The eXtended Reality & metaverse standards register and regulation issues

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

Director
Virtual Dimension Center (VDC) Fellbach

Projektleiter
Living Lab XR-Interakt

Living Lab XR-Interakt

© Kompetenzzentrum Virtuelle Realität und Kooperatives Engineering w. V. – Virtual Dimension Center (VDC)

Living Lab XR-Interakt

VIRTUAL DIMENSION CENTER

Virtual Dimension Center (VDC)

- non-profit association
- founded 2002
- core topic: professional usage of virtual reality, augmented reality, mixed reality, including solutions, technology, business cases, legal aspects
- regular assessments by the European Secretariat for Cluster Analysis (ESCA): VDC is certified, best-in-class organization: cluster management excellence label "*Gold*" in 2013, 2016, 2019

GOLD Cluster Management Excellence PROVEN FOR CLUSTER EXCELLENCE

members

vote

board of directors

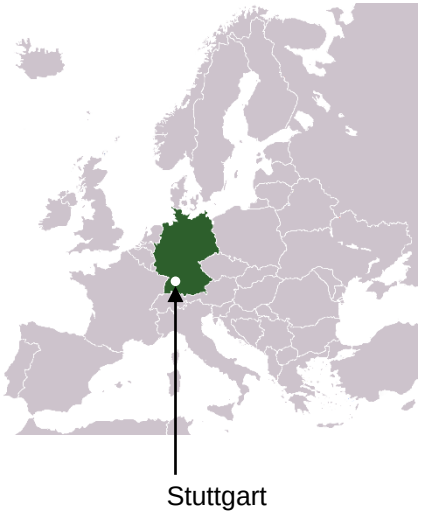
appoint

VDC general manager

Prof. Dr. Christoph Runde

employ

business office



VDC target groups & members

Living Lab XR-Interakt

VIRTUAL DIMENSION CENTER

XR end users

TRUMPF
HOBNER
JOHN DEERE
Miele
BARMER
SID ZÜBLIN WORK ON PROGRESS
mtu
Mercedes-Benz
KÄRCHER makes a difference
pininfarina
KOP
SCHWARZ Beschaffung GmbH
KUSSMAUL
FESTO
KLINGELE PAPIERWERKE
AST Arbeits-Sicherheit & Technik
B/S/H/
OPTIMA

XR tech providers

THREEDY
nstant 3Dhub
HOLOCO
get it right IC.IDO
halocline
iXtenda
CMC ENGINEERS the creative engine
Palette CAD
EUROVERSE
imsys immersive systems
CDMTech
holoNative
alfaloc media
SOLID WHITE
Meyle Müller
VISCON VIRTUAL REALITY
reden
Bitmanagement Software GmbH
Käser
development
SICOS
imsimity immersive simulation & mixed reality
room
VISOMETRY
VRdirect
XCAVE

XR research & education

Deutsches Forschungszentrum für Künstliche Intelligenz GmbH
zaik/rrzk
Institut für Visualisierung und Interaktive Systeme
Fraunhofer IPA
Fraunhofer IAO
Fraunhofer IPK
Fraunhofer IOSB
Fraunhofer IDMT
HOCHSCHULE ESSLINGEN
DHBW Duale Hochschule Baden-Württemberg Mosbach
DHBW Duale Hochschule Baden-Württemberg Stuttgart
Hochschule für Technik Stuttgart
Hochschule Aalen
virtual engineering
Hochschule Karlsruhe Technik und Wirtschaft UNIVERSITY OF APPLIED SCIENCES
Hochschule Albstadt-Sigmaringen
UniTyLab
HOCHSCHULE DER MEDIEN
HLRS
Hochschule Reutlingen Reutlingen University
Hochschule Anhalt Anhalt University of Applied Sciences

others

Volksbank am Württemberg eG
Kreissparkasse Waiblingen
WIN VERLAG
Mercedes-Benz Consulting
INDUSTRIE-VEREINIGUNG FELLBACH
Stadt Fellbach
GFaI
SWF STADTWERKE FELLBACH
SE Steuerberatung GmbH & Co. KG
aed
PÉCS-BARANYAI KERESKEDELMI ÉS IPARKAMARA
Wirtschaftsförderung Region Stuttgart
InMediasP
LNT Innover & Réussir

XR- & Metaverse Eco Systems

Living Lab XR-Interakt

VIRTUAL DIMENSION CENTER

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

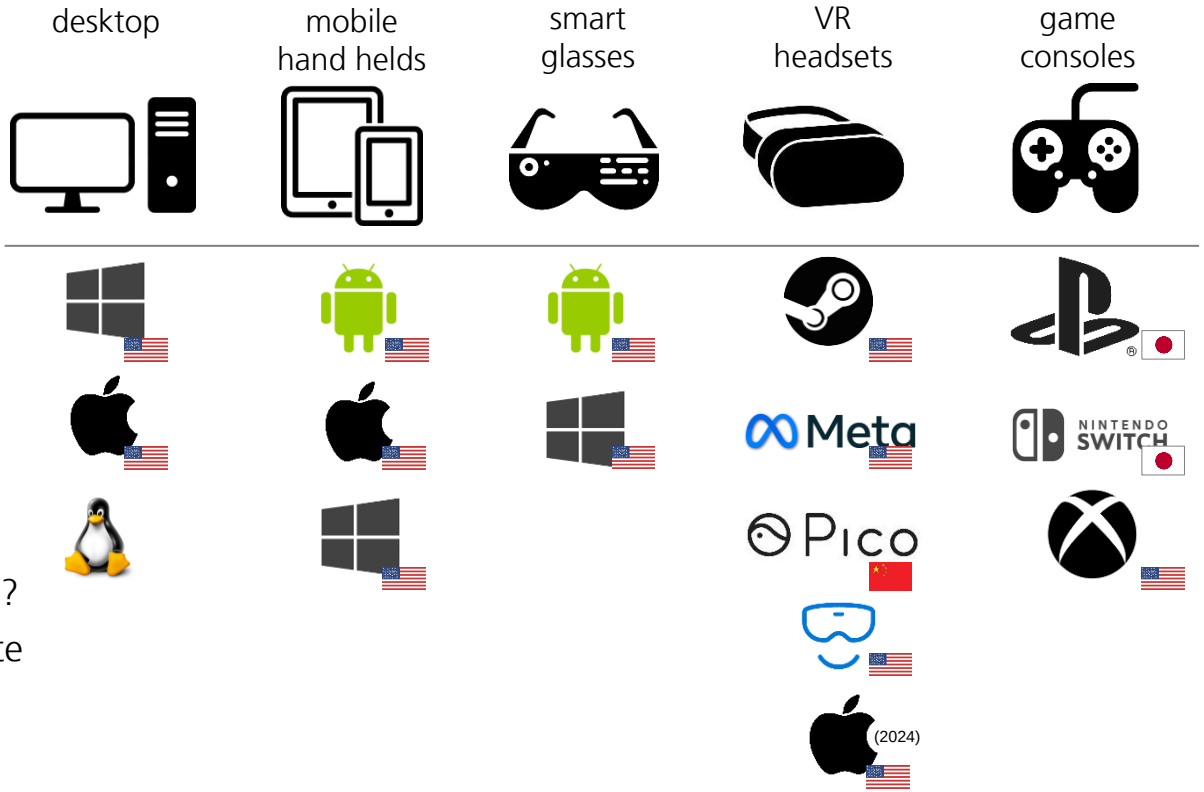
problem:

