



eXtended-Reality- and metaverse-related standards

A global overview of the status quo and outlook

Prof. Dr.-Ing. Dipl.-Kfm. Christoph Runde

Managing director - Virtual Dimension Center (VDC)

VP Industry & End Users – EuroXR

Founder - XR EXPO

Co-Chair – Standards Registry WG at Metaverse Standards Forum (MSF)

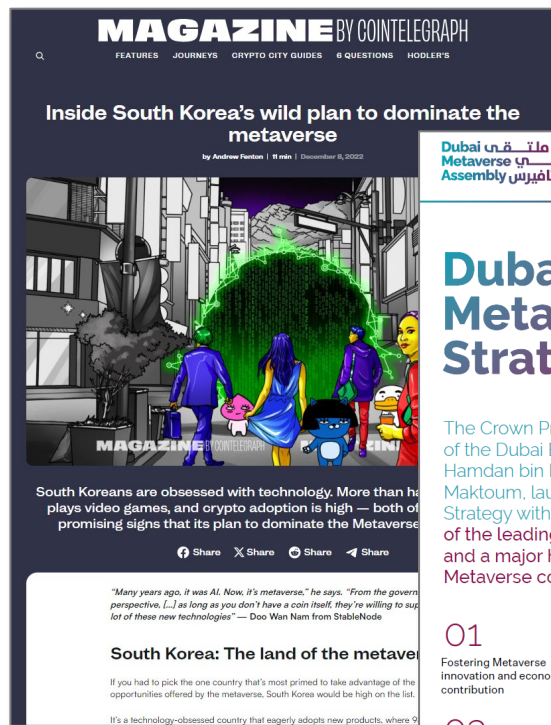
Chairman - Standardization Committee „eXtended Reality und Metaverse“ at DIN e.V.



Some countries are going ahead

some countries and EU

- identified economic & societal potential and
- started initiatives
- some of the strategies appear ambitious to almost aggressive



دبي 2022
مجلس دبي
المتaverse
للمبادرات

Dubai's Metaverse Strategy

The Crown Prince of Dubai and Chairman of the Dubai Executive Council Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, launched the Dubai Metaverse Strategy with the aim for Dubai to become one of the leading Metaverse economies and a major hub for the global Metaverse community by

01

Fostering Metaverse innovation and economic contribution

02

Cultivating Metaverse through education

03

Developing metaverse use-cases and applications in Dubai Government

04

Adopting, scaling, and globally advocating for safe platforms



Metaverse Initiative by the Finnish Ecosystem

Virtual Potential into Real-World Impact

This is an initiative created by the Finnish Metaverse industry for itself. The project was initiated by Business Finland in order to understand better customer needs and business possibilities in the Metaverse and increase cooperation in the field. Initiative does not create binding obligations for Business Finland.



**元宇宙产业创新发展三年行动计划
(2023—2025年)**

元宇宙是数字与物理世界融合使用的沉浸式交互空间，是新一代信息技术集成创新和应用的未来产品，是数字经济与实体经济深度融合的产物。中国建设元宇宙应坚持“一以贯之”原则，加强顶层设计，强化政策引导，推动元宇宙产业高质量发展。当前，全球元宇宙产品加速涌现，为构建元宇宙与实体经济深度融合新生态提供重要支撑。为把握元宇宙与实体经济深度融合重要发展机遇，有力支撑制造业强国、网络强国和文化强国建设，制定本行动计划。

一、总体要求

以习近平新时代中国特色社会主义思想为指导，全面贯彻党的二十大精神，立足实际，全面贯彻新发展理念，加快构建新发展格局，以网络强大动能与实体经济深度融合，以新一代信息技术融合创新为驱动，以虚实融合的应用需求为导向，以增强元宇宙核心技术、新产品、新模式为抓手，统筹推进元宇宙与实体经济深度融合，全面赋能实体经济转型升级；以网络强大动能与实体经济深度融合，以新一代信息技术融合创新为驱动，以虚实融合的应用需求为导向，以增强元宇宙核心技术、新产品、新模式为抓手，统筹推进元宇宙与实体经济深度融合，全面赋能实体经济转型升级。

二、重点任务

坚持创新驱动，开展元宇宙基础技术研发，构建元宇宙技术融合生态，提升产业链和供应链水平，加速元宇宙应用



**Dubai Metaverse 2023
الميتافيرس دبي 2023
Assembly Outcomes Report**

28-29 September
Museum of the Future
Dubai, UAE



COMMISSION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Brussels, 14.7.2023
COM(2023) 401 final

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Metaverse Initiative by the Finnish Ecosystem

Virtual Potential into Real-World Impact

This is an initiative created by the Finnish Metaverse study for brief. The project aims to identify Finnish actors in order to establish a collaborative ecosystem and to promote cooperation in the Metaverse and digital innovation in real life. The project does not include any funding for business Finland.



Agreement on the creation of the "Japan Metaverse Economic Zone"

Ministry of Economy, Trade and Industry
Ministry of Digital Transformation
Ministry of Health, Labour and Welfare
Ministry of Education, Culture, Sports, Science and Technology
Ministry of Internal Affairs and Communications
Ministry of Agriculture, Forestry and Fisheries
Ministry of Land, Infrastructure and Transport
Ministry of Environment
Ministry of Defense
Ministry of Foreign Affairs
Ministry of Justice
Ministry of Health, Labour and Welfare
Ministry of Education, Culture, Sports, Science and Technology
Ministry of Internal Affairs and Communications
Ministry of Agriculture, Forestry and Fisheries
Ministry of Land, Infrastructure and Transport
Ministry of Environment
Ministry of Defense
Ministry of Foreign Affairs
Ministry of Justice



**다지털 뉴딜 2.0 초연결 신산업 육성
메타버스 신산업 선도전략**

2022. 1. 20.

관계부처 합동



SAUDI ARABIA METAVERSE

CHEAT SHEET

- Population: 35.5 million
- Mobile connectivity index: 71
- Population density: 17 per sq km (2019 average per sq km)
- Global ease of doing business index: 114
- Urban population: 85%
- Metaverse added to yearly GDP: \$10 billion by 2030
- Median age in 2020: 31.3
- Metaverse consumer investment: \$1M and \$10M per person
- GDP per capita: \$12,100
- Cybersecurity Global index: 10.3
- GH GDP contribution: 0%
- Individuals with basic digital skills: 10% (2019) with target of 40% by 2030



Chris Kremidas-Courtney, senior fellow at Brussels think tank „Friends of Europe“ and Lecturer for Institute for Security Governance (ISG) in Monterey, California.

He said that China plans to “*be the world leader in metaverse development,*” a technology that dovetails with its plan for a state-controlled digital renminbi. Standard-setting is the natural first step in that roadmap.

“If you want to seize the future,
you set the standards for it”

Chris said.

POLITICO

Enter keyword



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POLITICO PRO

FROM POLITICO PRO

Beijing is coming for the metaverse

Proposals reviewed by POLITICO show China wants to assert state control over virtual environments.



Experts that reviewed the proposal at the request of POLITICO said it risks violating principles of privacy and freedom | Jade Gao/AFP via Getty Images

BY GIAN VOLPICELLI

AUGUST 20, 2023 | 4:00 PM CET | 5 MINUTES READ



driving forces

Analysis by EY and NOKIA (2023)

Who will drive the **industrial** metaverse?

It will not only be

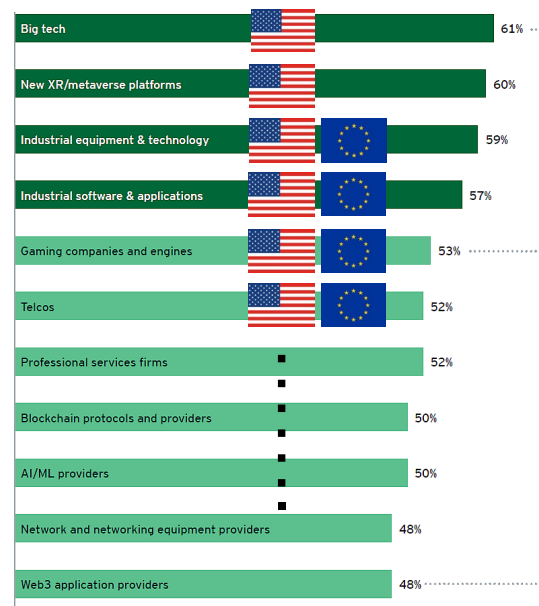
1. the big tech companies (1st place) and
 2. existing metaverse platforms (2nd place)
- that will drive future metaverse developments, but also
3. industrial equipment suppliers (3rd place),
 4. manufacturers of enterprise software (4th place) and
 5. game developers (5th place).

⇒ **USA and EU are the drivers**

Key Players in driving the advancement of the industrial metaverse



<https://www.nokia.com/metaverse/industrial-metaverse/the-metaverse-at-work-research/>



Big tech companies are already engrained in the infrastructure of the metaverse through their existing cloud services and visualization tools, while also investing heavily to create new metaverse platforms and AR/VR headsets.

Gaming companies and engines play a key role in the early metaverse by providing the technology needed to make high-fidelity virtual environments like digital twins. Many of the features needed for the industrial and enterprise metaverses like advanced 3D graphics and physics engines have been in development for over a decade in gaming companies.

Web3 application providers, while not ranked as highly as other players, are still viewed as important by nearly half of respondents for their ability to handle many of the new challenges metaverse technology will bring. Challenges in user authentication across companies, for example, can be solved with the use of decentralized identities (DIDs).

