

Summary of the Current Status and Future Directions of XR Technologies Workshop

30th September 2020

Organized by The AREA, ETSI and XR4ALL

The webinar was hosted by

- Oliver Schreer, Fraunhofer HHI and XR4ALL
- Jan Pflueger, advisXR

The panelists were

- Susanne Ahmadseresht, nextReality.Hamburg
- Robert Hoffmeister, Goodly Innovations
- Isabell van de Keere, immersive Rehab
- Andrey Lunev, #xrcrowd
- Carlos Ochoa, ONE Digital Consulting
- Christine Perey, PEREY Research & Consulting
- Lars Riedemann, Shift Medical
- Rene Schulte, Valorem Reply
- Wolfgang Stelzle, RE'FLEKT GmbH
- Richard Ward, McKinsey & Company

1 Objective

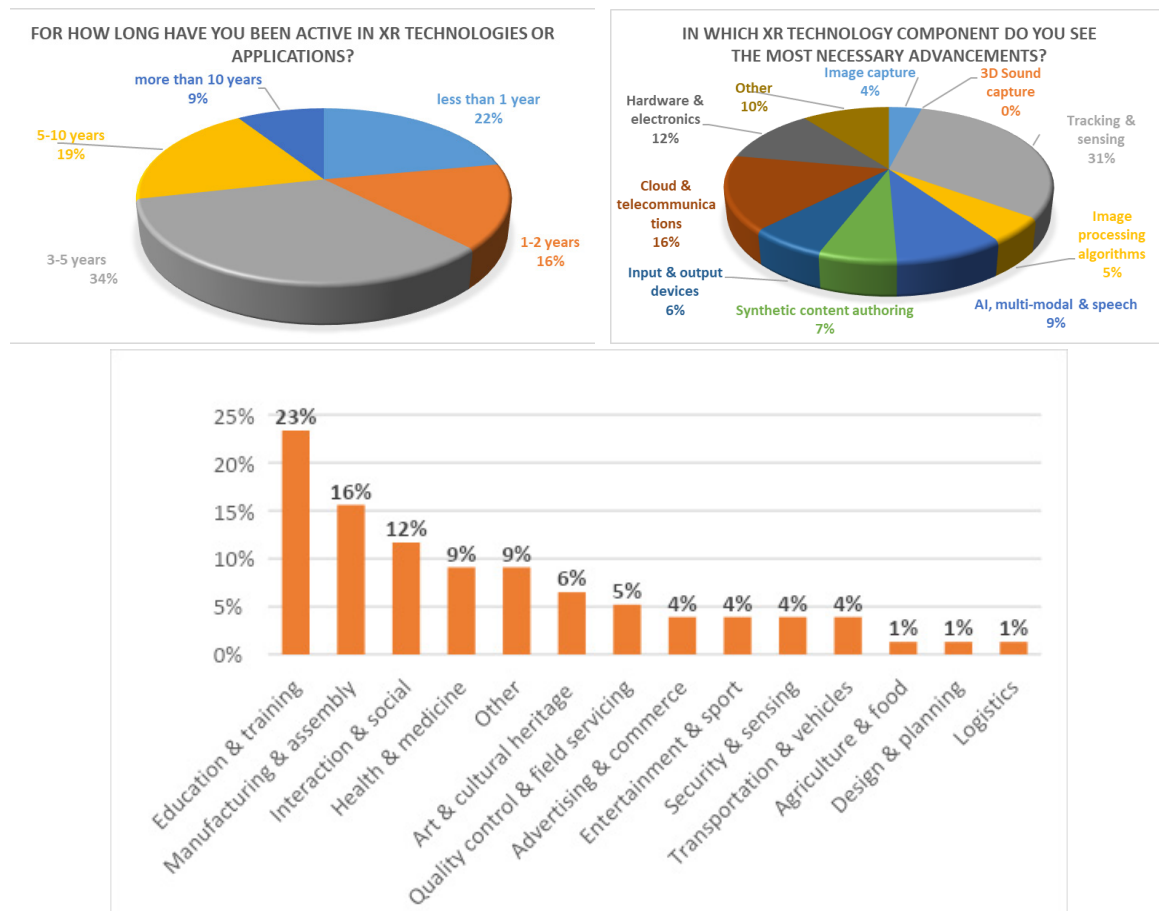
XR technologies are used in many areas. However, many challenges still need to be addressed before there is widespread adoption. The purposes of this workshop are to identify and gather opinions of experts about

- which challenges facing XR technologies are the greatest at the time of this workshop;
- how and when those challenges will be addressed;
- new directions and topics for research that will expand the future directions of the field of XR.

