthcare industry to improve patient outcomes and provide better training and education for medical professionals.
- Education and Training: XR is transforming the way education and training are delivered, providing students with more engaging and interactive learning experiences.
- Retail and E-commerce: XR is being used by retailers and e-commerce companies to enhance the shopping experience for users.
- Construction and Architecture: XR is being used in the construction and architecture industry to improve project visualization, design, and communication.

¹⁴ Transparency Market Research (n.d.). Extended Reality (XR) Market. Retrieved from:

<https://www.transparencymarketresearch.com/extended-reality-xr-market.html> (last visited on February 22, 2023)

¹⁵ Emergen Research (n.d.). Industry Report: Extended Reality Market. Retrieved from: <https://www.emergenresearch.com/industry-report/extended-reality-market> (last visited on February 22, 2023)

¹⁶ EC (2022). Vigkos, A., Bevacqua, D., Turturro, L., et al. VR/AR Industrial Coalition: strategic paper. *Publications Office of the European Union*. Retrieved from: <https://data.europa.eu/doi/10.2759/197536> (last visited on February 22, 2023)

¹⁷ Artillery Intelligence (n.d.). XR Global Revenue Forecast 2021-2026. Retrieved from: <https://artilleryiq.com/reports/xr-global-revenue-forecast-2021-2026/>. (last visited on February 22, 2023)



There is a broad consensus that a rising tide in the XR market will rise all boats. For example, the forementioned EU strategic paper confidently suggests that “various sectors are trending upwards, and, in the future, more uptake is expected for social interactions and entertainment purposes.”¹⁸

To remain relevant in the dynamic XR market, XRECO must leverage technological advancements in the XR market to address the challenges faced by its future users. Its success will depend on establishing a solid business model that considers its users' needs and addresses any barriers to growth. This will be a critical factor in determining XRECO's future success and is the topic of the following section.

2.2 XR value chain & business models

Simply having a positive market outlook is not enough for XRECO to thrive. To ensure that users receive the value generated by XRECO, it will be necessary for the initiative to have a well-designed business model. Before developing such a model, it is beneficial to first analyze the value chain to gain a deeper understanding of XRECO's intended operations.

Business models and the value chain are crucial analytical tools that can help businesses understand their operations and identify areas of improvement. Having a framework to analyze the options available is vital for decision-makers to make informed choices about market fit and stay ahead of their competitors.

The business model concept is essentially the way a company creates, delivers, and captures value, while value chain analysis is a systematic approach to examining the individual activities that make up a company's operations. Both analytical tools provide valuable insights into a company's operations and help to uncover inefficiencies, optimize processes, and find new sources of value creation.

2.2.1 XR value chain

A value chain is a progression of activities that a firm operating in a specific industry performs to deliver a valuable product (i.e., a good and/or service) to the end customer. The concept comes through business management and was first described by Michael Porter in his 1985 best-seller, *The Competitive Advantage: Creating and Sustaining Superior Performance*¹⁹.

Value chain theory has been applied in many fields, from manufacturing to services, in the physical world and in the digital world. It is a valuable tool to analyze activities as a logical sequence to determine at which point in the process an organization can add value and thereby create revenue-generating opportunities.

Just like other industries or markets, XR can be mapped as a value chain. For example, de Regt et al²⁰ have adapted Value chain theory to virtual reality, augmented reality and XR (see Figure 5: XR Value Chain). At a high level, the XR value chain comprises six core processes that can be divided into two main areas: (1) Content Activities, which should be considered primary activities, and (2) Support Activities, which refer to digital infrastructures and hardware.

¹⁸ EC (2022). Vigkos, A., Bevacqua, D., Turturro, L., et al. VR/AR Industrial Coalition: strategic paper. *Publications Office of the European Union*. Retrieved from: <https://data.europa.eu/doi/10.2759/197536> (last visited on February 22, 2023)

¹⁹ Porter, M. E. (1985). *The Competitive Advantage: Creating and Sustaining Superior Performance*. NY: Free Press

²⁰ de Regt, A., Barnes, S. and Plangger, K. (2020) The virtual reality value chain. *Business Horizons*, 63(6), pp.737-748.



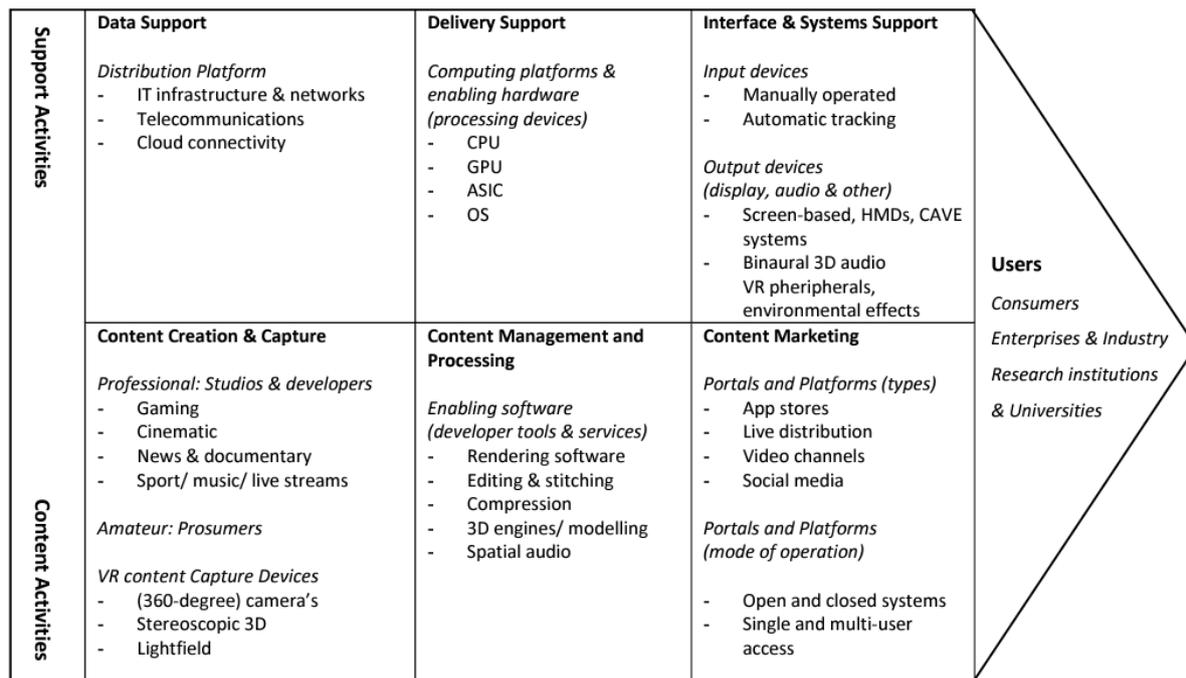


Figure 5: XR Value Chain

The content segment of the model consists of three core processes: content creation and capture, content management and processing, and content marketing.

2.2.1.1 Content creation and capture

Firms pursuing these processes add value through generating original virtual reality content through two complementary techniques: creation and capture. Content creation encompasses the digital production of materials by making use of programming and animation techniques to develop the content. Content capture relates to recording real-life photo or video content.

2.2.1.2 Content management and processing

Technological software that enables the conversion of digital content and raw 360° footage into usable formats is crucial to ready the content for distribution and mainstream usage. Firms add value by reconfiguration and post-production editing of the content. Based on the tasks that are performed and the technological tools and services that are implemented to do so, these processes can be divided into a few subclassifications. Content rendering, content stitching and editing, content compression, and content modeling all pertain to the visual content.

2.2.1.3 Content marketing

Firms involved in this step of the value chain act as market makers by providing user access through downloading or streaming services. Their primary tasks are to host, market, sell, and distribute content through various portals and platforms.

Looking at the support activities, it is apparent that digital infrastructures and services play a central role. The support activities segment of the framework consists of three core processes: data support, delivery support, and interfaces and systems support.



2.2.1.4 Data support

Firms pursuing these processes add value by providing the processing power and IT infrastructure and networks necessary to distribute the content to end-users. Content distribution networks are a crucial layer in the overall ecosystem.

2.2.1.5 Delivery support

To facilitate user interaction with the digital content, firms that provide delivery support systems (e.g., computing platforms, supporting hardware) are required, enabling the experience to run smoothly. In addition to hardware support, payment support becomes particularly important when XR is implemented as a sales channel. The payment process must appear as a smooth and immersive VR experience to enhance virtual commerce.

2.2.1.6 Interfaces and systems support

This part of the model covers the technological components of delivery systems that enable user interaction with the digital content, either as an input device or output device.

2.2.2 XRECO value chain

At first glance, XRECO is a comprehensive solution to a particular problem, because it is an ecosystem for frictionless content transformation, creation, curation, and transaction.

Figure 6 presents a conceptual design for XRECO²¹. This model of what XRECO should be technologically capable of delivering can be mapped onto the XR value chain:

- The repositories infrastructure is both a data support component as well as a content management component.
- The Blockchain and monetization module should be considered a delivery support aspect.
- The suite of XR services²² support content creation and content processing activities.
- Finally, the user interface (with the content sourcing & filtering functionality) is an interface support activity.

This high-level mapping confirms that XRECO is indeed a comprehensive solution (that is, it includes activities for each part of the value chain). However, the question arises if XRECO is not, in fact, a combination of two distinct value chains. An argument can be made that XRECO serves two different types of users:

- Users interested in the content creation and transformation capabilities of XRECO. These users will derive value from the 3D content creation tools like NeRF and volumetric capture. This type of user will perceive the data repository infrastructure as useful in the sense that it serves as input for certain creative processes, but not as a means in itself. Without the content creation tools, the repository on its own will not generate value for this type of user.
- Users interested in finding and retrieving 3D content. This type of user will derive value from the content search, licensing, transaction, and curation capabilities of XRECO. For this type of user, the emphasis is not on the 3D content creation tools and technology, but on the searchability of the repository and its ability to facilitate the licensing of existing assets.

²¹ Please refer to D2.1 for a detailed explanation of the components mentioned in this section.

²² XReco will use NeRF for creating 3D assets and 3D scenes/environments based on 2D footage. This should be considered not only a content processing activity, but a content creation activity in its own right. In this sense XReco aims to compete with content creation technologies like CGI.



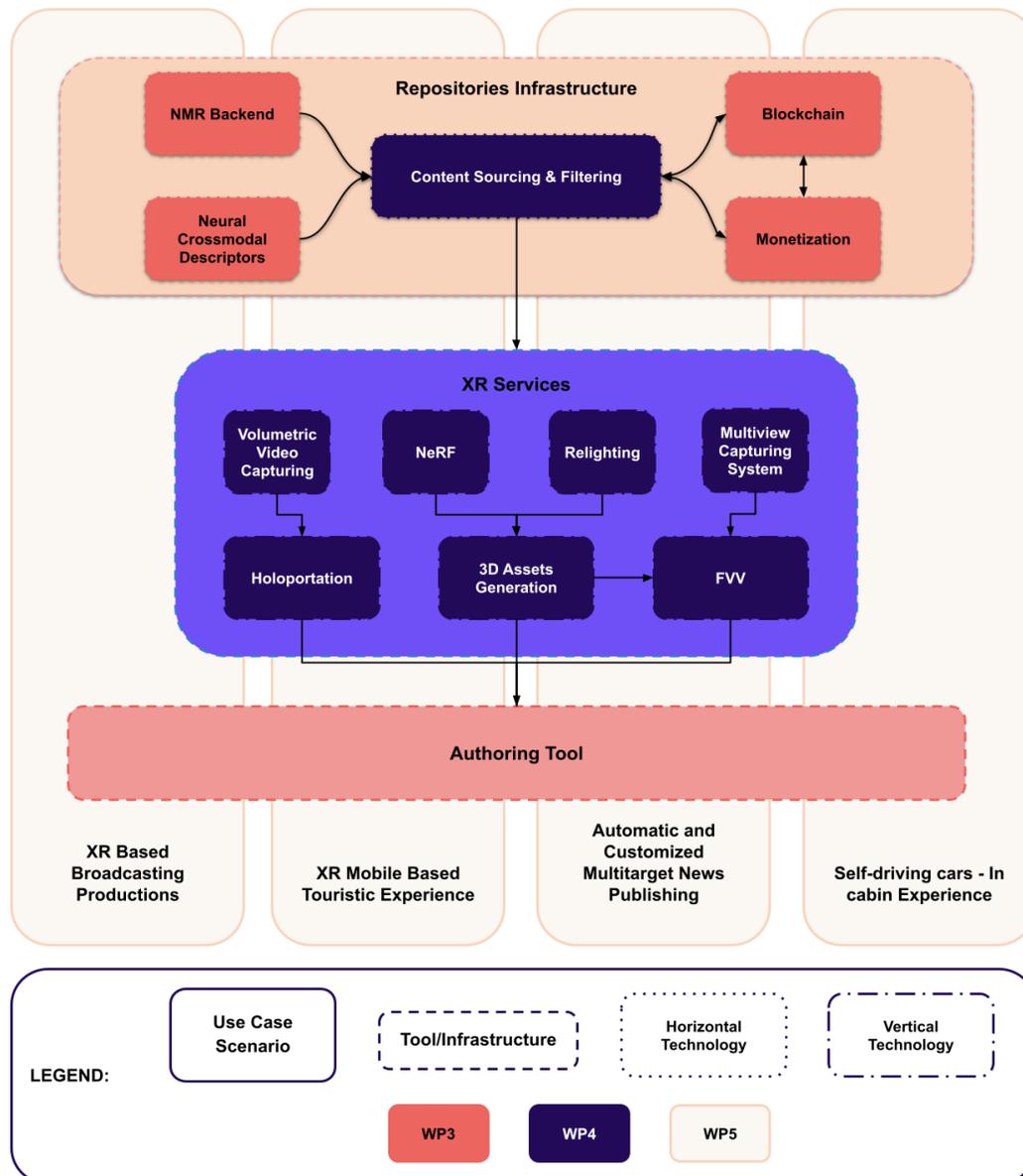


Figure 6: XRECO Conceptual Model

In this stage of the project, we have not yet validated user characteristics, but it is important to keep in mind that different types of users might exist, because different users will derive value from different aspects of XRECO. Therefore, the conceptualization of XRECO as a comprehensive solution may or may not be correct, in the sense that it combines two (or more) solutions.