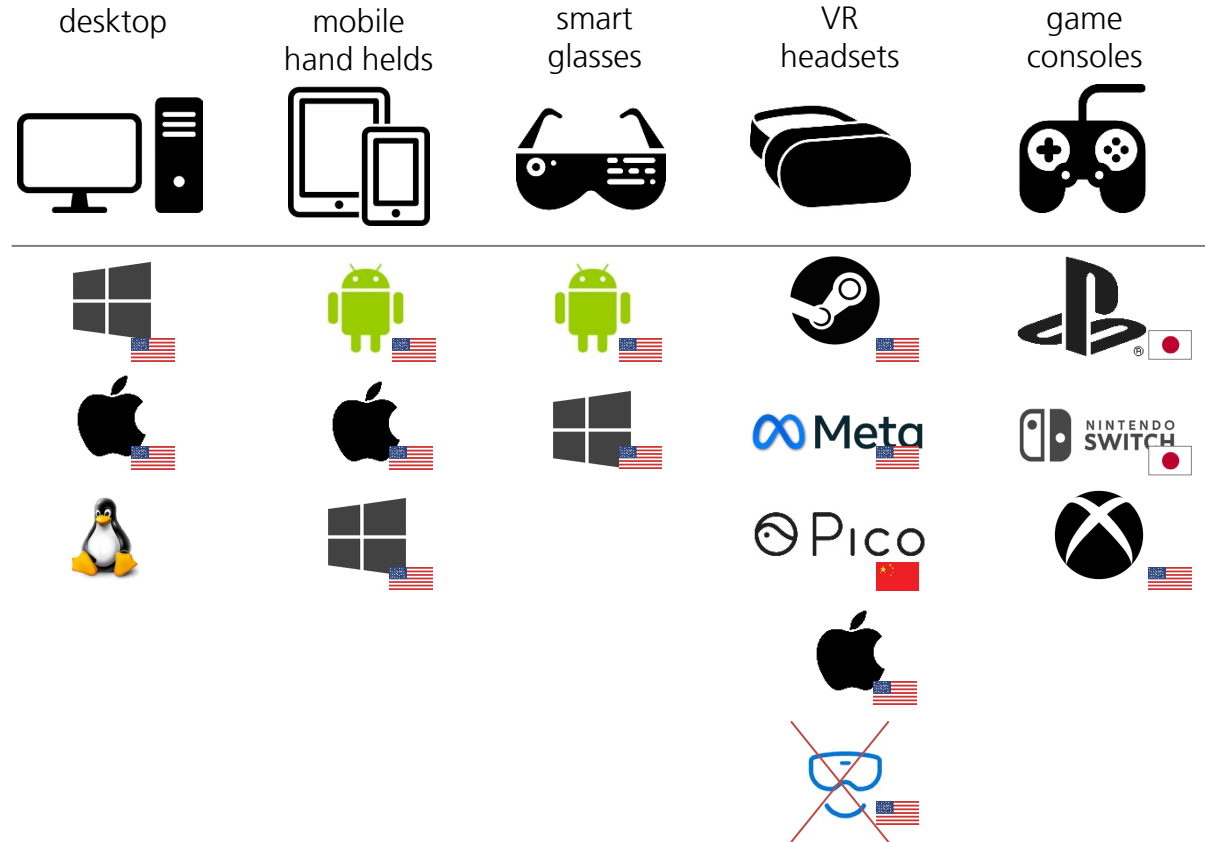


global XR ecosystems

problem:

- platform providers aim at vendor lock-in

⇒ standardization and regulation are crucial for us to minimize proprietary platform dependencies and supplier risks.



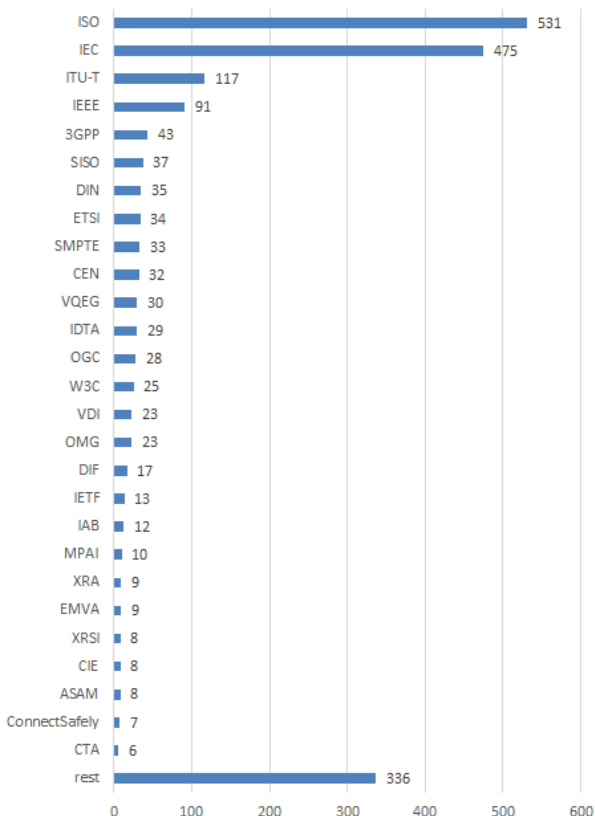
Global Metaverse Strategies Comparison

strategy goals	target groups	strategy key elements	discrete measures
 China - world-leading industrial mature metaverse ecosystem - Metaverse as an important growth pole of the digital economy - establish three to five companies with global influence - establish a number of specialised SMEs - establish three to five industrial development clusters - establish yuan / renminbi universe - secure and efficient governance system for the metaverse	- industry - public administration - society	- upgrade key technologies - Promote an industrial ecosystem - enable the industrial metaverse - strengthen the industrial base (incl. standardization)	- metaverse business parks - MV infrastructure - MV standardization agencies - create MV best practices - create MV applications for digital life
 Dubai - turn Dubai into one of the world's top 10 metaverse economies - turn Dubai into a global hub for the metaverse community - attract more than 1,000 companies - support more than 40,000 virtual jobs by 2030 - foster innovation; promote advanced ecosystems - foster talent - invest in future capabilities - create new governmental work models	- tourism - education - government services - retail and real estate [health care]	- XR and MV technologies - foster MV innovation and economic contribution - cultivate MV talent through education and training - develop MV use cases and applications in Dubai government - Adopting and scale globally - Dubai as the "crypto-capital" of the world - UAE as a "test bed" for new technologies	- over fifteen initiatives and strategies were announced in the 2022 assembly - MV virtual embassy - Emirates Airlines training in the MV
 European Union - boost the EU's technological capabilities - accelerate the uptake of new business models and solutions - support access to finance to support creators and to scale up innovative business models - support societal progress and improve public services	- industry - creative industry - society / consumers	- foster a supportive business environment; support SMEs, start-ups - Interoperability, standardisation, open standards and interfaces - support open-source community - build a talent pool of virtual world specialists - empower and protect children in virtual worlds - EU's robust legislative framework - IP protection	- skills development for MV technologies (Digital Europe programme) - guiding principles for virtual worlds through citizens' panel - research on impact of MV on people's health through Horizon Europe - develop a MV toolbox for the general public - create European initiative on Virtual Worlds - create EU partnership on virtual worlds - analysis of XR & MV standards landscape
 Finland - establish Finland as a leading architect and enabler for the Metaverse - Finland to be considered as a benchmark society - attract major foreign direct investments in all parts of the Metaverse value chain - avoid domination by a single company or country	- society - healthcare - industry	- Finish vision, values and strengths - boost economic growth - cross-boundary collaboration - education for the Metaverse - marketing and sales on a global scale - advance metaverse research	- Metaverse in Action Program (however just recommendations!): - support technology enablers - create / support business Networks - showcase industrial Metaverse - showcase Metaverse society - showcase Metaverse healthcare
 Japan - respond to rapidly growing demand for digital transformation (DX) for enterprises and government agencies - enable interoperability and collaboration between Metaverse platforms - serve as new social infrastructure for enterprise DX and employee experience (EX) transformation - promote metaverse business - expand the "Japan Metaverse Economic Zone" globally - respond to MV risks	- society / consumers - government services - enterprises	- agreement of numerous companies using their respective mature technologies to create an open Metaverse infrastructure supporting authentication, digital twins, NFTs, etc. - analysis by the "Study Group on Utilization of Metaverse, etc. for the Web3 Era" established by the Ministry of Internal Affairs and Communications	- create Metaverse economic zone „Ryugukoku“ - media conference
 Saudi Arabia - gaming and e-sports market: US\$ 13.3 billion to gross domestic product (GDP) and 39.000 jobs by 2030 - create digital MV twin of futuristic megacity NEOM	- e-games, e-sports - real estate - society / consumers	- MV is key part of Vision 2030 - launch of national „Gaming and e-Sports Strategy“	- the US\$ 500 billion futuristic megacity NEOM shall have its own metaverse - investment in metaverse gaming
 South Korea - take the upper hand in the global metaverse market (5th largest market share by 2026) - train metaverse experts (total of 40,000 people by 2026) - nurture metaverse service providers (220 companies by 2026) - discover metaverse best practices (total of 50 cases by 2026)	- society / consumers - government services - enterprises	- create world-class metaverse platform - create and support MV ecosystem - train Key players in the metaverse era - nurture specialized corporations that could lead the metaverse industry - build an exemplary metaverse world	- metaverse platform of the city of Seoul - diverse types of funds to be provided "Expanded Virtual World" marketing campaign - K-Metaverse pavilion: further showcases

