Normung und Regulierung für eXtended Reality und das Metaverse

16. Security Forum der TH Brandenburg: *„Metaverse und Security"*
Donnerstag, 18. Januar 2024
Brandenburg an der Havel

Prof. Dr.-Ing. Dipl.-Kfm. Christoph Runde
Geschäftsführer
Virtual Dimension Center (VDC) Fellbach
www.vdc-fellbach.de

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Cluster Management Excellence
PROVEN FOR CLUSTER EXCELLENCE

VIRTUAL DIMENSION **CENTER**

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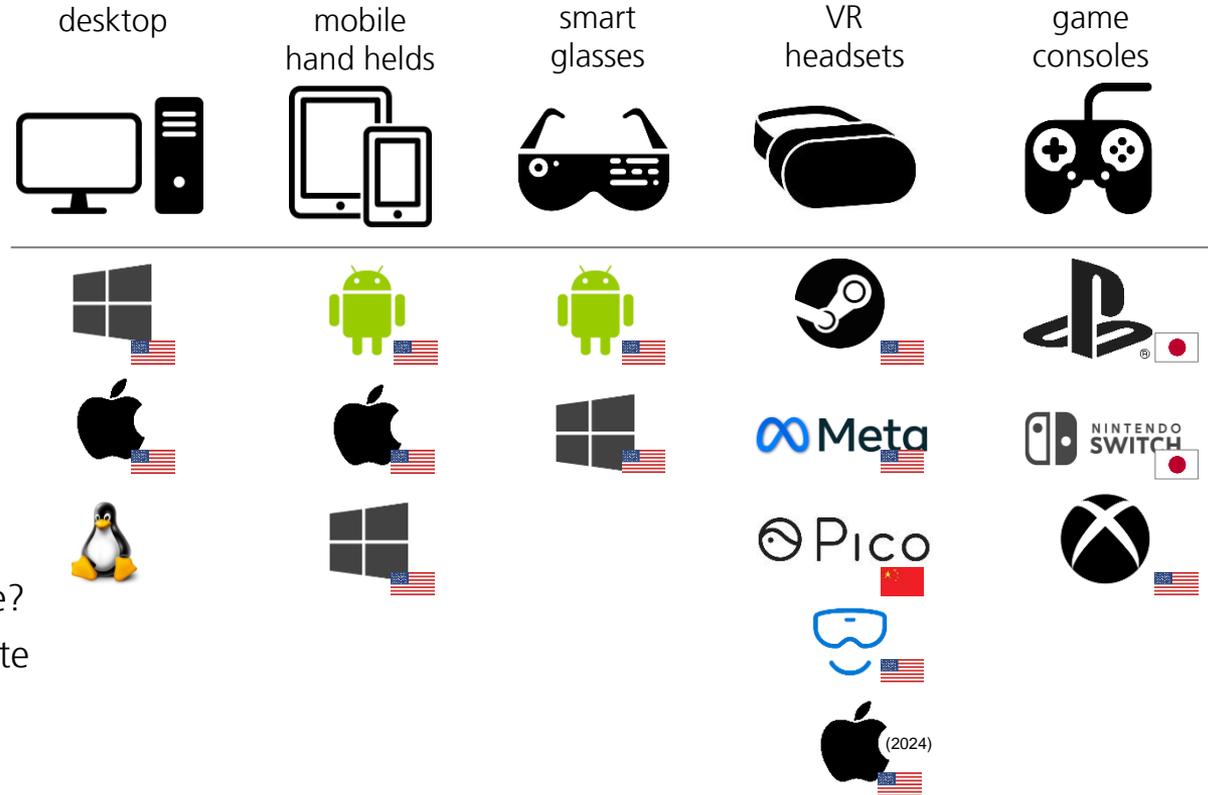
problem:

- 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!

desktop	mobile hand helds	smart glasses	VR headsets	game consoles

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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

EXPLORE ⌄   NEWSLETTERS & PODCASTS ⌄   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

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.

international

World Standards Cooperation

The World Standards Cooperation (WSC) is the working group of IEC, ISO and ITU. They created the WSC in 2001 to strengthen and promote the voluntary, consensus-based system of standardization. The WSC has 3 members..

members

members

members

ISO

International Standardisation Organisation:
1 member/country

ISO JTC1 IEC
INFORMATION TECHNOLOGY STANDARDS

Joint Technical Committee 1: IT.
Sub Committe (SC) 24: Computer graphics, image processing and environmental data representation

