

Metaverse & XR

Ein fachliche Einführung

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Douin, Vincent;
Kindt, Stefan, et
al.: The
metaverse at
work. EY /
Nokia: London,
June 2023

Figure 4.20: Deployment of field XR by industry

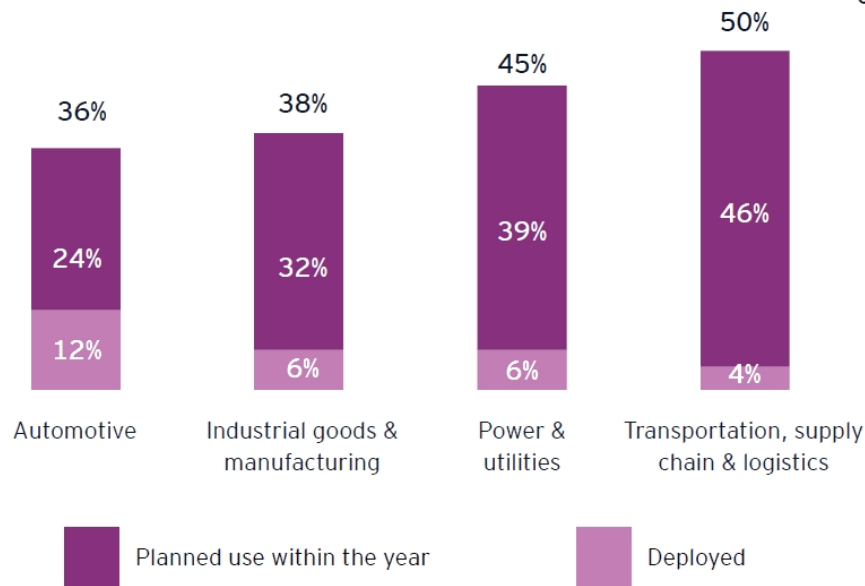


Figure 4.21: Key benefits reported by companies currently using field XR



Versprechen und Aktuelles...

- very big promises, but also
- very controversial discussions
- job cuts at Meta
- disbandment of Disney's Metaverse division...

important: to distinguish between

- Consumer Metaverse
- Commercial Metaverse
- Industrial Metaverse



aus:

McKinsey
& Company





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Figure 4.1: Metaverse use cases mapped to key areas of the business value chain

				
	Training & onboarding	Design & testing	Production & delivery	Service & support
Industrial	▶ XR hands-on training	▶ XR-enhanced UX research ▶ Virtual R&D, prototyping and testing	▶ Supply chain, grid or network planning and optimization ▶ Facility planning and optimization ▶ Autonomous/RC operations robotics	▶ Field XR ▶ Visualized predictive maintenance ▶ Autonomous/RC maintenance robotics
Enterprise	▶ Virtual recruiting and hiring ▶ XR onboarding and soft-skills training	▶ Virtual office and workspaces	▶ Virtual showroom* ▶ Virtual product and service trials*	▶ Metaverse-enhanced customer support*

 Non-customer-facing use cases, covered in detail throughout the report

 *Customer-facing enterprise use cases covered in less detail throughout the report

MV Use Cases to transform Industries

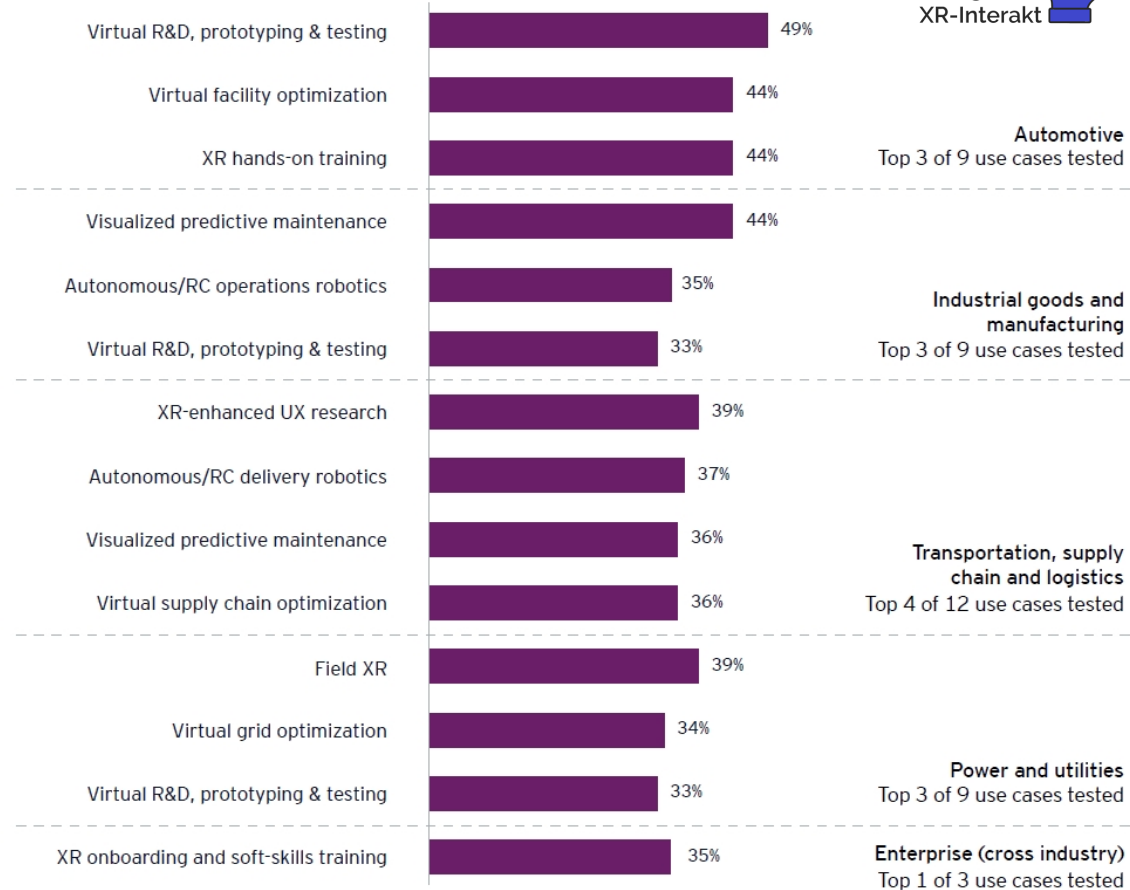


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Figure 4.2: Use cases most expected to deliver transformative value, by industry

