

ESTONIAN VIRTUAL AND AUGMENTED REALITY INDUSTRY IN 2022



Estonian Virtual and Augmented
Reality Association, May 2023

In January of 2023, Estonian Virtual And Augmented Reality Association (EEVR) carried out a **survey among 20 Estonian XR organizations** to study the state of the Estonian XR industry in 2022 and its future outlook. EEVR defines “XR industry” in Estonia as being made up of companies and institutions who use virtual reality (VR) or augmented reality (AR) technologies at the core of their service or product, or have the potential to easily do so in the future as “metaverse” gradually becomes mainstream.

The number of employees was picked as the most suitable metric to characterize the growth of the Estonian XR industry, because metrics typically used to evaluate this (such as total revenue or money raised) would provide a skewed picture for 2022. Estonian XR industry is showing significant potential for growth and innovation, **with a 72% increase in the employment from 132 people to 228 people from the end of 2022 to 2021**. Over half of the companies plan to hire also in 2023 and out of the 25 new positions, developers are most needed.

Estonian XR industry revenue grew from 4.1M to 4.6M (+12%) year-on-year. The entire two thirds of this revenue of 3.1M comes from CM Games, primarily from their hit game “Into the Radius”. **20% of Estonian XR industry’s revenue in 2022 (0.93M) came from Estonia and 80% (3.67M) from abroad**.

Revenue does not give us the full picture, however. Ready Player Me, one of the most successful companies of the XR industry globally, did not monetize last year while growing the number of apps and games connected to their interoperable avatar system from 1000 to 5000 (and to 7000 by the completion of this report). Additionally, **Ready Player Me raised a 56M series B round** in 2022 led by Andreessen Horowitz, which was 97%(!) of what all Estonian XR companies raised in 2022. In different ways, the gaming vertical continues to be the most lucrative, followed by experiences and e-commerce.

Out of the 20 survey respondents, 7 were educational institutions. Altogether they graduated **260 students who had obtained at least one XR-related skill** in 2022. It is encouraging to see that there are educational institutions in Estonia offering education and producing graduates with skills useful to working with XR technologies. We believe that investing in education and research is a key way to ensure that Estonia remains competitive in this field, and are hopeful that educational programs focused on design and development in XR in collaboration with companies successfully operating in the field will be created in the next few years.

Estonian Virtual and Augmented Reality Association has been active in promoting the Estonian XR industry at home and abroad, and for this has received positive feedback from its members and the community. The suggestions made by participants of the survey for creating further networking, promotion, and collaboration opportunities for them seem reasonable areas for EEVR to focus on also in the future.

The EEVR team
Märt, Eva, Rein, Vladimir

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I – Introduction

EEVR Mission and Objectives

EEVR was established in 2016 as an association of virtual (VR) and augmented reality (AR) enthusiasts. Over time, new terms such as mixed reality (MR) came about, giving rise to the use of an umbrella term XR (where X stood for any type of reality) which EEVR uses as well. As time passed, the field made significant strides worldwide, and in Estonia, more businesses and institutions began to focus on VR and AR projects. **At the start of 2021, EEVR underwent a transformation to become a new type of organization with professional members** that advocates for the interests of companies and institutions working professionally with VR and AR. Nine entities were the founding members of this re-envisioned EEVR, and as of the beginning of 2023, it now includes 18 member institutions.

EEVR strives to foster a thriving VR and AR ecosystem in Estonia, with a growth rate of 25-30% per year that matches the phenomenal success of the startup industry. The organization aims to achieve this mission by **undertaking several crucial initiatives**, including sharing Estonian XR success stories through press and social media, changing the public perception of AR and VR as purely recreational technologies, conducting an annual survey to track the progress of the industry, advising on RFPs and policies, organizing networking events, hackathons, and other community-building activities, collaborating with high schools and universities to raise awareness among youth about XR career opportunities, and potentially co-creating XR courses. Furthermore, EEVR aims to facilitate the exchange of information among stakeholders in the field, including procurement, job announcements, and consultations.

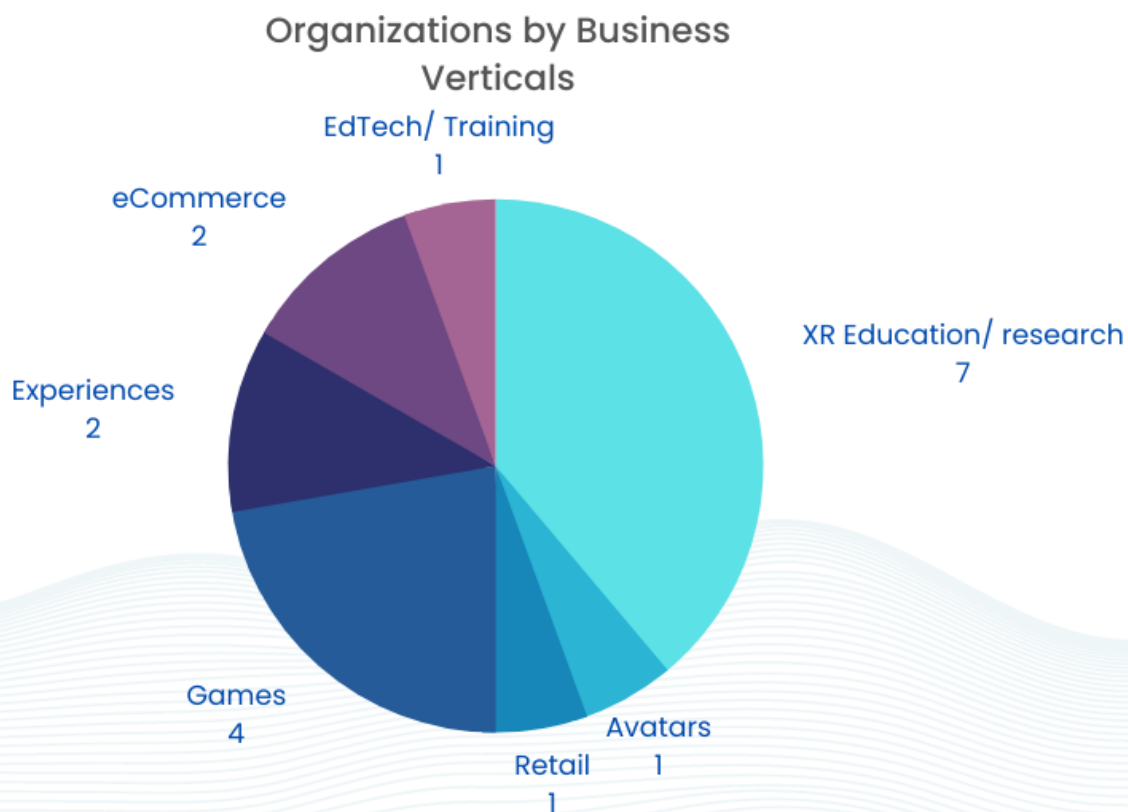
Goals of the Study

EEVR carried out a survey between January and February 2023, aiming to analyze the existing condition and future outlook of the VR and AR industry in Estonia. The survey focused on companies and public sector organizations operating in this field, and the findings are expected to provide valuable insights to both EEVR members and other stakeholders interested in this domain. By facilitating better interaction among the industry players, **it is hoped that this study will further boost the growth of the VR and AR industry in Estonia.**