IEC

International Electrotechnical Commission:
1 member/country

ITU

International Telecommunication Union:
United Nations Specialized Agency:
191 member states

European / regional

cen

European Committee for Standardization:
1 member/country

CENELEC

European Committee for Electrotechnical Standardization:
1 member/country

ETSI

European Telecommunications Standards Institute:
700 members from 60 countries

national

members

members

. . . **ANSI** **afnor** GROUPE **bsi.** **UNI** **DIN**

. . . **ANSI** **DKE**

Recognized SDOs:

- These a re 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, 30 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 Engineer and it brings together and organizes members from all over the world.

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Two main different types of "*standards*"

▪ Different types of standards according to the development process (standardization)

SDO standards a re produced by devoted organizations, called organizations whose purpose is to develop standards and Standards Development Organizations (SDOs) . SDOs are that put in place forma l well-defined procedures to guarantee a fair development process. De facto standards can become formal standards if they a re approved by a SDO. Examples: HTML PDF

De facto standards, or standards in actuality, are adopted widely by an industry and its customers. These standards a rise when a critical mass simply likes them well enough to collectively use them.
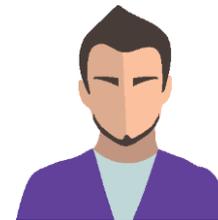
Setting standards in China, Europe and the US

ifri

CHINA	EUROPE	UNITED STATES
a state-driven process	a structured, market-driven process	a loose, market-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*.	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.	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.
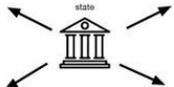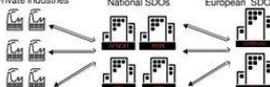
Source: John Seaman, "China and the New Geopolitics of Technical Standardization", Notes de l'Ifri, Ifri, January 2020

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

	ISO secretariats		IEC secretariats	
	2011	2021	2012	2021
Germany	130	132	34	36
U.S.	117	98	24	27
Japan	67	81	24	23
China	**45**	**71**	**6**	**12**
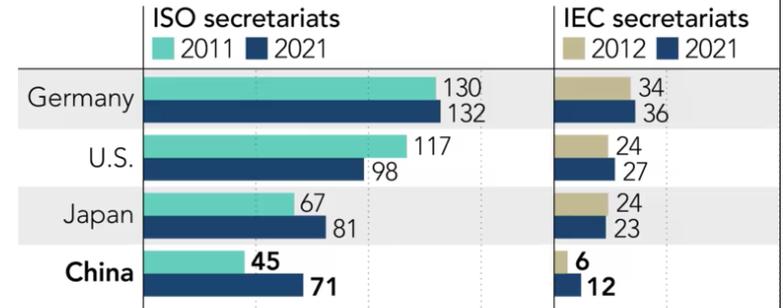
ISO stands for International Organization for Standardization, IEC for International Electrotechnical Commission; includes twinned ISO secretariats
Source: ISO, IEC, U.S. National Institute of Standards and Technology

Standardization Strategies: global view

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United States

UNITED STATES STANDARDS STRATEGY

ANSI American National Standards Institute
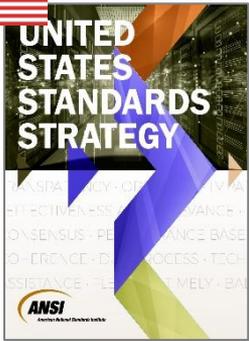
- Actively promote the consistent worldwide application of internationally recognized principles in the development of standards.
- work to prevent standards and their application from becoming technical trade barriers to U.S. products and services.
- Strengthen international outreach programs to promote 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.

European Union

EUROPEAN COMMISSION

- 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

China

"China Standard 2035" will be released

- 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.

Japan

Japan and Industrial Standards 2017

JISC Japanese Industrial Standards Committee Secretariat
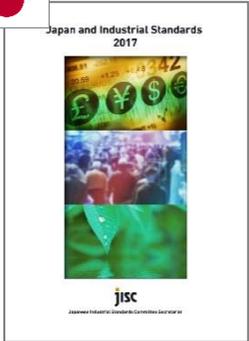
- Necessity of national standards
- Clarification of appropriate quality levels
- Revisions of the Industrial Standardization Law
- Observance of JIS standards and JIS markings
- Responses to Inappropriate ISO and IEC Standards
- Relationship with Standardization Organizations in Europe
- Support for 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

Germany

Deutsche Normungsstrategie

Mit Normung Zukunft gestalten!