To provide a framework for analyzing the interaction of multiple value chains, we turn our attention to the theory on business ecosystems. In 1993 business strategist James Moore²³ adopted the biological concept of ecosystems²⁴. He suggested that: “a company be viewed not as a member of a single industry but as part of a business ecosystem that crosses a variety of industries. In a business

²³ Moore, J.F. (1993). Predators and Prey: A New Ecology of Competition. *Harvard Business Review*. Retrieved from: <https://hbr.org/1993/05/predators-and-prey-a-new-ecology-of-competition> (last visited on February 22, 2023)

²⁴ The term "ecosystem" was first used in 1935 in a publication by British ecologist Arthur Tansley: Tansley, A. G. (1935). The Use and Abuse of Vegetational Concepts and Terms. *Ecology*. 16 (3): 284–307



ecosystem, companies coevolve capabilities around an innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations.”

2.2.3 XRECO added value – the ecosystem

Historically, management sciences have tended to think about markets as vertical or horizontal markets. In the past, competition was thought of as a simple battle between products and companies in a particular market. However, this traditional view of competition ignores the larger context and environment within which a business operates. The new approach to competition is to view it within the context of a larger ecosystem of interacting organizations and individuals, where cooperation as well as competition is necessary for success.

This ecosystem includes suppliers, lead producers, competitors, and other stakeholders, who coevolve their capabilities and roles over time. The function of an ecosystem leader is valued because it enables members to move toward shared visions, align their investments, and find mutually supportive roles. Therefore, ecosystems are an antidote to competition as it is historically interpreted because they offer a broader, more collaborative approach to doing business.²⁵

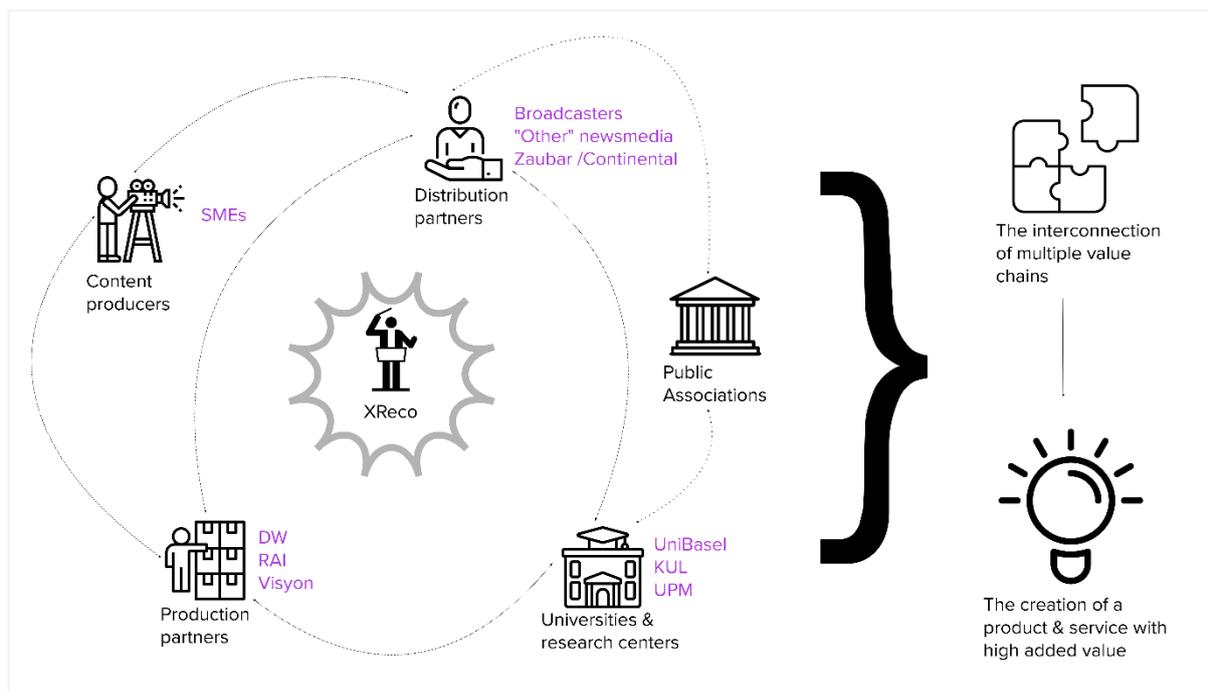


Figure 7: XRECO as an ecosystem

Ecosystems are a particularly useful way of thinking in cases of the interconnection of multiple value chains, which seems to be the case with XRECO.

²⁵ Moore, J.F. (1996). *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*. New York, NY: Wiley Harper Business.



The rise of ecosystems moves value away from traditionally vertically integrated business models and instead drives value concentration in interconnected, networked business models. We often refer to these business models as multi-sided platforms, as they create value by organizing interactions across different types of stakeholders across the ecosystem. In an ecosystem, we see three types of business models emerge - Aggregators, Integrators, and Infrastructures.²⁶

Aggregators are business models that aggregate consumer demand and capture data at scale through consumer-facing services. By controlling consumer relationships and data, aggregators act as gatekeepers of market access for producers.

They perform three key functions in a business ecosystem: (1) provisioning consumer services, (2) managing consumer data insights, and (3) matchmaking between producers and consumers. Aggregators engage consumers through data-driven personalization and habit design, capture consumer data at scale, and facilitate market-wide transactions by matching third-party producers and their products/services to consumers. Today's tech giants, like Facebook, Amazon, and Google, are examples of aggregators.

TYPE OF ECOSYSTEM	Examples
Aggregators	<ul style="list-style-type: none"> • Facebook => high engagement to aggregate demand. • Amazon Prime & Alexa => aggregate demand towards its commerce and media services.
Integrators	<ul style="list-style-type: none"> • Amadeus => integrate airlines with travel agencies. • Galileo => integrate across multiple financial services providing one-stop access to Fintechs and Ecommerce
Infrastructures	<ul style="list-style-type: none"> • AWS => compute infrastructure • Shopify => commerce infrastructure • Swift => international banking infrastructure

Table 1: Examples of ecosystems according to type of ecosystem

Integrators manage interactions (typically business to business) between supply-side producers/manufacturers and demand-side distributors by using APIs. By acting as switchboards, they connect production-side services with digital distribution environments on the consumption side. Integrators create opportunities to bundle multiple services from different producers, streamlining operations across an increasingly modular and diverse ecosystem.

They perform three key functions: (1) integrating production-side services into a one-stop storefront for distribution partners, (2) facilitating data exchange and matchmaking between manufacturers/producers and distributors, and (3) aggregating data across distributors and providing analytics to production partners.

²⁶ Choudary, S.P. (2022). Ecosystem business models: A teardown. *Substack*. Retrieved from <https://platforms.substack.com/p/ecosystem-business-models-a-teardown> (last visited on February 22, 2023)



Infrastructures provide essential production infrastructure, standards, information services, and data assets that support and coordinate a firms' production activities. Examples include operating systems like iOS, computing infrastructures like AWS, commerce infrastructures like Shopify, coordination infrastructures like the Autodesk Construction Cloud, and data infrastructure like Google's DeepMind.

Infrastructures perform three key functions in an ecosystem: (1) formulating a future vision and roadmap for the ecosystem, enabling producers to align their own roadmap with ecosystem milestones; (2) providing industry-wide data and knowledge services to their ecosystem, leveraging machine learning models and other key assets; and (3) expanding to attract third-party service providers to the ecosystem.

Based on interviews with consortium members and conversations with the Executive Board, we have reached the preliminary conclusion that XRECO as an ecosystem shares characteristics with both an integrator ecosystem and an infrastructure ecosystem.

2.2.3.1 Why XRECO is an integrator platform

The XRECO platform, as an integrator, manages B2B ecosystem interactions and as such acts as a bridge between the supply-side and demand-side players within the XR landscape, providing a seamless integration of product provisioning and distribution environments. As an integrator, XRECO uses APIs to manage interactions between content creators, producers, and distributors. This integration enables XRECO to act as a switchboard, facilitating the exchange of data and information between the different systems and applications within the ecosystem. Functionalities like the data repository, search and retrieval and the rights and monetization modules are geared towards this layer. As such:

- XRECO can create a one-stop storefront for distribution partners. This integration streamlines the distribution process, making it easier for distributors to access the content they need.
- XRECO can facilitate matchmaking between content creators and producers on the supply-side, and distributors on the demand-side. This matchmaking process helps to ensure that the right content is delivered to the right distributor, resulting in improved efficiency and effectiveness.
- In addition to facilitating the exchange of data and information, XRECO may also aggregate data across distributors on the consumption side of the ecosystem. This data aggregation provides valuable insights into user behavior and trends, allowing production partners to better understand the needs and preferences of their target audience (for example, for which type of 2D assets does demand exist?). This information can then be used to optimize the production process, improving the overall quality of the content and services offered to consumers.
- The XRECO platform can act as an intermediary between the production and consumption sides of the ecosystem, providing a critical link between the different systems and applications. This integration allows for a seamless flow of data and information between the different players within the XR landscape, ensuring that they can work together effectively and efficiently.

2.2.3.2 Why XRECO is an infrastructure platform

Infrastructure platforms play a crucial role in supporting and facilitating production activities within organizations. These platforms provide access to essential production infrastructure, standards, and information services, as well as valuable data assets. Functionalities like volumetric capture, delighting and relighting or NeRF are geared towards this layer, as it allows the user to perform



(parts of) its production process with XRECO infrastructure. As a consequence, the user will not need to develop this infrastructure in-house (for which they might lack the know-how) or outsource their production to third parties (which might be expensive). As such:

- XRECO may be able to formulate a comprehensive view of the emerging ecosystem and specify roadmap milestones that organize and support the ecosystem. By doing so, XRECO will help producers align their own roadmap with these milestones, allowing for a more cohesive and effective approach to production. For example, XRECO may formulate a roadmap to create a comprehensive image database of all European towns over 50,000 inhabitants. This might stimulate local photographers to start uploading images according to this roadmap. Another example is that XRECO could detect a need for certain features and by setting priorities and a roadmap align technology producers or developers to make resources available according to this schedule. This is particularly important in today's fast-paced and constantly changing business environment, where the ability to adapt and respond to new opportunities and challenges is key to success.
- In addition to its role in organizing, XRECO may also be well positioned to provide knowledge services to the ecosystem. This is due to its ability to capture industry-wide data on production processes, which allows it to provide insights and recommendations that are relevant and up to date. This knowledge can be used by producers to improve their processes, increase efficiency, and reduce costs, ultimately leading to increased competitiveness and profitability.
- To further support the ecosystem, XRECO can also expand its reach by attracting third-party service providers on board. By working with these providers, XRECO can offer a wider range of services to the ecosystem, providing even greater value to producers. These third-party providers can bring new and innovative approaches to production, helping to drive innovation and progress within the ecosystem.

In conclusion, infrastructure platforms like XRECO play a critical role in supporting and facilitating production activities within organizations. They provide access to essential production infrastructure, standards, and information services, as well as valuable data assets, and help producers align their efforts and roadmap with the ecosystem. Furthermore, they provide knowledge services that can be used to improve processes and increase competitiveness and are expanding their reach by attracting third-party service providers.

It is important to distinguish clearly between different roles for XRECO within the ecosystem and thereby acknowledge the hypothesis that XRECO might be two different ecosystems layered on top of each other.

The infrastructure ecosystem is the foundation of the platform, providing the necessary technology, standards, and data assets that are critical to the creation of products and services. This layer is responsible for providing the underlying technical infrastructure required for the production process, including hardware, software, data management systems, and communication networks. It is essential to ensure that the infrastructure is robust, scalable, and secure, providing the necessary stability to support the production process.

The integrator ecosystem, on the other hand, manages the interaction between production and distribution partners. This layer ensures that the production process runs smoothly and efficiently. It also facilitates the exchange of information between partners, allowing for real-time collaboration and coordination. This layer is crucial in ensuring that the production process is streamlined and that partners are able to work together effectively.



The business model and monetization strategy for each layer will be different as each layer has its own specific capabilities and solves different customer pains.

2.2.4 Identified business models

Broadly speaking, three types of business models exist in the XR business universe²⁷:

- Advertising (brands pay)
- In-app purchases (users pay)
- XR-as-a-service (b2b)

Brands are really coming around to the fact that XR has inherent capabilities to advertise products in new ways²⁸, for example the IKEA Place app utilizes AR to allow customers to virtually “place” furnishings in their own space, so a customer can make sure the product is the right size, design, and function for their room.^{29,30}

In-app purchases (IAP) are fitting for lots of XR experiences, because XR is too early and unproven to get users to pay upfront for premium applications. For example, BlenderKit is free to try out, and comes with a premium subscription plan as an in-application purchase for power users.

While the first model (advertising) involves brands paying and the second model (IAP) involves users paying, XRaaS serves anyone building XR products. And what they’re paying for are tools to lower friction or boost capabilities. XRaaS is handling back-end heavy lifting or democratizing advanced AR capabilities like graphics creation or 3D rendering.

A good example of XRaaS is Niantic’s Real World Platform. It was developed to serve the company’s own needs. That was everything from scaling capacity for surges in use, to a geospatial engine that determines where Pokémon hatch. Now Niantic is spinning it out as a developer platform.

In connection with XRECO’s value chain (See [Section 2.2.2 XRECO value chain](#)), an XR-as-a-service business model is a natural fit, rather than advertising or in-app purchases. XR-as-a-service as a business model is also consistent with XRECO’s stated objective to develop an ecosystem of business partners across industries.