II - Overview of Companies Operating in the Field of VR and AR

Participants in the Study

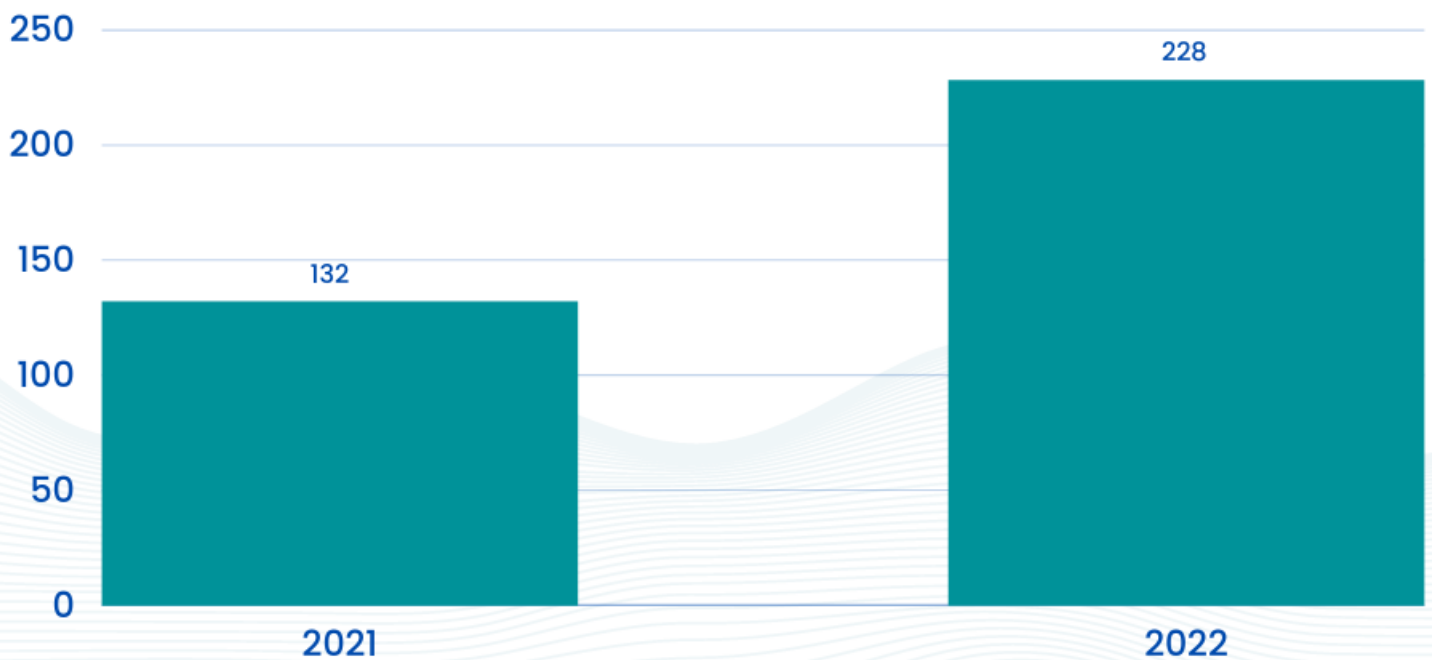
20 organizations operating in the field of VR and AR responded to the survey. The respondents included 13 companies, 7 universities or other educational institutions. The 7 organizations identified themselves as XR education and research providers, which indicates that XR education is being recognized and valued as an important field now and in the future. 4 out of the 13 organizations identified themselves as game companies. This suggests that game development is currently the most important vertical of the Estonian XR industry.



The Number and Composition of Employees of Companies

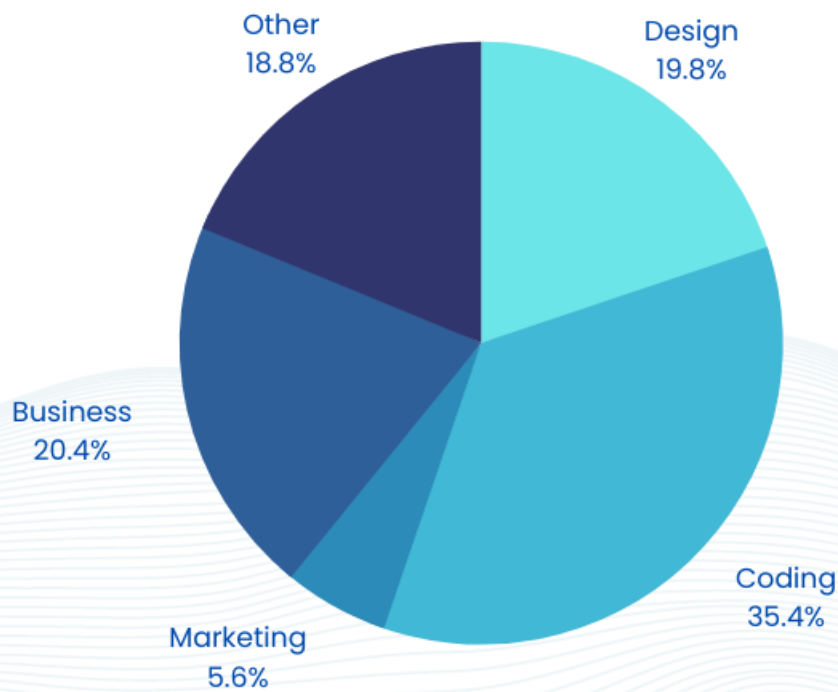
Between 2021 and 2022, the **employment in the Estonian XR industry experienced a significant increase from 132 people to 228 people. This reflects a growth rate of over 72% in just one year**, which is a remarkable accomplishment for the industry. The increase in employment in the Estonian XR industry is a positive indication of the industry's potential for growth and innovation in the years to come.

Employees in Estonian XR Sector



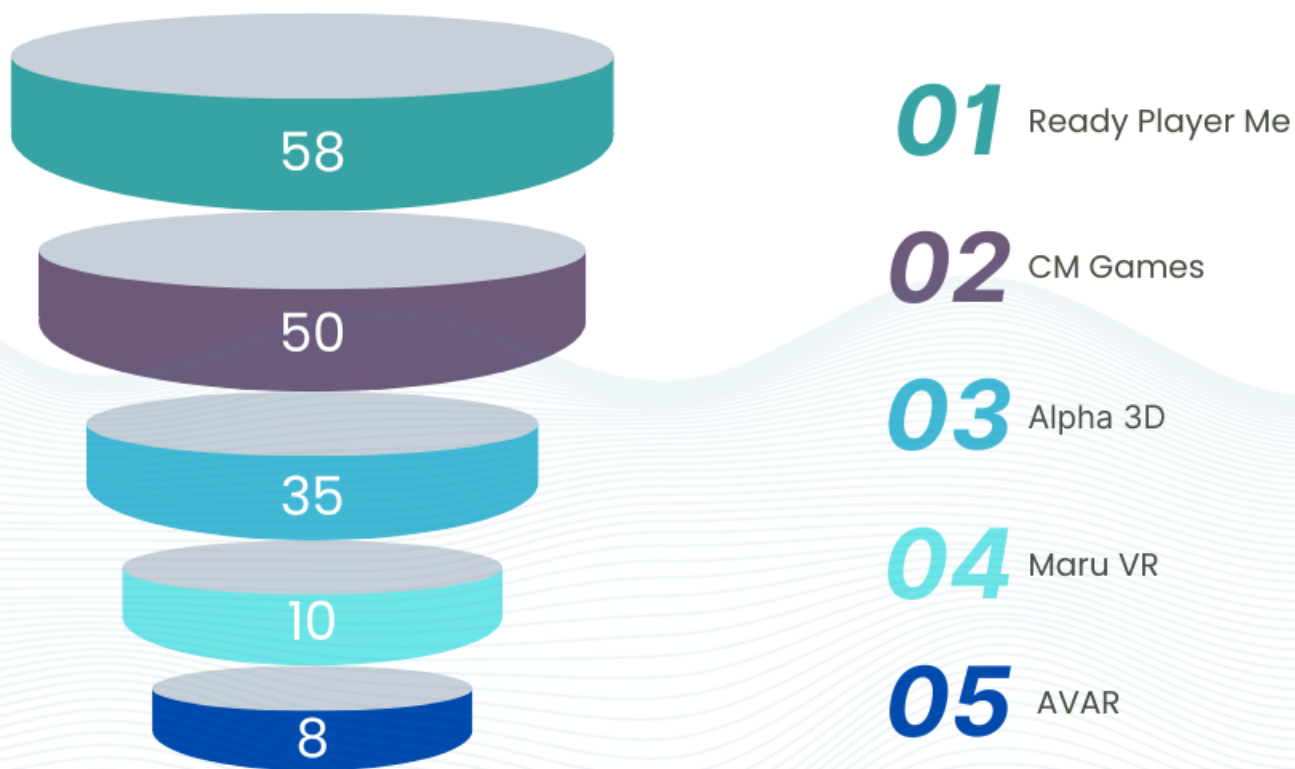
This year EEVR asked each respondent to divide up their employers into 5 categories by function: Design, Coding, Marketing, Business, Other. While the Coding segment being most common (35%) does not come as a surprise, the Design, Business and Other categories all making up approximately 20% of the workforce suggests that **there are many opportunities beyond coding in the XR field for those interested.**