- 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

Korea

Policy Objective & Strategy

- 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

Normungsstrategie 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
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- 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-Strategie China

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

- Ausführliche Bekanntmachung und Förderung von Normen und deren Umsetzung
- Normungsbedarf der Wertschöpfungs-kette Metaverse ermitteln
- Förderung des Aufbaus von Metaverse-Normungsorganisationen
- Ermutigung der Industrie zur aktiven Teilnahme an der internationalen Normungsarbeit
- Formulierung und Voruntersuchung von nationalen Normen, Industrie-normen und Gruppennormen organisieren und durchführen.
- Ermutigung der Anwendungs-industrien, die Formulierung von Normen in bestimmten Bereichen zu fördern
- Schwerpunkte:
  - grundlegende Gemeinsamkeiten
  - Vernetzung
  - Sicherheit
  - Vertrauenswürdigkeit
  - Schutz der Privatsphäre
  - industrielle Anwendungen

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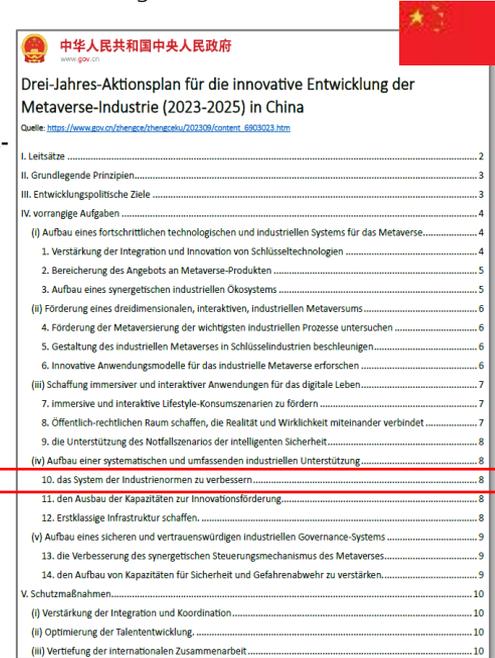
We got involved in the
standardization eco system
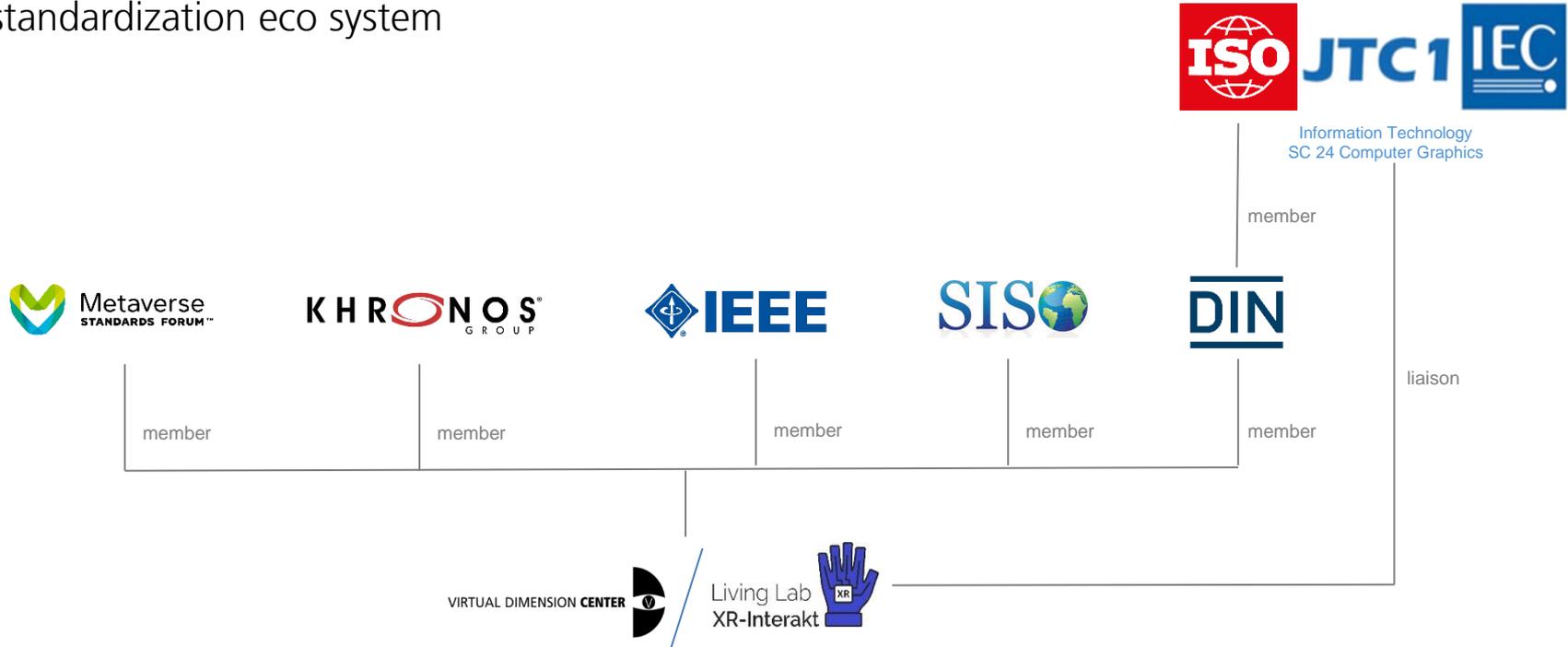
We found:

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

- 600+ published
- 100+ being created right now
- by 75+ active initiatives actually working on them
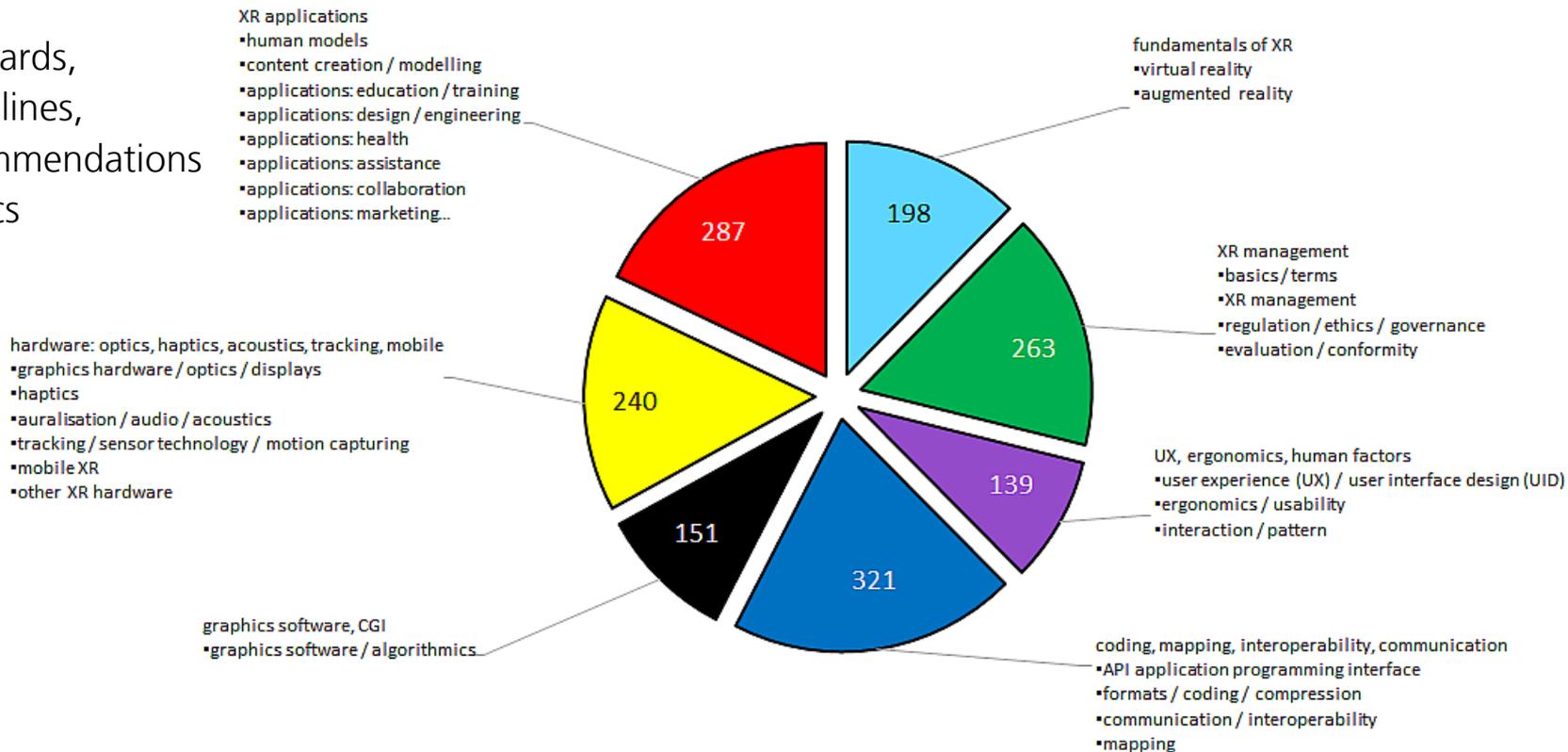
XR & MV Standard Development Organizations (SDOs)