In this context, it is important to remember that it isn’t enough to get an ecosystem up and running; you also need a way to sustainably monetize it. Three things are necessary to generate a sustainable profit stream from an ecosystem³¹:

1. Keystone contribution: some element or activity it can uniquely own and control that is essential for the ecosystem to create value for users.
2. Tollgates to collect revenues: the tolls may take the form of:
 - license fees,

²⁷ Adapted based on Boland, M. (2019). XR Talks: 3 Business Models for Consumer AR. *ARinsider*. Retrieved from <https://arinsider.co/2019/05/24/xr-talks-3-business-models-for-consumer-ar/> (last visited on February 22, 2023)

²⁸ ARinsider (2018). Advertising in AR: 3 case studies. Retrieved from <https://arinsider.co/2018/08/14/advertising-in-ar-3-case-studies/> (last visited on February 22, 2023)

²⁹ ISM (n.d.) Sales and Marketing VR/AR/XR Use Cases. Retrieved from: <https://ismguide.com/integrated-strategies-3/vr-sales-marketing/> (last visited on February 22, 2023)

³⁰ Although the source presents this application as an example of Marketing VR, we interpret this application as an example of augmented reality whereby the application allows the user to see digitalized furniture, sized to dimension, overlaid onto their actual room by pointing the camera of the phone.

³¹ Williamson, P. and Meyer, A. de (2019). How to monetize an ecosystem. *Harvard Business Review*. Retrieved from: <https://hbr.org/2019/09/how-to-monetize-a-business-ecosystem> (last visited on February 22, 2023)



- royalties, or commissions on transactions within the ecosystem;
 - a share in the revenues of the products and services that partners supply;
 - the profits on value-added products or services created using the data and knowledge from the ecosystem.
3. The profits on value-added products or services created using the data and knowledge from the ecosystem.

To illustrate these principles, Table 2 provides two examples of monetization strategies for both an integrator ecosystem and an infrastructure ecosystem.

ECOSYSTEM	KEYSTONE CONTRIBUTION	TOLLGATE MECHANISM	INNOVATION AND RENEWAL MECHANISM
Integrator – Amadeus	Collates airline seat availability and pricing data for travel agencies	Fees it charges to process airline ticket bookings => airlines pay Amadeus about EUR 4.30 euros for each booking it handles	Diversification <ul style="list-style-type: none"> - help airlines handle check-in and departure - help airlines expand their e-commerce activities
Infrastructure – Shopify	Customizable online storefront platform	Subscription fees (monthly/annually) + commissions on credit card transactions	Integrations with: <ul style="list-style-type: none"> - Marketing solutions (leads, engagement, data) - Back-office solutions (order fulfillment, finance)

Table 2: Examples of monetization strategies for ecosystems

2.3 Concluding remarks on market analysis

Based on thorough market research, it is evident that the current economic climate is favorable for XRECO's growth. Despite the impact of COVID-19, projections for the European XR market are expected to see significant growth in the coming years, reaching a market size of EUR 35 billion to EUR 65 billion by 2025. The outlook for the medium term remains positive, with continued growth projected into the 2030s.

These positive forecasts are driven by several global trends in XR, including advancements in hardware and software, which are expected to drive adoption and innovation in the sector. Although there may be barriers to growth, these are considered to be temporary hindrances rather than permanent roadblocks.



There is no shortage of sources citing exciting trends for many different sectors³², including media³³, tourism³⁴ and mobility³⁵, currently the principal sectors of interest for XRECO. For the months ahead three challenges remain to be resolved:

- Validate media, tourism, and mobility as customer segments to focus on. The section on Exploitation will provide further detail about the various validations to be done as part of the human-centered design process.
- Do a deep-dive sectorial market analysis based on validated customer segments.
- XR is a rapidly advancing sector and therefore market expectations are subject to revisions on a permanent basis. As part of the project, we intend to provide a continuous market monitoring with the intent on reviewing the latest market information each quarter and where necessary update our forecasts.

Through an analysis of the VR value chain and a mapping of XRECO's core functionalities, we aimed to demonstrate that multiple value chains exist within XRECO's conceptual design. The theory of ecosystems specifically addresses situations of these types of multi-sided platforms whereby multiple value chains intersect.

Ecosystem theory characterizes an ecosystem according to its principal functions as Aggregator, Integrator, or Infrastructure³⁶. Having analyzed XRECO's design in the light of this theory we have reached a preliminary conclusion that XRECO serves different types of users either as (1) an integrator ecosystem curating content and facilitating the exchange of 3D models and (2) an infrastructure ecosystem enabling a user to transform input data into 3D assets.

³² XR Today (2022). The Top XR Trends to Explore in 2023. Retrieved from: <https://www.xrtoday.com/mixed-reality/the-top-xr-trends-to-explore-in-2023/> (last visited on February 22, 2023)

³³ Jio Tesseract (2021). 5 Trends in XR that will transform the future of Media & Entertainment. Retrieved from: <https://www.linkedin.com/pulse/5-trends-xr-transform-future-media-entertainment-tesseract-imaging/> (last visited on February 22 2023)

³⁴ StartUs Insights (n.d.). Top 9 Travel Trends & Innovations in 2023. Retrieved from: <https://www.startus-insights.com/innovators-guide/travel-trends-innovation/#xr> (last visited on February 22, 2023)

³⁵ StartUs Insights (n.d.). Discover Top 10 Mobility Industry Trends & Innovations in 2023. Retrieved from: <https://www.startus-insights.com/innovators-guide/top-10-mobility-industry-trends-innovations-in-2021/#augmented-virtual-reality> (last visited on February 22 2023)

³⁶ Choudary, S. P. (2022). Ecosystem business models: A teardown. *Substack*. Retrieved from: <https://platforms.substack.com/p/ecosystem-business-models-a-teardown> (last visited on February 22, 2023)



3 Exploitation

The XRECO exploitation strategy is designed to provide guidance to Consortium Partners for an effective exploitation of the project results. In this section an initial framing of strategic aspects is shown.

It describes what the process for creating the exploitation strategy XRECO Minimum Viable Product (MVP) will come to look like, how it could address current needs, deliver benefits to customers and markets in the future, and how it could be jointly commercialized and monetized.

3.1 Methodology

This section focusses on the methodological underpinnings of exploitation within XRECO. Here, we will look at the design and business approach and tools of the XRECO exploitation methodology.

3.2 Exploitation components

This section briefly describes the methodology specifically defined and implemented by the XRECO WP6 team to maximize the exploitation of the outcomes to be generated during the project lifetime.

The implementation of the here described steps will be accompanied by communication activities undertaken by the dissemination team (described in [Section 4 Dissemination & Communication](#) of the present deliverable) as well as one-to-one demos with prospects.

The following components, influenced by Human-Centered Design (HCD) (for a more in-depth overview see [Section 3.3 The Human-Centered Design process](#)) and most of the time implemented, analyzed, and processed in parallel, have been put in place starting from September 2022 onwards, with the challenging objective to develop an integrated strategy for the exploitation of the project results at individual and collaborative level:

3.2.1 Component 1: market and customer analysis

In line with HCD methodology, the first step in the exploitation strategy involves conducting a comprehensive analysis of the current XR market and identifying the gaps and needs of the customers. This step prioritizes the (end) users, and customers, by taking into consideration their needs and preferences to inform the strategy. The objective of this step is to lay the foundation for defining a sound exploitation strategy by analyzing the current market and identifying potential opportunities for exploiting the results of the XRECO project. [Section 2 Market analysis](#) provides the framework for identifying the most relevant exploitation paths for key exploitable outcomes, ensuring that the end-user is always at the center of the strategy.

3.2.2 Component 2: creation of exploitation strategies

To understand the expectations and plans of each consortium member for using the project outcomes in their businesses or further research activities, specific interviews were and will be conducted. This step takes a co-design approach, involving the consortium members in the strategy development process and ensuring that their perspectives and expectations are taken into consideration. The individual exploitation plans will be revised based on the information obtained



from these interviews, and the process for the partner interviews will be described in [Section 3.5.1 Individual exploitation plans](#).

3.2.3 Component 3: Joint Business Clinics

To define an integrated strategy for exploiting the XRECO results, three Joint Business Clinics (JBC) will be organized. These workshops aim to present and demonstrate XRECO's key assets to business experts from different markets, discuss their needs and gaps, and assess how XRECO could potentially deliver value to specific customer segments. The workshops also aim to initiate further discussions with potential early adopters and explore partnerships with external companies to invest in the technological developments for future market uptake. The JBCs adopt a co-creation approach, involving business experts in the strategy development process and ensuring that their perspectives and needs are taken into consideration. For further insights see [Section 3.8.2 Joint Business Clinics](#).

3.2.4 Component 4: XRECO value proposition & commercial strategy

Based on the inputs that will be collected during the JBCs and the extended market analysis, a Minimum Viable Product (MVP) and a high-level business model will be defined. This step takes a user-centered approach, taking into consideration the inputs collected from the workshops and the market analysis to inform the development of the MVP and the business model. The workshops will allow for (1) the assessment of how XRECO's solution can be applied in specific markets; (2) the identification of key features customers are looking for in specific use cases; and (3) the development of unique value propositions for different customer segments. Business models for multiple selected use cases will be developed, ensuring that the HCD methodology and concepts are integrated into the commercial strategy. For further insights see [Section 3.7 XRECO value proposition](#).

3.2.5 Component 5: IP management

Before exploiting the results of an EU-funded collaborative project, it is essential to have a clear understanding of the potential inputs brought into the project by each participant, of the common goals and expected outcomes, and to come to a joint agreement on the terms and conditions for the use of and access to IP generated in the project. This step helps to avoid conflicts and supports individual and joint exploitation of results, during interviews and the creation of individual exploitation plans consortium members will be asked to list and describe their IP. The IP management step takes a collaboration-focused approach, ensuring that all participants have a clear understanding of the IP generated in the project and the terms and conditions for its use and access.³⁷

3.2.6 Component 6: results consolidation with human-centered approach

This component integrates the key project outcomes and lessons learned from the other components to provide a comprehensive overview of the available exploitation options for the XRECO project. Taking the HCR approach, we will be putting the needs and perspectives of the customers and users at the forefront, to ensure that the XRECO solution is designed and marketed in

³⁷ XRECO deliverable D1.2 Data Management Plan will give further details to selected readers. This document is not public.



a way that meets their needs and provides value. The results consolidation includes a thorough evaluation of the potential impact of the XRECO project on various user groups, as well as a consideration of ethical and societal implications to ensure that the solution is socially responsible and sustainable. This step provides a roadmap for the future development and commercialization of the XRECO solution.

3.3 The Human-Centered Design process

The XRECO methodology and exploitation process has been heavily influenced by Human-Centered Design (HCD), especially IDEO's view on it^{38,39}. As such we present to you in the following section a short overview of what HCD means for XRECO's WP6.

HCD is co-creation, a process of working with users to co-design solutions, rather than designing for them. This approach allows XRECO to tap into the knowledge and creativity of our target segments, and to create solutions and services that are more likely to be adopted and used.

- **User-focused:** HCD starts by understanding the needs, wants, and experiences of users and customers. In XRECO we work to identify the problems and challenges that users face and strive to create solutions that address these issues.
- **Collaborative process:** HCD is a collaborative process between stakeholders, such as users and consortium members. This helps to ensure that the solution being designed truly meets the needs of the people who will be using it.
- **Iterative approach:** HCD is an iterative process that involves repeated testing and refinement. XRECO will create multiple value propositions and test each one with users to gather feedback and make improvements. This helps to ensure that the result is the best possible solution for the users.
- **Empathy:** Empathy is a key component of HCD. At XRECO we aim to understand the users' perspectives, emotions, and motivations to create solutions that are meaningful and relevant to them.
- **Inclusivity:** HCD strives to create solutions that are accessible and usable for a diverse range of people, including people from different cultural backgrounds and people with varying levels of experience and expertise.
- **Holistic view:** XRECO's HCD takes a holistic view of the problem being addressed and the users' needs. This means considering not just the immediate needs of the users, but also the larger context in which they use the solution and the impact that the solution may have on their lives.
- **Evidence-based:** HCD is an evidence-based approach that relies on data and user feedback to inform design decisions. This helps to ensure that the solutions being created are effective and meet the needs of the users.

The following facets of HCD are included in the exploitation steps outlined in [Section 3.2 Exploitation steps](#). While not outright mentioned, they are present in every facet of WP6 and the activities that stem from this Work Package.

³⁸ IDEO (n.d.). What's the difference between HCD and design thinking. Retrieved from: <https://designthinking.ideo.com/faq/whats-the-difference-between-human-centered-design-and-design-thinking> (last visited on February 22 2023)

³⁹ DesignKit (n.d.). What is Human Centered Design? Retrieved from: <https://www.designkit.org/human-centered-design> (last visited on February 22, 2023)



3.3.1 Feasibility, desirability, and viability.

To ensure that XRECO is designed around or for the needs of its future users, and to ensure that the innovative solution we are building and iterating is what customers and users need, it is crucial to consider three key factors: feasibility, desirability, and viability.

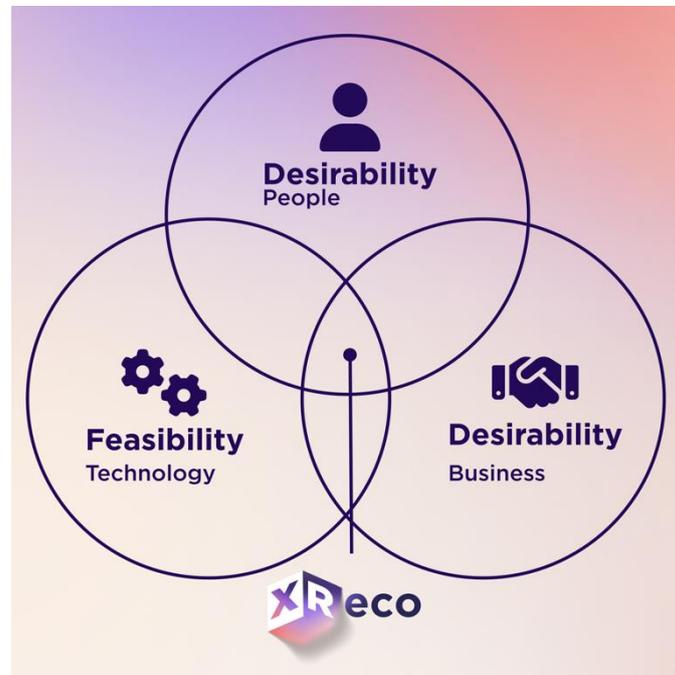


Figure 8: Where does XRECO need to be located?