Role breakdown



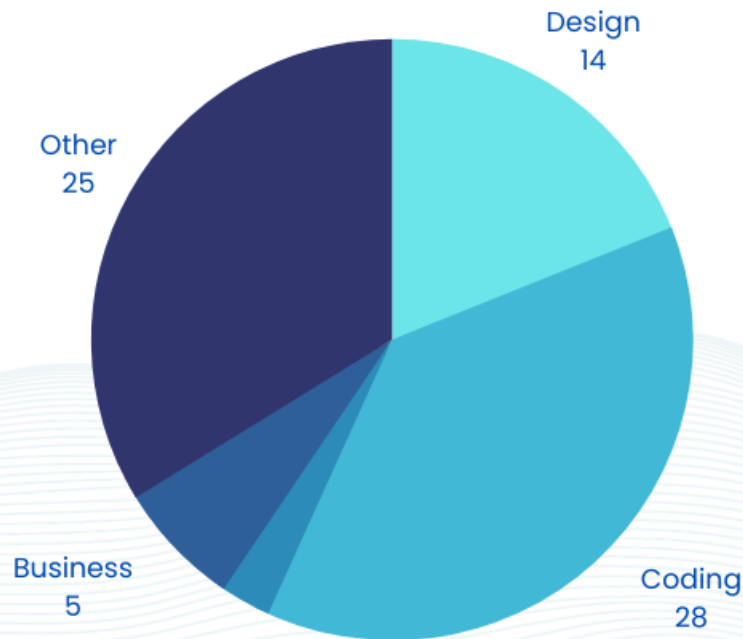
Although Estonian XR companies are still small in numbers, the trend of expansion in the number of employees is evident. In 2022 Ready Player Me had the highest number of employees with 58 (30 in 2021), followed by CM Games with 50 (30 in 2021) people working on XR-related projects, and Alpha3D with 35 employees (11 in 2021, rebranded from AlphaAR). The remaining companies employed 10 or less people. It is interesting to note that **top 3 XR companies employ 62% of the Estonian XR industry.**

Top Employers 2022



In total, **74 new people were hired in 2022**. In addition, Estonian XR companies worked with **73 subcontractors and part-timers in 2022**. The companies were primarily focused on expanding their technical capabilities in XR technology in 2022, with a significant emphasis on coding (28 new hires) and design roles (new hires).

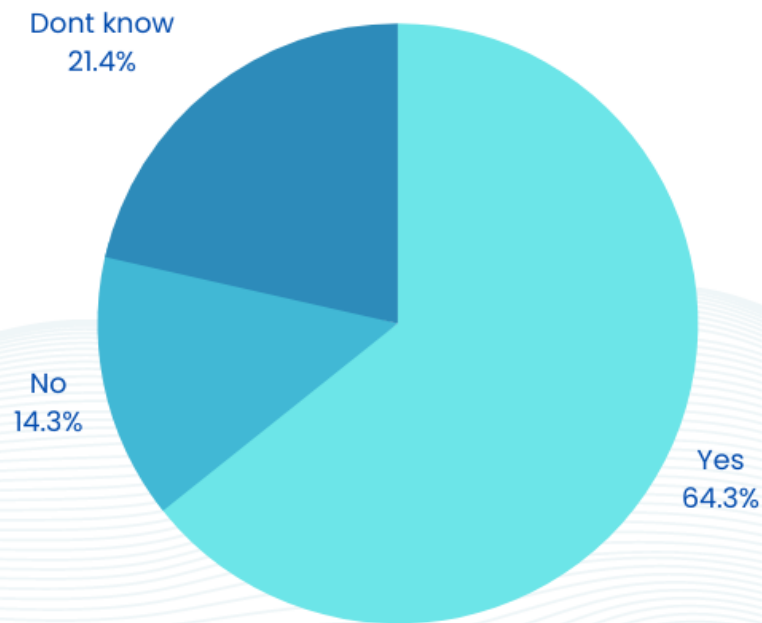
People hired in 2022 and their roles



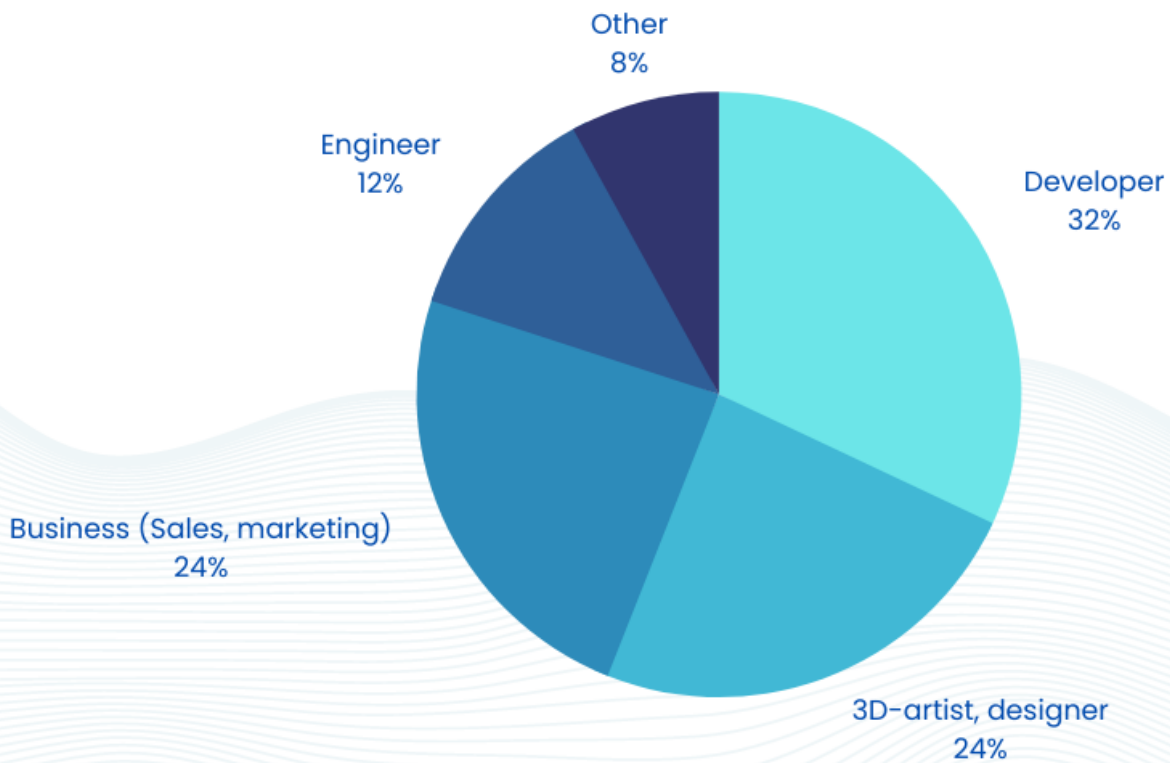
Workforce Forecast for 2023

Among 13 companies involved in the survey, 64% were optimistic and forecast the expansion of workforce in 2023. Only 14% were certain about not hiring any new people in 2023, and about 20% remained hesitant. Altogether **25 new positions are expected to be filled in 2023**.