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

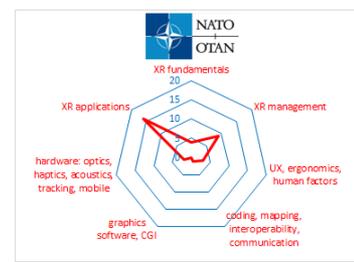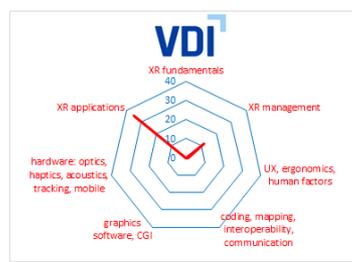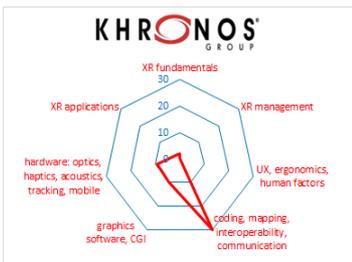| Organization	Value
ISO, ISO-IEC	274
IEC	61
IEEE	60
DIN EN CEN ISO	30
OGC	28
VDI	23
W3C	16
NATO	14
ETSI	14
Khronos Group	12
ITU	10
3GPP	10
XRSI	8
IETF	7
VRIF	7
SAE	6
VDA	5
CTA	5
SISO	4
XRA	4

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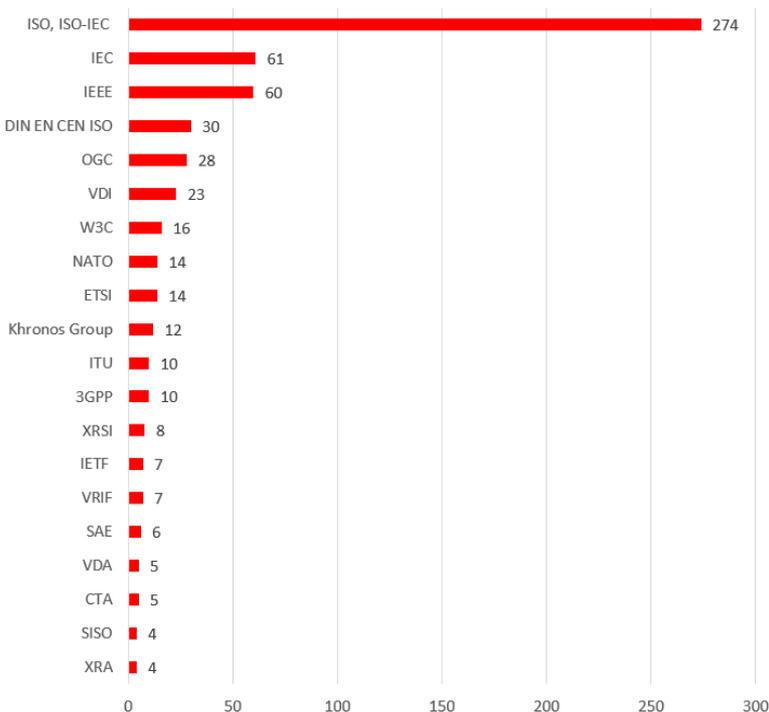
clustering
- XR standards,
- XR guidelines,
- XR recommendations

into 7 topics

XR applications
- human models
- content creation / modelling
- applications: education / training
- applications: design / engineering
- applications: health
- applications: assistance
- applications: collaboration
- applications: marketing...