National and European level actions and funding requirements will be discussed to guide resource prioritization.

2 Pre-registration survey

In total, about 70 participants registered for the workshop. During registration, the participants were asked three questions in order to understand their levels of expertise, the requirements they have for XR technology and relevant industries.



Over 60% of the registered participants reported having more than 3 years of experience in XR technologies. In terms of XR technology components in greatest need for advancement: 31% of the participants consider Tracking & Sensing as the technology that most needs to advance before it will meet their needs, followed by Cloud & Telecommunications (16%) and Hardware & Electronics (12%).

With respect to the industries, which can benefit from future research and development on XR, one quarter of the participants consider Education & Training as the domain with the highest need for future research and development, followed by Interaction & Social (12%), Manufacturing & Assembly (16%) and Health & Medicine (9%).

This result is consistent with an earlier survey, which was conducted by XR4ALL in September-October 2019 and which was reported in the first draft of the research agenda D4.3.

At the workshop itself, about 35 participants joined as observers and the discussion facilitated by the moderators was between the ten invited panellists.

3 Panellist statements

In preparation for the workshop, moderators and panellists provided one statement concerning the topic of the workshop. The statements are as follows.

Susanne Ahmadseresht, nextReality.Hamburg: "XR can revolutionize the way we live and work today and tomorrow. It provides solutions for global challenges like the availability of labour, the transfer of knowledge and being environmentally responsible and sustainable. The fundamentals have already been set. Let's do this."

Carlos Ochoa, ONE Digital Consulting: "Empowering XR to accelerate the digital transformation of European industry and enterprises"

Robert Hoffmeister, Goodly Innovations: "XR and other technological innovations are emerging in this Industry 4.0 revolution. Without well-planned and managed expectations and roadmaps too many projects are doomed to fail or stay in a pilot phase forever."

Isabell van de Keere, immersive Rehab: "Immersive technologies open up opportunities for health and social care to create experiences and treatments that are currently less accessible in the physical world."

Andrey Lunev, XRBASE: "Key metrics shaping XR products are latency, fidelity and relevance."

Christine Perey, PEREY Research & Consulting: "Spatial Computing and AR Cloud will permit much richer services by leveraging distributed computing and data storage resources in low-latency networks."

Lars Riedemann, Shift Medical: "Next phase: Integrating Medical AR/VR into Clinical Routine"

Rene Schulte, Valorem Reply: "It's an amazing time to be alive and experience science-fiction technology becoming a reality with Spatial Computing and the AR Cloud powered by AI."

Wolfgang Stelzle, RE'FLEKT GmbH: "XR is driving the convergence of human and machines."

Richard Ward, Global lead Enterprise VR at McKinsey & Company: "In the right place, with the right group, it is magical. Everywhere else...it feels like a solution in search of a problem."

Oliver Schreer, Fraunhofer HHI and XR4ALL: "XR needs a Pan-European umbrella organization to reduce fragmentation."

Jan Pflueger, advisXR: "A common ecosystem based on trust will allow using the potential of XR and accessing the world beyond."

4 Panel discussion part 1: Future of XR - fields of action definition

4.1 Introductory talk by Robert Hoffmeister, Goodly Innovations

The pace of technology development is accelerating, hence interaction, discussion and information exchange must maintain focus on the needs of users at the center of XR technology development. The end-users and clients need to understand how XR technology will be applied and the benefit of XR adoption to enhance the human's potential in respective fields.

4.2 Panel discussion

In this section of the workshop, panellists discussed the main obstacles to the widespread use of XR.