Do You Expect to Hire in 2023?



Role Breakdown of the Employees Needed in 2023

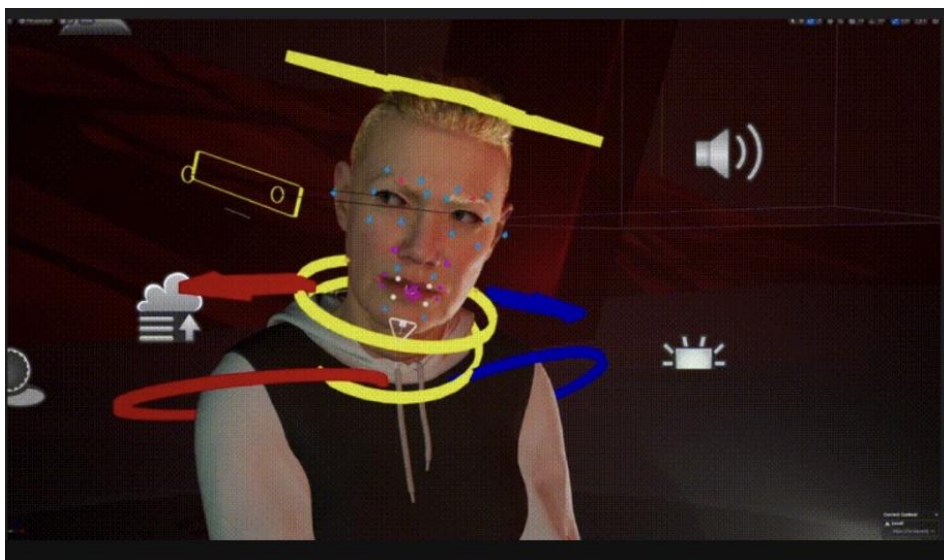


Best-Known Projects by Industry Verticals

XR Education / Research

Among the seven XR Education and Research Institutions who responded, a **variety of XR research projects were conducted in 2022**.

- The University of Tartu worked on DeltaVR, a project to represent the university in virtual space. The neuromarketing lab in the same university reported that their VR research was canceled in 2022 due to lack of funding.
- TalTech XR Lab developed various virtual environments for social and educational purposes, along with a VR CAVE and VR powerwall technology project for a participatory digital hub.
- BFM MEDIT is working on a teleoperation framework project for remote control of industrial robots using VR and AR, as well as multiple active research groups and projects focusing on XR and related topics. These include the Enactive Virtuality Research Group, led by Dr. Tia Pikka, XR research conducted by Marie-Laure Cazin, Ermo Säks, Abdallah Sham, Robert McNamara, and others, and Baltic Screen Media Review's issue on Metaverse.
- TTK University of Applied Sciences was working on a project involving visualizing building design project stages.



Development of an Installation called The State of Darkness II at Enactive Virtuality Lab

Games

CM Games flagship VR game **“Into the Radius”** was ported to and released on Quest 2 in September 2022. Although the porting from PC to Meta Quest 2 platform presented difficulties due to the game's extensive scale and complexity (extensively chronicled in [this UploadVR guest post](#)), the endeavor proved to be financially rewarding and well-received by the audience. **The total revenue of “Into the Radius” from both Quest and PC platforms made up two thirds of the revenue of the entire Estonian XR industry in 2022.**

In addition, CM Games launched a demo of their new VR game “Let it Boom”, which is a VR sandbox game that takes you on a journey to various surreal worlds in a van where you can wreak havoc on your surroundings. You have the ability to demolish entire buildings, smash objects with a baseball bat, and team up with your trusty allies - bombs. Additionally, you can spot elusive piñatas and give them a good spanking.



“Let it Boom” VR game by CM Games

Blueray worked on an AR game “The School Journey of Toots” for Palamuse museum.

The interactive reality game takes you to various places in Palamuse where you meet characters made famous by Oskar Luts. The game puts you in the shoes of Joosep Toots, adding an augmented reality layer to “real reality”.



"School Journey of Toots" augmented reality game by Bluray

Experiences

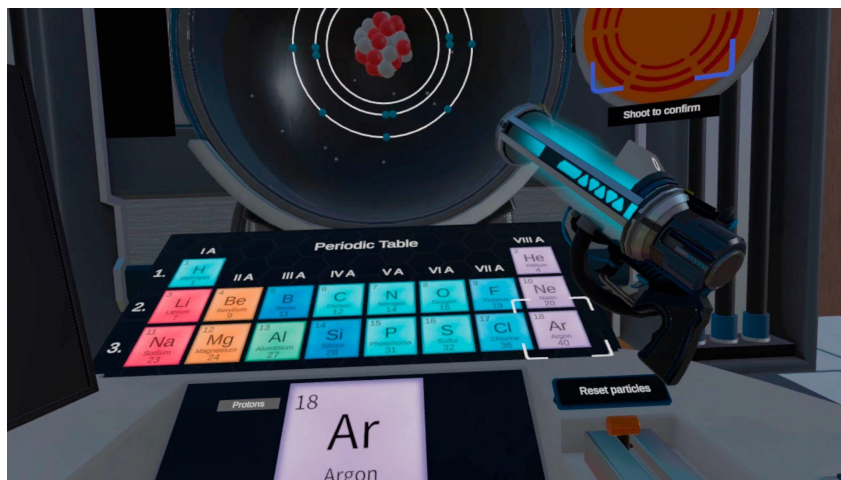
In addition to spending most of their efforts on developing **their first VR Game "Bootstrap Island"**, **Maru VR also worked on several VR experiences.** One of them, "Musical Journey" offers the opportunity to delve into the impact of migration and cultures on music. Through combining various music samples, ranging from blues to trap, you can create your own unique blends. Furthermore, the program provides insights into the evolution of instruments and genres, as migration has played a significant role in shaping diverse musical styles throughout history. This app (available for free on [Meta Quest's App Lab](#)) is also significant because it uses hand-tracking as its preferred form of in-game interaction.



Musical Journey experience by Maru VR Productions

EdTech

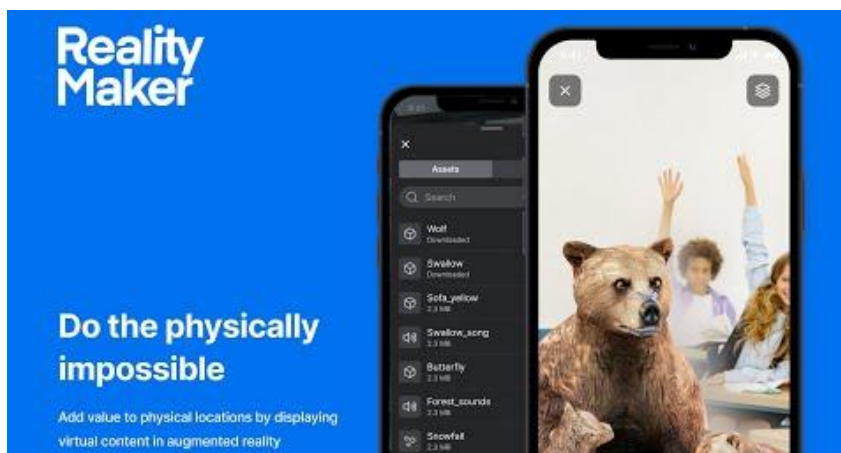
Futuclass released a consumer version of its most popular modules on Quest App Lab, Pico and Steam stores, and added 4 new modules to its ever-growing library of Chemistry and Physics VR games. Topics as complex as “Chemical Bonds” and “Redox Reactions” in Chemistry and “Electric Circuit” and “Nuclear Reactions” in Physics can now be learned through an interactive virtual experience. At the end of 2022, Futuclass was available in 10% of Estonian secondary schools, and was testing new markets in English-speaking countries.