Feasibility refers to the technical and practical aspects of the XR media ecosystem, ensuring that it can be realistically developed and deployed given current technology, resources, and constraints. Desirability refers to the user-centered aspects of the XR media ecosystem, making sure that it meets the needs and wants of its intended audience, in terms of features, user experience, and overall value. Viability refers to the business aspects of the XR media ecosystem, including its financial viability, ability to generate revenue, and alignment with the overall business strategy and goals.

As such, members of XRECO will consciously and continually ask the following questions as to ensure that XRECO is a human centered solution:

- **Desirability:** Are we solving for the right pain points?
- **Feasibility:** How can we build XRECO to make our product/service healthier and stronger?
- **Viability:** Does our business model fit with the way XRECO customers want to use and pay for our solution?

There are several methods and tools that XRECO uses to assess the feasibility, desirability, and viability of our solution. These include user research and testing, market research, and prototyping. User research and testing is a crucial tool for evaluating desirability, as it allows us to gather feedback from users and make informed decisions about our value proposition and services. Market research is used to assess viability by determining market demand and competition. Prototyping,



done mainly during Joint Business Clinics (see [Section 3.8.2 Joint Business Clinics](#)), is a valuable tool for assessing feasibility and desirability, as it allows us to test and refine our business models.

3.4 Advisory Board

Creating an Advisory Board is a great way to invite industry leaders into an ongoing relationship with our project so they can be partners in our success. They can be sounding boards, provide introductions to prospective funders and clients, and they can provide external validation for our project and business.

The list of experts in the Advisory Board includes:

NAME	ROLE	FIELD(S) OF EXPERTISE
Prof. Pablo Cesar (M)	Research	Distributed and Interactive Systems; Human-Centered Multimedia Systems
Lisa Maria Wurzinger (F)	Business	Immersive Storytelling & Experiences; Immersive media Production; Business
Alexandre Rouxel (M)	Research	AI; Innovation; Broadcasting/Media
Marloes Pomp (F)	Business	Human Centric AI; Blockchain; Metaverse; Web 3.0; Digital Economy
Laura Hirvi (F)	Research	Immersive Technologies; Metaverse; Business
Jae Grant Malony (M)	Business	Virtual Tourism; Business

Table 3: Advisory Board members

3.5 Individual exploitation plans

In this section the process for individual exploitation is discussed.

In M3-M4 we have conducted initial interviews on partner level that served as input and data for the deliverable you are currently reading. In these interviews we discussed the following topics:

- Trends & Challenges
- Other Emblematic Applications
- Added Value of XRECO
- Markets & Customers
- Key Exploitable Results
- Community Value
- IP
- Standardization

The individual interviews gave a plethora of insights concerning the current XR trends and competitors which served as basis for [Section 2 Market analysis](#). Furthermore, the interviews served to make consortium partners aware of the above topics and that they need to start thinking about these things before D6.2.

3.5.1 Individual exploitation plan template

The XRECO project emphasizes the importance of each partner leveraging their own results for maximum impact. To achieve this goal, we have included an approach to defining Minimum Viable



Products (MVP) and sending out validation questionnaires to consortium partners. These plans, which will build upon the information presented in the current deliverable and future insights will prioritize the needs and perspectives of customers and users in the XR market. Incorporating HCD, we aim to ensure that our XRECO solutions are not only technically sound, but also meet the needs and expectations of the people who will be using them.

The first version of the individual exploitation plan consisting of Business Model Canvasses on partner level and internal validation questionnaires will be included and updated from Deliverable D6.2 onward. At this early stage, we will focus on the methodology and give an overview of the Individual Exploitation Plan questions, tables, and Business Model Canvas.

The Business Model Canvas (BMC) was created by Alexander Osterwalder, of Strategyzer. XRECO will be using the Creative Commons version supplied by Design a Better Business and the concurrent step-by-step guide they provide.⁴⁰

The individual exploitation plan will include the following sections, for the detailed survey text please see [Annex I: Individual exploitation plan](#):

- **Exploitation:** Description of an individual commercial exploitation plan to support the BMC. Includes market focus, business plan, and commercialization strategy questions. As well as a table to describe non-commercial project results.
- **Validation:** By incorporating feedback and insights gathered through validation questionnaires and other methods, we are able to iterate and improve upon our value propositions to create an ecosystem that will truly resonate with and serve the needs of our target audience. The questionnaire includes questions on products and services, markets and customers, commercial and community value, and IPR protection.

3.6 An XRECO exploitation overview

In this section we will give a preliminary overview of the ways XRECO creates an XR ecosystem. In the upcoming months (M6-M18), XRECO will research and (in)validate our assumptions written down in this section. This section will present a first combination and selection of potential ecosystem models that might inform the XRECO exploitation options, this selection is derived from the options laid out in [Section 2.2.3 XRECO added value – the Ecosystem](#).

As outlined in Table 4 below, the consortium currently positions XRECO as a combination of integrator platform and infrastructure platform:

⁴⁰ Design a Better Business (n.d.) Business Model Canvas. Retrieved from: <https://www.designabetterbusiness.tools/tools/business-model-canvas> (last visited on February 22, 2023)



ECOSYSTEM	KEYSTONE CONTRIBUTION	TOLLGATE MECHANISM	INNOVATION AND RENEWAL MECHANISM
Integrator	<ul style="list-style-type: none"> - Integrate different stakeholders - Currently not easy to find, share, use & re-use content - Authoring Tool 	<ul style="list-style-type: none"> - What to do with processing? - Commission on transactions? 	<ul style="list-style-type: none"> - Training of AI - Learning effect - Network effect
Infrastructure	<ul style="list-style-type: none"> - Infrastructure for media - Content search/discovery - Content upload - Content editing/ stitching 	<ul style="list-style-type: none"> - Infrastructure subscription based on data size? 	<ul style="list-style-type: none"> - Training of AI - Greater lock in - Learning effect - Economies of scale

Table 4: Monetization of the XRECO ecosystem

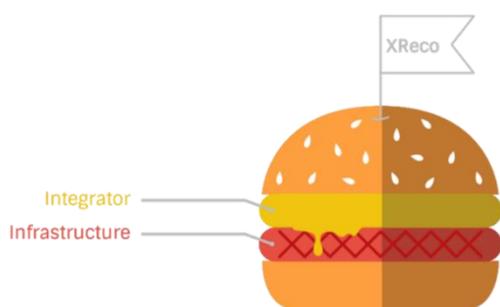


Figure 9: The XRECO Ecosystem Layer Burger

Both ecosystems described above co-exist, one on top of the other. Each layer will have its own specific capabilities and solves different customer pains. Therefore, the business model and monetization strategy for each layer will be different as well. XRECO is like taking a bite of a cheeseburger, there are 2 layers and depending on how you take the bite you will taste more cheese or hamburger. For an overview of the capabilities included in XRECO see [Section 3.7.3 XRECO key features](#). For now, it shall suffice to state that the XRECO integrator and

infrastructure ecosystem(s) will be built around core user and customer needs. The user and customer may be an end consumer at the end of the value chain, or any intermediary customer who uses the services to deliver results, such as created content through our authoring tools, further into the value chain. During Joint Business Clinics these exploitation options and user and customer needs will be analyzed and interpreted, see [Section 3.8.2 Joint Business Clinics](#) for an overview of this process. Furthermore, we will interview individual consortium partners to align this exploitation view across the consortium.

3.7 XRECO value proposition

Overall, the XRECO process of designing a value proposition involves understanding the target customer, defining customer segments, analyzing the competition, and developing a value proposition that offers real value to the customer. By following the HCD process, XRECO can create a value proposition that is tailored to the needs of our users and customers and help us stand out from the competition.

The procedures outlined in [Section 3.2 Exploitation components](#) will gather a significant amount of information and data that will be fundamental in determining the XRECO exploitation strategy and value proposition. We will turn that information and data into valuable and validated value propositions by the following means:



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- **Defining the target audiences:** The first step in creating a value proposition is to understand our target audience. This means researching and identifying their needs, pain points, and desires. By understanding the target audiences, we create a value proposition that addresses their specific needs and resonates with them.
- **Identifying unique selling points:** The next step is to analyze our product or service and identify what sets it apart from the competition. What are the unique features, benefits, and values that XRECO offers that others do not?
- **Understanding customer benefits:** Once we have identified our unique selling points, we need to determine how these will benefit the target audiences. What are the outcomes that the XRECO target audience will experience because of using our product or service?
- **Creating a clear and concise message:** The next step is to craft a value proposition statement that clearly communicates the unique selling points and benefits to the XRECO target audience. This statement will be concise, easy to understand, and memorable.
- **Testing and refining:** The final step is to test and refine the XRECO value proposition. This means gathering feedback from target audiences, analyzing customer behavior, and continuously refining it to ensure it effectively resonates with the target audience.

In the subsequent sections, the focus will be on the tools XRECO uses for creating a validated and aligned value proposition, and a high-level business model based on the Business Model Canvas (BMC). This will provide an initial insight into what the XRECO Minimum Valuable Product (MVP) might be.

The methodology used to gather this information incorporates both HCD principles and Lean Start-up concepts. The HCD approach focuses on understanding the needs and perspectives of the target market, while the Lean Start-up methodology encourages a data-driven approach to testing and validating assumptions. By combining these two approaches, the XRECO project can ensure that the exploitation strategy and value proposition are not only aligned with the target market but also grounded in evidence and validated through continuous testing and iteration.

3.7.1 Value Proposition Canvas

To define and really understand our customers, including their jobs-to-be-done, pains, and gains, as well as our unique offer to them, XRECO will be employing the Value Proposition Canvas and step-by-step guide supplied by Design a Better Business⁴¹. By creating, validating, and iterating the canvas, a first version to be included in deliverable D6.2, XRECO will be able to better create outcomes that are tailored to the needs of our target clusters, users, and customers.

Based on the insights from the preliminary consortium partner interviews, and those gathered in the market analysis (See [Section 2 Market analysis](#)) multiple high level Value Proposition Canvasses will be filled in for the target segments identified in [Section 3.8.1 Target segments](#).

These first VPCs are to be (in)validated and iterated during the planned JBCs, market analysis, and user interviews. Over the course of the coming deliverables, they will be reviewed and updated when the need arises.

⁴¹ Design a Better Business (n.d.) Value Proposition Canvas. Retrieved from: <https://www.designabetterbusiness.tools/tools/value-proposition-canvas> (last visited on February 22, 2023)



3.7.2 Business Model Canvas

The Business Model Canvas (BMC) is a virtual representation of current or new business models that provides a holistic view of XRECO as a whole and describes how to monetize our products and services. The BMC provides a visual representation of a XRECO's value proposition, customer segments, channels, customer relationships, revenue streams, and cost structure.

As such, the BMC is a strategic tool used to map and visualize the key components of our business model. Its aim is to provide a visual representation of the exploitation strategy and to serve as a blueprint for the development of XRECO.

3.7.2.1 Preliminary Business Model Canvas

The initial BMC shown in this section has been made based on the XRECO Market Analysis presented in [Section 2 Market analysis](#). It was presented during the second XRECO Consortium Meeting in Barcelona (February 2023). Over the course of the project lifetime, and accompanying deliverables, the BMC will be updated.

The preliminary BMC, provides XRECO with a simple, visual representation of a business model, making it easier for all stakeholders present during JBC#1, and during internal consortium meetings, to understand and communicate their ideas, and as such (in)validate and build upon the shown BMC. Multiple BMCs will be generated over the project lifetime.

The BMCs will be further validated through the individual exploitation plans (see [Section 3.5 Individual exploitation plans](#)) and in consortium meetings with the involved partners per use case present.

By mapping out the BMC building blocks, XRECO will create a comprehensive view of the project and identify potential problems, opportunities, and solutions. XRECO will use it to test and validate exploitation ideas, and to iterate on the business model until successful solutions are found.