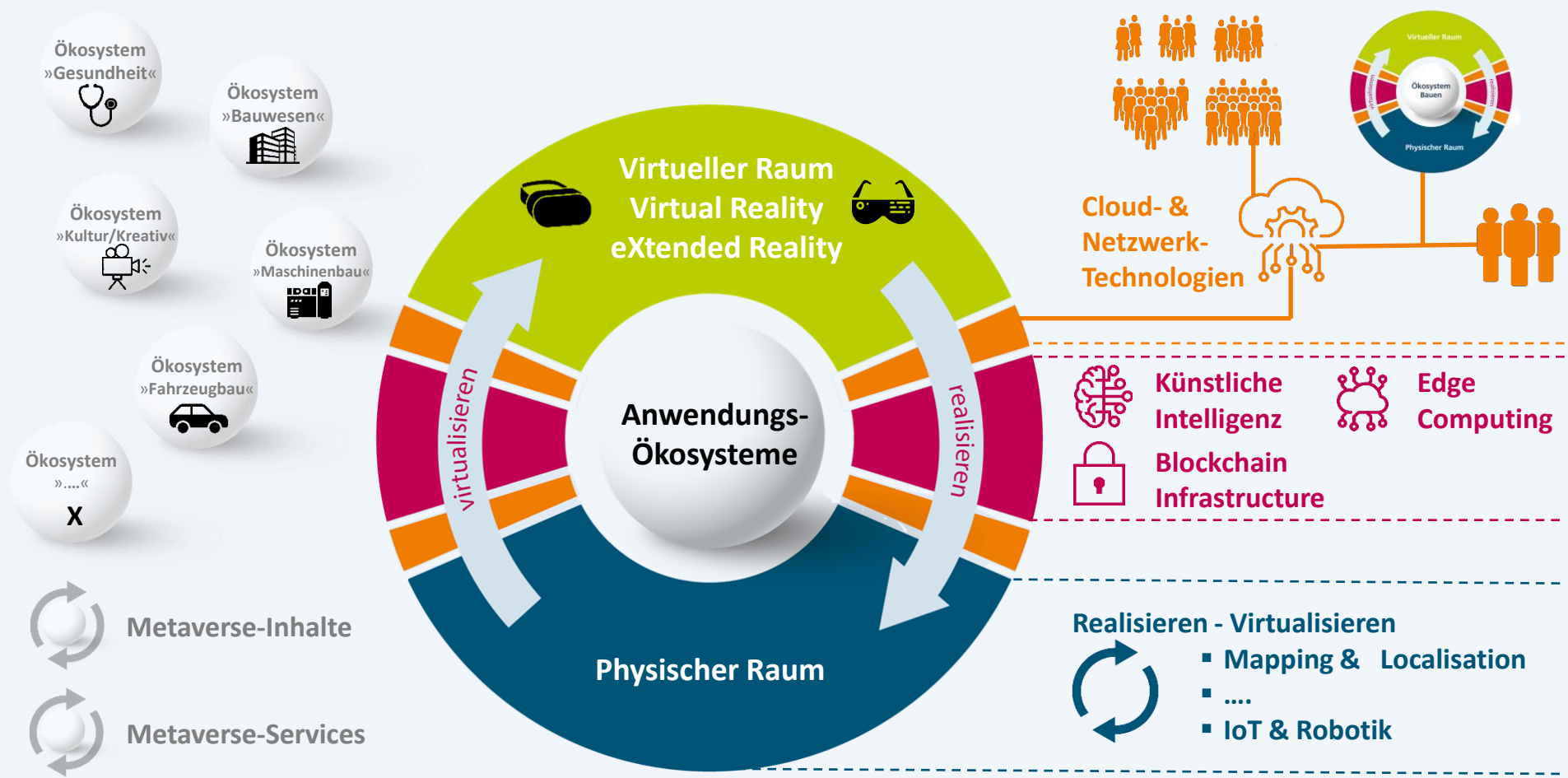


VIRTUAL DIMENSION CENTER



Eine Definition des Metaversums

- Das Metaversum (englisch metaverse) ist ein kollektiver virtueller Raum, der durch die Konvergenz von virtuell erweiterter physischer Realität und physisch persistentem virtuellen Raum entsteht – einschließlich der Summe aller virtuellen Welten.



Aus:



Gefördert vom Ministerium für
Wirtschaft, Arbeit und
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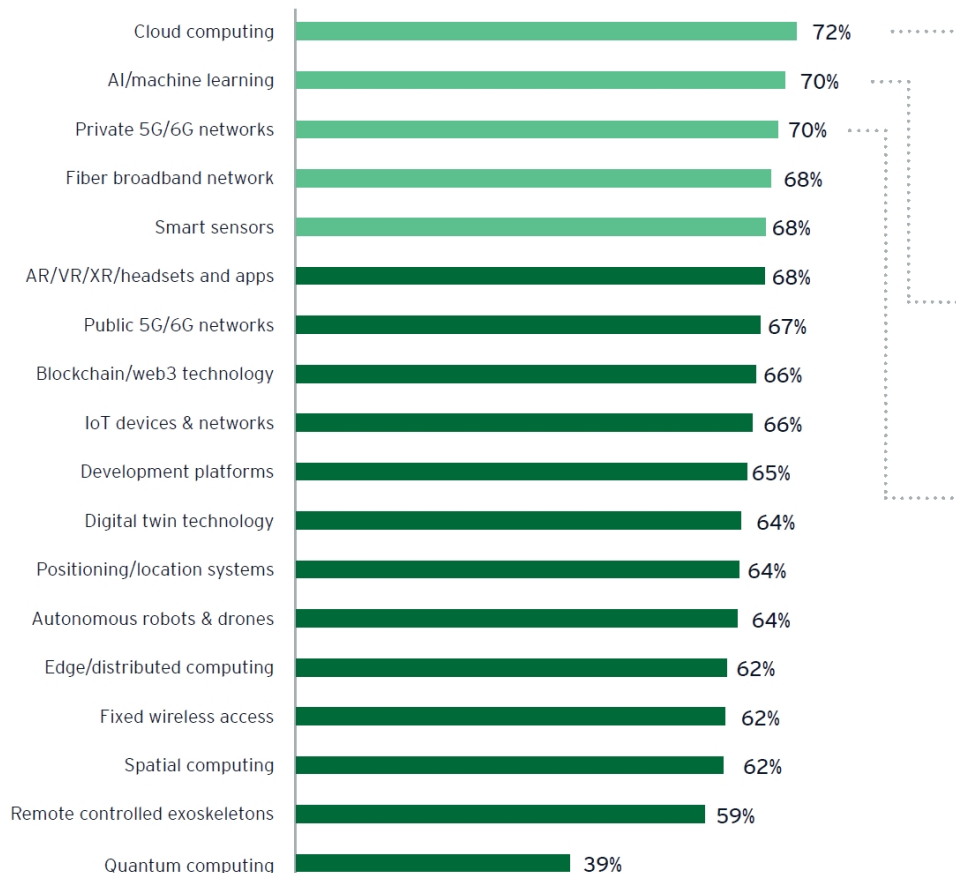
Figure 5.2: Views on importance of technical enablers, among all respondents



Key Technologies



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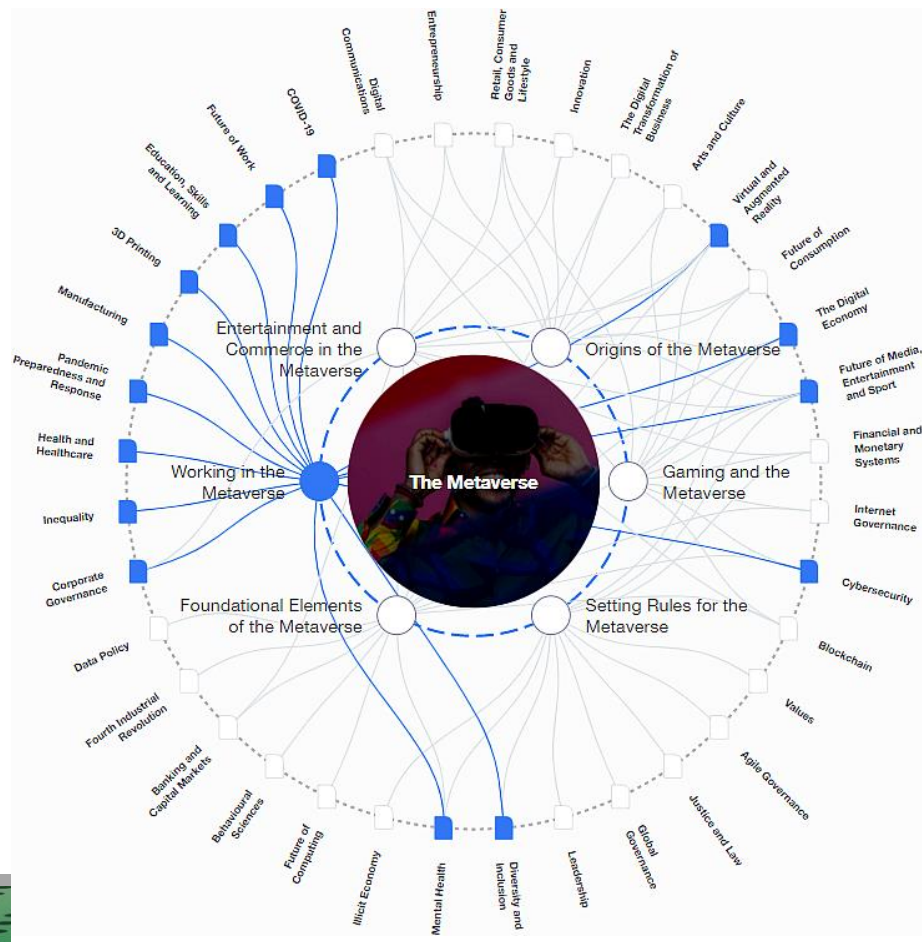
17 percentage point increase
in importance of cloud
computing for experienced
companies over inexperienced

9 percentage point increase
in importance of AI/machine
learning for experienced
companies over inexperienced

11 percentage point increase
in importance of private 5G/6G
networks for experienced
companies over inexperienced

While all respondents value
essential metaverse enablers,
those with first-hand experience
are even more aware of the need
for foundational capabilities.