Organizations related to or fostering MV / VW standardization



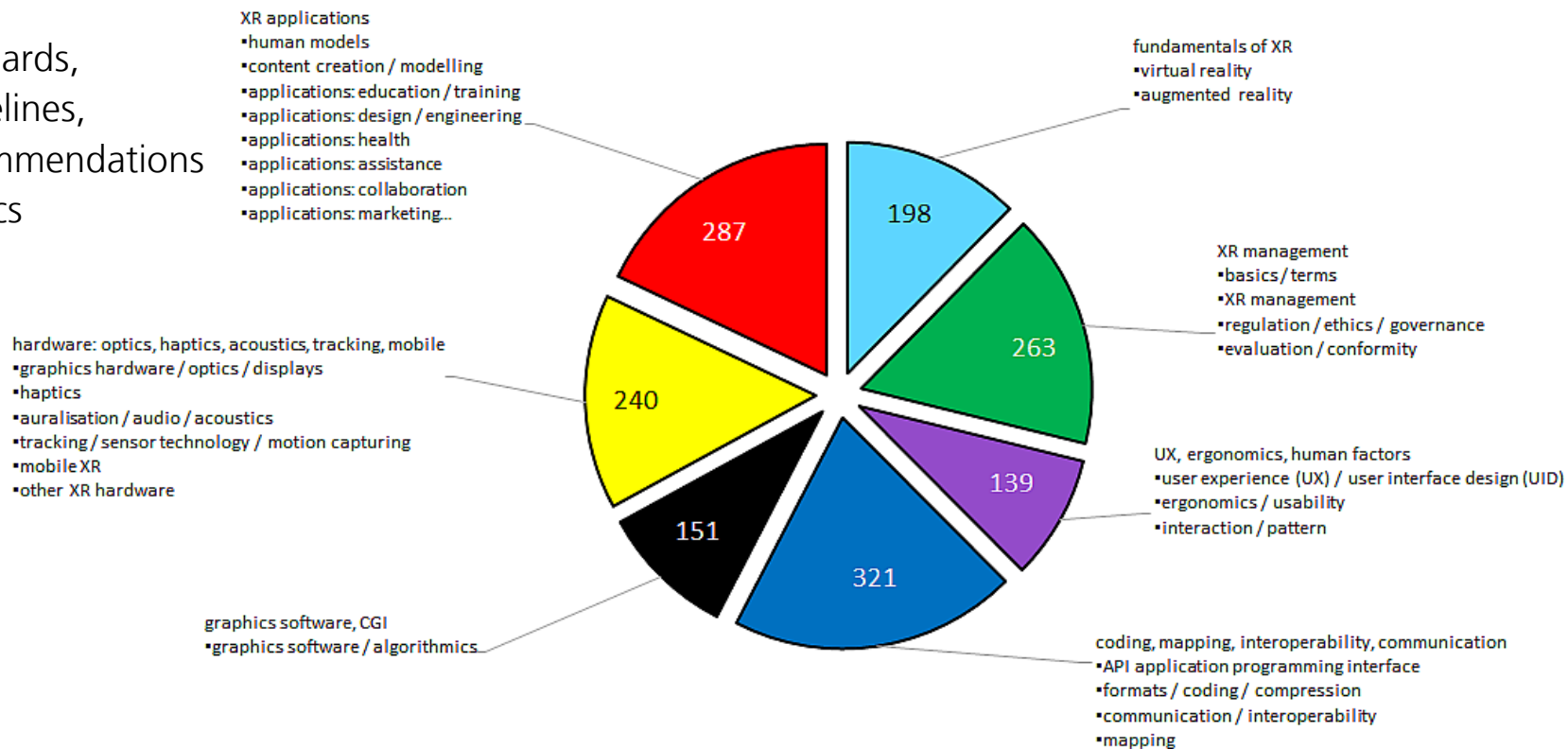
published standards, specs, recommendations





clustering

- XR standards,
 - XR guidelines,
 - XR recommendations
- into 7 topics

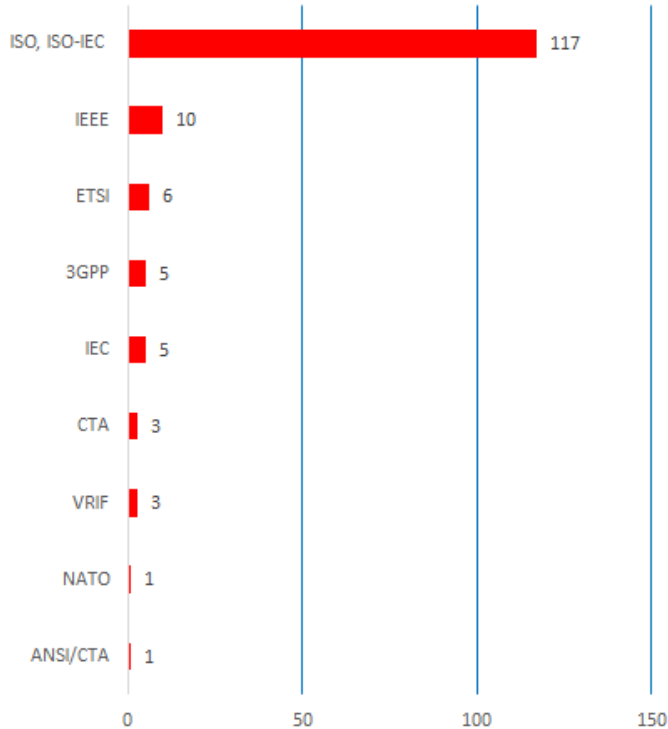




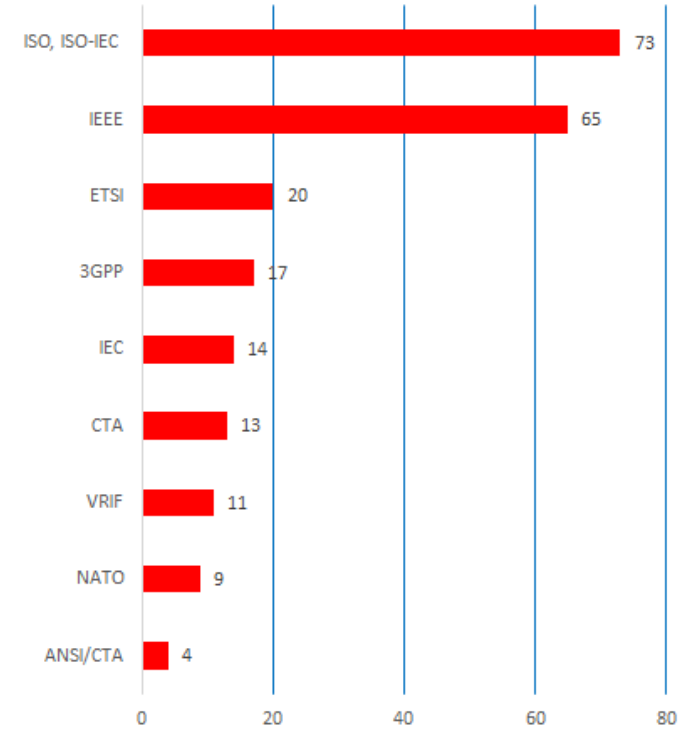
analysis on the right shows XR SDOs contributing with own documents to certain XR fields.

It becomes further obvious that certain XR topics are treated by SDOs in different number at total.

graphics software, CGI

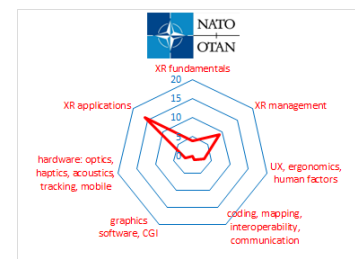
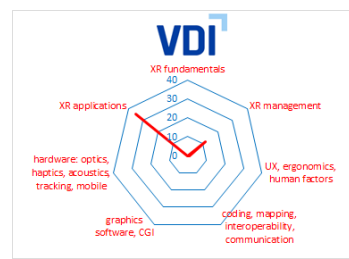
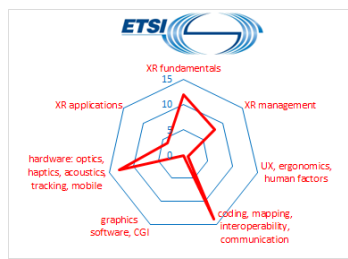
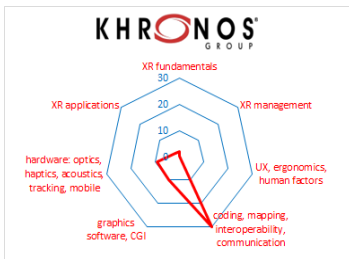
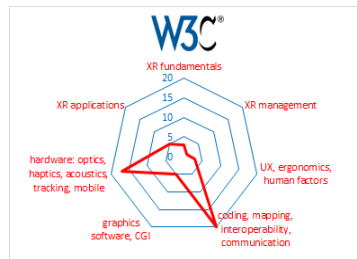
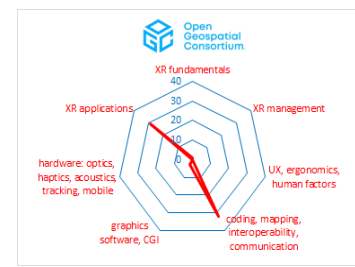
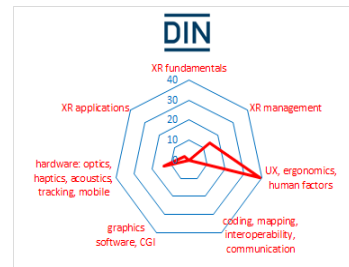
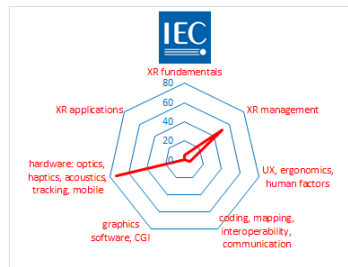
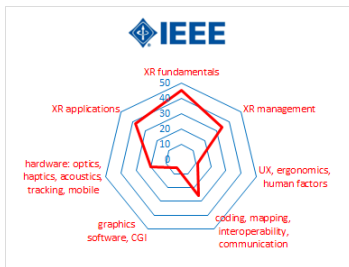
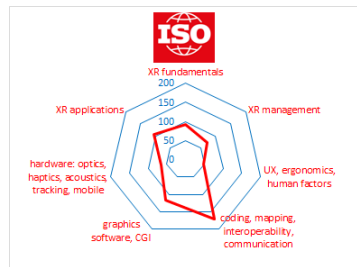