Futuclass “Atom Structure” module

Augmented Reality

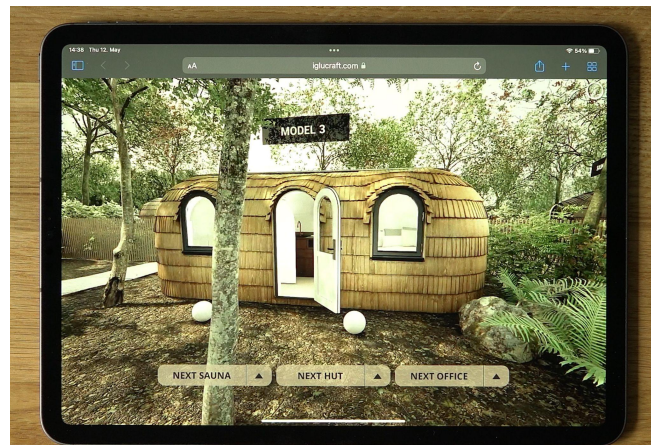
Mobi Lab launched its AR application Reality Maker. **Reality Maker harnesses augmented reality technology to offer immersive experiences in any setting.** By utilizing a smartphone or tablet as an augmented reality viewfinder, it enables users to view lifelike 3D renderings as extended content. With the convenience of its self-service editor, users can effortlessly add and modify virtual content, paving the way for virtually limitless creative opportunities.



Mobi Lab Reality Maker application

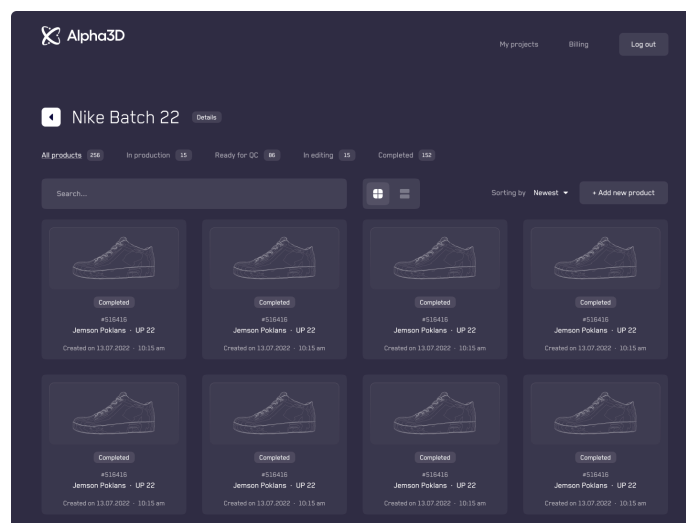
eCommerce

AVAR launched the AVAR One platform for virtual showrooms. AVAR's goal is to transform the way individuals engage with constructed spaces by leveraging state-of-the-art digital twin technology and virtual configurators. The industries where AVAR expects virtual showrooms to make the biggest difference include real estate, construction and prefab, modular office booths, wellness and furniture industries.



AVAR One Iglucraft Showroom

Alpha3D launched their platform to transform 2D images into 3D assets at scale in early 2023. The platform at first is focused on shoes, offering “AI Lab” method for creating 3D models of simpler shoes, and “Design Studio” method for shoes with complex contours and fabrics. Alpha3D has ongoing relations with a number of known tech firms such as Nvidia and electronic retailers such as Farfetch. Alpha3d raised 800k for their AI-driven 3D modeling platform in the spring of 2022, and thus are certainly one of the Estonian XR startups to watch in 2023.

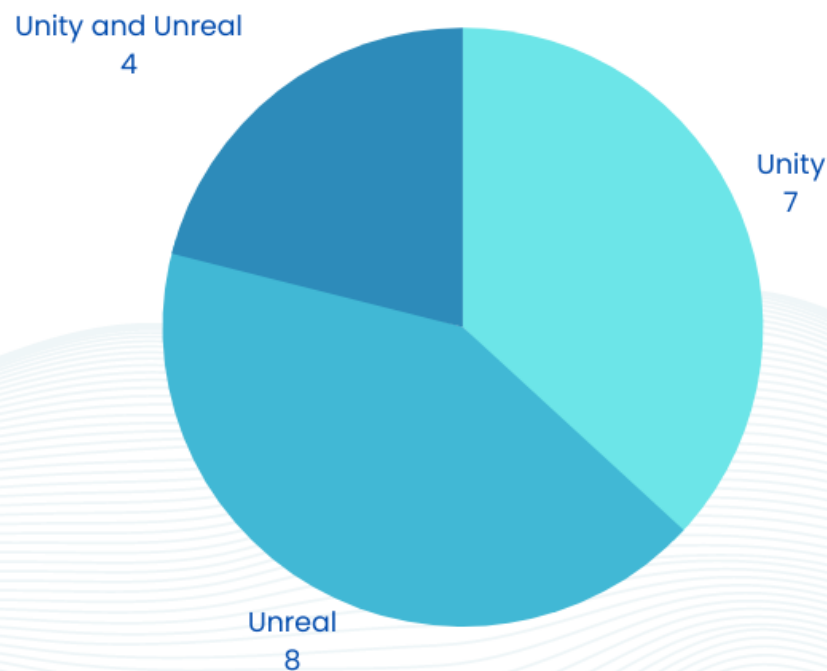


Alpha3D workflow of transforming 2D images into 3D objects at scale

Main Development Platforms

Both Unity and Unreal engines are popular choices for XR development, with no other engines being used by the survey respondents in 2022. Unreal, usually considered preferable for more realistic-looking higher-end productions, interestingly won out slightly with 9 to 8 uses out of 13 companies or institutions. 4 respondents out of 13 used both engines.