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

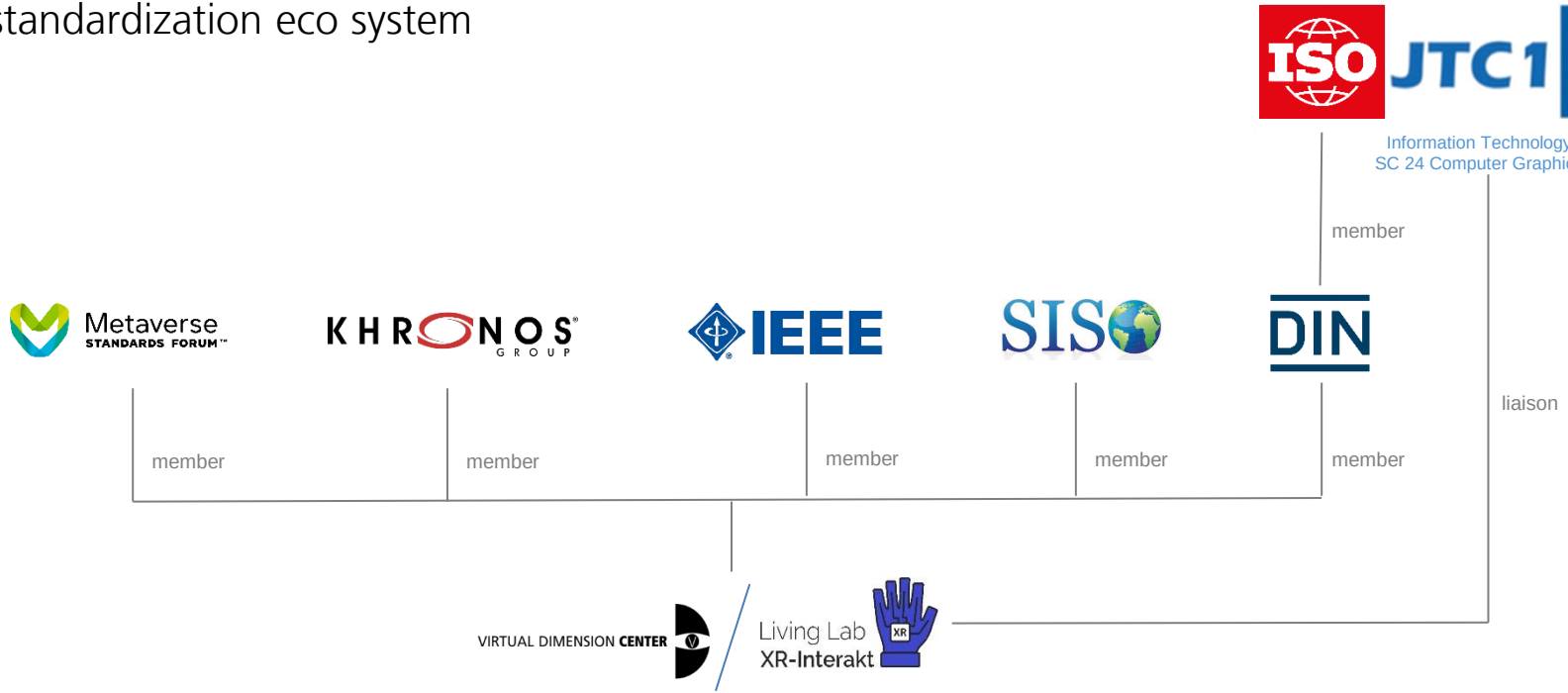
questions:

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

=> standardization!



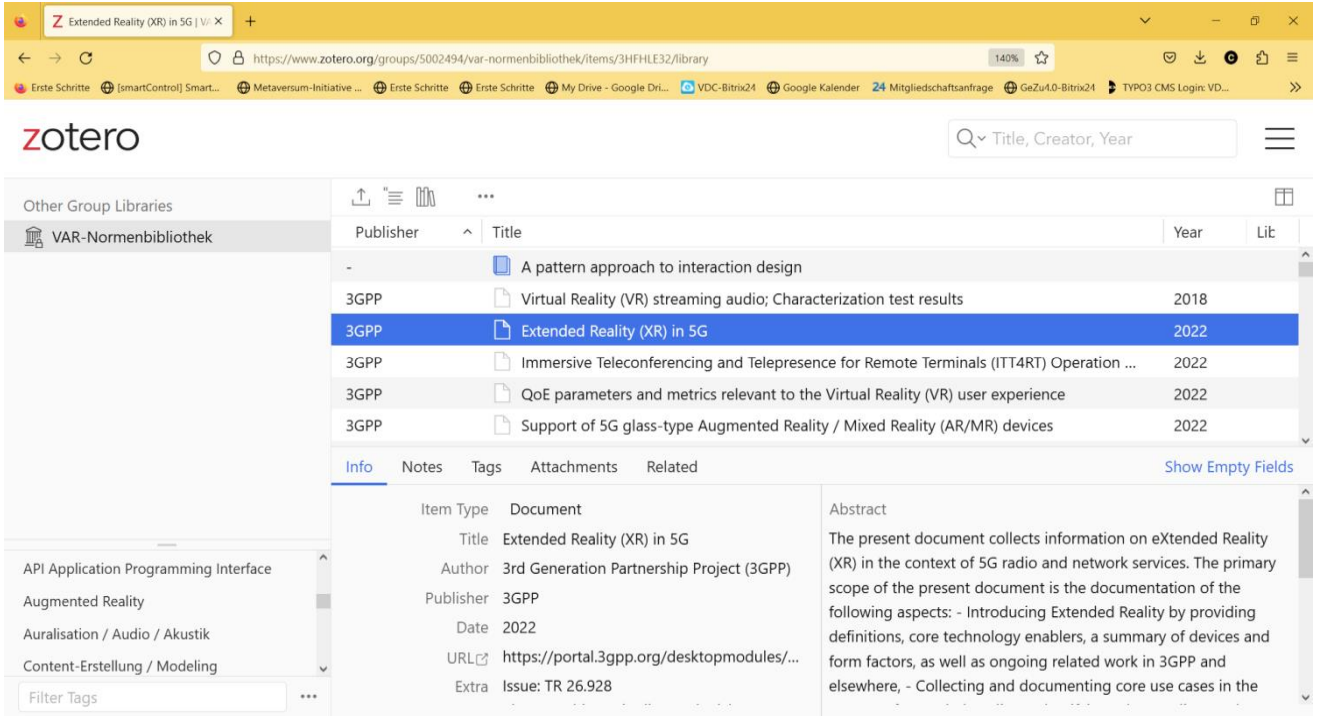
We got involved in the standardization eco system



We found:

XR norms,
XR standards,
XR recommendations,
XR guidelines:

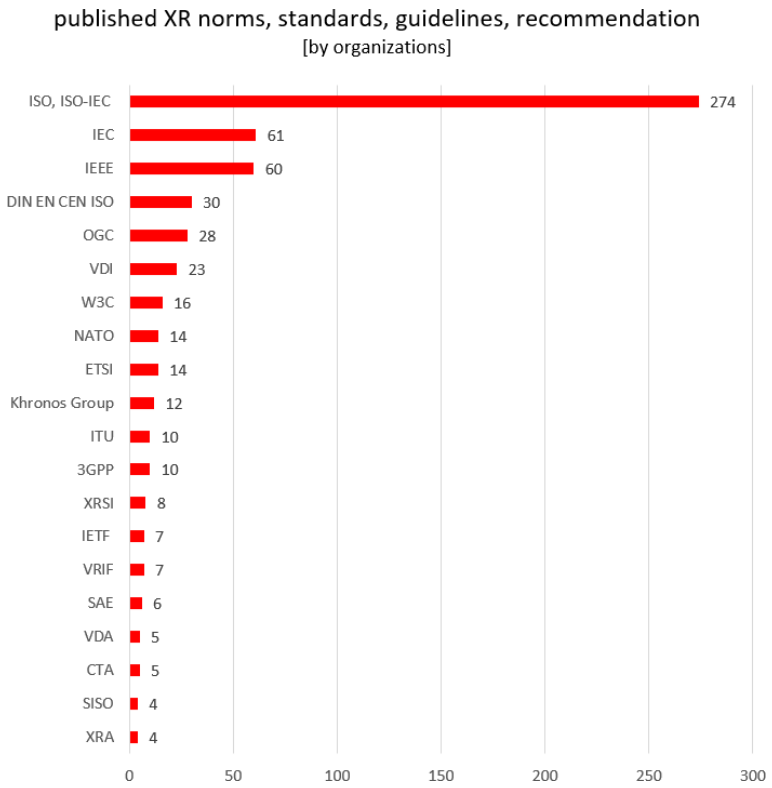
- 800+ published
- 100+ being created right now
- by 75+ active initiatives actually working on them



XR & MV Standard Development Organizations (SDOs)

Living Lab XR-Interakt

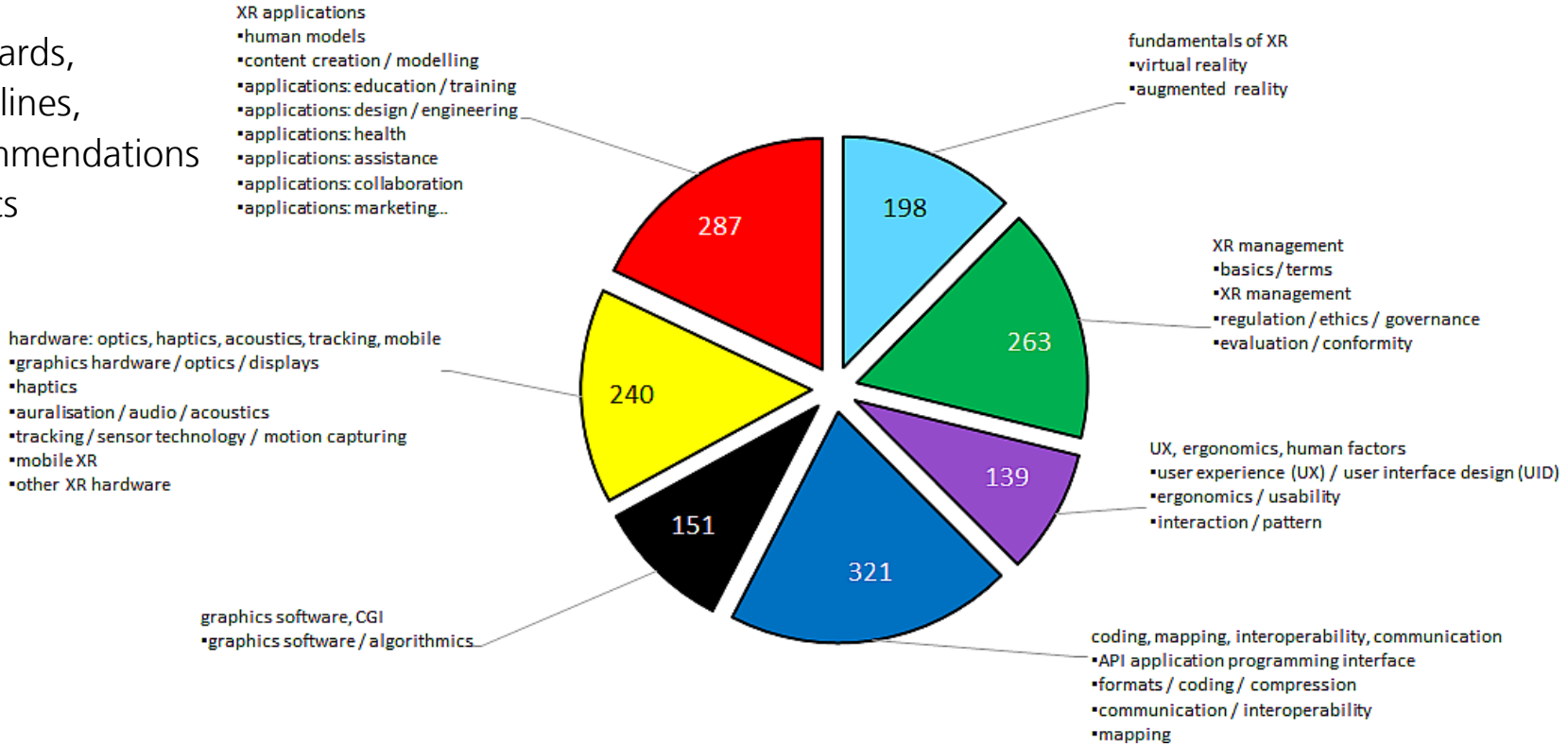
VIRTUAL DIMENSION CENTER



XR Standards clustering: focussing on 7 main topics

clustering
- XR standards,
- XR guidelines,
- XR recommendations

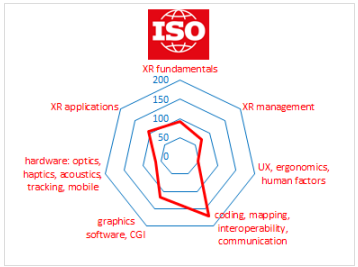
into 7 topics

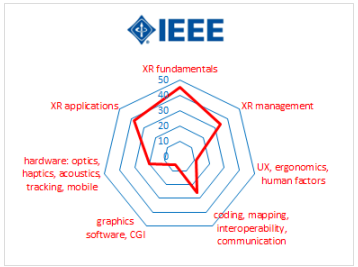


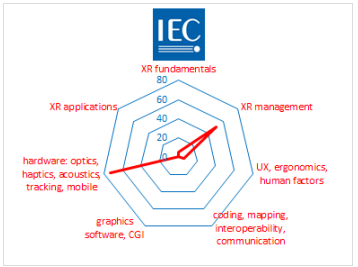
Living Lab XR-Interakt

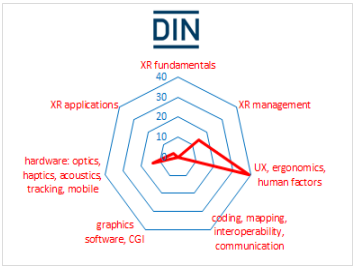
VIRTUAL DIMENSION CENTER

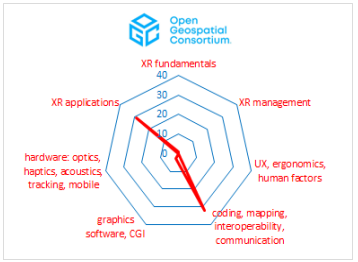
Focuses of XR standardization organizations varying