Metaverse Transformation Map of World Economic Forums





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Figure 5.1: Key players in driving the advancement of the metaverse, among all respondents

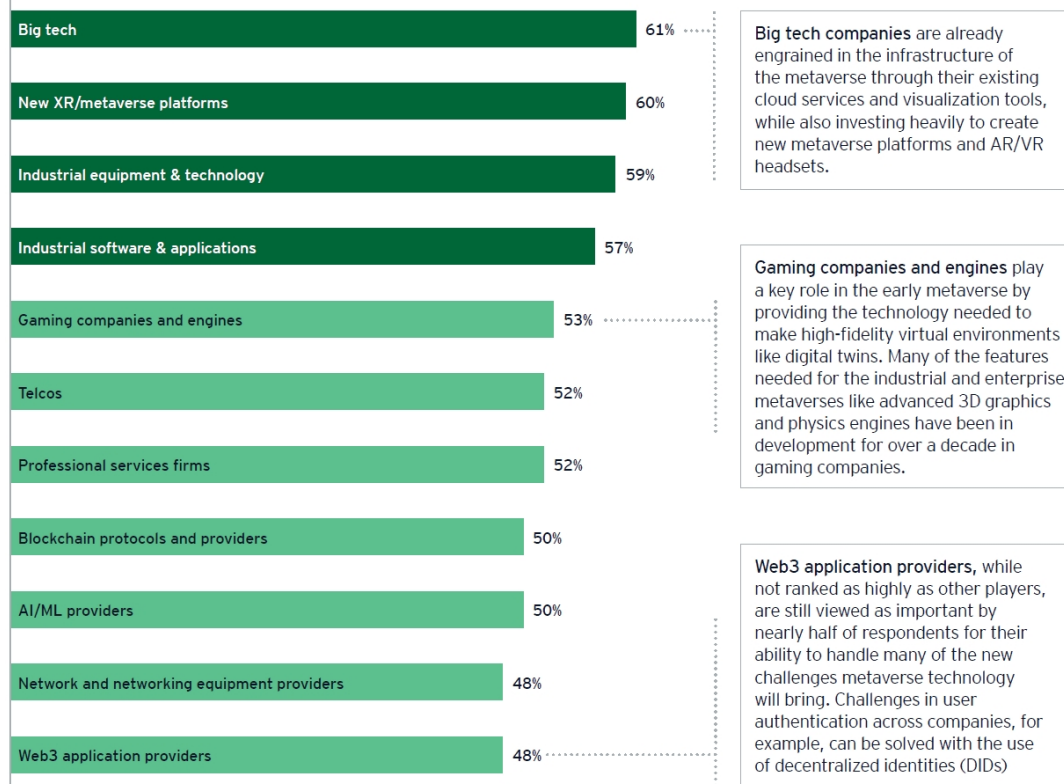
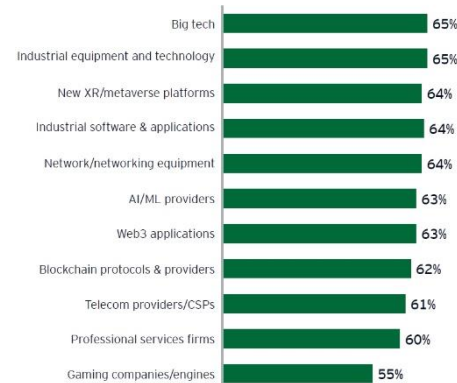


Figure 5.5: Key partners in deploying industrial metaverse use cases, among all respondents



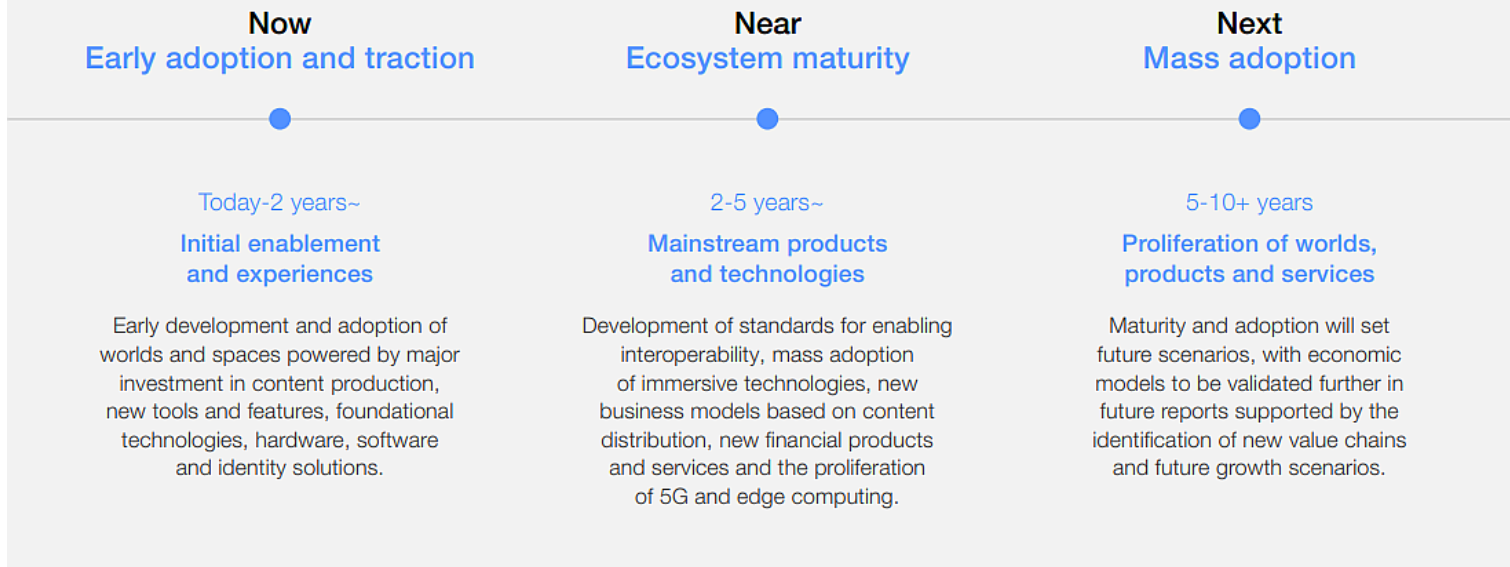


17. Feb. 2023

FIGURE 7

Projected horizons of metaverse growth and adoption

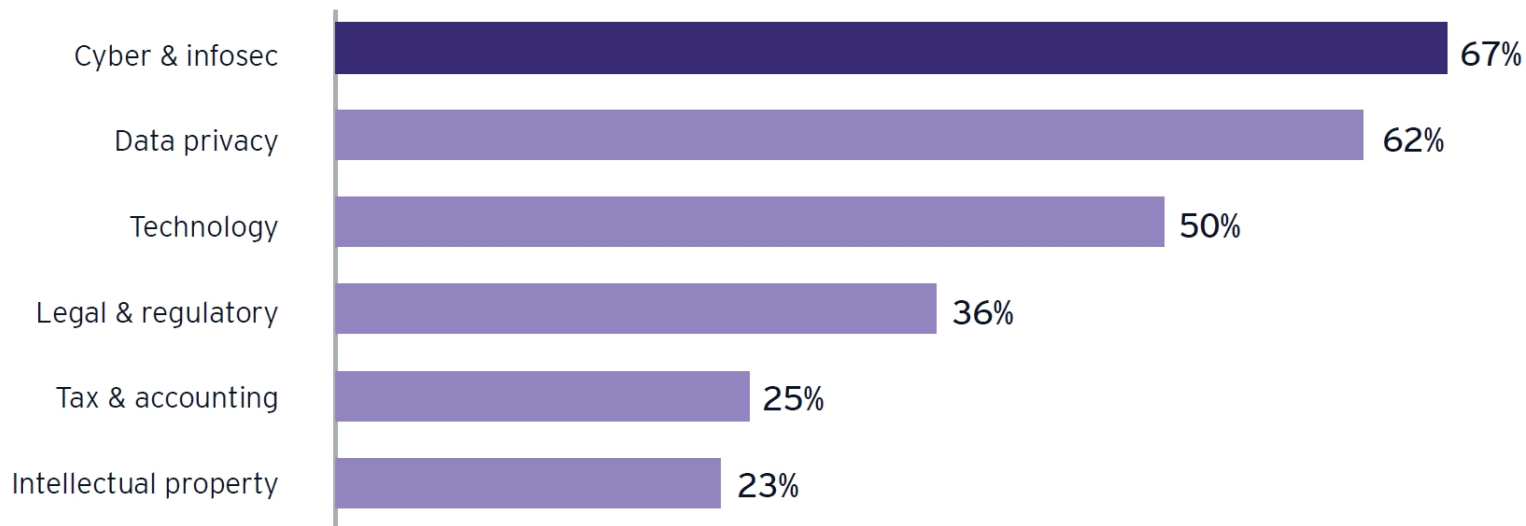
Economic models selected today must consider the varying stages of maturity across technology, policy and wider enablers that these choices may use, as these choices will act as the foundations for how experiences of product and service offerings will evolve over time.