hardware: optics, haptics, acoustics, tracking, mobile



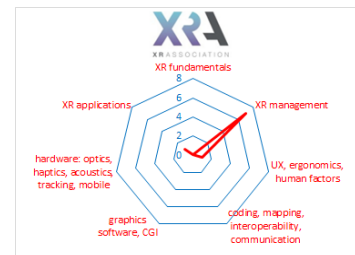
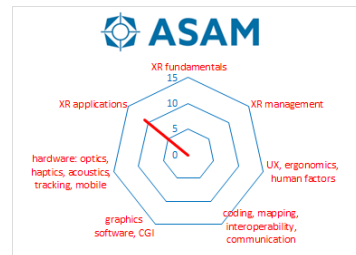
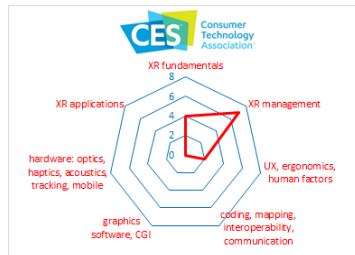
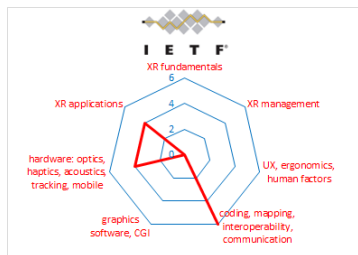
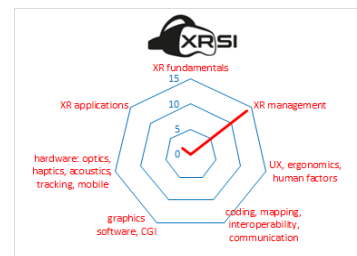
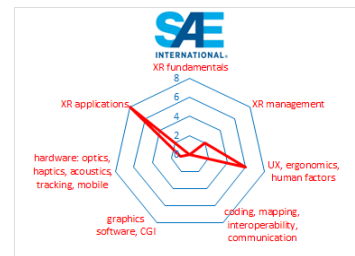
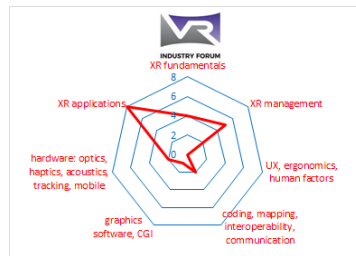
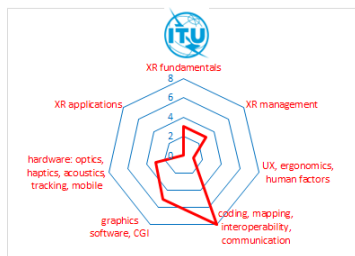
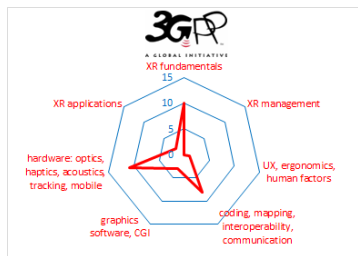