Development Platforms

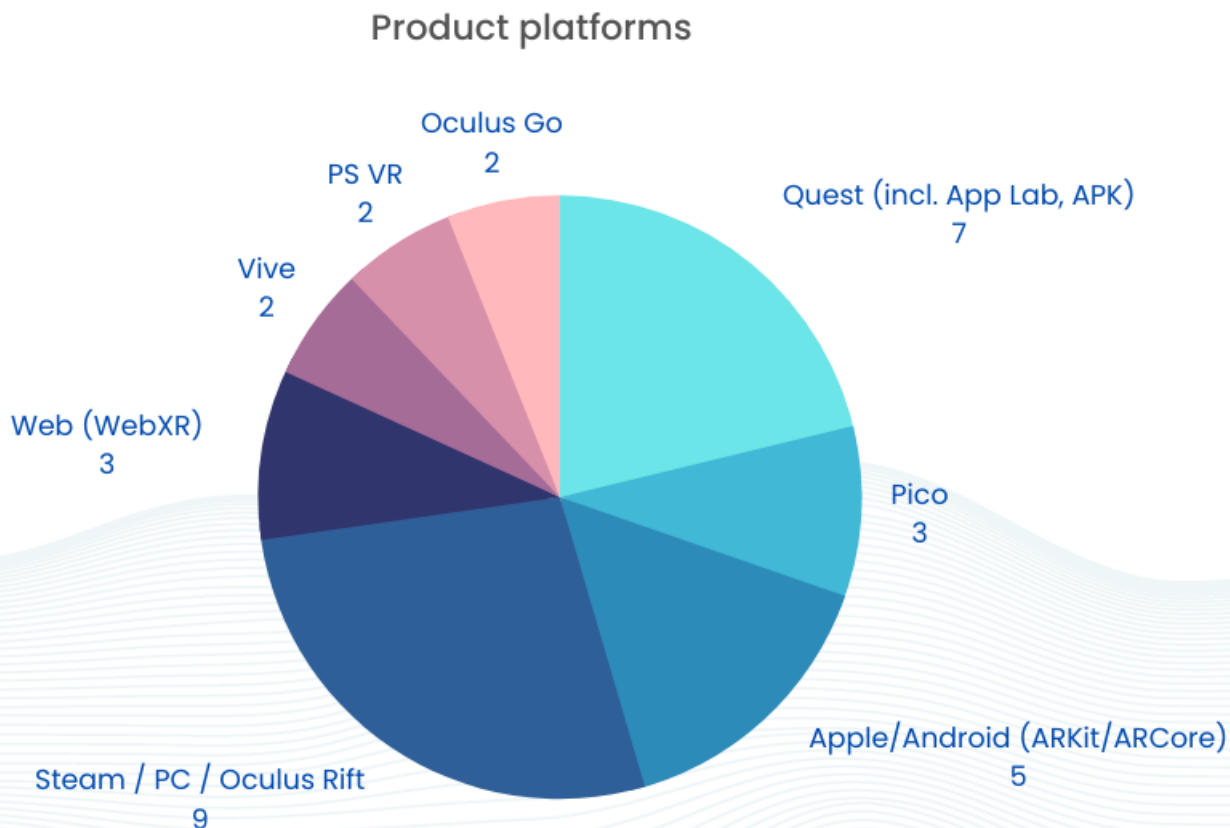


Among art packages, Blender was the most popular choice with 10 respondents using it. Substance 3D was the second most popular, marked by 7 respondents, followed by Maya and Houdini marked 4 times each. It is worth noting that Blender is a free and open-source software while the other packages mentioned are proprietary software requiring a paid license to use, which is likely to be a contributing factor to its popularity among XR developers.

Application Publishing Platforms

The most popular delivery platform for the Estonian XR Industry in 2022 was PC with 9 respondents. The second most popular is the **Meta Quest platform, including both App Lab or sideloading APKs** used by 7 respondents. These were followed by Apple/Android (ARKit/ARCore) mobile platforms with 5 respondents, and Pico and WebXR with 3 respondents.

The choice of platform depends on a number of factors dictated by the product and the audience, such as performance (favoring PC-based), headsets being tethered for security (PC-based), technological flexibility in development (PC-based), freedom of movement (favoring standalone such as Quest or Pico), deployment to a global audience (standalone), price (standalone, or 3 DOF such as Oculus Go), and more.



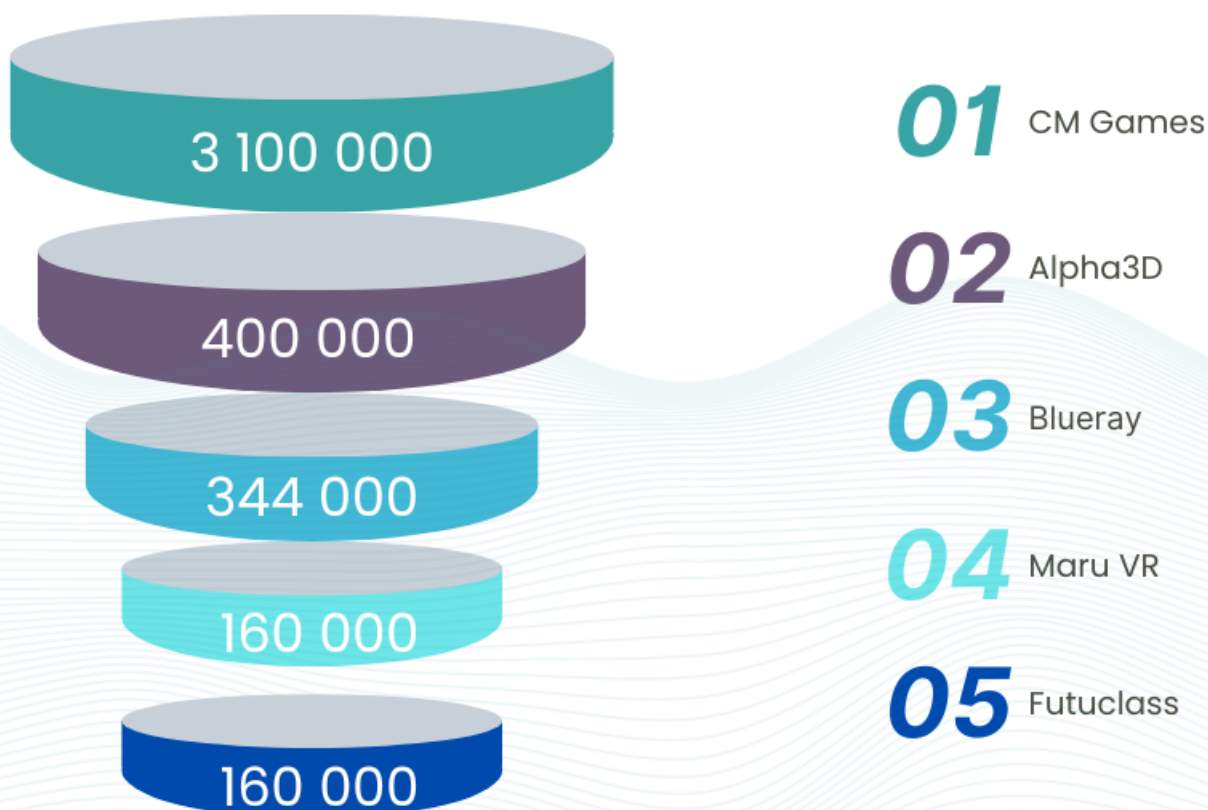
III – Economic Indicators of the VR/AR Industry

Total Revenue of Companies in the VR/AR Industry

The total revenue of the Estonian VR and AR industry in 2022 has been calculated based on the 13 respondent companies, and their sales revenue related to the production of VR/AR/XR content. The total revenue of the industry was **4.6 million euros, which is a 12 % increase compared to last year (4.1 million euros).**

CM Games accounts for approximately 67% of the total revenue of the industry, while both Alpha 3D and Blueray both contribute around 8% to the total revenue. The most widely known Estonian XR company Ready Player Me is not represented because they are still pre-revenue, in the growth phase. One of their main goals for 2023 will be to figure out how to effectively monetize their ever-popular avatar platform for the open metaverse.