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Figure 6.1: Top risks in deploying metaverse use cases, among experienced companies



Europe finds ourselves only at the sideline of a fight for global XR ecosystems.

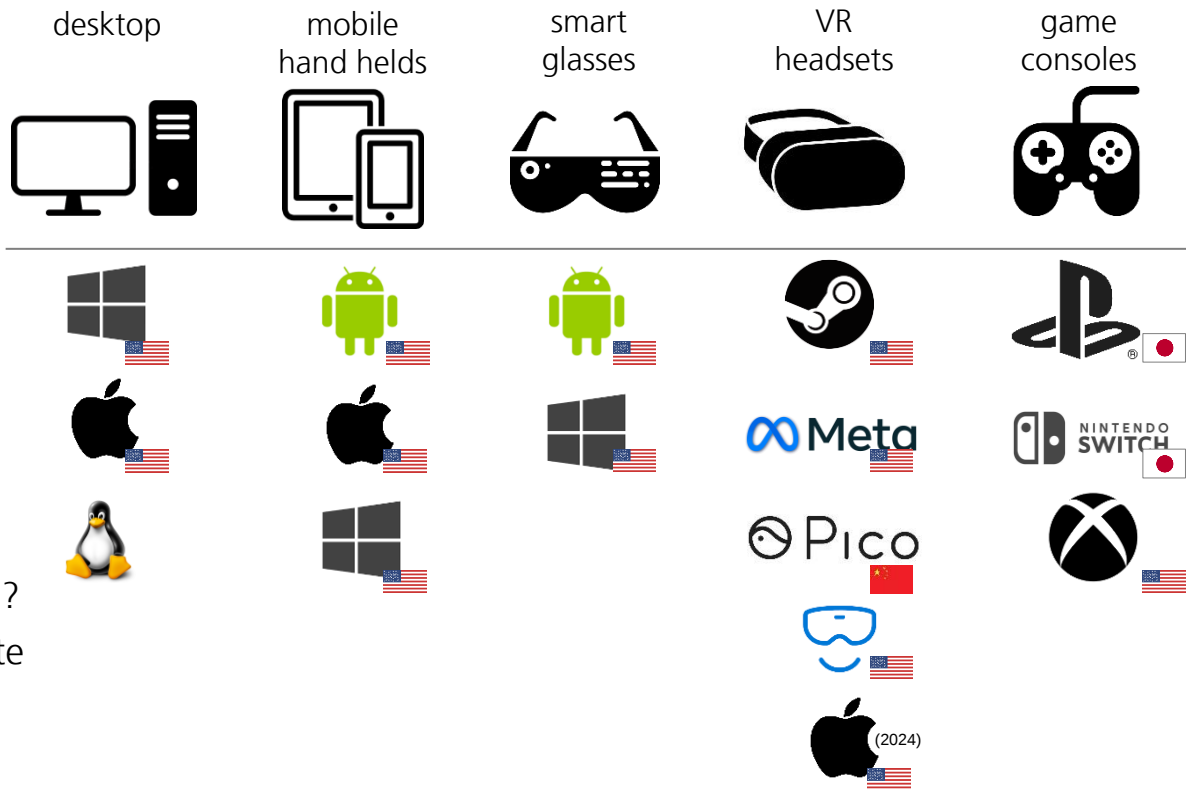
problem:

- Europe will probably not create a huge, global platform provider
- platform providers aim at vendor lock-in

questions:

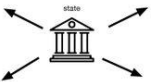
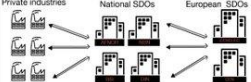
- what options for action do we have?
- what can be our future role to create added value and employment?

=> **standardization!**



Germany is still excellent on norming and standardization:
top international influencing position
to ensure interoperability

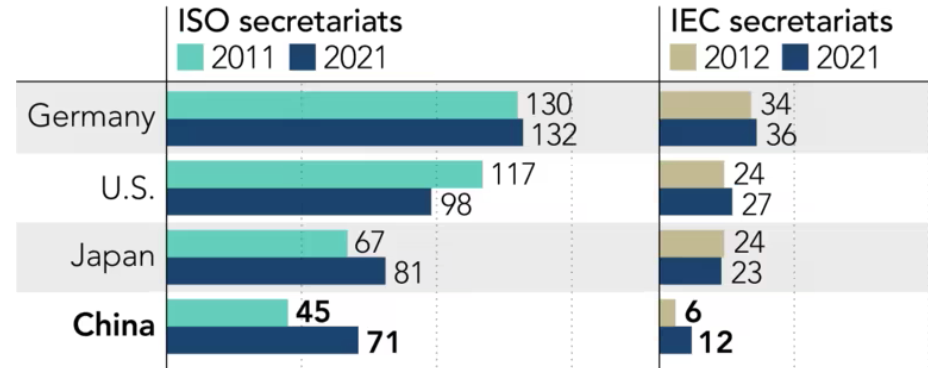
Setting standards in China, Europe and the US

 CHINA a state-driven process  Coordinated by the Standardization Administration of China (SAC), which lies under the State Administration for Market Regulation (SAMR), an arm of the State Council.	 EUROPE a structured, market-driven process  Private industry actors coordinate largely under the auspices of non-governmental standards development organizations (SDOs) at the national and European level. This process typically respects a clear hierarchy.	 UNITED STATES a loose, market-driven process  600 standards development organizations, mostly industry associations, set standards for their industries in the spirit of competition. The American National Standards Institute (ANSI) represents US interests at the international level but plays a comparatively limited role.
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Source: John Seaman, "China and the New Geopolitics of Technical Standardization", Notes de l'Ifrri, 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



- Actively promote the consistent worldwide application of internationally recognized principles in the development of standards.
- work to prevent standards and their application from becoming technical trade barriers to U.S. products and services.
- Strengthen international outreach programs to promote understanding of how U.S. voluntary, consensus-based, market-driven standards can benefit businesses, consumers, and society as a whole.
- Respect diverse funding models for the U.S. standards system.
- Address the need for standards in support of emerging national priorities.



- supporting the EU's leading position as a forerunner in key technologies and promoting EU core values
- leveraging the European standardization system to deliver on the twin green and digital transition and support the resilience of the single market
- new High-Level Forum for Member States and European standardization organizations
- foster the development and deployment of international standards for a free, open, accessible and secure global internet
- establish an EU internet standards monitoring website
- monitor the effective implementation of existing commitments on standardization in EU trade agreements
- concerned about decision-making in ETSI



- 15-year plan to shape the future, to set the global standards for the next-generation of technologies.
- pushing domestic firms and experts to be part of the global effort to set standards
- research on China Standardization System, Method and Evaluation
- research on Supporting High-quality Development Standardization System
- research on Standardization Military-Civil Integration Development
- start with the national standards of **virtual reality technology**, integrated circuit design, intelligent health care and 5G key components, and gradually expand to the emerging areas of Internet of Things, photovoltaic, information equipment and other industries.



- Necessity of national standards
- Clarification of appropriate quality levels
- Revisions of the Industrial Standardization Law
- Observance of JIS standards and JIS markings
- Responses to Inappropriate ISO and IEC Standards
- Relationship with Standardization Organizations in Europe
- Support for Strategic Standard Proposal
- Active Contribution to Standardization Activities
- Programs for Developing Standardization Experts in Asia and the Pacific
- Standardization regarding Information Technology, environmental preservation, consumers, elderly people, and people with disabilities, manufacturing technology and industrial platform technology



- International and European trade is facilitated by standardization
- Standardization relieves the burden on government regulation and supports it
- Germany is driving forward standardization worldwide in future topics by networking stakeholders, establishing new processes and open platforms for coordination.
- Industry and society are the driving forces in standardization
- Standardization is used as a strategic and attractive tool, especially by companies.
- Standardization has a high status in the public perception



- advance national standards system
- innovate KS management system
- strengthen standard technology infrastructure
- advance measurement standards
- advance legal metrology system
- actively participate in international standardization activities
- lead the international de-jure standardization
- support international de-facto standardization
- address the technical barriers to trade (TBT)
- assist the private sector in increasing its capacity to develop standards
- foster standardization capacity of private sector
- promote standard development activity of producer group



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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FROM POLITICO PRO