Focuses of XR standardization organizations varying



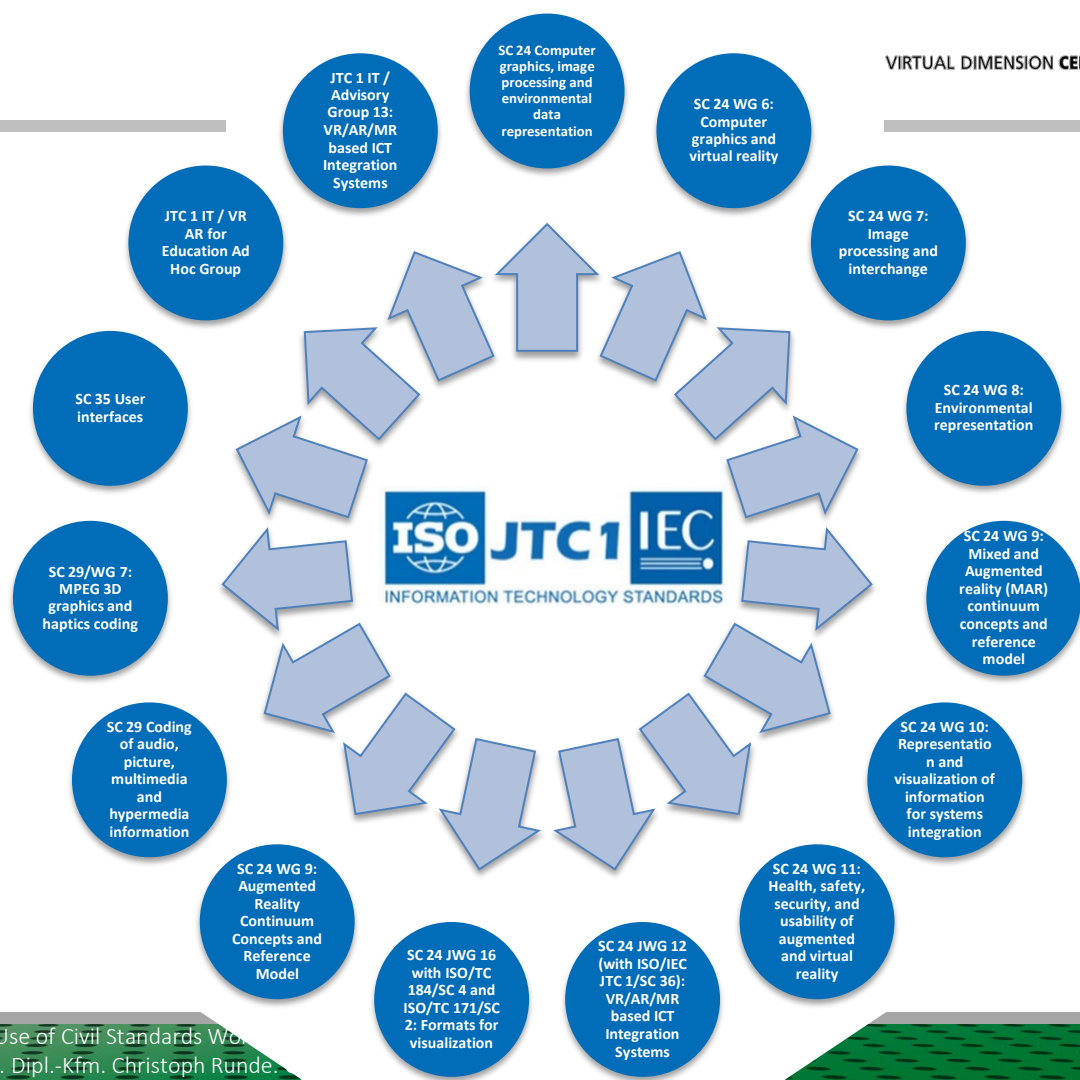


Focuses of XR standardization organizations varying



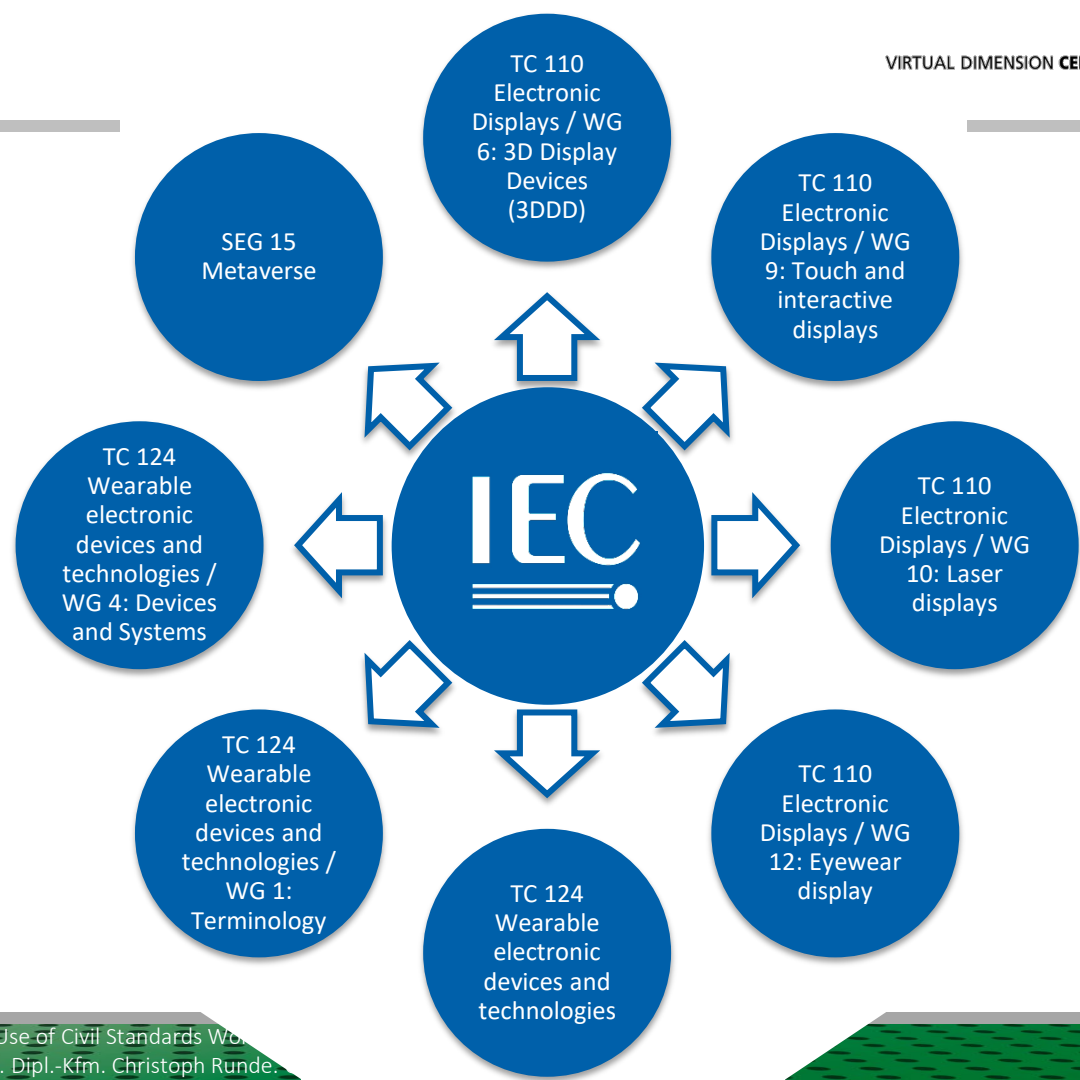


The **International Organization for Standardization (ISO)** is an independent, non-governmental organization, whose members consist of various national standardization bodies. As of 2022, there are 167 members who represent ISO in their country, with each country having only one member. The organization develops and publishes international standards in all technical and non-technical areas, except for electrical engineering and electronics, which fall under the jurisdiction of the International Electrotechnical Commission. By February 2023, ISO has developed over 24,676 standards that cover all areas from industrial products and technology to food safety, agriculture, and healthcare. **The Moving Picture Experts Group (MPEG)** is a group of experts dealing with the standardization of video compression and related areas, such as audio data compression or container formats. Colloquially, "MPEG" usually refers not to the group of experts, but to a specific MPEG standard. The MPEG meets three or four times a year for five-day meetings. About 350 experts from 200 companies and organizations from 20 countries participate in these meetings, the MPEG meetings. MPEG is part of ISO/IEC JTC 1/SC29.



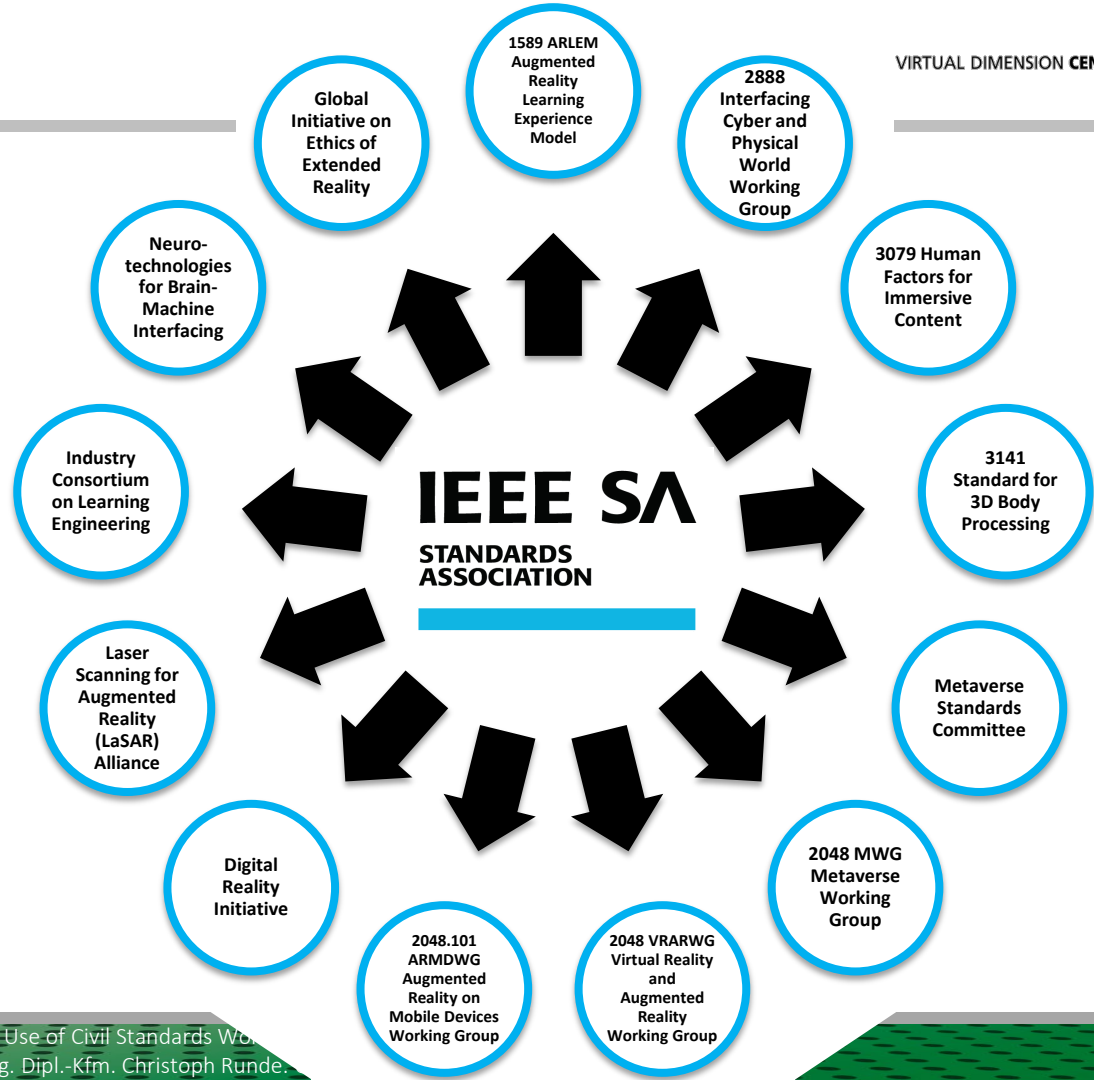


The **International Electrotechnical Commission (IEC)** is an international standardization organization for standards in the field of electrotechnology and electronics, based in Geneva. Some standards are developed jointly with ISO (International Organization for Standardization). IEC was founded in 1906 and is located in Geneva. IEC played a crucial role in standardizing units of measurement, particularly Gauss, Hertz, and Weber. It also first proposed a system of standards, the Giovanni-Giorgi-System, which ultimately became the SI, the International System of Units. The IEC charter encompasses the entire field of electrotechnology, including the transformation and distribution of energy, electronics, magnetism and electromagnetism, electroacoustics, multimedia, telecommunications, and medical technology as well as general disciplines such as terminology and symbols, electromagnetic compatibility, measurement technology and operational behavior, reliability, design and development, safety, and the environment.