In order to communicate about these obstacles in meaningful ways, one needs to differentiate between

- Industrial use cases and consumer-facing (mass market) use cases
- Augmented reality and virtual reality

In the case of industrial AR, there are compelling use cases out there, however, the potential total market for industrial AR device sales is much smaller than the total market for consumer AR devices. Nevertheless, the overall value and return on investment for industrial use cases is driving adoption in domains like maintenance, repair, and logistics. XR technologies are increasing the efficiency of workers; they lower risks and make some tasks much safer. The case for adoption of industrial AR is especially compelling where and when complex or rare procedures are concerned.

For adoption in industry, a key challenge is the integration of the new technology with existing IT infrastructure of companies. This challenge is especially great for large corporations.

In terms of fast and straightforward development of XR applications, there are well-established tools available such as Unity, Unreal and several platforms are supported by these. However, there is a lack of easy development of customized solutions. To reduce the barriers to fast and successful experience development, tools that do not require software engineering skills should be developed and made widely available.

Another challenge is the lack of a 3D digital representation of the real world and associated content and services (sometimes referred to as the "AR Cloud"), with which users can easily access and store digital objects. At the moment, every vendor is doing their own digital mapping and relocalization and there is no interoperability.

Today, this means that when adopting XR, a user must choose one vendor's technology and only use content created for or by that vendor's platform. One objective of future development must be to enable users to choose the display devices and software options of their choice, without having to choose the content or even more critical, to give up or narrow requirements on safety and privacy. Therefore, the devices and the technologies for content creation and delivery need to be separated from the place and content of experience delivery. More specifically, the digital properties of the objects must be separated from the physical objects and a clear ownership for the rights of digital objects needs to be put in place. This also affects the ownership of real-world images.

The Open AR Cloud initiative is very important to support interoperability in the mapping, storage and annotation, then the publishing of experiences to be used anywhere in the real world.

A very problematic case happened recently with Oculus's announcement that, in order to use their devices, a user must have a Facebook account. This is incompatible with regulations and rules in Europe e.g. GDPR, but especially in the healthcare sector due to privacy issues. The huge amount of personal data in therapy, pre- and post-operative applications has to be on the devices and it must be assured that this data is not transferred to some server operated by Facebook or any other company.

One approach is that such data is encrypted on the device and will be stored locally on it. Overall the data privacy is the main concern. The challenge is how to control the data flow and to avoid that information and generation of data symmetries will solely be in the hands of a few big tech companies. Security and tracking features such as facial recognition should be a governmental monopoly and being regulated. For some areas, like HMD development, the position of European

vendors is quite difficult, because of the aggressive marketing strategy of the market leaders. One example is Oculus, which wiped out nearly all competitors from the market. The current pricing of Oculus devices is much cheaper than the XR2 chipset it uses. This challenge any competitors in the VR device market.

Concerning the future of XR in the healthcare sector, there are clear benefits for patients and professionals. The opportunities and challenges for XR adoption may be compared with any other kind of technology adoption.

The XR ecosystem is highly fragmented due to many different XR companies proposing their own platforms and using different terms to describe them. There is also a lack of communication between stakeholders. Furthermore, user experience and user interfaces issues are far from being addressed. Although in general, regulatory affairs is a big issue, for the medical domain, a regulatory framework is available.

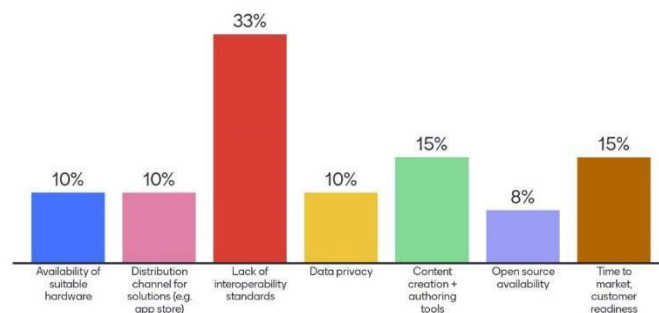
Another challenge is the quality of content. However, the following criteria for high-quality content can be set:

- to develop accessible and appropriate experiences for first-time users and,
- to meet the customer goals and requirements.