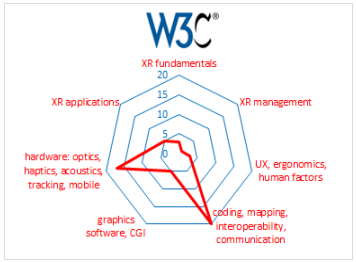


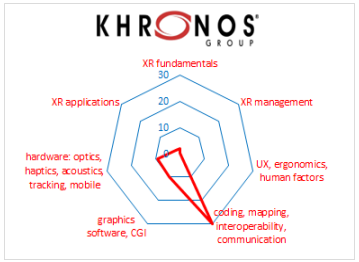


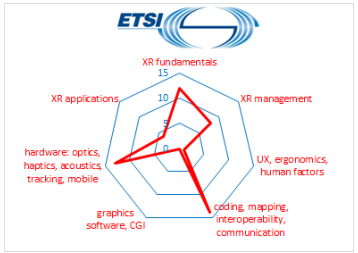


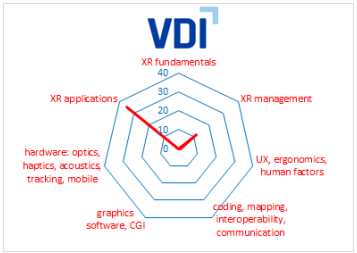


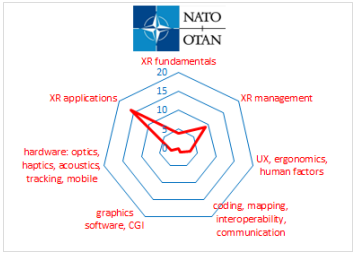








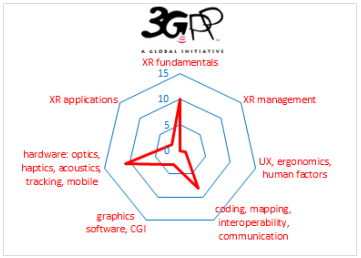


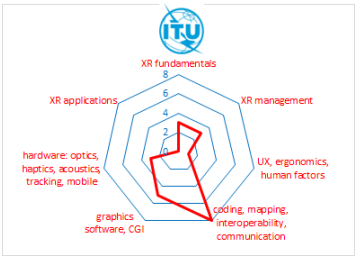


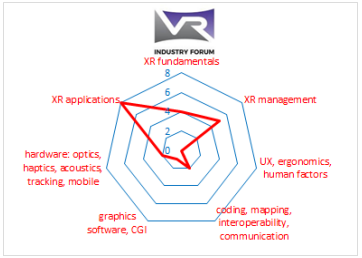
Living Lab XR-Interakt

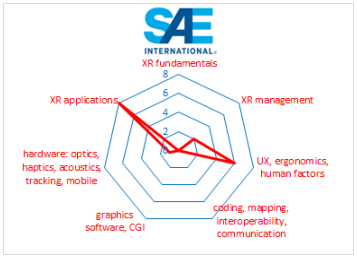
VIRTUAL DIMENSION CENTER

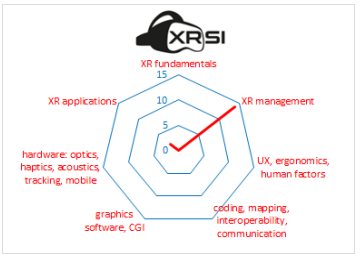
Focuses of XR standardization organizations varying