Beijing is coming for the metaverse

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

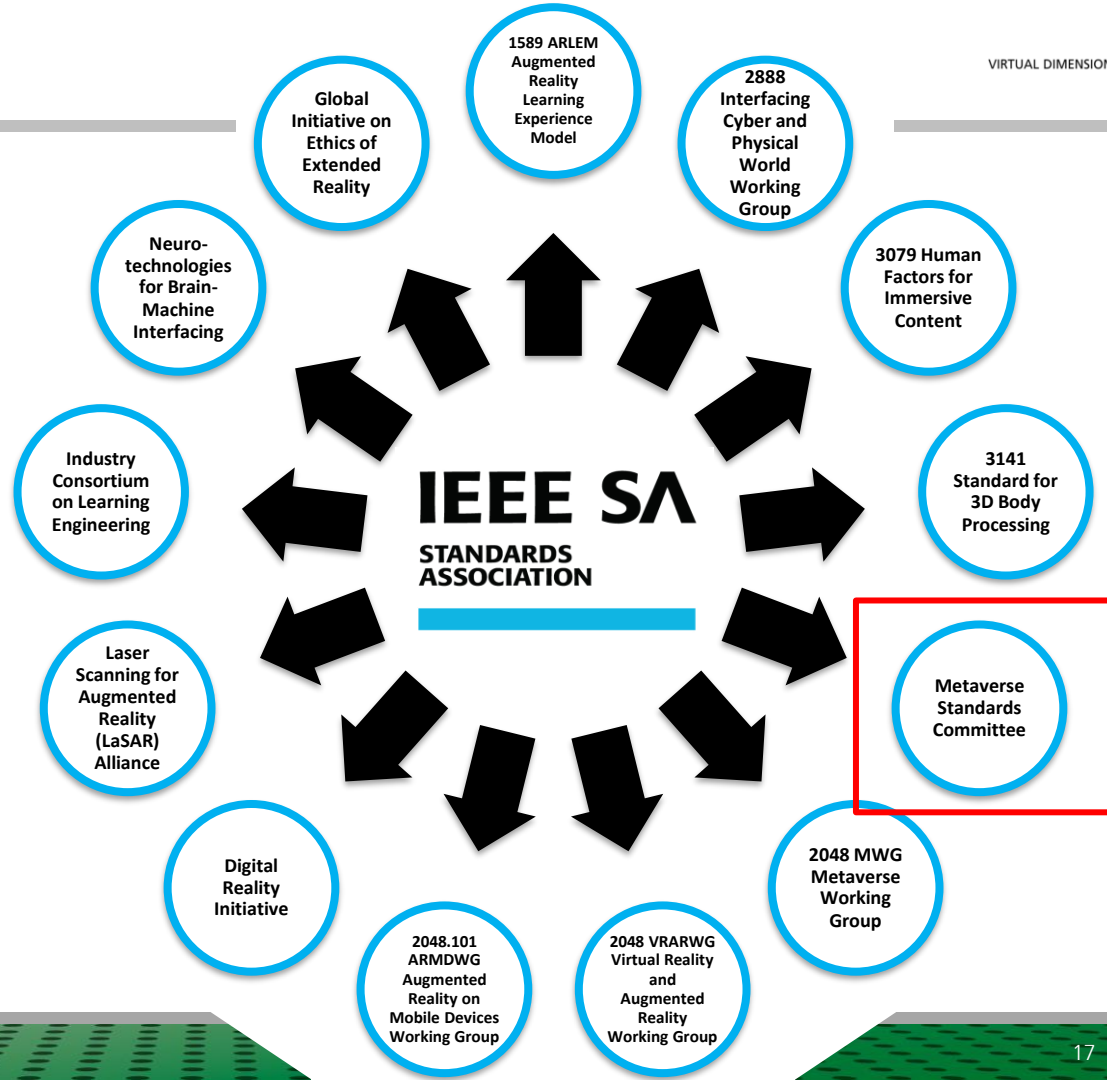


Experts that reviewed the proposal at the request of POLITICO said it risks violating principles of privacy and freedom | Jade Gao/AFP via Getty Images

BY GIAN VOLPICELLI

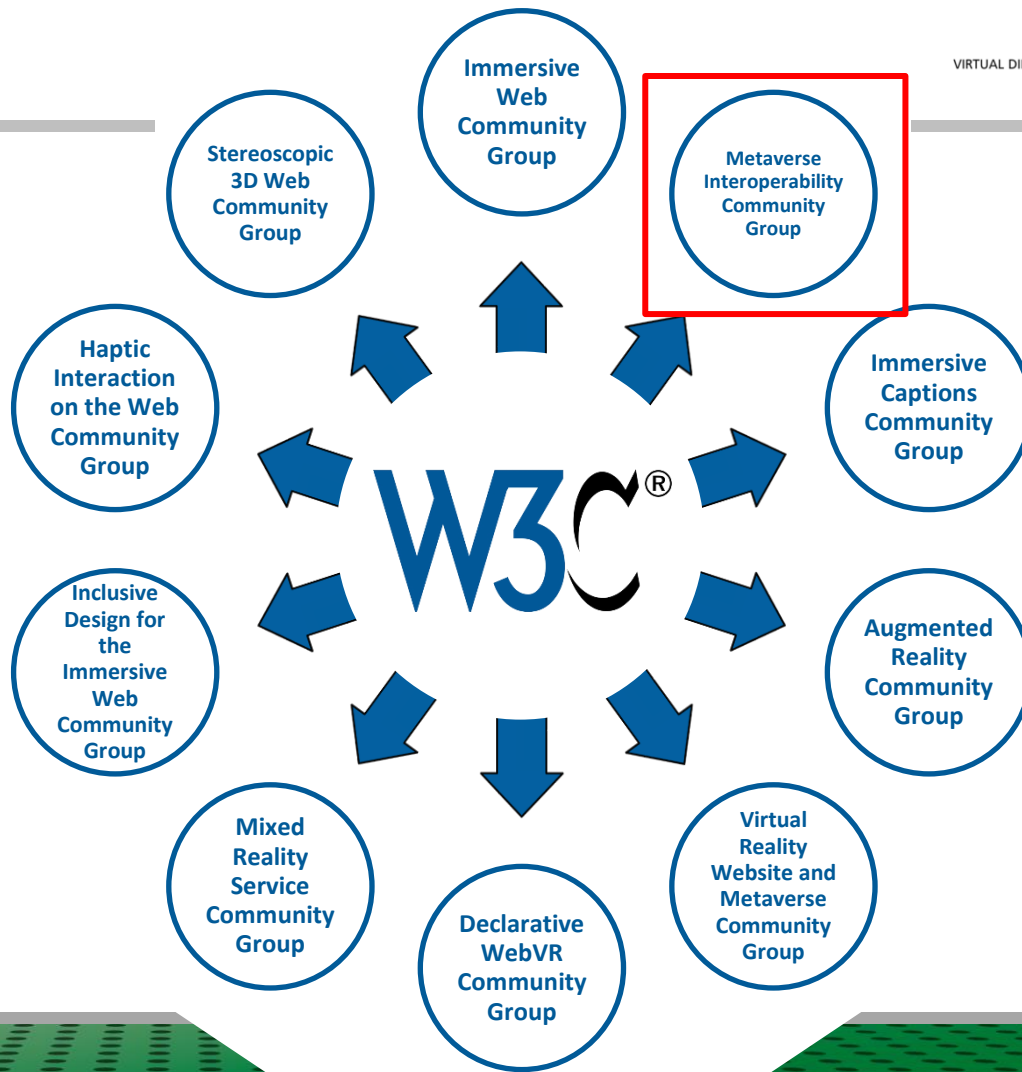
AUGUST 20, 2023 | 4:00 PM CET | 5 MINUTES READ

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..