The preliminary Business Model for XRECO consists of the following elements and information:



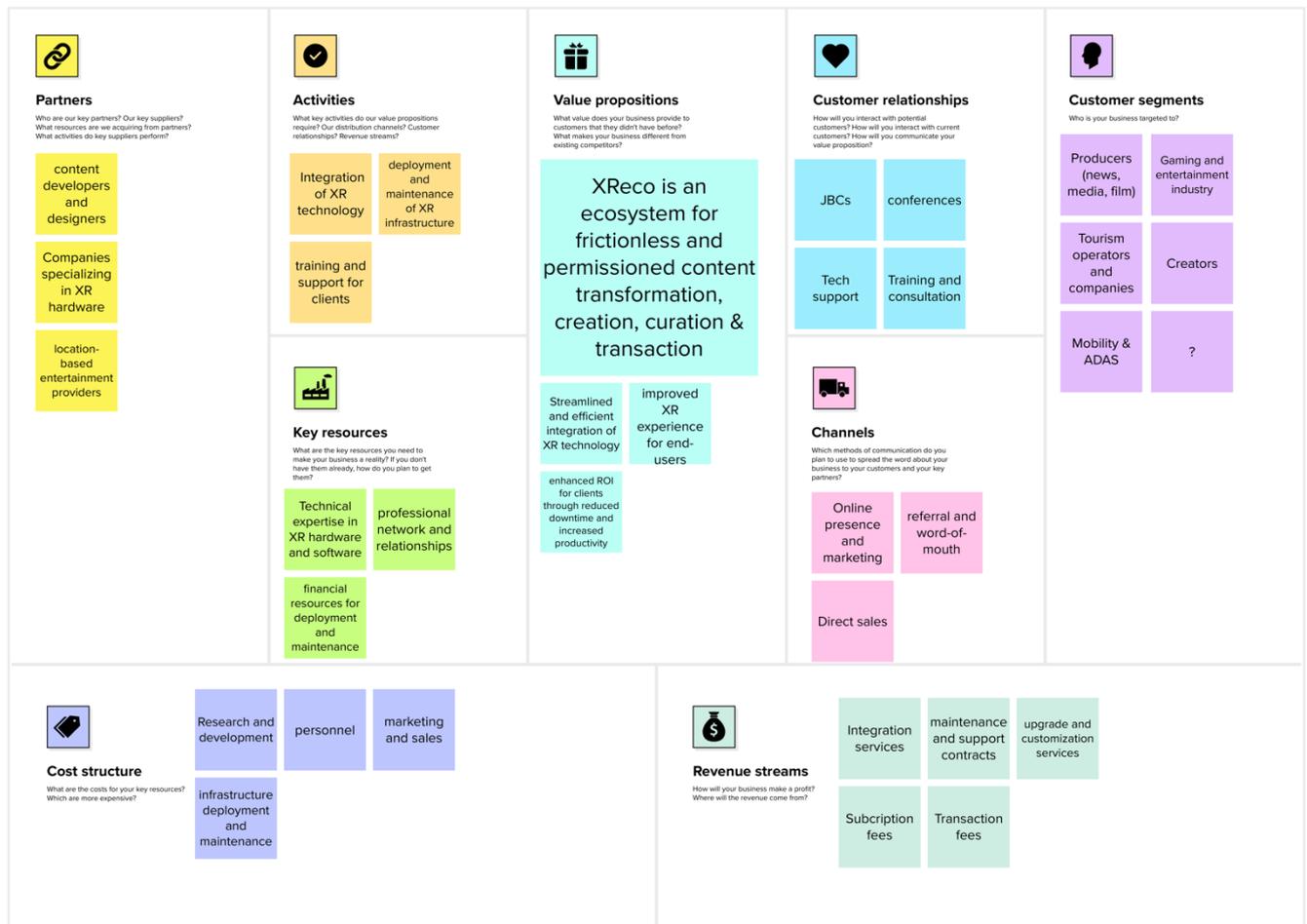


Figure 10: Preliminary Business Model Canvas for XRECO (status February 2023)

3.7.2.1.1 Key partners

The success of XRECO depends heavily on its partnerships. Key partners, many of which are included in the XRECO consortium already, would include companies specializing in XR hardware and software, content developers and designers, and location-based entertainment providers.

3.7.2.1.2 Key activities

The integration of XR technology is the core activity of this business. This requires a deep understanding of XR hardware and software, as well as a willingness to invest time and resources into the deployment and maintenance of XR infrastructure. In order to deliver value to customers and users, XRECO can also offer training and support services – which are included in our capacity building track. This will help to ensure that customers and users are able to effectively use the technology and get the most out of XRECO

3.7.2.1.3 Key resources

The technical expertise in XR hardware and software is the most critical resource for XRECO. This expertise must be combined with a professional network and relationships which can help to open doors and provide access to new opportunities. XRECO will also need significant financial resources in order to deploy and maintain XR infrastructure. These resources will be used to support research and development, marketing and sales, personnel, and infrastructure deployment and maintenance.



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3.7.2.1.4 Value proposition

The value proposition of XRECO is an ecosystem for frictionless and permissioned 2D and 3D content transformation, creation, curation, and transaction, a streamlined and efficient integration of technology results in improved content creation and search, and thus a more efficient pipeline for customers and users. By using its technical expertise and experience, XRECO can increase productivity for its users and customers. This, in turn, will lead to enhanced ROI, making it a win-win situation.

3.7.2.1.5 Customer segments

The customer segments for XRECO are diverse, including the news & media segment, the tourism industry segment, and the mobility and automotive segment (see [Annex II: XRECO personas](#)). Market analysis (See [Section 2 Market analysis](#)) has further yielded the following potential segments: gaming and entertainment industry, real estate, education and training, and healthcare. These segments offer a range of opportunities for XRECO to deliver value, whether it be through improved quality of XR assets or increased efficiency for their creation and organization.

Our current assumption, which we plan to (in)validate during JBC#1, is that while the value proposition for each customer segment may have unique features, the general XRECO business model will remain largely the same for most of them. The methods used to approach specific customers and generate income may vary slightly but can still be incorporated into a single, overarching XRECO business model.

3.7.2.1.6 Channels

Two important channels are inherent in ecosystems: network effects and learning effects.

The network effect refers to the feedback loop whereby increased participation of distribution partners in the ecosystem attracts more participation from production partners, which in turn increases supply within the ecosystem and this increased supply will in turn attract even more distribution partners. The learning effect refers to a similar feedback principle. In this case, increased participation of distribution partners will generate more aggregate demand data, which leads to improved matchmaking capability within the ecosystem, eventually leading to greater participation of both production and distribution partners. These are powerful effects, although it should be noted that they depend on the quality and the dynamism within an ecosystem.⁴²

Additionally, XRECO can use a combination of direct sales, referral and word-of-mouth, and online presence and marketing to reach its target customers directly. The XRECO project itself may be used to build relationships with key customers such as DW and RAI, while referral and word-of-mouth will help to spread XRECO's message and reach new prospects. An online presence and communication and marketing strategy (see [Section 4 Dissemination & Communication](#)) will help to build XRECO's brand and increase its visibility.

3.7.2.1.7 Customer relationships

Customer relationships will be critical for success. XRECO will include customers and users during and after the project lifetime as part of our HCD process. Co-creation is central to XRECO's engagement with customers (See [Section 3.3 The Human-Centered Design process](#)). XRECO may provide technical support and ongoing maintenance to ensure that customers and users can get the

⁴² Choudary, S. P. (2022). Ecosystem business models: A teardown. *Substack*. Retrieved from: <https://platforms.substack.com/p/ecosystem-business-models-a-teardown> (last visited on February 22, 2023)



most out of the XRECO platform. In addition, XRECO may offer training and upskilling, through our capacity building track T6.3, to help users get the most out of their XRECO experience.

3.7.2.1.8 Revenue streams

Potential revenue streams for XRECO, to be (in)validated in the months to come during Joint Business Clinics and user interviews may be a combination of integration services, maintenance and support contracts, subscription fees, transaction fees, as well as upgrade and customization services. Integration services may be a source of revenue, as clients will need to have the XR technology integrated into their existing systems and processes. Maintenance and support contracts can be used to generate recurring revenue and ensure the continued success of the technology. Upgrade and customization services may allow customers and users to tailor the technology to their specific needs, further increasing its value.

3.7.2.1.9 Cost structure

The cost structure of our integration- and infrastructure-focused business model is composed of several important components. Research and development are a crucial aspect of the cost structure as it involves continuous efforts to improve XR technology and enhance the user experience. Personnel costs include salaries, benefits, and other expenses related to hiring and retaining skilled employees who have expertise in XR. Marketing and sales efforts are also important for building brand awareness and reaching out to potential customers, and these costs should be factored into the overall cost structure. Finally, deploying and maintaining XR infrastructure can also be expensive, and these costs must be accounted for to ensure a successful business model.

3.7.3 XRECO key features

In this section we will outline the key features XRECO has to offer.⁴³

3.7.3.1 Multi modal search & retrieval

To help better store and archive XR content, so that it remains traceable, a new platform will be developed, providing a way to search and retrieve (XR) content (generally including audio, image, video, and 3D/volumetric data). The technology will be an extended version of the [multimedia-retrieval system 'vitivr'](#), created by our partners at the University of Basel.

This new platform is going to provide us with a Neural Media Repository (NMR), which is the common data space that enables the search and discovery of content. Users will be able to quickly share their content on the platform *and* reuse assets from other XR experiences. This means, the content shared in the NMR can be exploited to create new footage, viewpoints, 3D models or productions.

3.7.3.2 Neural Radiance Fields (NeRF)

This technology makes it possible to create 3D scenes from 2D images. More specifically, [Neural Radiance Fields \(NeRF\)](#) allow us to create 3D scenes from just a collection of photographs or very sparse views of a scene. Additionally, all possible camera angles and positions can be estimated and recreated. This way, new XR experiences can be realized with minimal effort.

⁴³ This overview was created by DW for a cross-WP workshop where partners needed to be aligned on the potentials of the XReco project to agree on the project's value propositions.



3.7.3.3 Relighting & delighting

When creating a 3D scene from a bunch of different 2D images, as described above, the lighting can vary from image to image, for instance, if many different people take photos of the same building and upload it to the NMR. To correct this and have a smooth 3D scene with cohesive lighting and color information, it is possible to retroactively [light the scene in ways it was never lighted](#). Other automatic enhancements include AI techniques such as stitching, super resolution and image restoration. This way, content can be repurposed and adapted to different production needs (e.g., different times of the day, weather conditions, etc.). New footage, viewpoints or 3D models can be created.



Figure 11: Portrait Relighting Volumetric capturing⁴⁴

3.7.3.4 Volumetric Video

[Volumetric Video](#) is the process of capturing a video in three-dimensional space and converting it into a 3D model. This model can then be placed within any 3D environment, whether it is rendered into a scene, placed in VR, AR or the Metaverse. In the case of a recording of an object or person, this allows a viewer to rotate or move around the end experience.



Figure 12: Example of Volumetric Video: Coldplay and BTS in their music video 'My Universe'⁴⁵

⁴⁴ Source image: Sun, T., et al (2019). Single image portrait relighting. ACM Trans. Graph., 38(4), 79-1.

⁴⁵ Stills taken from [Coldplay X BTS – My universe video on YouTube](#)



3.7.3.5 FVV Live: Free Viewpoint Videosystem



Figure 13: FVV Demonstration by partner UPM

[This program from UPM](#) (Universidad Politecnica de Madrid) makes it possible to instantly create a 3D video using multiple cameras that are pointed at a person, an object, or a scene.

Remote control of the viewpoint is possible via a smartphone, with which you can control the position of the virtual camera in real time. It is a similar setup to volumetric capturing.

3.7.3.6 AR CMS by ZAUBAR

Tech-start-up [ZAUBAR](#) from Berlin combines AR and tourism. They offer a location based Augmented Reality Content Management System (CMS). This means, they can place mainly images, but also 3D objects in actual geo locations. For this, they collaborated with Google to be able to place so-called anchors (ARCore's Earth Cloud Anchors), which enable markerless content placement for the first time. Some of their other use cases include projecting historical architecture photography on actual walls, as done in an app for touring the [KZ Dachau](#).



Figure 14: Location-Based AR-Application by ZAUBAR

In the future, ZAUBAR would be interested in creating content on location and then allowing users to 'take it home', e.g., NFT-souvenirs from a city.

3.7.3.7 Holoportation

It will be possible to teleport a news presenter in a high-fidelity 3D reconstruction of a scene (i.e., a square of a well-known city). Or, if the news wants to cover a specific event that happened on the same day (e.g., a riot or an accident), that will be possible too. In this case, content is made available via user contributions in the NMR and repurposed by creating an overlay with a previously created 3D scenario. The producer can show this content from potentially unlimited viewpoints, with the possibility of placing the spectator in an XR immersive experience. See also, news presenter in a ['Firenado'](#).





Figure 15: Example of holoported presenter in Immersive News Broadcasting⁴⁶

[Another Example by our technical partner i2CAT](#) (see also Figure 16 below): Here, two people sit in front of a camera, and, with VR goggles, other users could experience sitting at the same table as them. If this technology were used in a TV/ Video production, the director would be able to choose any viewing angle, because every person would be in 3D. This means, real-time holographic teletransportation is possible.



Figure 16: Holoportation by i2CAT

3.7.3.8 Virtual production capsules

Partner Visyon, a Creative Immersive Company based in Barcelona, plans a case study, in which they collaborate with TV Broadcasters to produce 3D content with assets retrieved from the NMR. They plan to create Virtual Production Capsules to be consumed via TV (with mobile phones as a second screen) to project and explore the 3D scene as augmented content over the viewer environment. It will be possible to watch the news on, e.g., the mars rover, and then actually ‘transport’ it into your living room. Eventually, the capsules are also supposed to be accessible via immersive websites or in VR.

⁴⁶ Still taken from [Weather Channel - Hurricane Florence augmented reality storm surge graphics video on YouTube](#)



3.8 Engagement with potential customers

Engaging with potential customers, users, producers, and consumers is central to XRECO's HCD approach and the development and validation of fitting value propositions. Continuous and structural engagement with these groups through Joint Business Clinics, focus groups and user interviews will help us better identify target segments, further understand our unique benefits and features of XRECO, and validate with customer segments.

XRECO plans to organize customer-focused validation events in the first year and beyond, with the aim of fostering strong engagement with potential users. The company recognizes the importance of a diverse range of participants, including small startups, large corporations, commercial entities, and well-known universities. This diversity is crucial in ensuring effective validation of the market, problem, and solution, as it helps to prevent group thinking and encourages a wider range of perspectives and insights.

By engaging with a diverse group of potential customers, XRECO can gather valuable information about their needs, pain points, and preferences. This information can then be used to inform the development of a value proposition that effectively addresses the identified market problem and offers a compelling solution.

3.8.1 Target segments

The three current target segments that have been identified by XRECO are as follows:

- **Media and News:** The media and entertainment industry has been quick to adopt XR technology, with virtual and augmented reality experiences becoming increasingly popular. A first focus group that gives data for the creation of the Value proposition Canvas has been held already in M4 by Deutsche Welle, see [Section 3.8.3.1 Journalists focus group](#) for further information.
- **Tourism:** The tourism industry has been exploring the potential of XR, with virtual tours and experiences becoming a popular tool for destination marketing. In the coming months we will create a Value Proposition Canvas together with the Consortium's tourism experts – [Zaubar](#).
- **Mobility and Automotive:** The mobility market has also started to incorporate XR technology, with companies exploring its use in areas such as training and simulation, vehicle design, and customer experience. In the coming months we will create a Value Proposition Canvas together with the Consortium's mobility & automotive experts – [Continental](#).

Furthermore, the creation of the market analysis (see [Section 2 Market analysis](#)) and initial BMC (see [Section 3.7.2 Business Model Canvas](#)) yielded four other potential target segments; gaming and entertainment industry, real estate, education and training, and healthcare. These segments will be further looked into and one-on-one interviews might be planned with representatives of each respective segment (see [Section 3.8.4 User interviews](#)).