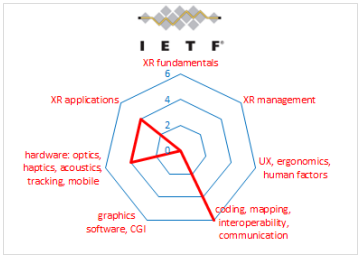


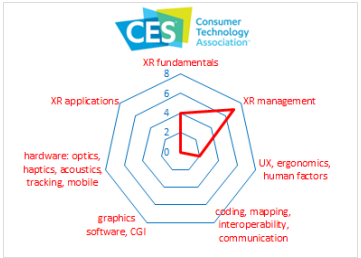


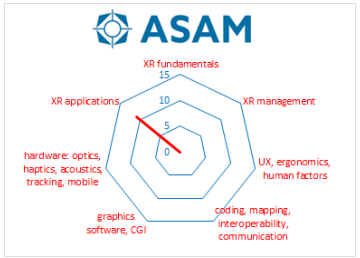


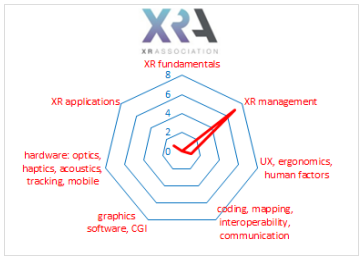






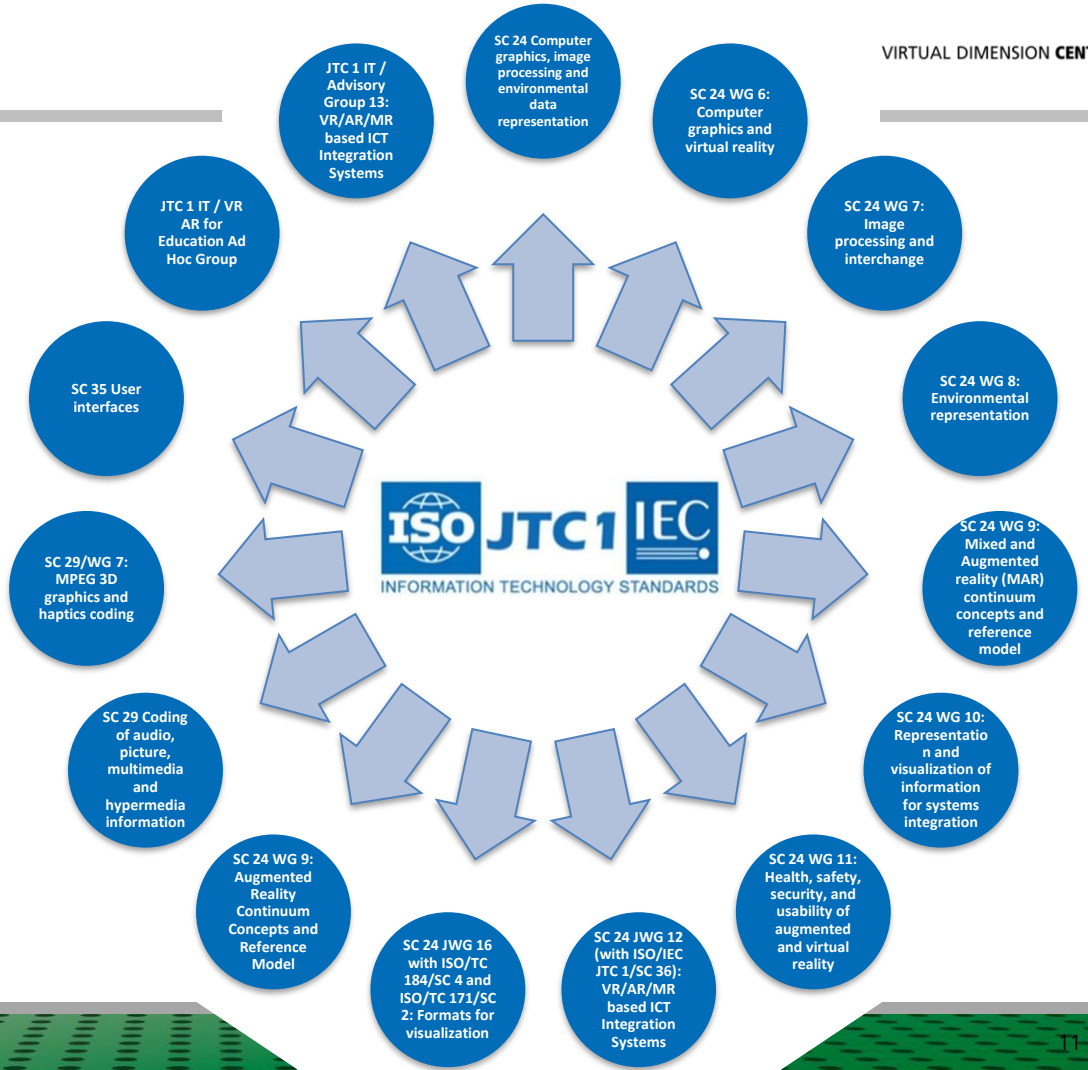






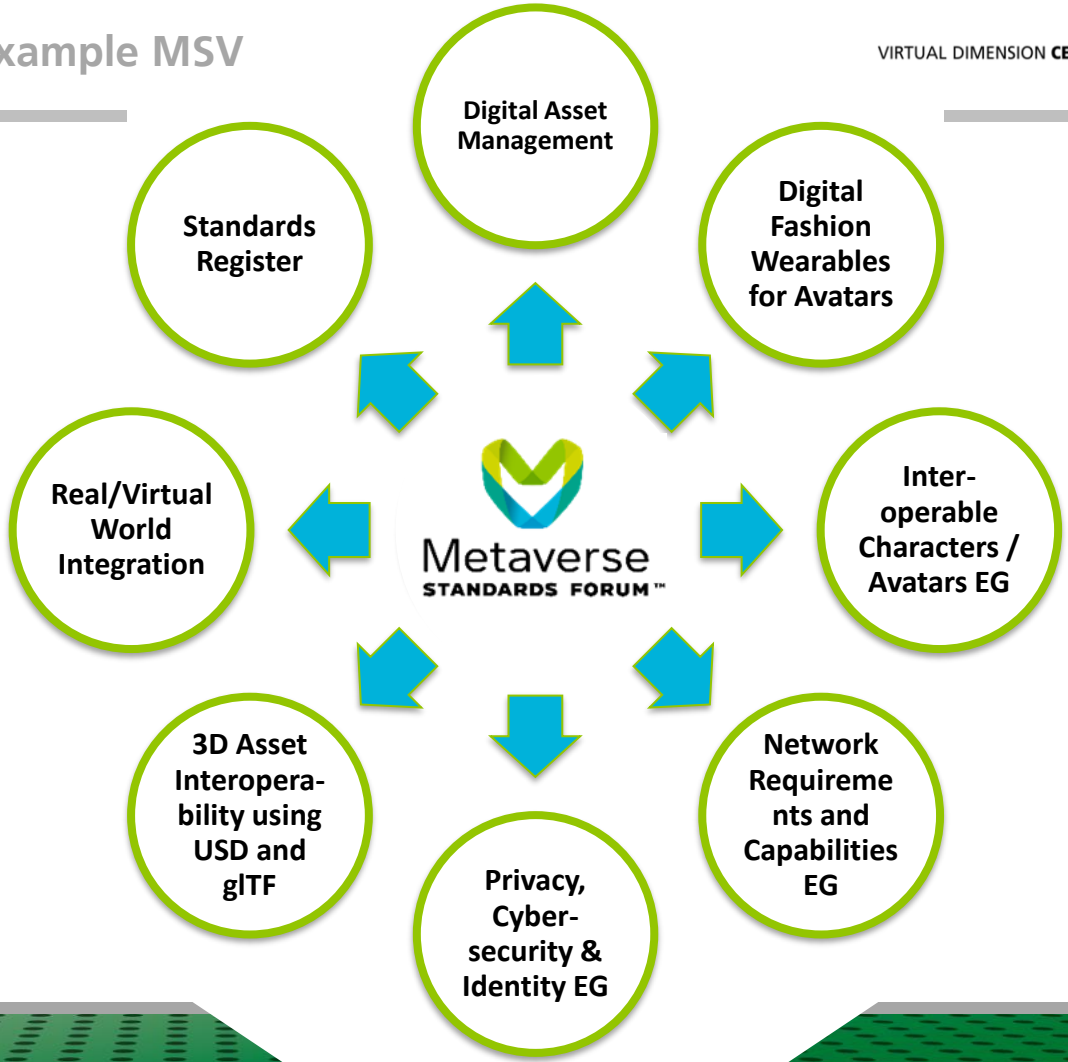
XR Standards Working Groups

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 JTC1/SC29.

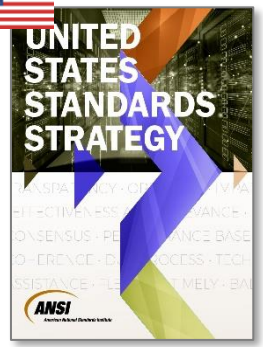


XR Standards Working Groups: example MSV

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.



Standardization Strategies: global view



- 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

Standards Strategy China

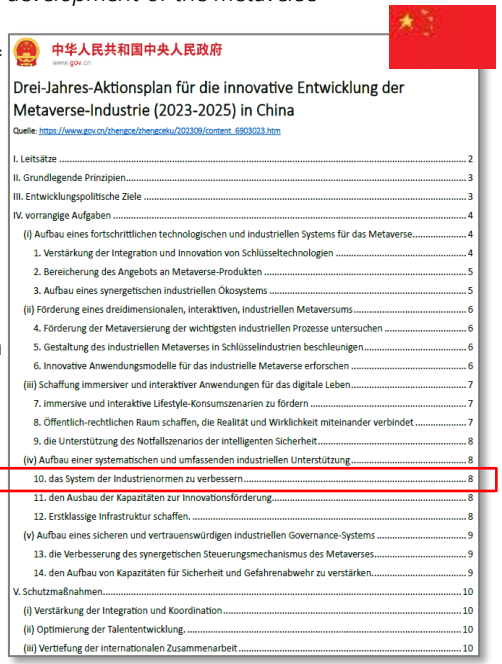
"China Standard 2035"

- 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.