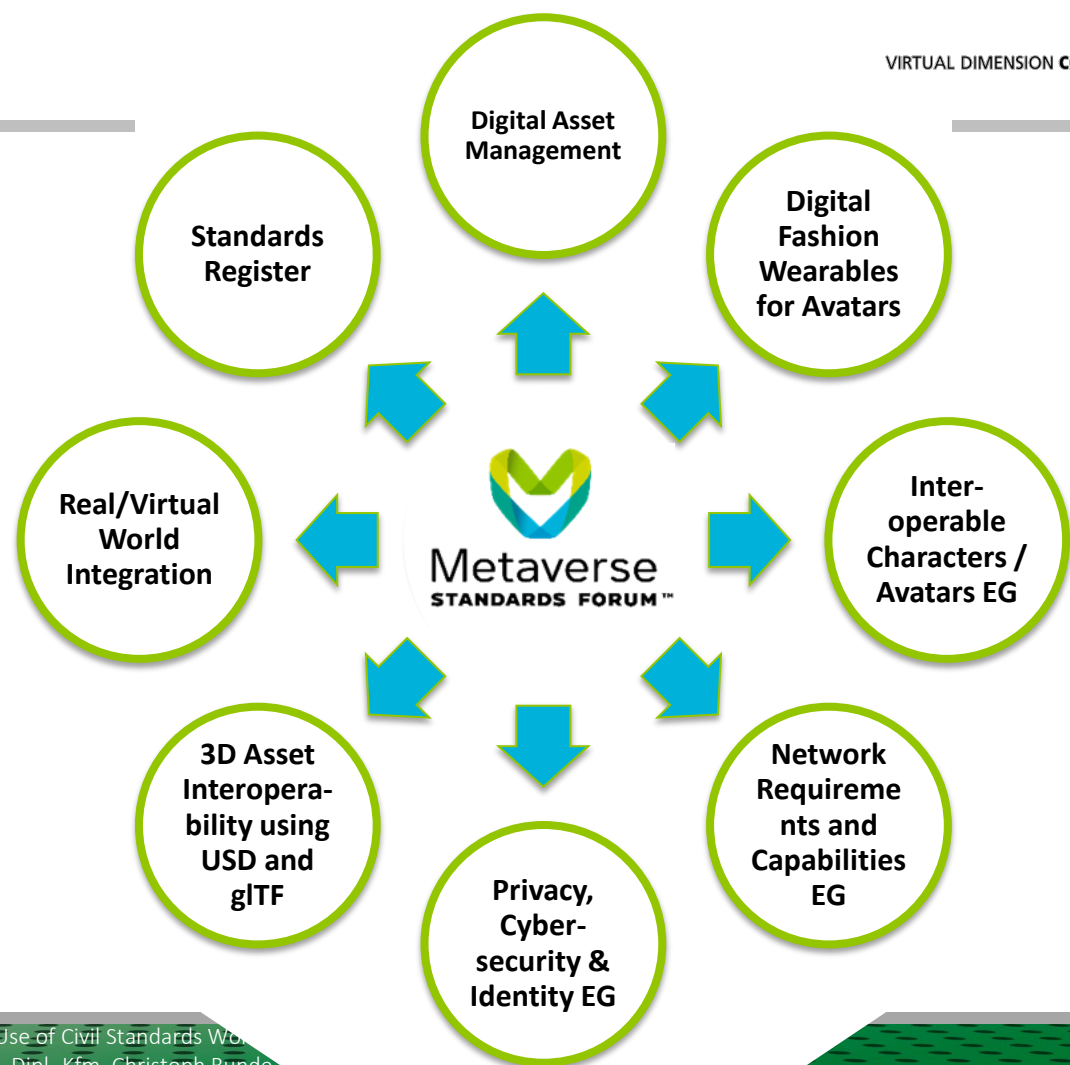




The **Institute of Electrical and Electronics Engineers (IEEE)** is a global professional association of engineers primarily from the fields of electrical engineering and information technology, legally based in New York City with operational headquarters in Piscataway, New Jersey. It organizes professional conferences, publishes various professional journals, and forms committees for the standardization of techniques, hardware, and software. Scientific contributions in journals or to IEEE conferences are generally presumed to be of particularly high professional quality. With publications like the IEEE Spectrum journal, the organization also promotes interdisciplinary information and discussion on the societal impacts of new technologies. The IEEE organizes several subgroups addressing VR or AR topics, including (1) Digital Reality, (2) Augmented Reality Learning Experience Model (AR-LEM), the (3) IEEE 2048 VR/AR Working Group (VRARWG), and a (4) Smart Glasses Interest Group. Additionally, the IEEE operates a Standards Group. Where the latter collaborates with one of the aforementioned four theme groups, V/AR-relevant norms, standards, and guidelines are created..

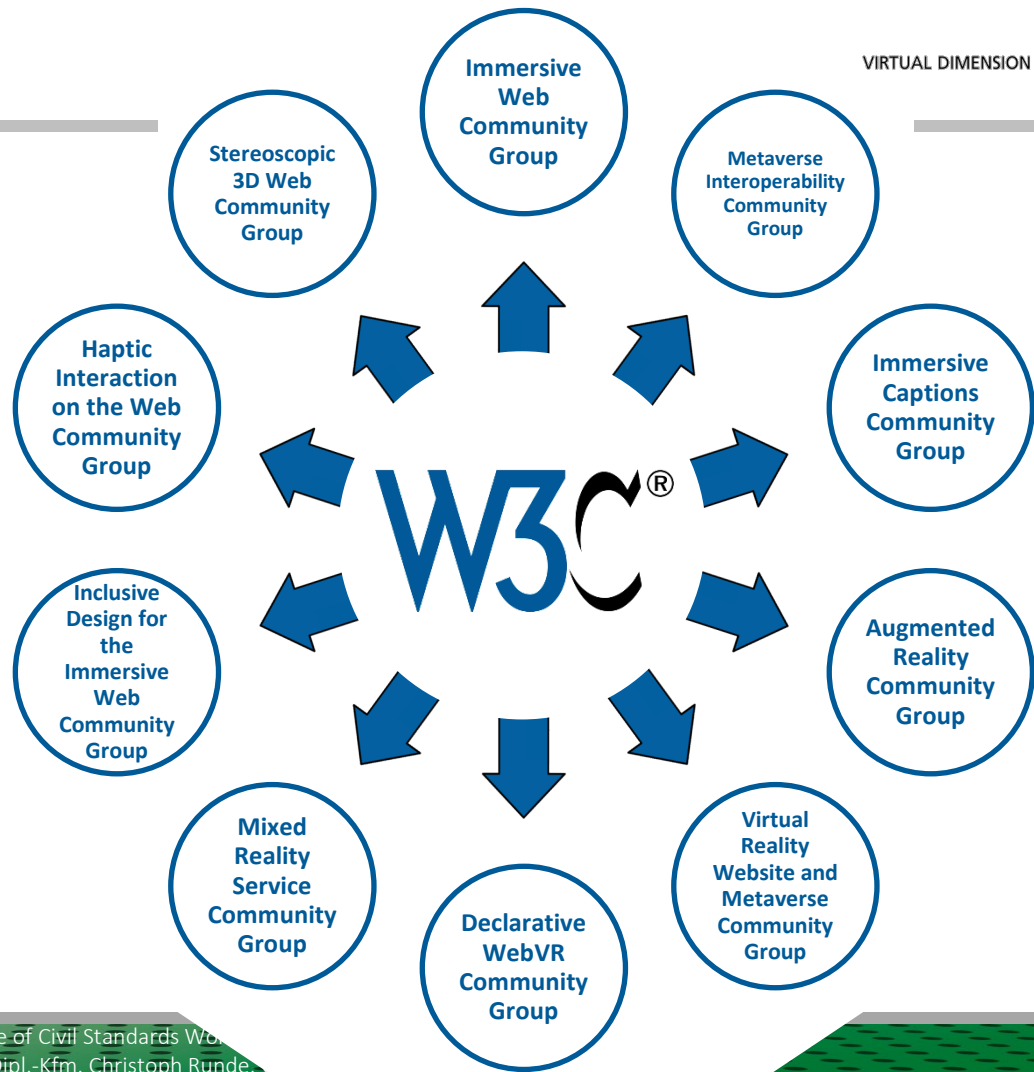


The **Metaverse Standards Forum (MSF)** was founded in June 2022 to foster the development of interoperability standards for an open and inclusive metaverse, and accelerate their development and deployment through pragmatic, action-based projects. Since the vision of the metaverse is still a work in progress, the group also has the stated purpose of bringing some order to the underlying terminology of the metaverse. The MSF is an industry-wide effort to harmonize standards and best practices for the metaverse. Its members, which to date number 1,800, include tech titans Google, Meta, Microsoft and Nvidia; standards bodies Khronos Group and Web3D Consortium; multinational software companies Adobe, Autodesk and Epic; and professional technology services firm Accenture. Members of the forum hope the process will help build trust among the builders of the metaverse. This is important as the industry explores new technologies and new business models. Early blockchain and decentralized finance efforts attempted to address trust programmatically, only to discover new vulnerabilities and types of abuse no one had previously imagined. The MSF is free for all participants, including companies, standards organizations, non-profit organizations, industry associations and universities.