fundamentals of XR
- virtual reality
- augmented reality

XR management
- basics / terms
- XR management
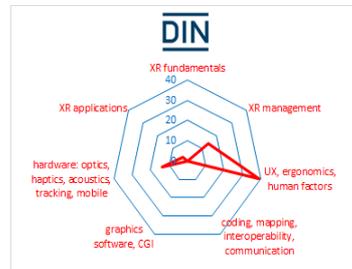- regulation / ethics / governance
- evaluation / conformity

hardware: optics, haptics, acoustics, tracking, mobile
- graphics hardware / optics / displays
- haptics
- auralisation / audio / acoustics
- tracking / sensor technology / motion capturing
- mobile XR
- other XR hardware

UX, ergonomics, human factors
- user experience (UX) / user interface design (UID)
- ergonomics / usability
- interaction / pattern

graphics software, CGI
- graphics software / algorithmics

coding, mapping, interoperability, communication
- API application programming interface
- formats / coding / compression
- communication / interoperability
- mapping

Pie chart values: 198, 263, 287, 240, 151, 321, 139

Focuses of XR standardization organizations varying
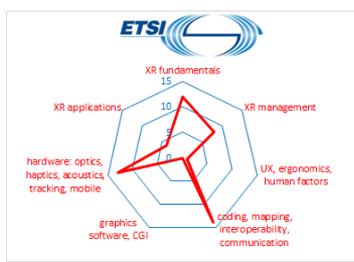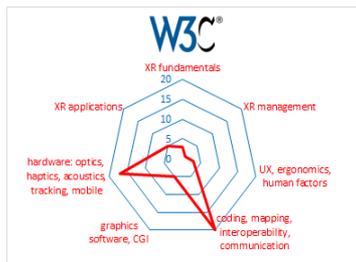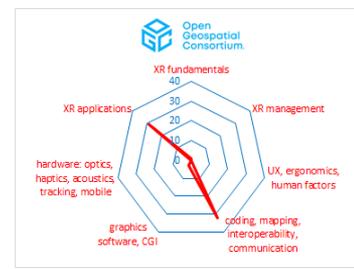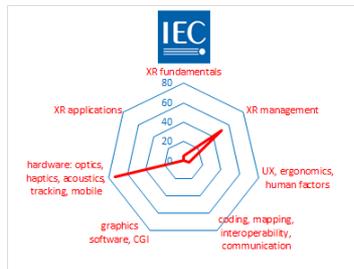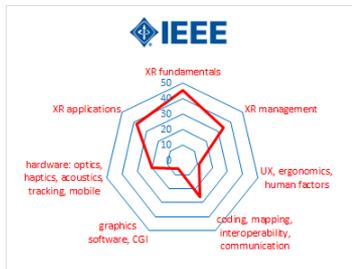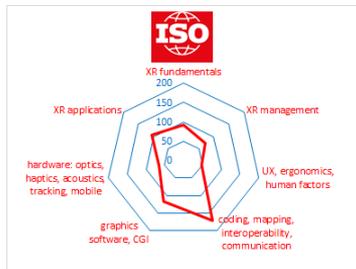
DRAFT INTERNATIONAL STANDARD
ISO/IEC DIS 3721-1

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

Reference number
ISO/IEC DIS 3721-1:2021(E)

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INTERNATIONAL STANDARD
ISO/IEC 23488

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)

Reference number
ISO/IEC 23488:2022(E)

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INTERNATIONAL STANDARD
ISO 17901-1

First edition
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 mesurage de l'efficacité de diffraction et caractéristiques optiques associées aux hologrammes

Reference number
ISO 17901-1:2015(E)

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International Telecommunication Union

ITU-T G.1035

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

(11/2021)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Multimedia Quality of Service and performance – Generic
and user-related aspects

**Influencing factors on quality of experience for
virtual reality services**

Recommendation ITU-T G.1035

ITU

NORTH ATLANTIC TREATY
ORGANIZATION

SCIENCE AND TECHNOLOGY
ORGANIZATION

NATO
OTAN

S&T
organization
www.sto.nato.int

AC/323(HFM-MSG-323)TP/1039

STO TECHNICAL REPORT

TR-HFM-MSG-323

**Guidelines for Mitigating Cybersickness
in Virtual Reality Systems**

(Guide d'atténuation du cybermalaise
dans les systèmes de réalité virtuelle)

Peer-reviewed Final Technical Report of the Human Factors and Medicine /
Modeling Simulations Group, Activity Number 323. This Report describes
the outcome of the activity performed during the study.