Metaverse Strategy China

"Three-year action plan for the innovative development of the metaverse industry (2023-2025) in China"

- Extensive publicising and promotion of standards and their implementation
- Identify the standardisation needs of the metaverse value chain
- Promote the establishment of metaverse standardisation organisations
- Encourage industry to actively participate in international standardisation work
- Organise and carry out the formulation and preliminary study of national standards, industry standards and group standards.
- Encourage application industries to promote the formulation of standards in specific areas
- focal points:
  - fundamental similarities
  - networking
  - security
  - trustworthiness
  - privacy protection
  - industrial applications


中华人民共和国中央人民政府

Drei-Jahres-Aktionsplan für die innovative Entwicklung der Metaverse-Industrie (2023-2025) in China

Quelle: https://www.gov.cn/zhengce/zhengceku/202309/content_6903023.htm

I. Leitsätze ... 2
II. Grundlegende Prinzipien ... 3
III. Entwicklungspolitische Ziele ... 3
IV. vorrangige Aufgaben ... 4
(i) Aufbau eines fortschrittlichen technologischen und industriellen Systems für das Metaverse ... 4
1. Verstärkung der Integration und Innovation von Schlüsseltechnologien ... 4
2. Bereicherung des Angebots an Metaverse-Produkten ... 5
3. Aufbau eines synergetischen industriellen Ökosystems ... 5
(ii) Förderung eines dreidimensionalen, interaktiven, industriellen Metaversums ... 6
4. Förderung der Metaversierung der wichtigsten industriellen Prozesse untersuchen ... 6
5. Gestaltung des industriellen Metaverses in Schlüsselindustrien beschleunigen ... 6
6. Innovative Anwendungsmodelle für das industrielle Metaverse erforschen ... 6
(iii) Schaffung immersiver und interaktiver Anwendungen für das digitale Leben ... 7
7. immersive und interaktive Lifestyle-Konsumszenarien zu fördern ... 7
8. Öffentlich-rechtlichen Raum schaffen, die Realität und Wirklichkeit miteinander verbindet ... 7
9. die Unterstützung des Notfallszenarios der intelligenten Sicherheit ... 8
(iv) Aufbau einer systematischen und umfassenden industriellen Unterstützung ... 8
10. das System der Industrienormen zu verbessern ... 8
11. den Ausbau der Kapazitäten zur Innovationsförderung ... 8
12. Erstklassige Infrastruktur schaffen. ... 8
(v) Aufbau eines sicheren und vertrauenswürdigen industriellen Governance-Systems ... 9
13. die Verbesserung des synergetischen Steuerungsmechanismus des Metaverses ... 9
14. den Aufbau von Kapazitäten für Sicherheit und Gefahrenabwehr zu verstärken ... 9
V. Schutzmaßnahmen ... 10
(i) Verstärkung der Integration und Koordination ... 10
(ii) Optimierung der Talententwicklung ... 10
(iii) Vertiefung der internationalen Zusammenarbeit ... 10