3.8.2 Joint Business Clinics

XRECO is a cutting-edge solution that is set to revolutionize the way businesses approach and utilize XR technologies. The Joint Business Clinics (JBCs) represent an essential component of XRECO's integrated exploitation strategy. By utilizing a human-centered design approach, the JBCs aim to gain a deep understanding of the needs and challenges faced by potential customers and explore how



XRECO can deliver value to specific customer segments to address these needs and solve existing problems.

The JBCs bring together business experts from various markets, including those interested in using XR solutions or delivering related services to customers. These workshops provide an opportunity for XRECO to showcase its key assets and demonstrate its potential to address the needs and gaps in the market. The JBCs also provide a platform for engagement with business experts, allowing XRECO to gain a deep understanding of the customer needs and assess how it can potentially address those needs and solve existing problems.

Another crucial objective of the exploitation workshops is to explore potential partnerships with external companies who are interested in investing further in the technological developments for future market uptake. The workshops provide opportunities to identify such companies and explore potential collaborations to accelerate the commercialization of the XRECO solution.

By taking a human-centered approach, the JBCs ensure that the XRECO solution is tailored to meet the real needs and requirements of the market. The three consecutive JBCs are a crucial part of the process for defining XRECO's integrated exploitation strategy and offer a unique opportunity for XRECO to gain hands-on experience, gather fresh perspectives and innovative ideas, and validate its value proposition with potential customers.

A co-creative approach will be taken for the organization of the three workshops:

3.8.2.1 The First Joint Business Clinic (JBC#1)

JBC#1 will prioritize the exploration of customer problems and needs, experts from diverse markets will co-create a high-level XRECO business model and define various value propositions tailored to specific customer segments. In this way we get a sense of the keystone contributions and tollgates of XRECO. Essential for defining XRECO's ecosystem. Participants will brainstorm potential concepts to understand how XRECO can solve their current or upcoming problems within the next three years. The workshop will also consider important factors such as risks, success metrics, tests, costs, and timelines required to ensure the success of the XRECO solution.

3.8.2.2 The Second Joint Business Clinic (JBC#2)

JBC#2 will build upon the outcomes of the market analysis and partner interviews to focus on the most relevant markets for the XRECO solution. The workshop will delve into specific key challenges faced by participants in these markets and understand the current barriers, pains, and needs. This second workshop will investigate how XRECO can offer value to address these challenges and reach product-market fit. Participants will develop use cases for the application of XRECO and assess any additional functionalities required to make the use cases sustainable.

3.8.2.3 The Third Joint Business Clinic (JBC#3)

JBC#3 aims to present a compelling business pitch for the XRECO platform, showcasing the value it will deliver to target markets. The workshop will validate the most realistic business model, identify high-priority use cases, and discuss further functionalities required to meet market needs and drive sales of the XRECO solution. This event will bring together a comprehensive understanding of customer needs, market challenges, and the potential of XRECO to create a winning proposition.



3.8.3 Focus groups

A focus group is a small group interview of 4-6 people with similar backgrounds. The aim is to get qualitative insights into a market or societal sphere for which you want to develop a product or service – this could be a group of chefs interviewed on the acceptance of a new kitchen product just as well as people from a neighborhood discussing a new urban planning scheme.

The idea for the XRECO focus groups was to find out the requirements of the project’s target groups. To gather such information, content creators from all relevant areas were invited to participate in guided group interviews,

All partners followed a generic procedure, following the same setup and guiding questions.

Task Leader DW shared an introductory leaflet to attach to the invitation of participants (see Annex I), a PowerPoint presentation summarizing XRECO’s content creation and adaptation technologies, and a set of questions to guide the discussions:

1. How important/relevant is XR content in your business? (max. 3 min.)
2. What kind of journalistic XR content would you be interested in as a consumer, or like to see created? (20 min.)
 - a. (What would excite you, what would you find boring or redundant? Should it be interactive?)
 - b. Googles/Smartphone? Device of preference (for consumption)
3. You have heard a lot about tools for XR content creation now. Does the idea of such a platform (including tools and marketplace) encourage, inspire, or support you to create more XR content? (max. 3 min.)
4. What do you think are the strengths and weaknesses of XR content? (20 min.)
 - a. What do you think it needs to be regularly integrated in the news media?

All partners were then asked to organize such interviews with target group members. In the upcoming deliverables the results of more focus groups will be discussed.

3.8.3.1 Journalist focus group

DW organized a focus group on 21 October 2022, discussing the project’s vision and potential with five DW employees with different backgrounds; while all of them had a journalistic background, their current tasks also include content strategies, marketing, and audience development.

In summary, so far DW mostly has been using AR which the participants perceived as ‘nice but gimmicky’, not necessary. They did not know of any plans to expand to other XR technologies as these were often viewed as complicated and too expensive. Some journalists, however, saw potential in XR and found that it would make sense to incorporate it in news media. XR could be a new and promising way of storytelling and could give end users new possibilities to access a story and/or a subject. The participants agreed that one major added value of XR in journalism would especially be the option to take users to places where they cannot go (e.g., monuments that were destroyed by some sort of disaster or are in areas the end user could not reach. The reasons might include physical disabilities, political restrictions, and others) and/or allowing them to interact with objects that they could not touch in real life (e.g., art objects that they would see only from two or three sides in a museum but could turn in all directions in AR).

The possibility to create 3D models of objects, buildings, and complete environments to visualize situations and allow interaction and the option to provide location-based AR experiences were perceived as providing most added value to journalistic storytelling.



Most of the participants thought that a platform like the one XRECO envisions can encourage journalists to create more XR content, however, they felt they would need to broaden their (technical) skillset to be able to use it, which was seen as an obstacle.

3.8.3.2 Content creator focus groups

In December 2022, FFP and Visyon held focus group interviews with people involved in content creation, mostly focusing on immersive content but also including traditional film production staff.

FFP's focus team comprised of broadcasters and producers who have been deploying the latest technological advances in real-life, challenging productions, as well as experts in technology development with a particular focus on multi-view capture, streaming and Neural Rendering technologies.

Visyon's group was composed of CGI developers and Tech Management professionals.

Both groups confirmed that their customers more and more often ask for XR productions and that XRECO's offers are very relevant to their daily work in multimedia production and the path that they see lying ahead.

The main conclusion from FFP's focus group was that the "need for XR/AR/VR experiences comes from the fact that the passive viewer activities, like watching a TV show no longer entertain a new generation of young audiences whose attention need to be captured by parallel interactive experiences supporting the original broadcast content. As such, interactive second screen experiences, novel cross-media targeted ad campaigns are where we see most value. In particular, the XRECO tools and database will enable SMEs working in this sector to gain access to ready-made assets, production methodologies (such as 3D model construction with NeRFs, and location-based content retrieval) all of which and more are adding to the high-quality outcomes [their] clients have come to expect."

The main outcome of Visyon's focus group was that their participants "would like to have tools that allow us to create and develop XR content without the need for extensive technical knowledge. They were excited to think that AI could be part of the process to help generate and edit content. This would extend the use to profiles that are not only 3D technicians (modelers, renderers, etc.). In addition, the possibility of obtaining assets and generating content immediately would speed up the delivery of material, as this 3D technical profile would not be required for the creation of XR content. In many cases, this would mean a saving in time and money."

Further focus groups will be conducted during the project to keep an eye on the users' needs and pain points. Project partners will invite colleagues from their networks – the diversity of the consortium will guarantee that the participants will cover a broad range of target areas.

3.8.4 User interviews

A user interview is a type of qualitative research that is used to gather insights and feedback from real users about our product, service, and experience. In XRECO we will use user interviews as another method to validate our value proposition in conjunction with JBCs, focus groups, and internal interviews.

The aim is to analyze and identify common themes, patterns, and insights. As to consider how these insights may impact XRECO and to iterate and improve defining the best exploitation options based on customer and user insights. Thus, keeping an eye on the best product-market fit possible and designing for this in a human driven way.



The first round of user interviews will be planned in the month leading up to JBC#1 and serve as input for the Joint Business Clinic. We will use snowball sampling and ask consortium partners to refer us to promising potential users already in their network.

3.9 Minimum Viable Product

The Minimum Viable Product (MVP) is a product with the bare minimum, yet essential, features that provide value to customers. The MVP of XRECO is an ecosystem for frictionless and permissioned 2D and 3D content transformation, creation, curation, and transaction, streamlined and efficient integration of technology results in improved content creation and search, and thus a more efficient pipeline for customers and users. It is yet too early to make any meaningful assumptions based on this proposition and as such the current preliminary value proposition is to be validated and evaluated by advisors, business experts, and potential customers through feedback and testing.

The results of these evaluations will help the XRECO consortium understand what features of the XRECO ecosystem are necessary to address the core problems of specific user groups and bring the product to market.

This section will be updated over the coming deliverables with new validated customer and user insights and data. Topics will include *key features*, *unique selling points*, and *technical features* to be included in the XRECO MVP.

To facilitate this process the consortium will use the MVP canvas and method designed by Bram Kanstein.⁴⁷ The MVP Experiment Canvas is a practical framework that offers us a structured approach for designing and launching the XRECO MVP to validate our exploitation options and business ideas. Over the course of the next consortium meetings this canvas will be created and included in the next deliverable D6.2.

3.10 Concluding remarks on exploitation

This section has given an overview of our proposed exploitation strategy for XRECO. Our aim was to provide a clear and effective plan for realizing the project's results and maximizing their benefits for customers and markets through Human-Centered Design. To achieve this, we have outlined six core components that are essential for identifying the appropriate value proposition(s). Through this approach we can maximize the benefits of our solution for customers and partners while also positioning ourselves for future growth and success.

The XRECO exploitation strategy will begin by defining current needs, how we could deliver benefits to customers and markets in the future, and how it could be jointly commercialized and monetized. We believe that our exploitation approach will lay the foundation for future market opportunities. As the XR market continues to evolve and grow, we anticipate a growing demand for solutions that enable seamless and permissioned collaboration and interaction across different stakeholders, such as distributors and consumers.

One of the key elements of our exploitation strategy is to identify the appropriate business model(s) for our ecosystem. We recognize that different types of ecosystems require different approaches to monetization. Based on the insights on ecosystem monetization shown in [Section 2 Market analysis](#), we have identified three essential elements: a keystone contribution, a tollgate mechanism, and a

⁴⁷ Kanstein, B. (n.d.). The MVP Experiment Canvas. Retrieved from: <https://themvpcanvas.com/> (last visited on February 22, 2023)



mechanism for innovation and renewal. These elements, together with our value proposition and other aspects of our preliminary Business Model Canvas will be (in)validated during upcoming individual consortium plans, user interviews, and JBCs.

In addition, we aim to design a Minimum Viable Product (MVP) that meets the needs of our target users and addresses the current challenges in the XR ecosystem. The MVP will be designed to demonstrate the full potential of our solution and generate interest from potential customers and partners.

The important next steps leading up to D6.2 will be:

- We will organize our first Joint Business clinic and use results to (in)validate current insights on value proposition, target segments, BMC, and MVP. We will cocreate with participants to brainstorm potential concepts to understand how XRECO can solve their current or upcoming problems within the next three years.
- The creation of Individual exploitation plans for each consortium member and map joint exploitation opportunities based on this data.
- As WP6 we will design a standardized capacity building framework for learning modus. And select and create the first of five eLearning modules for capacity building in relation to the XRECO solution.



4 Dissemination and communication

We have developed a comprehensive communication and dissemination strategy to inform and engage the target audience, including research institutions, consortium partners, and the XR industry. Several communication tools were implemented, including social media channels, a project website, and physical events to promote and successfully disseminate the project's goals and outcomes.

Overall, XRECO has made progress in raising awareness of the project among the XR community and is building an online community around the project. Efforts will need to continue and expand during the remaining project lifetime. In this section we will give an overview of current and future activities for dissemination and communication.

4.1 Specific objectives

"Dissemination and Communication" is used not only for general publicity of the project, but also for focused dissemination to target groups yet to be defined. An important component of these efforts is to develop a coherent narrative that provides a good and, above all, comprehensible basis for the explanation and communication strategy.

4.2 Metaphorical narrative

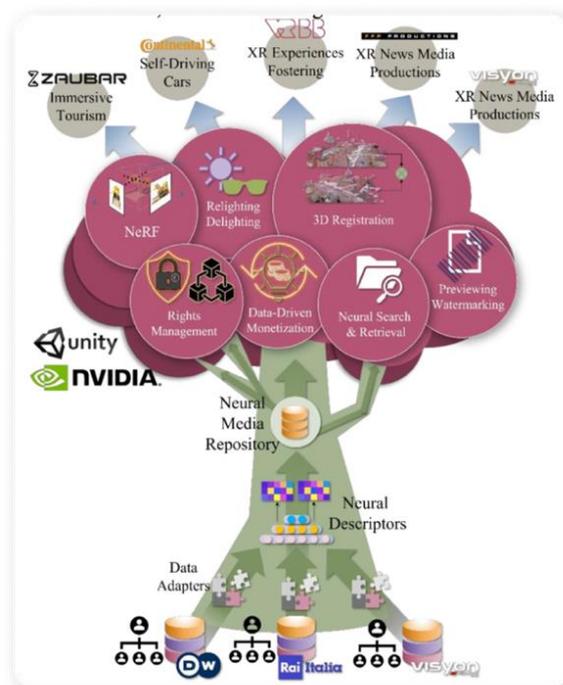


Figure 17: Tree metaphor visualization representing the ecosystem

tools but also to communicate complex content and make XRECO attractive and accessible to a diverse audience. In addition, the communication efforts and channels act as input for suggestions, feedback, and discussion.

A potential metaphorical model was conceived early in the project and has already been applied.

In the proposal as well as at the first events a metaphorical reference in form of a tree served as a visualization and narrative approach to elaborate the DNA of the project. From the roots that represent the data adapters up to the leaves representing several components that are part of the XRECO project.