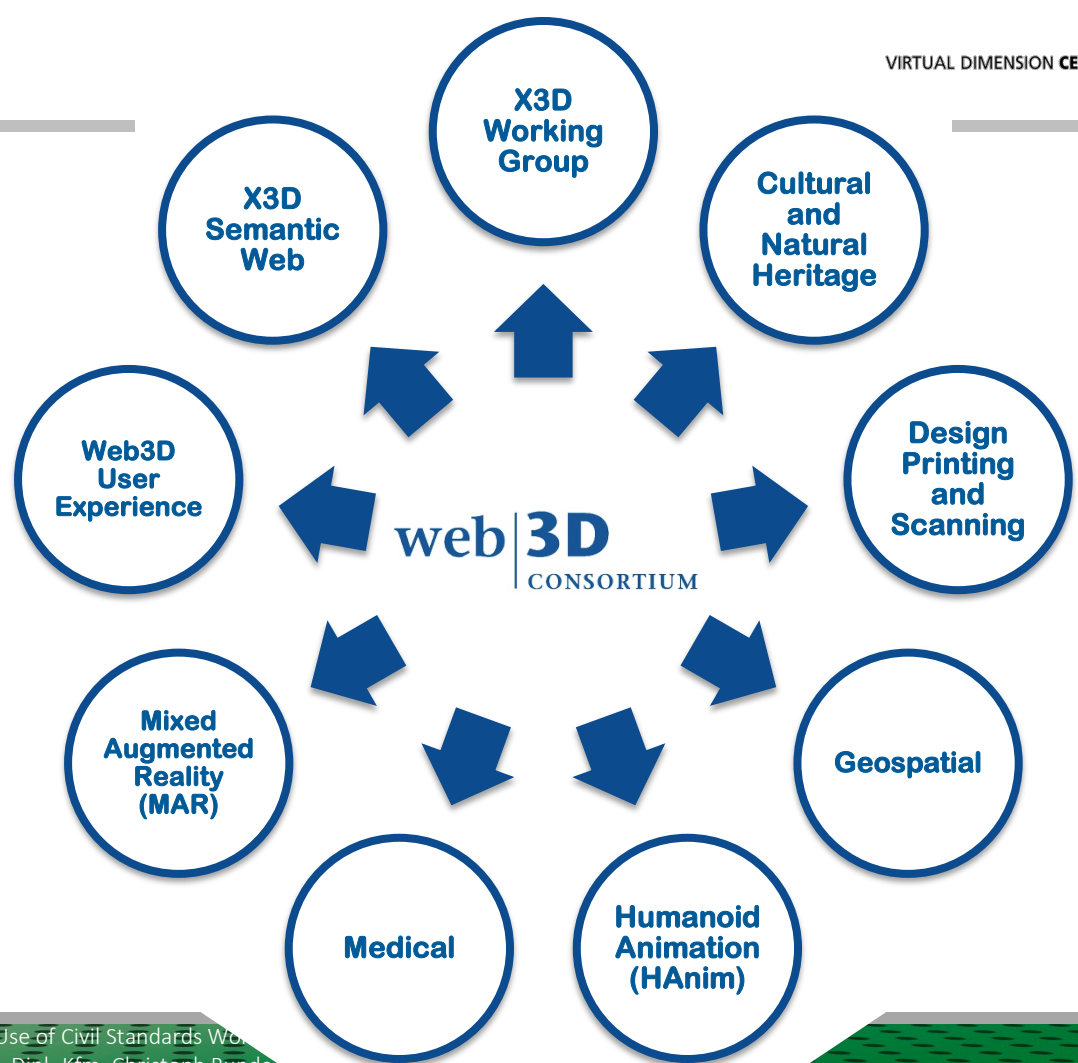


The **World Wide Web Consortium (shortly W3C)** is the body responsible for standardizing technologies on the World Wide Web. It was founded on October 1, 1994, at the MIT Laboratory for Computer Science in Cambridge, Massachusetts. The W3C is a membership organization. It develops technical specifications and guidelines through a mature, transparent process to achieve maximum consensus about the content of technical protocols, high technical and editorial quality, and approval by the W3C and its followers. Examples of technologies standardized by the W3C include HTML, XHTML, XML, RDF, OWL, CSS, SVG, and WCAG. Within its "Immersive Web Community Group," the W3C addresses VR and AR topics. Already in the early 1990s, ideas for a 3D extension of the internet emerged at the first HTML conferences, which then resulted in the Virtual Reality Language (VRML) as a counterpart to HTML.





The **Web3D Consortium** is an international, non-profit, member-funded, industry organization dedicated to the development of standards (SDO) established in 1997. The Web3D Consortium champions the deployment of ISO-ratified X3D standards for communicating interactive 3D scenes across various applications, use cases, platforms, and industries. It provides robust web-based 3D capabilities and long-term stability for enterprise solutions, as well as interoperability with other standards. Members collaboratively work on the development of the X3D standards and tools to ensure their broad dissemination across various markets, catering to academia, government, industry, and individual users. Today, the Web3D Consortium leverages its extensive industry backing to continue the evolution of the X3D specification..





A free, online accessible database for the entire XR community with references to

- 1.500 XR standards, specifications, guidelines and recommendations
- 350 standardization working groups
- 140 SDOs

They are qualified (by tags) and with a searchable description. The group's entry further comprises the organizing/leading SDO and a link to this resource in the WWW.

Please support by adding standards and SDOs.

We may offer database as an iFrame for interested organizations' websites.

The screenshot shows a web interface for a standards database. At the top, there is a search bar labeled 'search database'. Below it are several filter buttons: 'type', 'SDO', 'status', 'year', 'tags', and a 'Default or...' button. A row of active filters shows 'standard (industry)', 'specification', '3GPP', and 'published'. The main content area is a table with columns for 'identifier', 'title English', and 'Properties'. The table lists four entries, all from 3GPP TR 26.118, 26.818, 26.905, and 26.918. The first entry is 'Virtual Reality (VR) profiles for streaming applications'. The second is 'Virtual Reality (VR) streaming audio; Characterization test results'. The third is 'Mobile stereoscopic 3D video'. The fourth is 'Virtual Reality (VR) media services over 3GPP'. To the right of the table, a 'tags' dropdown menu is open, showing a list of categories with checkboxes: 'applications: geo & construction', 'applications: health', 'applications: marketing', 'applications: others', 'augmented reality', 'auralisation / audio / acoustics' (which is highlighted), and 'basics / terms'. Below the tags, there is a section for 'tags: communication / interoperability, virtual reality, auralisation / audio / acoustics, mobile XR'. At the bottom right of the table, there are two green 'Details' buttons.

identifier	title English	Properties
3GPP TR 26.118	Virtual Reality (VR) profiles for streaming applications	type: specification status: published year: 2022 tags: communication / interoperability, virtual reality, auralisation / audio / acoustics, mobile XR
3GPP TR 26.818	Virtual Reality (VR) streaming audio; Characterization test results	type: specification status: published year: 2022 tags: communication / interoperability, virtual reality, auralisation / audio / acoustics, mobile XR
3GPP TR 26.905	Mobile stereoscopic 3D video	type: specification status: published year: 2022 tags: communication / interoperability, virtual reality, auralisation / audio / acoustics, mobile XR
3GPP TR 26.918	Virtual Reality (VR) media services over 3GPP	type: specification status: published year: 2022 tags: communication / interoperability, virtual reality, auralisation / audio / acoustics, mobile XR



search for actual standards

- example: search for published standard from ANSI and CTA

search database

type SDO status tags Default order

standard (industry) standard (official) technical report ANSI CTA published Reset all

identifier	title English	Properties
ANSI/CTA 2085	Definitions and Characteristics for VR Video and VR Images	type: standard (official) status: published year: 2019 tags: basics / terms, virtual reality, graphics software / algorithms
ANSI/CTA 2087	Recommendations and Best Practices for Connection and Use of Accessories for XR Technologies	type: standard (official) status: published year: 2019 tags: XR management, virtual reality, augmented reality, ergonomics / usability, other XR hardware, applications: others
ANSI/HFES 100-2007	Human Factors Engineering of Computer Workstations	type: standard (official) status: published year: 2007 tags: evaluation / conformity, ergonomics / usability, graphics hardware / optics / displays
CTA 2095	Best Practices for Limited Mobility in XR	type: standard (industry) status: published year: 2021 tags: XR management, regulation / ethics / governance, virtual reality, augmented reality, user experience (UX) / user interface design (UID)
CTA 2103	Best Practices for Diversity in XR	type: standard (industry) status: published

search for recommendations

- example: search for recommendations on regulation / ethics / governance

search database

type SDO status tags Default order

recommendation / guideline regulation / ethics / governance Reset all

identifier	title English	Properties
ConnectSafe MV & Parents	Metaverse and Virtual Reality Safety Tips for Parents	type: recommendation / guideline status: published tags: regulation / ethics / governance, applications: entertainment / culture
Council of the European Union Metaverse	Metaverse - Virtual World, Real Challenges	type: recommendation / guideline status: published year: 2022 tags: XR management, regulation / ethics / governance, virtual reality, augmented reality
Cyber-XR Coalition Cyber XR-2020-1.0	Immersive Technology Standards for accessibility, inclusion, ethics, and safety	type: recommendation / guideline status: published year: 2020 tags: regulation / ethics / governance
European Parliament Metaverse	Metaverse Opportunities, risks and policy implications	type: recommendation / guideline status: published year: 2022 tags: XR management, regulation / ethics / governance, virtual reality,



search for upcoming standards

- example: search for standards with status "draft" or "work in progress" in the field of graphics hardware / optics / displays

search database

type SDO status tags Default order

specification standard (industry) standard (official) draft work in progress

graphics hardware / optics / displays Reset all

identifier	title English	Properties
 IEC 62629-1-3	future IEC/TR 62629-1-3 ED1: 3D display devices - Part 1-3: Depth perception and determination of the position of 3D object on the non-physical screen	type: standard (official) status: work in progress tags: interaction / patterns, graphics hardware / optics / displays
 IEC 62629-1-3 ED1	3D display devices - Part 1-3: Depth perception and determination of the position of 3D object on the non-physical screen	type: standard (official) status: work in progress tags: graphics hardware / optics / displays
 IEC 62629-502-1	3D Display devices - Measurement method of plane-symmetrical real-image-forming optics for aerial display	type: standard (official) status: work in progress year: 2023 tags: evaluation / conformity, graphics hardware / optics / displays
 IEC 62629-52-1 ED1	3D Display devices - Part 52-1: Fundamental measurement methods of aerial display - Optical	type: standard (official) status: work in progress year: 2024 tags: evaluation / conformity, graphics hardware / optics / displays
 IEC 62629-62-12 ED1	3D display devices - Measurement methods for virtual-image type - Image Quality	type: standard (official) status: work in progress year: 2024

search for SDOs and working groups

- example: search for standards development organizations (SDOs) and working groups in the field of education and engineering

search database

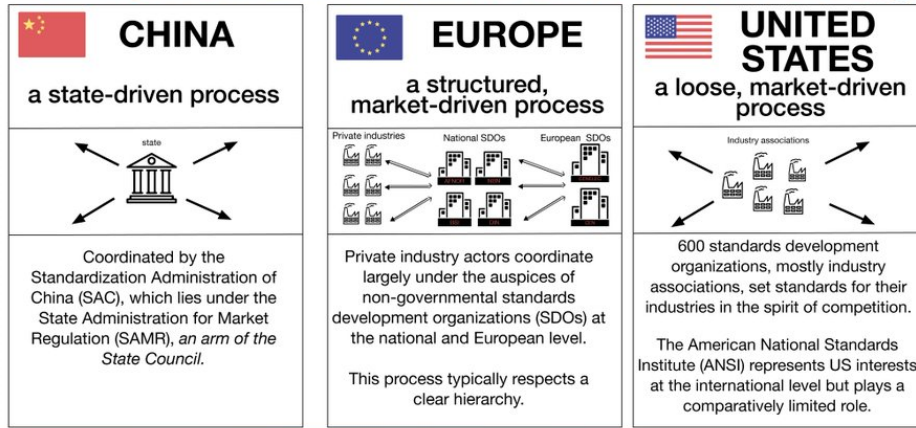
type SDO status tags Default order

SDO working group applications: education / training applications: design / engineering Reset all