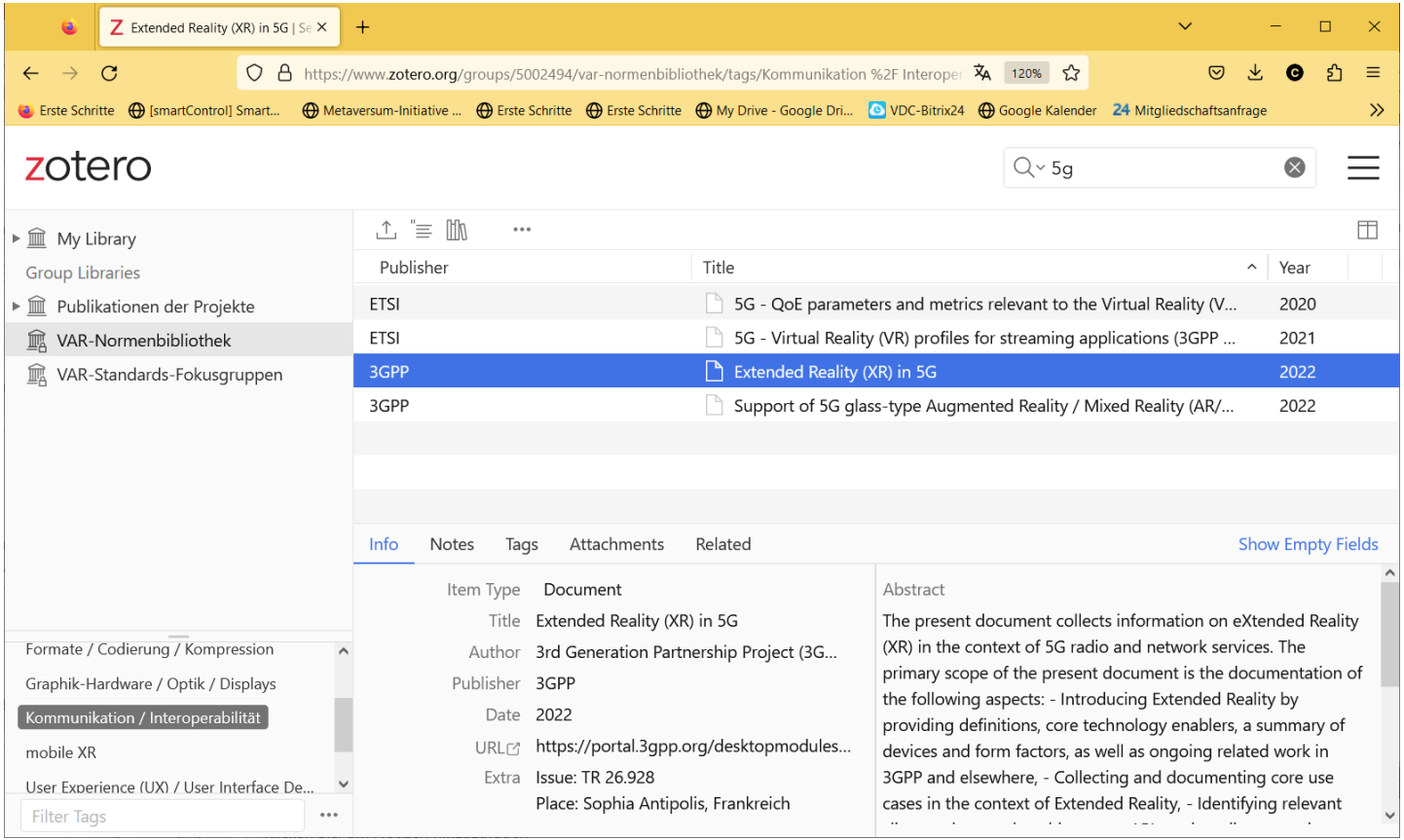
VDC's XR Standards Monitor

Living Lab XR-Interakt

VIRTUAL DIMENSION CENTER

An online accessible database (a common literature database) with

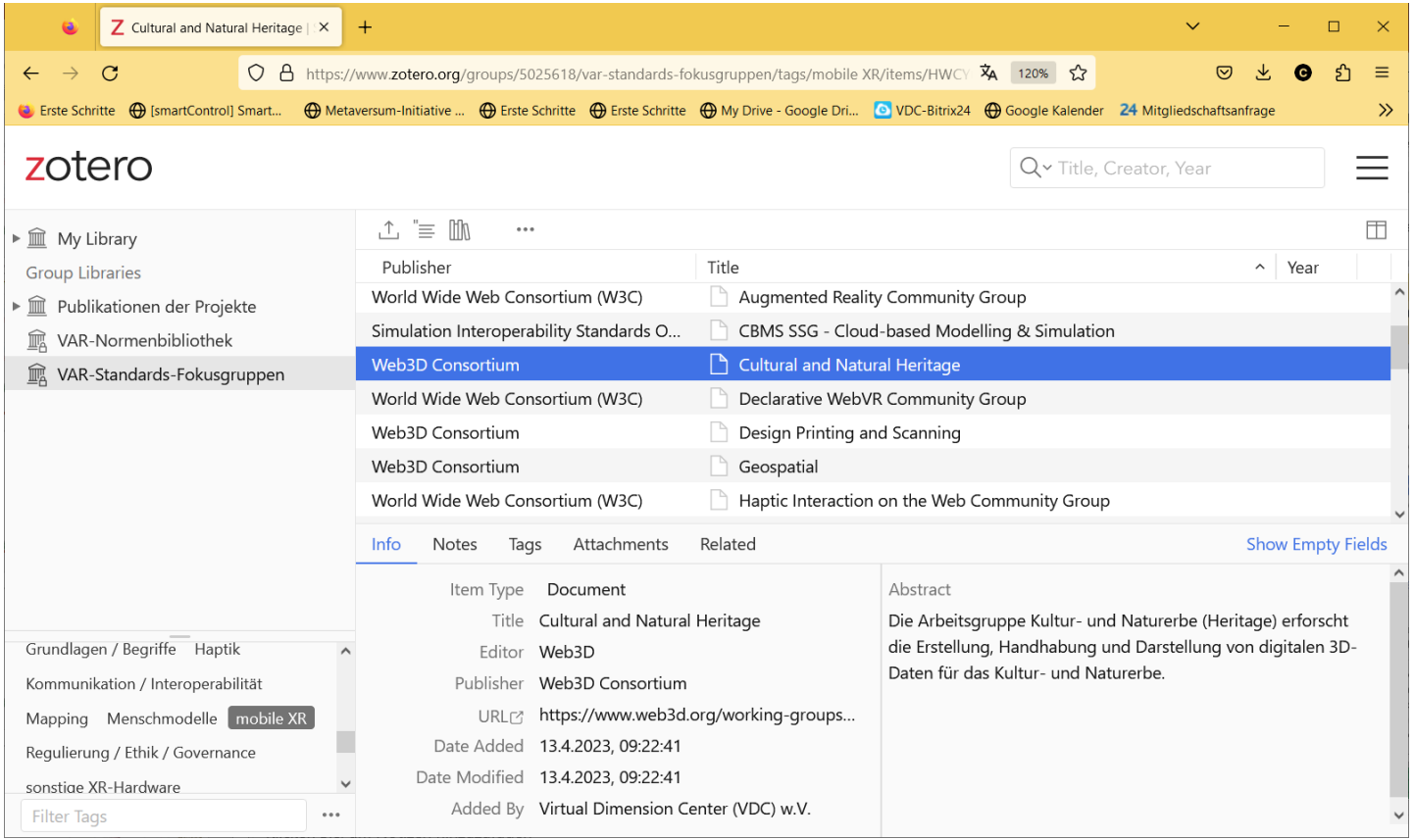
- references to all known documents. They are qualified (by tags) and with a searchable description. The document's entry further comprises the publishing authority, release date and a link to this resource in the WWW.

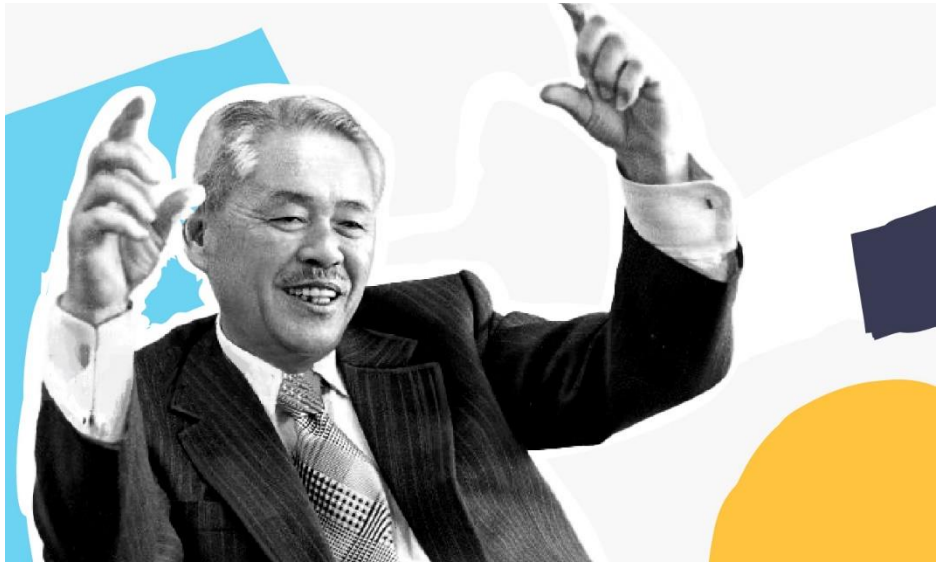


VDC's XR Standards Monitor

An online accessible database (a common literature database) with

- references to all known active XR SDO working groups. 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.





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

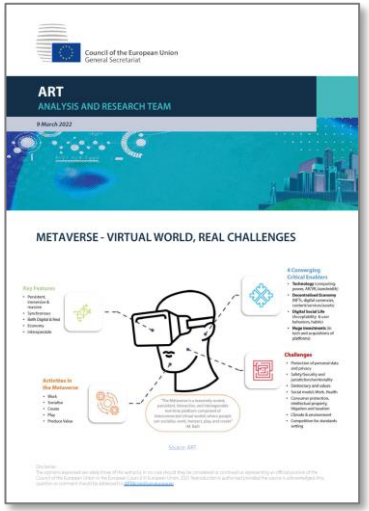
Ōno Taiichi

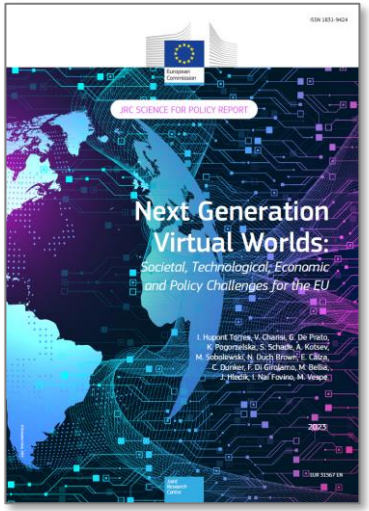
(* 29 February 1912 in Manchuria; † 28 May 1990) was the inventor of the Toyota production system. He developed today's basic logistics methods, the Kanban system and just-in-time production, between 1950 and 1982. The Japanese management concept Kaizen is also based on his ideas.