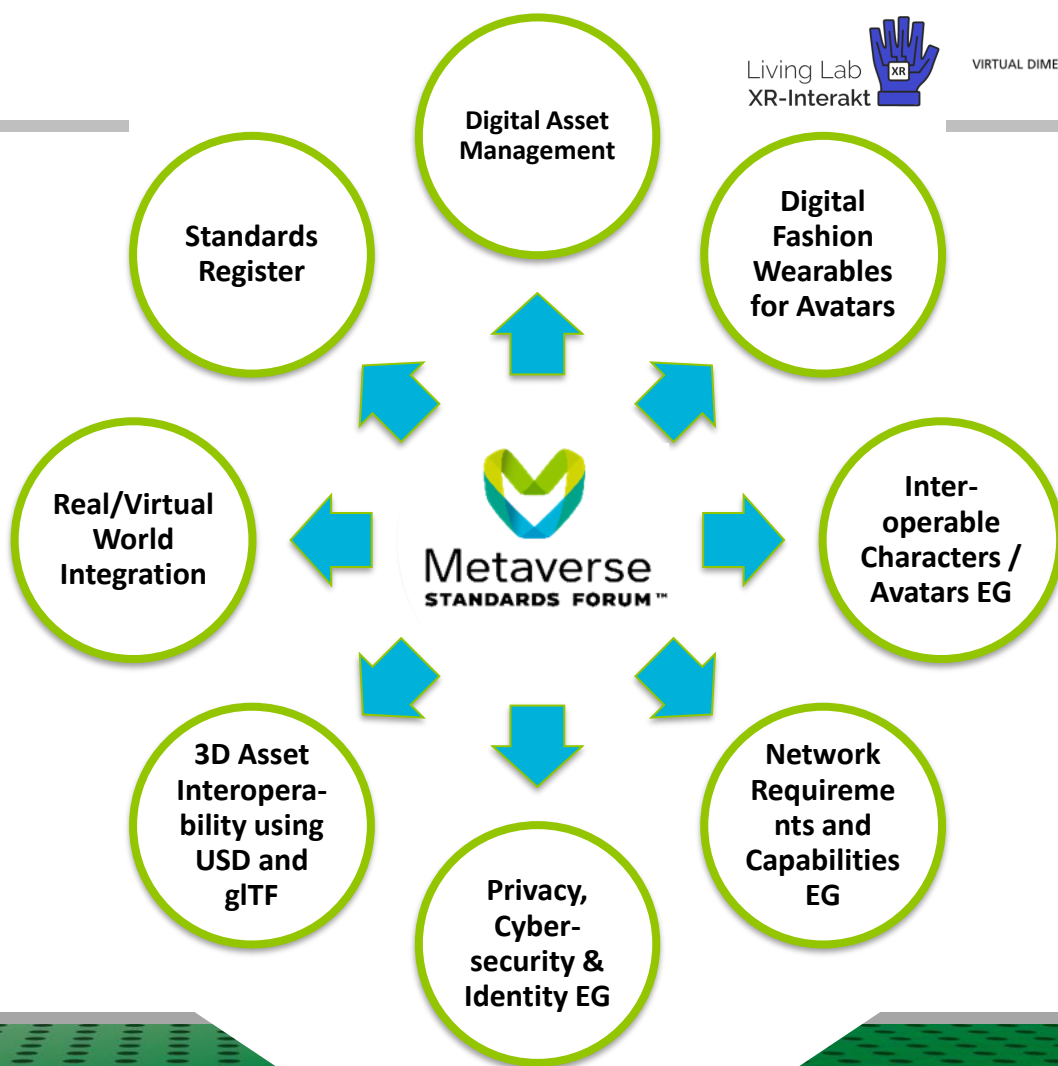




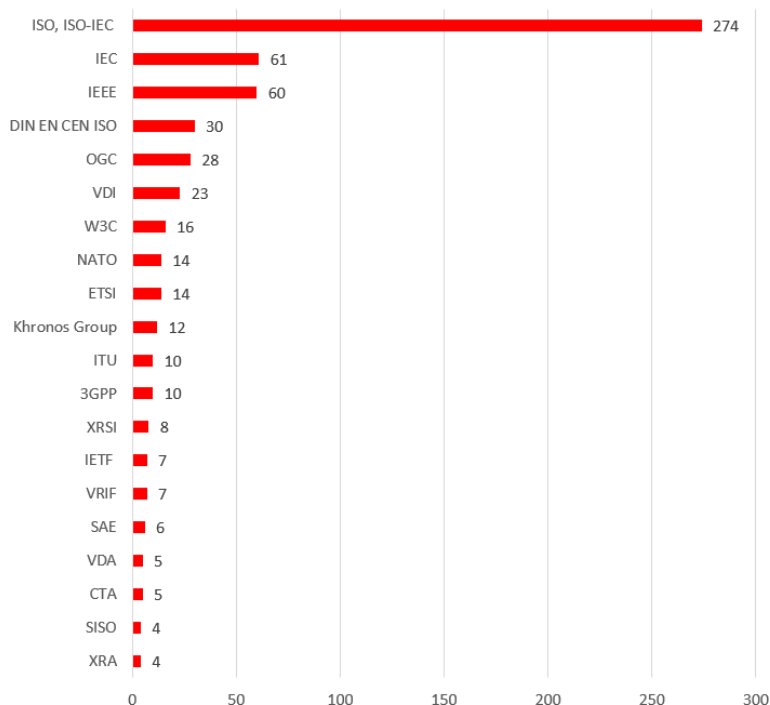
The **World Wide Web Consortium (shortly W3C)** is the body responsible for standardizing technologies on the World Wide Web. It was founded on October 1, 1994, at the MIT Laboratory for Computer Science in Cambridge, Massachusetts. The W3C is a membership organization. It develops technical specifications 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 **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.

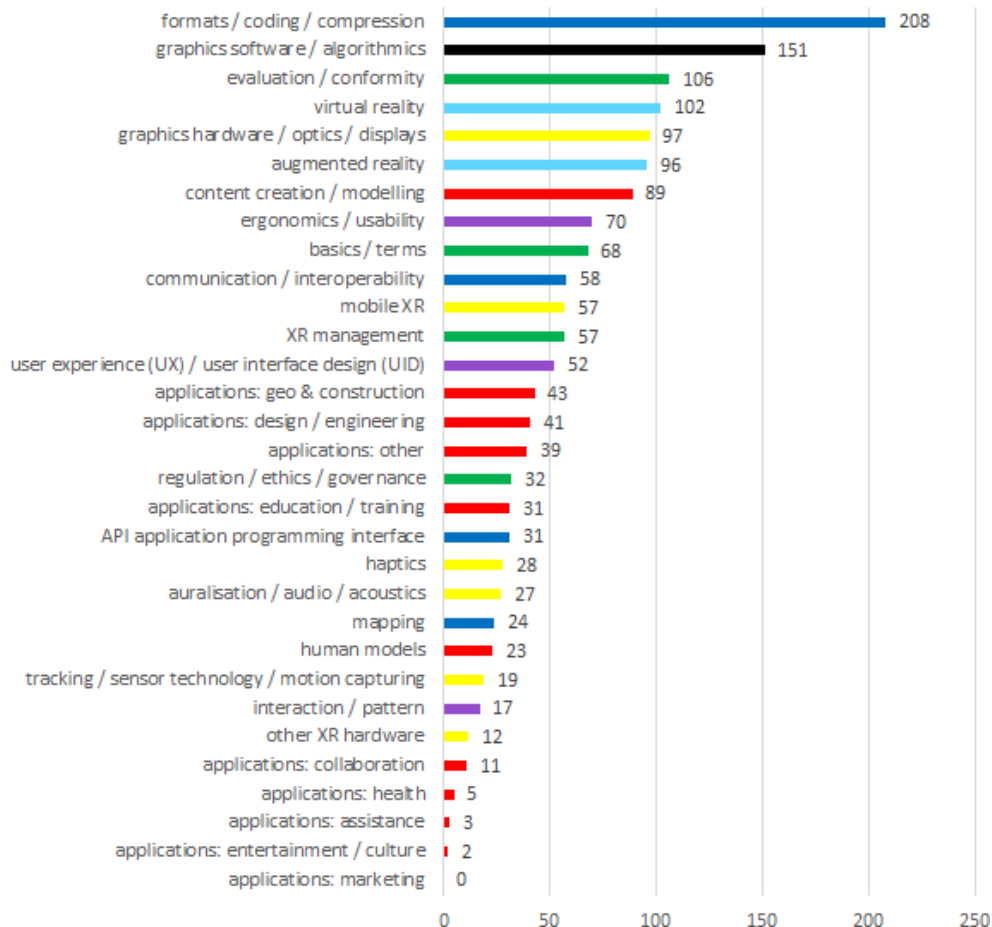


published XR norms, standards, guidelines, recommendation
[by organizations]