4.3 Poll result

Where do you see the most limitation to the further development of XR?

Mentimeter



During the first part, a poll was initiated asking for the limitations to further development of XR. The result of the poll reflected the discussion as the majority of participants highlighted the lack of interoperability as a major challenge on which future efforts must focus.

5 Panel discussion part 2: Future of XR - outlook on research and funding

5.1 Panel discussion

At the beginning of the discussion, the panellists were asked about the impact of COVID-19 and the resulting effects.

Panellists pointed out that due to social distancing and other changes in behaviour to avoid the propagation of COVID-19, many more people are and will be using XR technologies. Especially in the industrial domain, an acceleration of development by 2-3 years can be noticed. For some areas, such as health care, the faster introduction and widespread use of XR technologies is crucial. Telehealth and remote care are important ways to deliver service to patients during the pandemic, and therapies will benefit from XR technology. Thus, especially for home settings, connectivity and bandwidth availability is an issue for XR technologies to become more widely used.

For a successful support of SMEs, the right market placement, knowing the market and knowing the niche is essential. It is still difficult to find investors and VCs in Europe to get the necessary financial support compared to the American market.

The introduction and promotion of quality certificates for the XR area enables an easier evaluation of companies and might facilitate better access to investment funds.

The current national and EC funding is far too slow to cope with the dynamic change of the technology and market. Higher demands on the quality of the proposals and a transparent selection process can help accelerate this process.

Time spans of 2-3 years before entering the market with a new product is too long to compete with companies working in other regions of the world where capital is more easily available.

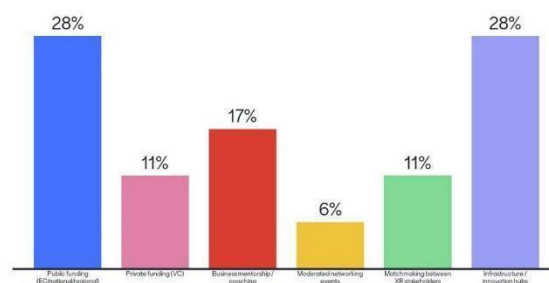
Thus, universities, industry and customers need to collaborate in technology and business development acceleration programs, such as innovation hubs to accelerate the process and reduce time to market. It is necessary to identify the best use cases, the best talent and the real needs in the markets. The focus of universities should be on technology research. To connect these results with the economy, the area of business research must be fostered and market intelligence agencies should be established.

More risky funding schemes are necessary because funding can be considered a statistical process. It can never be guaranteed that all funds invested will succeed. Therefore, a greater trial and error-based approach to funding will help to identify the successful ideas and products sooner.

5.2 Poll result

What kind of support would fit your needs best?

Mentimeter



Also in the second part of the workshop, a poll was initiated asking which support would be most valuable to develop the XR technology market. The majority voted for EC and national funding as well as infrastructure and innovation hubs. There were some critical comments on this result because the focus should be much more on supporting SMEs and start-ups as well as market readiness of XR solutions. To ensure market readiness the product development should be connected to potential future customers from the beginning. Sharing lessons learned (not only success stories) will help the XR industry in general and increase the quality for the following funding activities.

6 Conclusion

The workshop brought together a group of ten experienced panellists with expertise in research and industry as well as VCs and incubators. The overall feedback from the panellists was quite positive and the discussion led to some interesting outcomes, which are summarized below:

- Interoperability is considered a major issue for the success of XR technologies. A faster and better approach for standardization that meets market needs is recommended;
- The monopolistic market situation, especially for HMDs, leads to serious privacy issues and, therefore, offers the possibility to foster the development of European and Open Source initiatives such as that demonstrated by the Open AR Cloud association;
- The pandemic accelerated the pace for digitization in general, but also a wider spread use of XR technologies. Some domains strongly depend on a faster development of applications to offer new tools replacing conventional procedures. Healthcare is a good example of this;
- The need for intensified support of SMEs and start-ups is essential to accelerate the transfer of research results to market-ready products and services.