Published October 2021

Distribution and Availability on Back Cover

3GPP TR 26.928 V17.0.0 (2022-04)

Technical Report

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Extended Reality (XR) in 5G
(Release 17)

5G

3GPP
A GLOBAL INITIATIVE

ETSI GS ARF 005 V1.1.1 (2022-09)

GROUP SPECIFICATION

Augmented Reality Framework (ARF);
Open APIs for the Creation and Management of the
World Representation

Disclaimer

The present document has been produced and approved by the Augmented Reality Framework (ARF) ETSI Industry Specification Group (ISG) and represents the views of those members who participated in this ISG. It does not necessarily represent the views of the entire ETSI membership.

IEEE SA STANDARDS ASSOCIATION

INDUSTRY CONNECTIONS REPORT

THE IEEE GLOBAL INITIATIVE ON ETHICS OF EXTENDED REALITY (XR) REPORT

EXTENDED REALITY (XR) ETHICS AND DIVERSITY, INCLUSION, AND ACCESSIBILITY

Authored by

Dylan Fox

Isabel Guenette Thornton

Chapter Leaders

◆IEEE

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IEEE STANDARDS ASSOCIATION ◆IEEE

IEEE Standard for Distributed Interactive Simulation— Application Protocols

IEEE Computer Society

Sponsored by the
SISO Standards Activity Committee

IEEE
3 Park Avenue
New York, NY 10016-5997
USA

19 December 2012

IEEE Std 1278.1™-2012
(Revision of
IEEE Std 1278.1-1995)

COLLADA

COLLADA – Digital Asset Schema Release 1.5.0

Specification

April 2008

Editors: Mark Barnes and Ellen Levy Finch, Sony Computer Entertainment Inc.