Based on feedback from consortium partners, external experts, and potential future customers we will endeavor to adapt the visualization approach to the USP, the value proposition, the keystone proposal, tollgates, etc. First steps have been initiated by obtaining desk research for various visualization approaches.

Based on the identification of the target groups, an online as well as an offline strategy is formulated. Activities on both levels allow XRECO's visibility, reach and influence to grow continuously. They serve not only as promotional



4.3 The XRECO dissemination & communication strategy

The communication and dissemination strategy consists of four basic pillars:

1. the goals
2. the target segments
3. channels & content
4. team & process

The goal of the communication & dissemination strategy for XRECO is to create, address and engage an interdisciplinary audience that will support the project and ideally act as a multiplier for the entire project. The project's communication strategy will aim to inform research institutions, consortium partners, and XR industry representatives as well as news media industry about its existence and goals by explaining, presenting, and showing results. In doing so, XR technologies will also be made interesting to people who do not yet work with them, who are, for example, active in the tourism or automotive industries, by showing demonstrable successes of the technologies after the initial prototyping phase.

The communication strategy will also convey the interconnectedness of the XR industry, science, and culture/entertainment as a holistic XR ecosystem. Over a three-year period, the audience will continuously grow on the various platforms, benefiting from the existing networks of XRECO staff. The success of the communication strategy will be monitored regularly and evaluated by documenting and validating the KPIs defined in the proposal.

XRECO's communication content is aimed at various identified and potential target groups. The focus is on news media, tourism, and the automotive industry. However, it also includes individuals and companies in the fields of engineering and manufacturing, architecture, real estate and construction, education and culture, medicine, awareness and reporting, communications and social interaction, arts and storytelling, retail and advertising, gaming, and live entertainment and experiences.

XRECO can also be used as inspiration for students in tourism, entertainment, history, computer science, game design, media design, and architecture.

The communication channels that will be used to disseminate the XRECO project are Instagram, YouTube, LinkedIn, and Twitter but the newsletter as well as scientific publications on various platforms are used. Among other communication formats, the members of the consortium will be introduced via social media to give XRECO a face and make it accessible. Planning meetings and key development steps will be communicated via social media and the newsletter to provide a "behind the scenes" look. XRECO will also make public appearances at numerous events to publicize the project. Materials suitable for publication will be shared on various platforms.

The production of content is aligned with the development of the project, with VRBB asking consortium members to curate material that embodies the goals of the project. Coordination within the team is done through Trello, and the strategy is systematically evaluated based on KPIs to ensure that the communications plan is aligned with both the project goals and the target audience.

All in all, the communication strategy for XRECO aims to create an interdisciplinary audience and to communicate the connection between the XR industry, science, and culture/entertainment as a holistic XR ecosystem. This involves addressing identified target audiences in a deliberate manner.



4.3.1 XRECO personas on the basis of target segments

Understanding the target audience is a critical step in ensuring communication and dissemination success because it helps tailor the content to their specific needs and preferences. By gaining insights into the characteristics, behaviors, and motivations of the target audience, effective marketing strategies can be developed and improve overall reach of the project. To achieve this understanding, we will create personas. These personas will be developed iteratively and continuously, based on new insights and data, (in)validated and updated over the project lifetime.

Based on insights gathered in [Section 2 Market analysis](#) and [Section 3.8.1 Target segments](#) three personas that correspond to the news media industry, tourism industry, and automotive industry have been developed, see [Annex II: XRECO personas](#) for the illustrations and descriptions.

It is important to say that throughout the lifespan of the XRECO project not only nuances of the user personas might be adjusted but also additional aspects might be added or created. It is possible that additional application purposes can be identified that are in other market segments than already identified ones. The personas serve as a tool for thinking about, generalizing, and pinpointing target segments and can only summarize the heterogenous nature of these groups in real life.

4.4 Communication tools (online and offline)

The XRECO dissemination and communication strategy is relevant both online and offline.

The latter will mainly be in form of events and activities focusing on interaction and exchange. Trade fairs, conferences, workshops, tutorials, and other relevant events will be leveraged, visited, and created to communicate and disseminate the XRECO project.

However, in the age of digital media and in the context of an XR ecosystem, the online strategy takes on a special significance.

It is divided into general tools such as the newsletter or the website on the one hand, and social media tools on the other.

4.4.1 Online

4.4.1.1 General tools

The general tools include a basic toolkit that can be used by all Consortium members. This guarantees a visually uniform presentation of XRECO internally and at official and public events.

A uniform design identity has been created. Besides a logo, colors and font have been defined, and a variety of mesh gradients has been created and determined that serve as backgrounds for slides and visual representation materials like banners, brochures, and rollups. Furthermore, a template for presentations has been created for the consortium partners to ensure a uniform visual appearance.

To keep our audience informed, we created a newsletter specifically for XRECO News which is promoted on the website <https://xreco.eu>. We used a newsletter distribution platform to manage our contacts, design layouts for the content, and distribute it effectively and centrally. This approach allows us to make the process of collecting contacts, creating engaging content, and distributing it to our subscribers more efficient.

Parallel to the newsletter a press distributor has been created, to save all press contacts for further strategic communication and dissemination.



The general toolset also includes a website:

<https://xreco.eu>. The website serves as a general dissemination and representation tool. Throughout the project, this website will be updated and filled with current and relevant content regarding the XRECO project.



Figure 18: The XRECO website

4.4.1.2 Social media tools

1. Instagram: [XRECO EU](#)

- Share visually engaging posts introducing the project and the consortium members and showcase the progress and results of the XRECO project. This can include photos and videos of the XR technologies in action, as well as behind-the-scenes glimpses of the research and development process.
- Relevant hashtags will be used in the posts to reach a wider audience, such as: #XRtech, #tourismindustry, #automotiveindustry, #creativity, etc.
- Engage with followers by responding to comments and messages, and reposting user-generated content related to the project.

2. YouTube: [XRECO](#)

- Use YouTube to share longer-form videos that provide in-depth insights into the XRECO project. This can include interviews with Consortium members, demos of XR technologies, and coverage of project events (as stated in the KPIs of the proposal, 2 videos > 5 min. length need to be produced).

3. LinkedIn: [XRECO](#)

- Introduce the consortium members of the project to give XRECO a face.
- Use LinkedIn to share updates on the XRECO project's progress, as well as relevant industry news and insights.
- Consider sharing thought leadership content, such as articles written by Consortium members, to establish the project as a thought leader in the XR industry.

4. Twitter: [XRECO EU](#)

- Use Twitter to share timely updates on the project's progress, as well as industry news and events.
- Use relevant hashtags to reach a wider audience and engage with other users in the industry.
- Consider using Twitter to live-tweets from events and conferences, to provide real-time updates to followers who are not able to attend in person.



Figure 19: Screenshots of current social media channels



The social media channels have been created to disseminate XRECO among the target groups and to establish an online community centered around the project.

LinkedIn will be leveraged as the communication channel to target key players in the car and tourism industries, but also in the media/creative industry as well as universities. The LinkedIn account will gather decision makers from the car industry with focus of innovation management and connection and infotainment departments, managers from the tourism industry that are running institutions or focusing on innovation as well as investors in the media landscape.

4.4.2 Offline

In addition to our online communication efforts, the XRECO project will also be disseminated and communicated through offline channels.

For this, physical event participation and organization will be undertaken. Besides trade fairs, workshops, conferences and meet-ups, we may also organize workshops and tutorials. This will be leveraged by offline media and communication materials.

As an example, the VRBB is planning to host the HIRA award show in Autumn 2023 in Berlin (<https://virtualrealitybb.org/events-projects/>). As this event attracts a relevant audience from the XR industry each year, it is a good opportunity to raise awareness of the project in the XR community. Parallel to the award show and the associated exhibition, premises of the respective venue may be used for workshops or presentations of the XRECO project. The concrete planning will follow in the coming months. The planning of the award show and the related exhibition has already started and the first talks with event venues and partners are in progress.

A wide range of printed communication materials will be produced to present the project and its results. The content will be created specifically to meet the needs of each channel or target group, using a clear and engaging approach.

4.4.2.1 Promotional materials

Brochures and factsheets are very useful at events to explain in detail the developments achieved.

The initial versions will focus on general information about the project (i.e., scope, objectives, and technologies to be developed) and technical insights into the pilots, while successive updates will be made to reflect the progress of the project and the results achieved. At least two brochures, with a total distribution of 800 copies each, are expected to be produced during the project. These brochures will be shared with the consortium so they can also have them printed and distributed at events. Furthermore, already created QR codes will be used in the brochures, which link directly to the digital channels, such as the social media channels and the newsletter.

In addition to the arrangement and production of conventional print materials, promotional materials are also going to be designed and created, especially for use at events. One to two banners and rollups will be produced, which can be utilized for large events and trade fair booths, as well as workshops and meetings.

4.4.2.2 Calendar of events

XRECO will be represented at several events. These can range from smaller professional conferences to large congresses, trade fairs, or award shows.

It is collectively and permanently recorded which relevant events are coming up and who of the consortium partners may participate in them and represent XRECO.



A list was made to keep track of events that consortium partners plan to attend. The list includes the type of event, so that the project can be promoted at events that align with its goals and target audience.

For this purpose, among other things, a list was created in which all partners of the consortium can register the events they aim to attend. This spreadsheet is easily accessible to all consortium members through the project's Sharepoint™.

In addition, the WP6 team continues to track relevant events, keep the consortium updated, and suggest attendance to relevant partners.

Type of activities	organised by XRECO	Name of Event	Date/Period	Place	Type of audience	Event web page	Participating partners	Partner contribution
Conference	no	Stereopsia	17.10.2022	Brusse	Technology, Re	https://stereopsia.com/	DW, i2Cat, Sound, VRBB	Project presentation
Symposium	no	Immersive Tech Week	28.11-02.12.22	Rotter	Technology, Bu	https://vrdays.co/	DW, i2Cat, Sound, VRBB	Project presentation
2023								
Symposium	no	XR SYMPOSIUM	02. Mar 23	Heidelt	Researchers, E)	https://www.srh-hochschule-heidelberg.de/	VRBB	Project presentation
Conference	no	ITB	March 23	Berlin	Tourism	https://www.itb.com/de/	VRBB, ZAUBAR	Project presentation
Conference	no	Hub.Berlin	28-29.6.2023	Berlin	Technology, Bu	https://www.hub.berlin/	VRBB, DW	Project presentation
Conference	no	South by Southwest in Berli	Summer 2023	Berlin	Technology, Mi	Still not out	VRBB, Sound	Project presentation
Conference	no	European Research and Inn	Sep 23	Online	EU, Research, I	https://ec.europa.eu/research-and-innovation/	VRBB, Sound	Project presentation
Conference	no	Slush	Nov 23	Helsinki	Technology, St	https://www.slush.org/events/helsinki/	VRBB, Sound	Project presentation /
Conference	no	Nordic VR Forum	Nov 23	Hamar	XR, Technology	https://www.vrforum.no/about/	VRBB, Sound	Project presentation /
Conference	no	Web Summit	Nov 23	Lisbon	XR, Technology	https://websummit.com/		Project presentation /
Conference	no	Stereopsia	18-20.10.23	Brussels		https://stereopsia.com/	Sound	Project presentation /
Conference	no	IBC	15-19.09.23	Amsterdam		https://www.ibc.org/	Sound	Project presentation /
Conference	no	AWE	21-22.10.23	Lisbon		https://www.awexr.com/	Sound	Project presentation /
Conference	no	Laval	12-14.04.23	Laval		https://www.laval-virtual.com/	Sound	Project presentation /
2024								
Conference	no	Re:publica	June 24	Berlin	Digitalisation, M	https://re-publica.com/de/	DW, VRBB	Project presentation

Figure 20: Screenshot of the event calendar

4.5 Obligations towards the European Commission

Most of the project deliverables are public and will be published on the project website in a dedicated section.

All the documentation must meet the EC communication requirements, especially regarding the HorizonEurope program funds. Any dissemination of results must:

- display the EU emblem and
- include the following text: “XRECO is an HorizonEurope Innovation Project co-financed by the EC under Grant Agreement ID: 101070250”.

These obligations were communicated and shared to the whole consortium. Furthermore, all the planned communication actions have to be presented and submitted for approval by the partners, before performing dissemination towards specified audiences.

4.6 Online actions report

The following numbers document the online activities from 10 October to 20 February (i.e., the last day of the editing process for this deliverable).

4.6.1 Website xreco.eu

XRECO launched the xreco.eu website on October 10, 2022 and recorded 780 page views and 426 visitors during the launch period through the end of the year. Most visitors accessed the website via



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desktop devices, with LinkedIn, Google, and Twitter being the main referrers to the website. However, the website was down for two weeks in November 2022 due to technical issues.

Between January 1, 2023, and February 20, 2023, the website received 286 visitors, 96.5% of which were new visitors, resulting in a total of 477 page views. Most visitors accessed the site from desktop devices, 83.7% from desktop devices and 16.3% from mobile devices. The top five referrers to the site were google.com, linkedin.com, google.com, bing.com, and virtualrealitybb.org/events-2.

4.6.2 LinkedIn

During the period from October 11, 2022, to February 20, 2023, the LinkedIn account recorded a total of 895 page views and 395 unique visitors. The account has 211 followers. This means that the LinkedIn account has already achieved the KPI defined in the proposal.

Visitor statistics during this period show that most visitors were from engineering, accounting, and business development (27.6%, 13%, and 12.2%, respectively). Visitors with an artistic and design background accounted for 7.1% of the total visitor demographic.

These numbers show that the content, as well as the project's campaigns to date, are engaging the target audience and have the potential to convert them into customers, partners, or supporters. By continuing to create valuable content and build a strong community, the communications strategy can leverage the LinkedIn presence to achieve its goals and build awareness further.

4.6.3 Twitter

The project's Twitter account was quite successful with a total of 5.2K impressions, 25 link clicks, 41 retweets without comments, 149 likes, and 15 replies during the reference period from October 11, 2022, to February 20, 2023. This indicates that the content shared on the platform is well received by the target audience and the account is successfully generating interest and interaction. However, compared to the LinkedIn account, there is still room for improvement. If the project continues to create engaging content and increase the reach of the account, it can continue to leverage Twitter to grow its online presence and achieve its goals.