identifier	title English	Properties
 AREA	Interoperability and Standards program	type: SDO year: 2013 tags: XR management, evaluation / conformity, augmented reality, applications: education / training, applications: design / engineering, applications: assistance, applications: others
 ASAM	Association for Standardization of Automation and Measuring Systems	type: SDO year: 1998 tags: evaluation / conformity, communication / interoperability, applications: design / engineering
 BDSV	Simulation and Training Working Group	type: working group tags: applications: education / training
 DIN	DIN Work Innovation	type: working group tags: applications: education / training, applications: design / engineering, applications: collaboration, applications: others
 DIN	DIN I4.0	type: working group tags: applications: design / engineering, applications: others
 DIN	DIN NIA	type: working group tags: applications: education / training, applications: design / engineering, applications: health, applications: assistance, applications: collaboration, applications: marketing, applications: entertainment / culture, applications: geo & construction, applications: others
ETSI ISG-ARF	Industry Specification Group (ISG)	type: working group

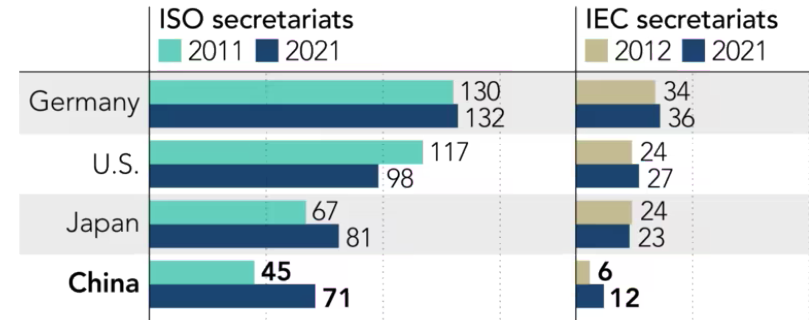
standardization systems and public engagement

Setting standards in China, Europe and the US



Source: John Seaman, "China and the New Geopolitics of Technical Standardization", Notes de l'Ifr, Ifri, January 2020

China's growing clout in standardization organizations (Number of secretariat positions by country)



ISO stands for International Organization for Standardization, IEC for International Electrotechnical Commission; includes twinned ISO secretariats
Source: ISO, IEC, U.S. National Institute of Standards and Technology

⇒ the U.S. seems to lose interest,
and China seems to gain interest.



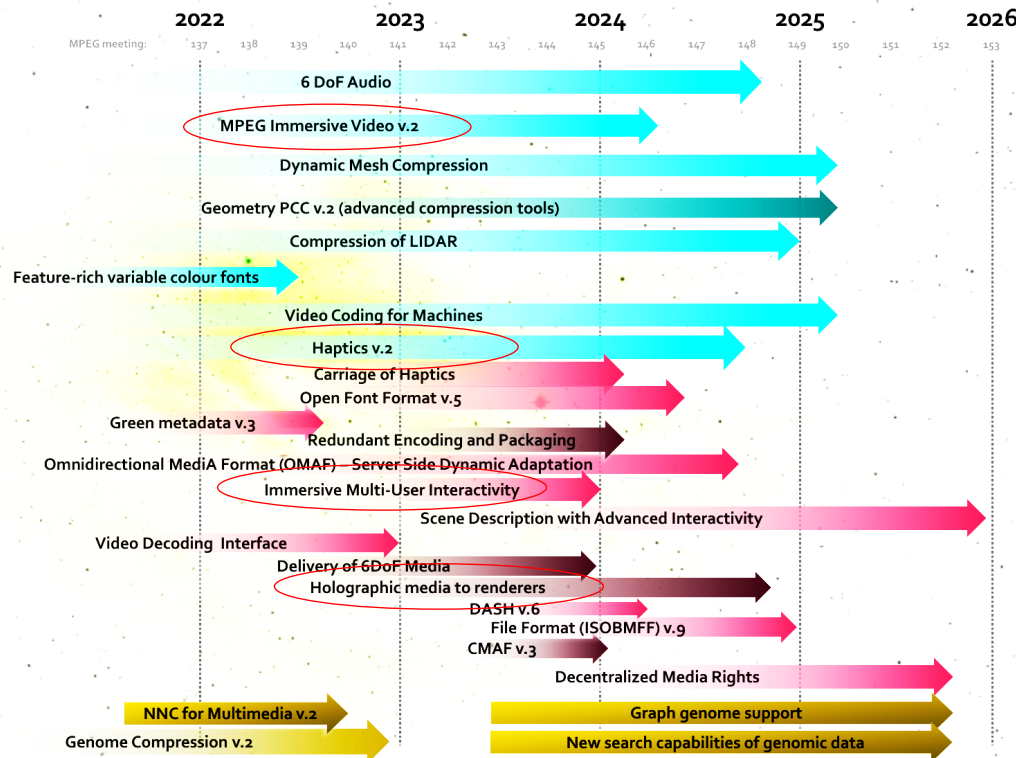
What's further interesting?

Many SDOs publish standardization roadmaps.

These roadmaps provide an excellent, combined perspective on many activities and their corresponding timelines.

Such activities are an opportunity to contribute to.

Example on the right hand side: the MPEG roadmap



Media
Coding

Systems
and Tools

Beyond
Media



- **Proposed starting year:** 2025
- **Format:** Co-programmed European Partnership: to foster a strong engagement from industry, research and technology organisations (RTOs) and SMEs through commitments to common research and innovation agenda.
- **Budget:** build on existing virtual worlds related investments under this MFF [multiannual financial framework: (Horizon Europe, Digital Europe Programme, Creative Europe)] 2.16 Billion € according to:
 - Investments in the period 2021-2024: ~700 million Euros
 - Destination Earth and related Digital Twins: ~300 million Euros
 - The Human Brain Project Flagship and the digital twin of the body: ~ 50 million Euros
 - Extended Reality technologies: 150 million Euros
 - Creative and Content Industries: 60 million Euros (tbc)
 - Future Internet / next generation Internet technologies: ~100 million Euros
 - Additional Investments foreseen in the period 2025-2027: 800 million Euros



▪ 4 topic pillars of European Virtual Worlds Partnership:

- research and innovation in technology building blocks
- applications – ecosystem
- policies, human and ethical aspects
- **open standards**

Additional actual activities

1. Foundation of the ‘Virtual Worlds Partnership Association’ by the European Commission (VR/AR Industrial Coalition as a starting point):

- focus on industry participants from Europe, networks not intended
- industrial anchor partner (Feb. 2025): Siemens
- currently creating core group of 15 enterprises throughout Europe

2. determination and establishment of **regulatory sandboxes** / real laboratories

- testing of virtual worlds applications
- derivation of new regulatory requirements

3. analysis and **mapping of standardization** and the standardization system in the context of ‘Virtual Worlds’

- work ongoing in ViWISSO project

EU Virtual Worlds Steering Group:

- made up of: DG Connect – Unit G.2. Interactive Technologies, Digital for Culture and Education
- consisting of representatives of involved member states
- invited speakers
- meetings:
 - 7. March 2024 (constituting)
 - 20. June 2024 (focus on regulatory sandboxes: applications, implementation issues)
 - 21.-22. October 2024
 - [ongoing]



Virtual Worlds Interoperability and Standards Status and Opportunities (ViWISSO) Project

The ViWISSO Project is preparing a complete and exhaustive assessment of standardization activities in diverse virtual world technologies, collecting requirements from a wide range of experts and sources and, based on gaps between the current activities and future requirements, will propose actions and recommendations designed to accelerate development and adoption of standards for virtual worlds.

Interested to contribute? Please get in touch!



Co-funded by the
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- As a cross-cutting technology, XR standardisation is spread across many organisations, which makes it difficult to get an overview.
- There are already a large number of XR standards in existence, which provide a solid foundation for further development. This eliminates the need to reinvent the wheel and allows companies to focus on the truly innovative aspects of their work.
- Individuals and companies appear to be unaware of the existing publications, which indicates a lack of technology transfer.
- Standards pave the way for current and future markets, minimizing dependencies on proprietary solutions and supplier risk.

=> let's use them and extend them, engage!



VDC
standards
database





*„Without standards,
there can be no improvement.“*

Ōno Taiichi

(* 29 February 1912 in Manchuria; † 28 May 1990) was the inventor of the Toyota production system. He developed today's basic logistics methods, the Kanban system and just-in-time production, between 1950 and 1982. The Japanese management concept Kaizen is also based on his ideas.



Thank you for your attention.

Prof. Dr.-Ing. Dipl.-Kfm. Christoph Runde

Managing director - Virtual Dimension Center (VDC)

VP Industry & End Users – EuroXR

Founder - XR EXPO

Co-Chair – Standards Registry WG at Metaverse Standards Forum (MSF)

Chairman - Standardization Committee „eXtended Reality und Metaverse“ at DIN e.V.