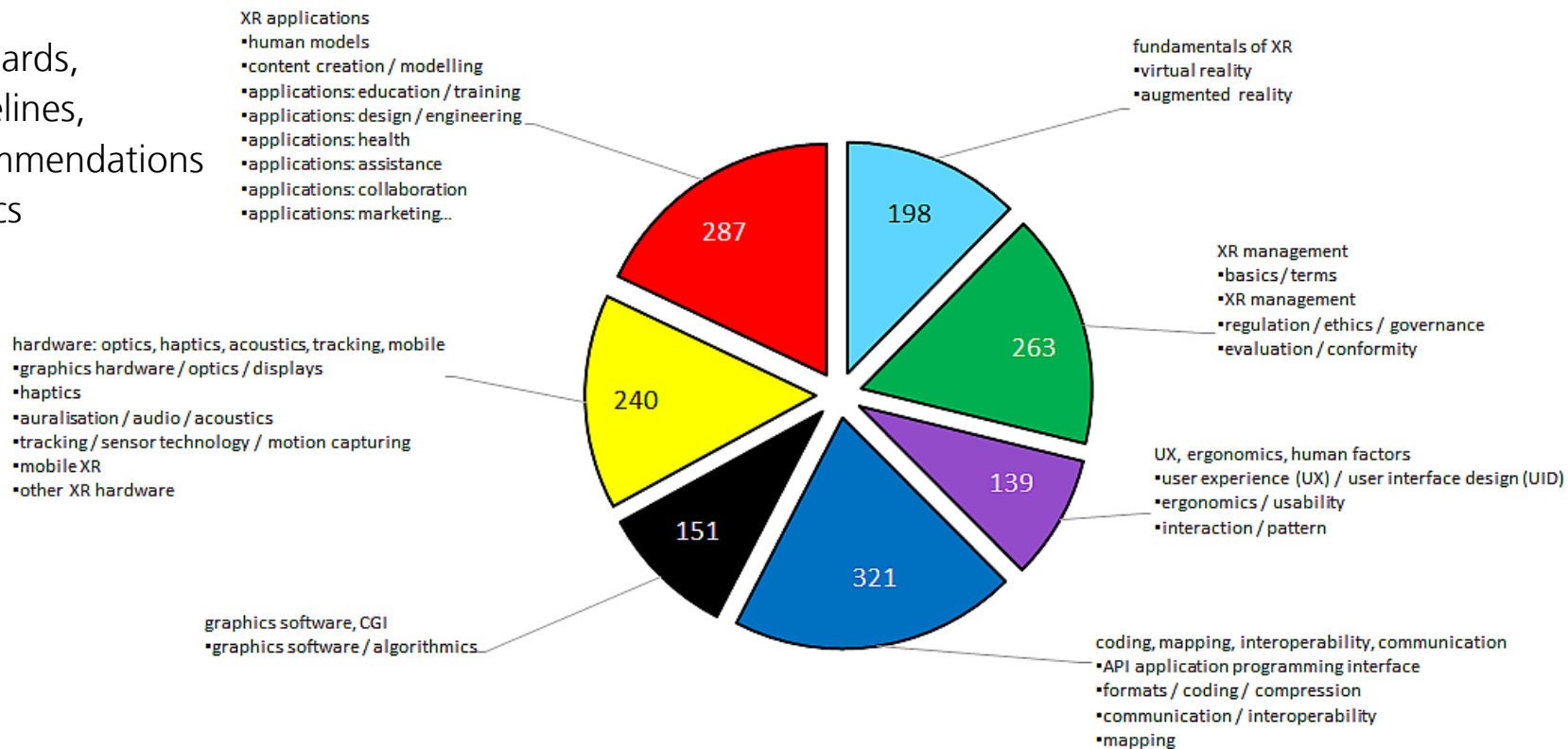
ranking

- XR standards,
 - XR guidelines,
 - XR recommendations
- by frequency of topic



clustering

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



Recognized SDOs:

- These are officially recognized by regulation systems or political bodies
- ITU, UN specialized agency for information and communication
- UE regulation 1025/2012 rules the standardization at an European level and lists a set of reference SDOs with either an international (ISO, IEC, and ITU) or European scope (CEN, CENELEC, and ETSI)



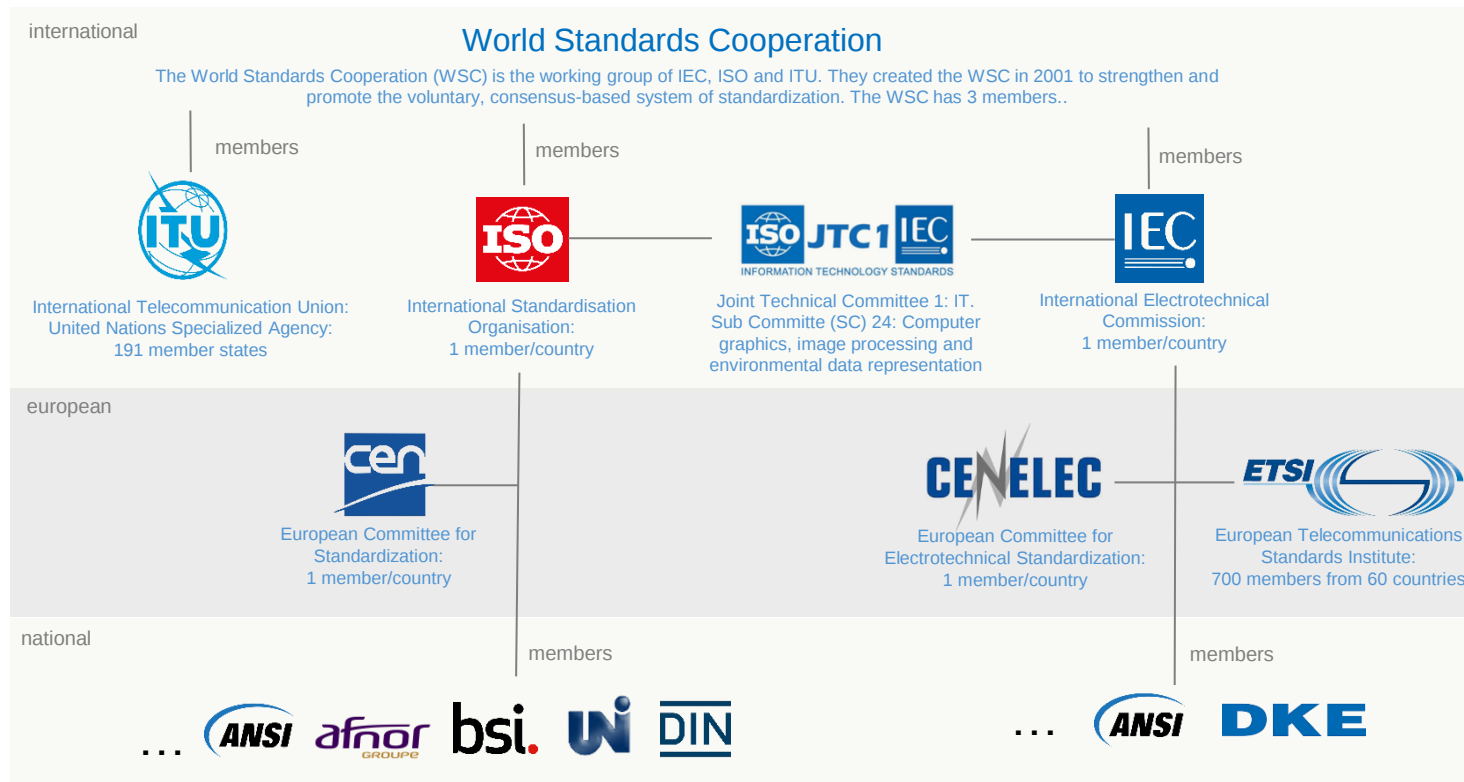
Not Recognized Organizations:

- These are not recognized by any political bodies
- IEEE is a primary SDO with a large number of active technical standards, ranging from wireless communications and digital health to cloud computing, power and energy, 3D video, electrical vehicle standards, and the Internet of Things. It was created by the Institute of Electrical and Electronics Engineers (IEEE), the American association of Electrical and Electronics Engineers and it brings together and organizes members from all over the world.



Structure of International Standardization

National SDOs organize so-called "mirror committees" to ISO and IEC committees. They represent national input and interests in ISO and IEC and feed information from ISO and IEC back to their homeland.