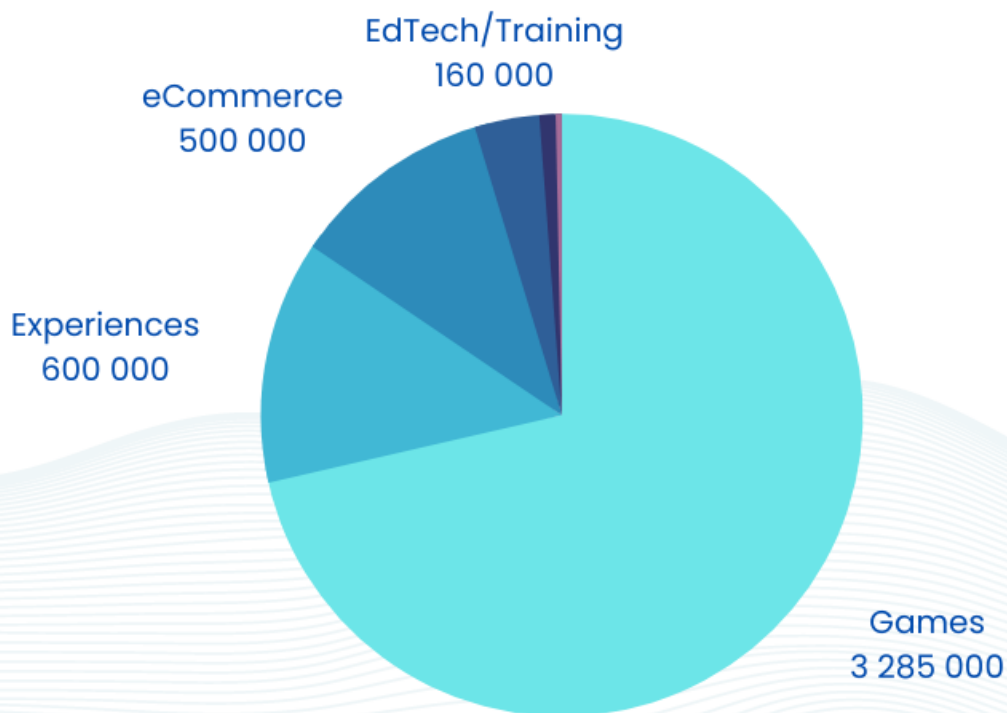
Top Revenue 2022



VR/AR Industry-Specific Revenue Distribution

Games were the most lucrative business vertical of the Estonian XR industry in 2022 with the revenue of 3,285,000 euros. **Experiences, including virtual tourism, museum exhibits, and other interactive applications**, generated revenue of 600,000 euros, making it the second most profitable vertical. **eCommerce, including XR shopping experiences and product visualization**, generated 500,000 euros, making it the third most profitable vertical. EdTech/Training generated revenue of 160,000 euros. The remaining verticals listed were Avatars and Retail.

Business Verticals by Revenue



Funding

Two Estonian XR companies raised venture funding in 2022, Ready Player Me and Alpha3D. At least 4 XR companies received various grants.

Ready Player Me, which offers a customizable 3D avatar creation platform for use in virtual and augmented reality experiences, secured a huge \$56 million Series B funding round led by a16z GAMES FUND ONE and a16z crypto, with participation from a range of other investors

including Justin Kan, co-founder of Twitch, and Kevin Hart's Hartbeat Ventures. The funding will enable Ready Player Me to continue expanding its platform and explore new applications for its technology.

Meanwhile, Alpha3D, an AI-driven modeling startup focused on creating 3D content for augmented reality, virtual reality, NFTs, games, and marketing, reached \$1 million in total funding after closing an \$800K seed funding round led by Curiosity VC and ZAKA Startups. The company's platform offers retailers a way to provide a three-dimensional view of their products to customers, enhancing the online shopping experience. With this funding, Alpha3D plans to improve its AI-powered platform and expand its offerings to new markets.

It is known that at least 4 companies received grants in 2022 for the development of specific projects, parts of their product or innovation outcomes. The size of each grant is not exactly known, but the typical range is between 50,000 EUR and 200,000 EUR. A note was taken to inquire about grants more specifically in the following year's survey.

IV – Industry Trends in 2022 and 2023

Year 2022 Trends According to the Respondents

Evolution in headsets

Pico 4 headset was released in 2022, which by many was seen as a positive step to finally have some competition to the dominant Meta Quest 2. Bytedance's deep pockets enabled Pico to catch up with Quest 2 in most areas and in some (such as form factor) to even leap ahead.

Meta itself released the Quest Pro headset for a heavy price tag of \$1500 (now going at \$1000). While it featured some great innovations (independently tracking controllers, wireless charging dock) the key features of face and eye tracking and colored mixed reality view have so far not captured as much of a creator audience as Meta would have liked. Perhaps once the software starts to fully make use of these features, the audience sentiment improves.



PSVR2 released in early 2023 and gathered great reviews from the gaming audience. Sony's first-party VR software is a reason to buy this headset, which if all goes well might still become the most popular 6DOF headset in the world.

Meta Accounts

For anyone developing VR content for business or educational clients, having to create dummy Facebook accounts which would be scrutinized as real Facebook users and therefore often blocked was a very time-consuming hassle. Since the fall of 2022, **Meta now allows simple**

email based accounts to exist and purchase apps, no further questions asked. It is a working solution until proper Business solutions hopefully emerge in the next few years.

Pixel Streaming

Lastly, pixel streaming was cited as the new technology that makes it possible to effectively stream light Unreal 5-quality experiences through a browser. As we will want our Metaverse experiences to work on all kinds of devices at the fidelity suitable to the device, doing the heavy lifting off-device and streaming back only the visuals will be very important.

Year 2023 Trends Expected by Respondents in 2023

Building towards the Metaverse will continue in 2023. There are a number of trends according to the respondents for which to remember the coming year.

New and better headsets

The most impactful event of the year will no doubt be the announcement of Apple's first XR headset, expected on June 5. This moment has been in the making for a number of years, and the specifics and the strategy Apple will outline in their approach to VR and AR will impact almost every XR vertical. Additionally, **Meta Quest 3** will likely be released in the second half of 2023, along with several other competitors in the standalone headset space including potentially one from Valve. **Lighter and more convenient headsets**, and **more affordable AR headsets** were mentioned by the respondents.



Most oftenly speculated design and name for Apple's MR headset

More Varied Content

General XR market growth, more and more **people spending more time in immersive experiences**, and therefore **quality content in other categories than entertainment** were all mentioned by different respondents. The current VR app stores, led by Meta, are promoting and prioritizing the development of different types of games. As the audience becomes larger and more diverse, **other categories such as education or social experiences should deserve more attention.**