XR and metaverse regulation

© Kompetenzzentrum Virtuelle Realität und Kooperatives Engineering w. V. – Virtual Dimension Center (VDC)

Sources:





- Bundesnetzagentur: Metaverse. Status, Perspektiven für die Standardisierung und Regulierung, July 2023
- European Parliament: Metaverse opportunities, risks and policy implications, June 2022
- Council of the European Union: Metaverse - Virtual World, Real Challenges, March 2022
- European Commission: Next Generation Virtual Worlds, July 2023
- Rosenberg, Louis B. (Chief Scientist, Unanimous AI): Regulation of the Metaverse: A Roadmap, March 2022

Competition / Wettbewerb

- Requires interconnection and interoperability of many devices and platforms across digital ecosystem
- issues:
  - standardisation and interoperability
  - killer acquisitions and merger control
  - antitrust, monopolisation

Data Protection / Datenschutz

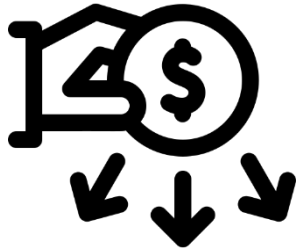
- People will participate in the metaverse through avatars, using special equipment, enabling an immersive experience. This entails the collection of massive amounts of data, including biometric and behavior data.
- issues:
  - blurred roles
  - data sharing and portability
  - issue of direct marketing
  - intrusive profiling
  - Metaverse workplace, tracking & tracing of employees

Liabilities / Haftung:

- There is considerable scope for a wide range of illegal and harmful behaviours and practices in the metaverse environment.
- issues:
  - illegal and harmful content online
  - advertising practices
  - intellectual property rights protection
  - open question for sovereign law (Hoheitsrechte) in a distributed decentral network

Financial transactions / Finanztransaktionen

- Commercial transactions in the metaverse are expected to be largely under-pinned by cryptocurrencies (e.g. bitcoin or ethereum) and non-fungible tokens (NFTs) will be used to track and validate the sale and ownership of digital goods.
- issues:
  - ownership of digital assets in the metaverse
  - misuse of NFTs
  - interoperability and portability

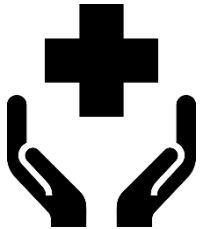


Cybersecurity / Cyber-Sicherheit:

- The sheer volumes of data circulating in the metaverse and the ways in which this data will be used constitute a growing risk for users. Current cybersecurity challenges such as phishing, malware and hacking will persist15 and will extend to devices enabling a metaverse experience and to avatars.
- issues:
  - security of metaverse enabling devices
  - security of protocols
  - avatar integrity, identities

Health / Gesundheit

- The metaverse has various mental and physical health implications that are especially worrying when concerning vulnerable groups such as children. At the same time, the metaverse can also help to cure people and improve patient safety.
- issues:
  - impact on mental and physical health
  - impact on children
  - occupational health and safety



Accessibility and inclusiveness / Zugänglichkeit und Inklusion:

- Although in principle, the metaverse is open to all, in practice many might have trouble accessing it for various reasons, ranging from a lack of digital skills to not having reliable broadband or the right hardware.
- issues:
  - people with a low level of digital literacy
  - disabilities
  - areas with low connectivity, no reliable broadband
  - cost of equipment

Co-Working & Distributed Work / verteilte Zusammenarbeit

- The Metavers offers new ways of distant co-working and of including (potential) customers into the design phase.
- issues:
  - copy right protection
  - co-creation and IP

XR & Metaverse Regulation

Living Lab XR-Interakt

VIRTUAL DIMENSION CENTER

Net Neutrality

- The Net Neutrality Regulation 2015 (No 2015/2120) is a Regulation in EU law where article 3(3) lays down measures concerning open internet access.
- Net neutrality is the principle that Internet service providers must treat all Internet communications equally, offering users and online content providers consistent rates.

General Data Protection Regulation:

- The GDPR 2016/679 is a European Union regulation on information privacy. It was adopted the GDPR on 14 April 2016, to become effective on 25 May 2018.
- The GDPR's goals are to enhance individuals' control and rights over their personal information and to simplify the regulations for international business.

Digital Markets Act

- Regulation 2022/1925, commonly referred to as the Digital Markets Act, is an EU regulation that aims to make the digital economy fairer and more contestable. The regulation became applicable, for the most part, on 2 May 2023.
- The DMA intends to ensure a higher degree of competition in European digital markets by preventing large companies from abusing their market power.

Digital Services Act

- The Digital Services Act (Regulation (EU) 2022/2065, DSA) is a regulation in EU law to update the Electronic Commerce Directive 2000 regarding illegal content, transparent advertising, and disinformation. It was submitted on 15 December 2020.
- The DSA is meant to "govern the content moderation practices of social media platforms" and address illegal content. It is organised in five chapters, with the most important chapters regulating the liability exemption and obligations of intermediaries.

eIDAS - electronic IDentification, Authentication and trust Services

- eIDAS is an EU regulation with the stated purpose of governing "electronic identification and trust services for electronic transactions". It passed in 2014 and its provisions came into effect between 2016 and 2018.

European Data Act

- published 22.12.2023; it aims to facilitate and promote the exchange and use of data within the European Economic Area
- European standards may be drafted by the European SDOs following standardization requests from the EC in order to support the application of the requirement that 'products shall be designed and manufactured, and related services shall be provided, in such a manner that data generated by their use are, by default, easily, securely and, where relevant and appropriate, directly accessible to the user'.

AI Act:

- The Artificial Intelligence Act (AI Act) is a European Union regulation on artificial intelligence in the European Union. Proposed by the European Commission on 21 April 2021 and not yet enforced.
- Its scope encompasses all types of AI in a broad range of sectors. As a piece of product regulation, it would not confer rights on individuals, but would regulate the providers of AI systems, and entities making use of them in a professional capacity. The proposed AI Act aims to classify and regulate AI applications based on their risk to cause harm.

EU Fitness Check on Digital Fairness

- ongoing process; call for evidence until June 2022; public consultation until Feb. 2023; final version planned for second quarter 2024
- This fitness check (evaluation) will look at the following pieces of EU consumer protection legislation to determine whether they ensure a high level of protection in the digital environment:
  - the Unfair Commercial Practices Directive 2005/29/EC
  - the Consumer Rights Directive 2011/83/EU: aligns and harmonises national consumer rules, for example on the information consumers need to be given before they purchase goods, services or digital content, and on their right to cancel online purchases, wherever they shop in the EU.
  - the Unfair Contract Terms Directive 93/13/EEC

Thank you for your attention.

XR EXPO 2024

3rd - 4th April 2024 - Stuttgart

Living Lab XR-Interakt

Die vorgestellten Arbeiten entstanden im Rahmen des Projekt Living Lab XR-Interakt. Dieses Projekt wird vom Bundesministerium für Bildung und Forschung unter dem Förderkennzeichen 16SV8827 gefördert.

Bundesministerium für Bildung und Forschung

© Kompetenzzentrum Virtuelle Realität und Kooperatives Engineering w. V. – Virtual Dimension Center (VDC)