DRAFT INTERNATIONAL STANDARD ISO/IEC DIS 3721-1

ISO/IEC JTC 1/SC 24 Secretariat: BSI
Voting begins on: Voting terminates on:
2021-09-01 2021-11-24

Information technology — Computer graphics, image processing and environmental data representation — Information model for Mixed and Augmented Reality Contents —

Part 1: Core Objects and Attributes

ICS: 35.140

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First edition
2022-05

Information technology — Computer graphics, image processing and environment data representation — Object/environmental representation for image-based rendering in virtual/mixed and augmented reality (VR/MAR)

Technologies de l'information — Infographie, traitement d'images et représentation des données environnementales — Représentation d'objets/environnements pour l'habillage à partir d'images réelles dans la réalité virtuelle/mixte et augmentée (VR/MAR)



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INTERNATIONAL STANDARD ISO 17901-1

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2015-07-01

Optics and photonics — Holography —

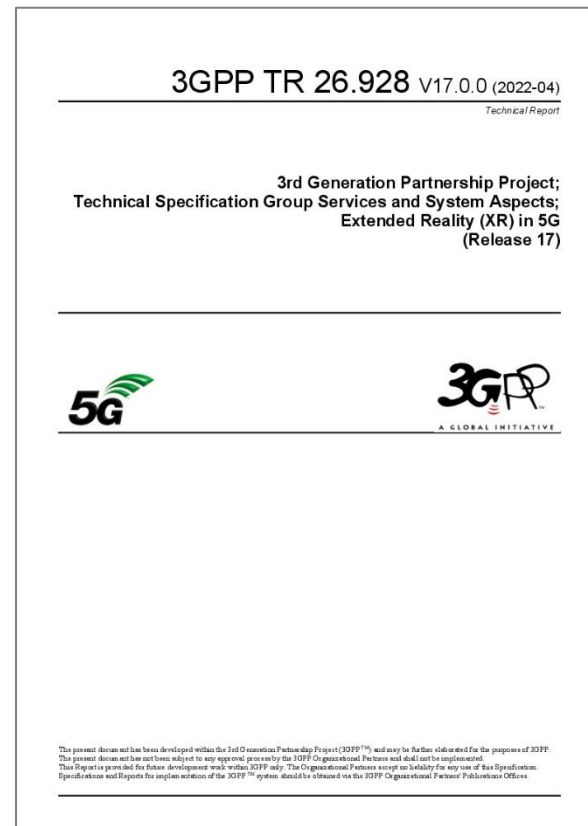
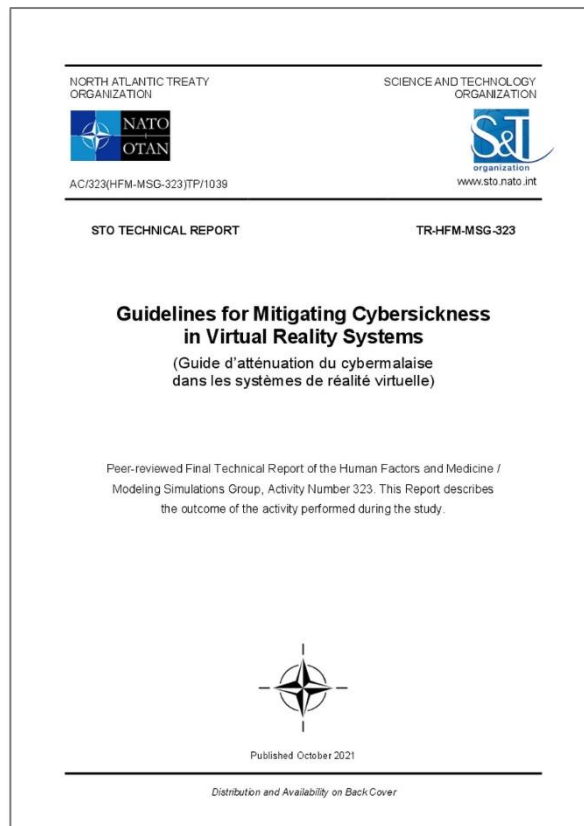
Part 1: Methods of measuring diffraction efficiency and associated optical characteristics of holograms

*Optique et photonique — Holographie —
Partie 1: Méthodes de mesure de l'efficacité de diffraction et caractéristiques optiques associées aux hologrammes*



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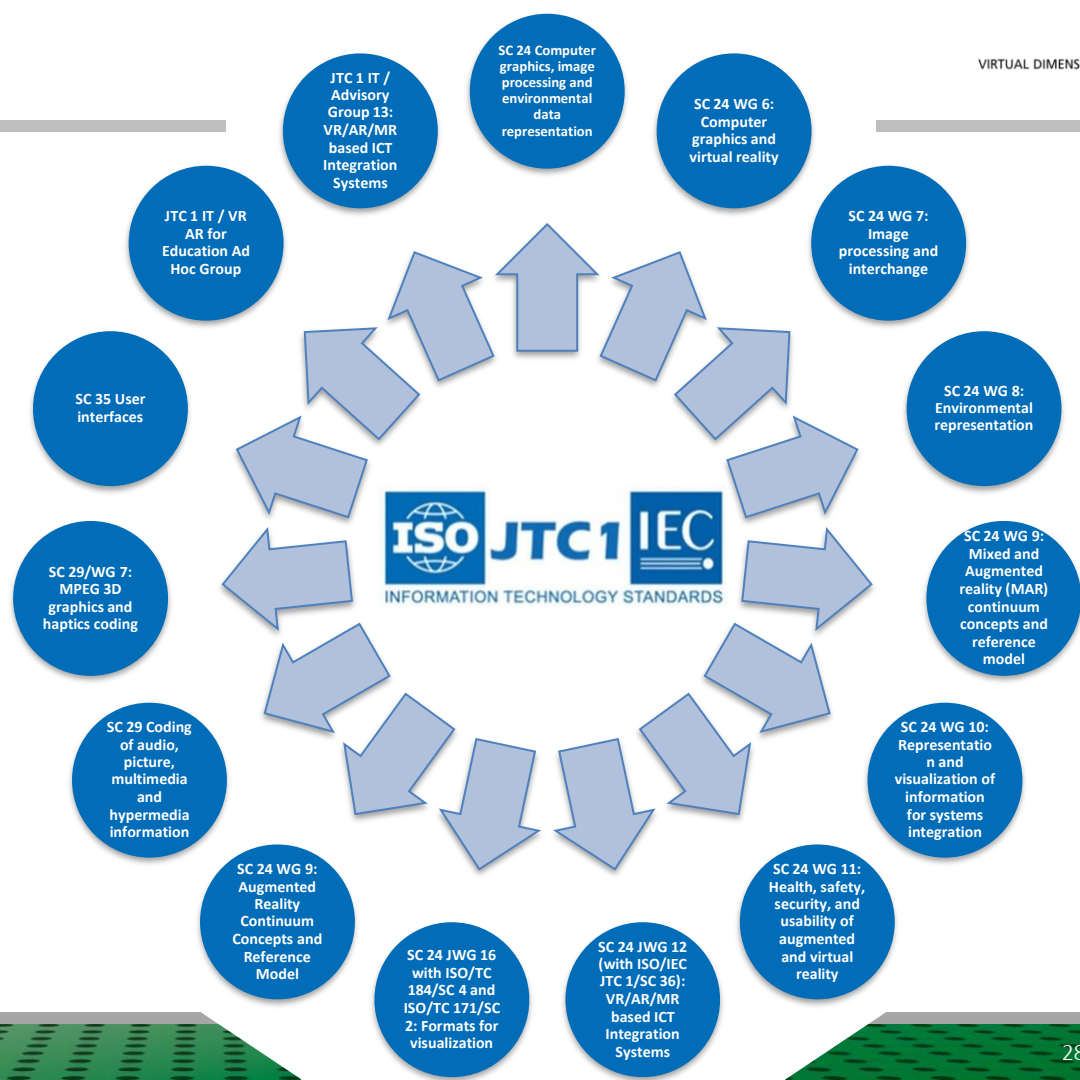
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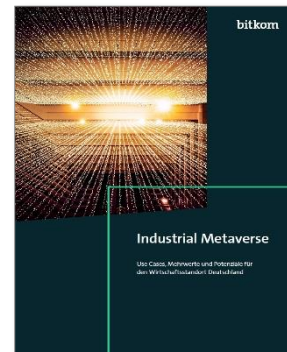
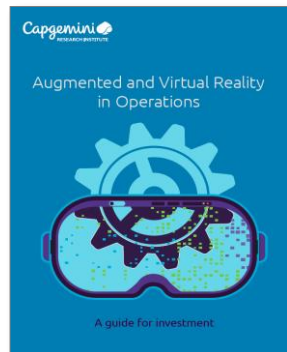


Grundlagen und Begriffe XR

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- **Touch and interactive displays - Part 1-2: Generic - Terminology and letter symbols**. IEC oder VDE-Verlag, 15. September 2017, <https://webstore.iec.ch/publication/28112> .

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.





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