Content creation via Generative AI

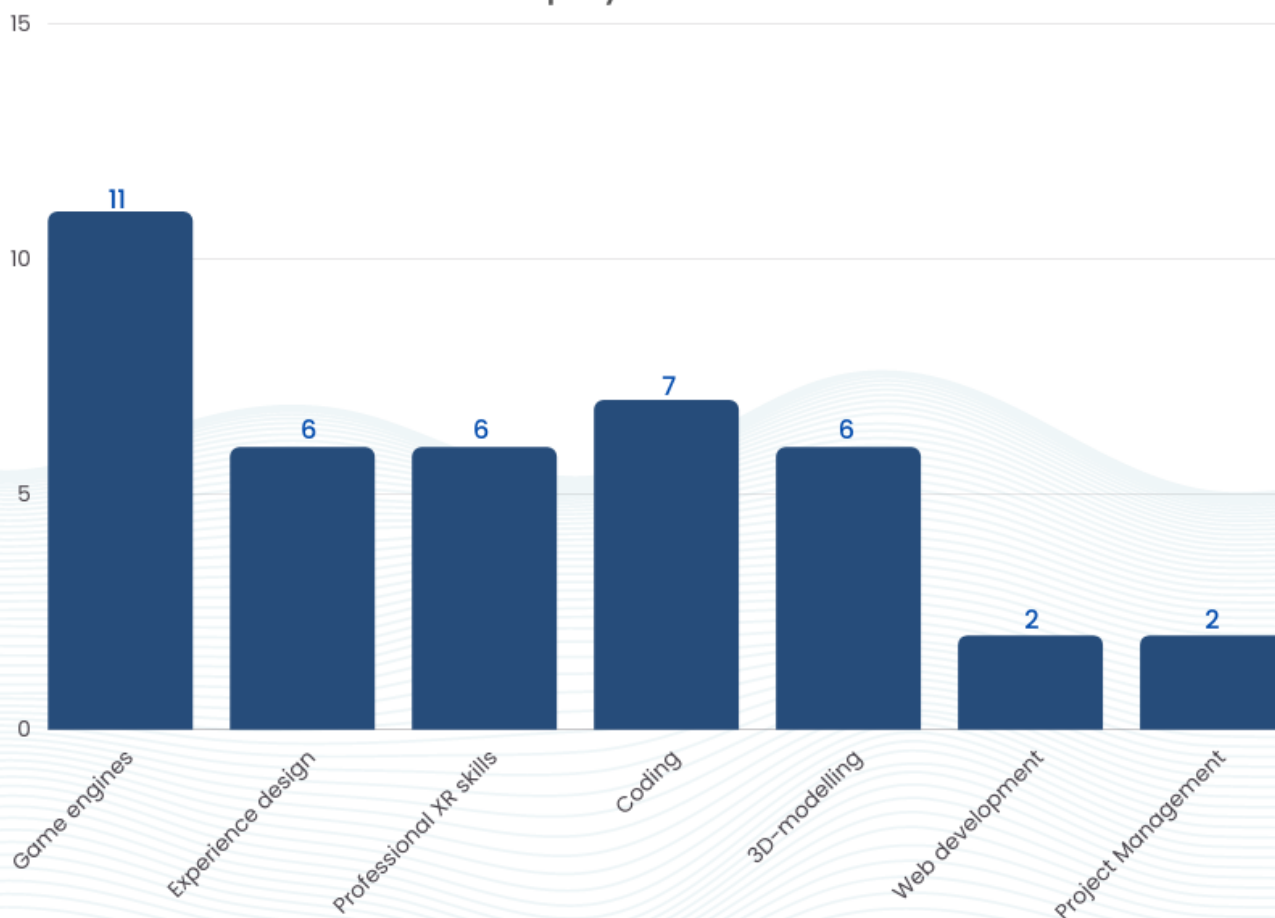
In line with the hottest trend of 2023, **generative AI is expected to dramatically speed up 3D content creation in development tools and immersive virtual worlds.** Additionally, adaptive 3D experiences based on personal preferences and data were mentioned.

V – Promoting the Evolution of the VR-AR Ecosystem in Estonia

Skills of the Youth Workforce

Since it is believed that companies will mainly have to raise the needed workforce in the coming years, the survey specifically asked about the desired skills of the youth workforce. The most important of these were **the design of VR/AR experiences and knowledge of game engines such as Unreal and Unity. Out of the 13 companies 5 brought out the lack of talent as the biggest bottleneck of their growth.** EEVR strives to contribute to the need for these skills to be increasingly taught in Estonian higher education institutions soon.

Desired XR Skills According to Employers



XR Education and Research in Estonia

Out of the 20 respondents to the survey **7 were educational institutions**. Altogether **they produced/educated 260 graduates** who had obtained at least one of the skills specific to the XR industry.

Depending on which institution a student attended, they could obtain the following skills related to the XR field: game design, experience design, engineering, 3D-modeling, architecture, crossmedia, practical XR experimenting, research, interaction design, digital learning games, and human-computer interaction.

XR skills Taught in Educational Institutions



EEVR Joint Activities

In 2022, **EEVR welcomed four new members: Alpha AR, CM Games, Greip Productions, and IVAR lab in Taltech**, and expanded its membership base to 20. We held **four meetups**, two in Tallinn and two in Tartu, bringing together professionals and enthusiasts to share knowledge and network. EEVR participated in and co-organized **four partner events**, including the University of Tartu Computer Graphics Projects EXPO 2022, Delta Career Day, AWE Nite: Eyes on Estonia, and Latitude 59.

XR Jobs page was launched on the EEVR website, aimed at connecting professionals with relevant job opportunities. Furthermore, EEVR also launched a **Discord server** and **EEVR Monthly newsletter**, providing a space for members to collaborate and stay informed about the latest developments in the industry. Lastly, members of the EEVR board made **nine media and other appearances**, including articles, talks, and radio/TV interviews, raising awareness about the potential of virtual and augmented reality in Estonia.

When asked what EEVR could do further, some common themes emerged. Several respondents suggest that EEVR could help with **networking by arranging events or meetups** where members of the VR community can connect with each other. Other respondents suggest that EEVR could **promote VR in Estonia by creating information campaigns**, such as preparing monthly blog posts that highlight Estonian XR companies and hosting XR-related events for outsiders. Collaboration opportunities also arose as a theme, with respondents suggesting that **EEVR could help companies find partners** interested in VR usability and eye-tracking. Overall, the responses suggest that **there is a desire for EEVR to play a more active role in promoting and supporting the VR community in Estonia**. This includes providing networking opportunities, promoting VR in Estonia, and facilitating collaboration opportunities.

Taking into account the suggestions made, EEVR has big **plans for 2023 that aim to further develop and promote the Estonian XR industry**. For example, EEVR plans to create a Courses page listing all XR education opportunities in Estonia, providing a valuable resource for anyone interested in learning more and entering the industry. In addition, one of the major plans is to work on an Erasmus+ project aimed at fostering cross-border collaboration with other XR industry players. We will also continue to organize local meetups and participate in partner

events to promote networking and knowledge-sharing within the industry. By implementing these plans, EEVR hopes to strengthen the Estonian XR industry and support its ambition to produce globally impactful XR companies.

Appendix 1 - Companies/Organizations that Responded to the EEVR Questionnaire

	Companies	Business Vertical	Home Page	EEVR Member
1	Acode OÜ	Games	www.acode.ee	Yes
2	Alpha3D	eCommerce/Metaverse	www.alpha3d.io	Yes
3	AVAR	eCommerce	avar.one	Yes
4	Blueray OÜ	Experiences	www.blueray.ee	Yes
5	Creative Mobile OÜ	Games	cm.games	Yes
6	Criffin	Experiences	cstudio.co/about-us	No
7	Envelope OÜ	Retail	www.envelope.vision	No
8	ExteriorBox OÜ	Games	www.exteriorbox.com	Yes
9	Futuclass OÜ	EdTech/Training	www.futuclass.com	Yes
10	Greip Productions OÜ	EdTech/Training	https://greipproductions.eu	Yes
11	Maru VR Productions OÜ	Games, Experiences	www.maruvr.ee	Yes
12	Mobi Lab OÜ	Experiences (AR)	https://lab.mobi	Yes
13	Ready Player Me	Avatars/Metaverse	www.wolf3d.io	Yes
	Public sector organizations	Business Area	Home Page	EEVR Member
1	TalTech, Mektory XR Center	Educational Institution	taltech.ee/xr-keskus	Yes

2	Taltech, Industrial Virtual and Augmented Reality Laboratory	Educational Institution	ivar.ttu.ee	Yes
3	TTK BIM CAVE	Educational Institution	www.ttkk.ee/research-and-innovation/testing-and-laboratories/institute-of-civil-engineering/virtual-reality-laboratory	Yes
4	The Computer Graphics and Virtual Reality Study Lab of the University of Tartu	Educational Institution	cgvr.cs.ut.ee	Yes
5	The Neuromarketing Laboratory of the University of Tartu	Educational Institution	neuroturundus.ut.ee/abouts/?lang=en	No
6	Centre of Excellence in Media Innovation and Digital Culture (MEDIT) at Baltic Film, Media and Arts School (BFM), Tallinn University	Educational Institution	www.tlu.ee/en/bfm/research/medit-tlu-centre-excellence-media-innovation-and-digital-culture	Yes
7	Tartu Art School	Educational Institution	www.tartukunstikool.ee/en	No