4.6.4 Instagram

The project's Instagram account has posted 15 times, indicating that it is active and regularly sharing content. At this point, as it has only 72 followers. Instagram does not provide detailed insights into its performance. To build its following and increase its visibility on the platform, the account will engage more with its audience, using relevant hashtags, and collaborate with other accounts in the same industry or niche. By doing so, the account can potentially grow its reach and build a community around the brand. Also, more collaboration with accounts from consortium partners has a great potential to increase the number of followers and the overall awareness of the XRECO Instagram account.

4.6.5 Newsletter

The XRECO newsletter is an important tool to promote the progress of the project and to inform the target group about relevant news. It contains achievements, news, and other project-related information. The newsletter has shown good response, and there are plans to add a call to action to further increase participation. In addition, the newsletter acts as a mini report that is distributed



regularly to keep the target audience informed. Mailchimp was only used for one newsletter on October 26, 2022, and for the sign-up form on the website until December 15, 2022; since then, we have been using Cleverreach as our newsletter tool.

4.7 Offline actions report

As the project is in its early stages, there are not many results to report yet, but a few offline activities have been carried out already. We have not produced any information and communication materials such as brochures, information sheets, or roll-ups yet as it is still too early for these tools.

4.7.1 Project presentations

In order to be able to sufficiently represent the project in the context of lectures and presentations, a PowerPoint template was developed. This allows consortium members to create presentations quickly and efficiently in the context of new findings or other purposes within the XRECO program. Furthermore, this template ensures a high visual recognition value, particularly through the design language, which maintains the established corporate identity.

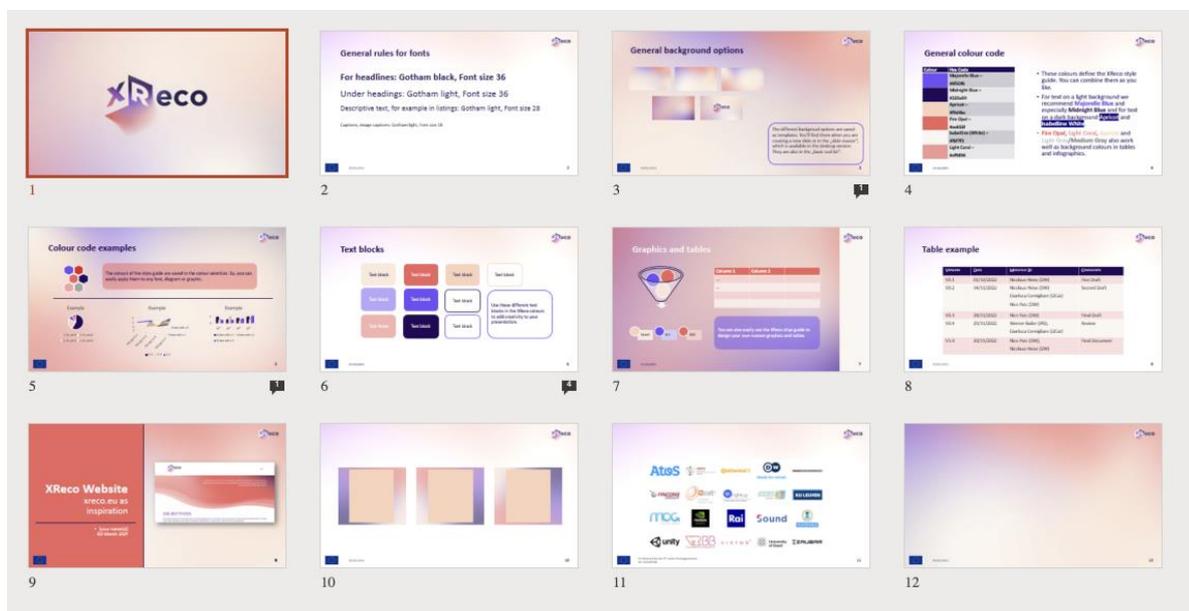


Figure 21: Overview of PPT Template layouts

4.7.2 Events

XRECO has already been presented to the European XR Community at two major events, Stereopsia in Brussels on 17 October 2022, only six weeks after its launch, and Immersive Tech Week in Rotterdam on 02 December 2022. Both presentations were met with interest and first connections could be made, some of which resulted in new subscriptions to the project newsletter.



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Figure 22: Nicolas Patz (XRECO's Innovation Coordinator, Deutsche Welle) presenting XRECO's project vision at Stereopsia



Figure 23: Marlene Bart (Managing director, VRBB) presenting the XRECO project at Immersive Tech Week



Figure 24: Patrick Lange (CEO, Sound) presenting the XRECO project at Immersive Tech Week

4.8 Concluding remarks on dissemination & communication

In summary, XRECO developed a comprehensive communication and dissemination strategy to inform and engage the target audience, including research institutions, consortium partners, and the XR industry. Several communication tools were implemented, including social media channels, a project website, and physical events to promote and successfully disseminate the project's goals and outcomes.

Overall, the XRECO WP6 team has made progress in raising awareness of the project among the XR community and has built an online community around the project. Efforts will expand with more results, activities, and demonstrators becoming available. To create a vivid community, we will continue to adapt and expand our communication and dissemination strategy to best reach target audiences and further increase awareness of the project.

This will include:

- The development of further communication campaigns, as well as collaboration with relevant industry partners.
- The creation of more offline materials, such as brochures and fact sheets, as content becomes more definable to support audience outreach at physical events.

Overall, with a strong strategy and commitment to continuous improvement, Communication and Dissemination is well positioned to disseminate research findings and engage with a variety of stakeholders.



5 Standardization

A flourishing ecosystem requires all participants to communicate. In technical terms, compatibility of components, formats, codecs, etc. is important so that data can be exchanged, and each service or technical component can use what is produced by another. XRECO aims to be open to exchange data from and to other existing technology and content providers. Therefore, multiple technology and research partners will follow relevant standardization activities and contribute requirements and propose solutions to various standardization groups.

5.1 Relevant standardization groups

Within the consortium we identified a number of standards to which XRECO can and will make substantial contributions. These are listed and described in the following chapters.

5.1.1 MPEG

Francisco Muran (UPM) is the Spanish Head of Delegation of ISO/IEC JTC1/SC29, and its working groups AG[1-5], and WG[1-8]⁴⁸, which includes JPEG and the collaboration between JPEG and MPEG, and also the Spanish advisor for MPEG-related matters since 2006. Concerning technical work, he has mainly been active in MPEG's 3D Graphics Compression subgroup (where Rai are also an active member), in which he co-chaired several Ad-hoc Groups (AhGs) in the past and has especially been following its activities on coding of point clouds and dynamic 3D meshes. Further, UPM could present in future MPEG meetings any improvements achieved within XRECO over their initial Free Viewpoint Video (FVV) system that already earned MPEG's praise in the past.

Werner Bailer (JRS) is co-chairing the Ad-hoc Group on Neural Network Compression, which currently finalizes v2 of the NN compression standard and monitoring starting activities on implicit neural representations of video content, which might build upon this specification.

5.1.2 AI standards

Current AI standards initiatives are ongoing on international level in ISO/IEC JTC1 SC42⁴⁹ and on European level in CEN/CLC/JTC 21⁵⁰. The addressed topics focus on establishing terminology and lifecycle of AI-based systems, trustworthiness, data governance and evaluation of AI systems. CEN/CLC/JTC21 has an important role in defining specifications for putting the upcoming EU AI regulation in practice. The specifications are expected to focus on data management and governance, transparency in the development of AI-based systems and evaluation methodologies, including measuring of biases introduced at various stages of the development process. JRS are involved in the Austrian Standards committee K001.42, which is the mirror committee of these European and international AI standards initiatives, contributing to the standards under development.

⁴⁸ For details see the structure of this standardisation group at <https://www.iso.org/committee/45316.html>

⁴⁹ ISO (n.d.). ISO/IEC JTC 1/SC 42 Artificial intelligence. Retrieved from: <https://www.iso.org/committee/6794475.html> (last visited on February 22, 2023)

⁵⁰ CEN-CENELEC (n.d.) Artificial Intelligence. Retrieved from <https://www.cenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/> (last visited on February 22, 2023)



Rai is involved in MPAAI (Moving Picture, Audio and Data Coding by Artificial Intelligence) where they are very active in several working groups dealing with virtual reality, augmented reality, 3D avatars, and the Metaverse. Results and outcomes of XRECO will be shared and discussed with this group.

5.1.3 VQEG (Video Quality Experts Group)

VQEG (Video Quality Experts Group) brings together international experts from industry, academia, government organizations, and Standard Development Organizations (SDO), with the general motivation of advancing the field of multimedia quality assessment by investigating new and advanced subjective and objective methods for assessing Quality of Experience (QoE), and its activities are documented in reports and submitted to relevant ITU Study Groups (e.g., ITU-T SG9, ITU-T SG12, ITU-R WP6C), and other SDOs as appropriate. Two researchers from GTI-UPM, Jesús Gutiérrez and Narciso García, are very active in VQEG, some of whose studies have resulted in ITU recommendations (e.g., ITU-T P919). Currently, several working groups within VQEG are addressing subjective methods, objective metrics, industry and applications, and support and outreach. Among them, the IMG (Immersive Media Group), which is chaired by Jesús Gutiérrez, works on quality assessment of immersive media, including virtual reality, augmented reality, 3D, free viewpoint video, plenoptic imaging, etc. Results and outcomes from developments, studies, and tests carried out within XRECO will be presented to this group through contributions.

5.1.4 Metaverse Standards Group

UPM and JRS are actively following the activities in the Metaverse AhG in MPEG.

NVIDIA, Unity, and VRBB are members in the Metaverse Standards Forum⁵¹ which according to its own website “aims to encourage and enable the timely development of open interoperability standards essential to an open and inclusive Metaverse.” This is not a new standards organization but rather sees itself as “a venue for discussion and coordination between standards organizations and companies building metaverse-related products, so that critical requirements for metaverse standards can be identified” and aims to support existing standardization bodies when it comes to developing standards for the Metaverse. This forum appears very relevant as many influential companies and organizations come together to define the requirements for the Metaverse (in this case apparently focusing on Meta who are among the principal members next to Google, Microsoft, and many others).

5.2 Concluding remarks on standardization

As shown in this section several partners have been active in various standardization bodies for years. This will bring two remarkable advantages to the project’s work. On the one hand, their knowledge of what is being discussed in the relevant work groups will ensure that XRECO’s activities are in line with the current developments. On the other hand, their active participation in such work groups will also enable the Consortium to specify needs of the XR industry and help bring such aspects on the way with future updates of these standards.

⁵¹ Metaverse Standards Forum (n.d.) Retrieved from: <https://metaverse-standards.org/> (last visited on February 22, 2023)



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7 Annex

7.1 Annex I: Individual Exploitation Plan

Part 1: Exploitation

Exploitation Questionnaire

Please provide a description of an individual commercial exploitation plan. Please consider the following points:

- **General**
 - Have disruptive technological developments changed your plans for exploitation?
 - Have your initial plans evolved due to first insights gained from the latest Market Analysis (D6.1), the JBC#1 and potential contacts/collaborations arisen with external participants and/or following the efforts launched made in defining a joint exploitation strategy?
- **Market focus & Business plan**
 - Update the markets you plan to address. Especially put forward if your individual plans include those markets which have been pre-selected for the joint exploitation strategy?
 - Please provide an updated Business Model Canvas for your individual exploitation of the project result(s).
- **Commercialization strategy** (*as much as you can share about it*)
 - Have you undertaken any IP protection measures over the last months (e.g., patent applications, design rights, copyrights, NDAs etc.)?
 - How will you approach prospects/potential costumers (high-level sufficient)?
 - What are the timelines for going to the market?

Description of non-commercial project results

Apart from the core components of the native pipeline, a number of additional project outcomes (e.g., new knowledge, data, findings, and processes, etc.) will be generated within XRECO that could contribute to the delivery of positive impacts of the project for the research community, Standardisation Development Organisations, and could therefore create impact on society in general. After the project closure, these results shall be reused by project partners or other stakeholders, thus contributing to the development of new products and services and/or future research and innovation initiatives.

Please report below on the specific actions you plan to put in place to ensure that those valuable results will be made available for future exploitation.

RESULT (OTHER THAN THE CORE COMPONENTS)	DESCRIPTION	EXPLOITATION MEANS (HOW IS THE RESULT GOING TO BE USED? FOR WHAT ADDITIONAL APPLICATION AREAS?)	CO- OWNER(S)	IMPACT EXPECTED FROM THE EXPLOITATION OF THE RESULT	NEXT STEPS / STATUS



Part 2: Validation Questionnaire

- **Section A: Business Idea, Product & Services**
 - What does your organization expect to achieve with XRECO?
 - How will this benefit your organization? (Example: new products/services, joint/partnerships, strengthening position in market)
 - Does your organization have existing scenarios which could generate revenue with future XRECO solutions?
- **Section B: Markets & Customer**
 - Could you list the markets or customers where you intend to exploit the results from XRECO?
- **Section C: Partner's Exploitation Plan**
 - Do you already have ideas to exploit XRECO outcomes?
 - How can you turn your ideas into actual opportunities?
 - What steps do you need to take to do so?
 - How will partnerships develop during and after the project?
 - Do you have an idea of the potential profit for identified opportunities?
 - Does the XRECO project open further research and development?
 - Have you identified future funding from national/regional sources to support your further research and development ideas?
- **Section D: Commercial value**
 - What results could be implemented and exploited in commercial products? In new services? Or in strengthening your position in the market?
 - Do you have an idea of the commercial values or estimated growth in 1-2 years and 3-5 years?
 - Finally, how will the results from the project improve your own business developments?
- **Section E: Community value**
 - How will you share the newly gained knowledge and expertise with the external community?
 - How will your outcomes and standardization works be exploited by your organization?
- **Section F: IPR protection**
 - How do you intend to market your outcomes generated by XRECO? (I.e., patent IPR, collaboration agreement, open source, or else)