ANSI/CTA Standard

Definitions and Characteristics for VR Video and VR Images

ANSI/CTA-2085

November 2019

ANSI

Consumer Technology Association

Consumer Technology Association

CTA Standard
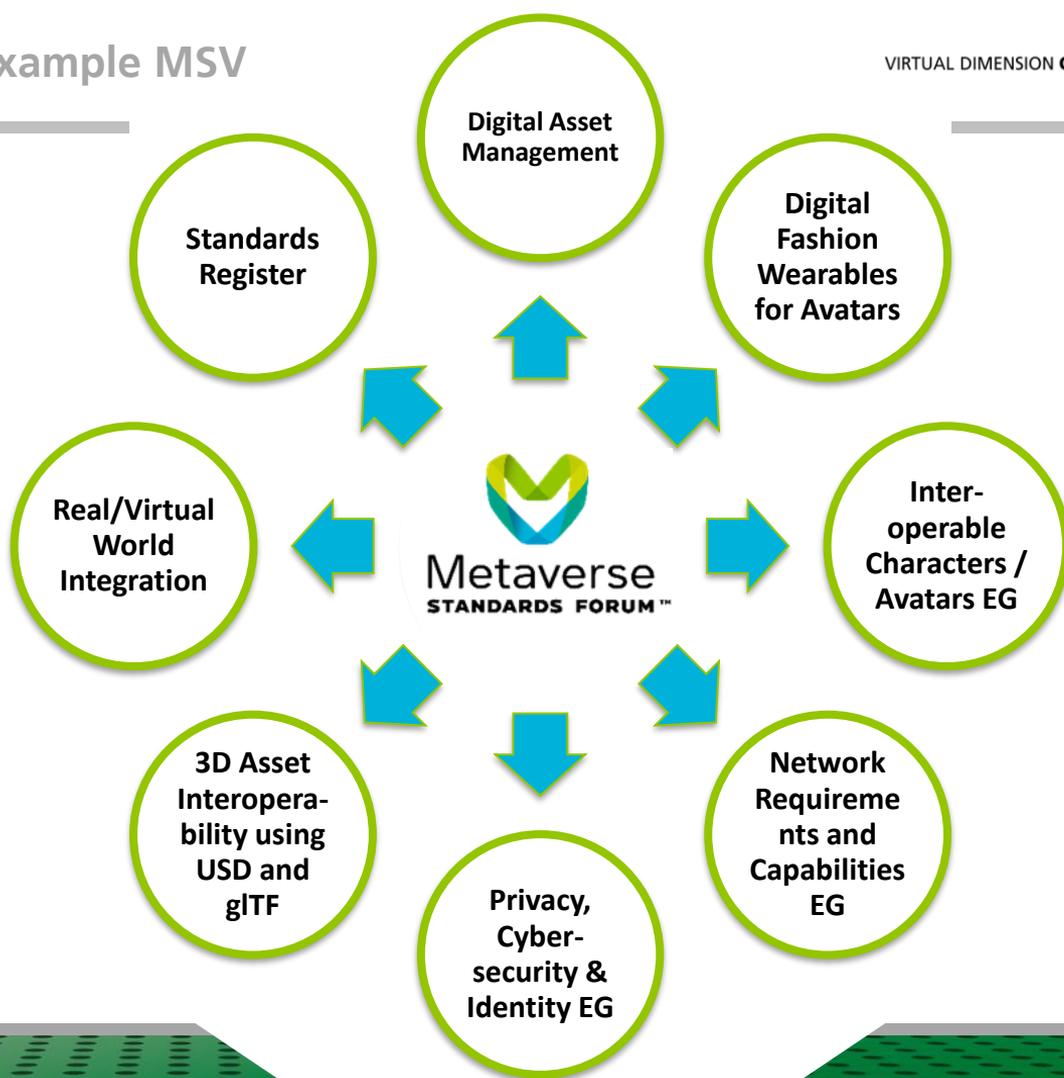
Best Practices for Limited Mobility in XR
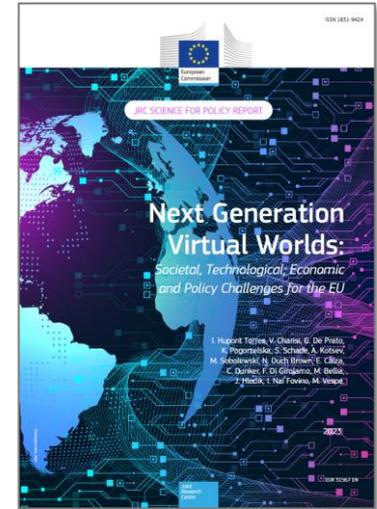
CTA-2095

May 2021

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.

Digital Asset Management

Standards Register

Digital Fashion Wearables for Avatars

Real/Virtual World Integration

Inter-operable Characters / Avatars EG

3D Asset Interopera-bility using USD and glTF

Network Requirements and Capabilities EG

Privacy, Cyber-security & Identity EG

Metaverse STANDARDS FORUM™

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Quellen

- 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
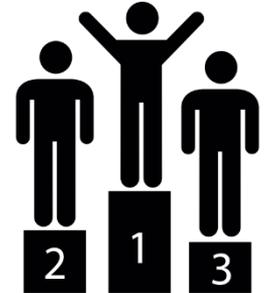
Data Protection / Datenschutz

- 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
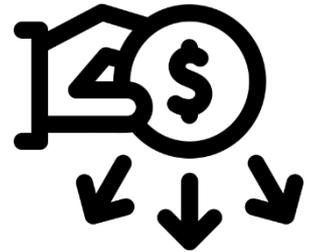
Cybersecurity / Cyber-Sicherheit:

- 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

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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 irrespective of content, website, platform, application, type of equipment, source address, destination address, or method of communication (i.e. no price discrimination).

General Data Protection Regulation:
- The GDPR 2016/679 is a European Union regulation on information privacy in the European Union (EU) and the European Economic Area (EEA). 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 and by allowing new players to enter the market.

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.

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:
  o the Unfair Commercial Practices Directive 2005/29/EC
  o 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.
  o the Unfair Contract Terms Directive 93/13/EEC

VIRTUAL DIMENSION **CENTER**

- es gibt etliche Felder, in denen Regulierungsbedarfe für XR und Metaverse diskutiert werden => Auswirkungen!

- Regulierung kann Zugang zu Plattformen erzwingen

- Normen können die Grundlage für technische Regulierung schaffen

- Normung ist unerlässlich, um technische Interoperabilität zu sichern

- darüber hinaus spart die Normennutzung Zeit und Geld. Sie schafft Marktzugang und Rechtssicherheit.

- Normenarbeit ist wichtig, um frühzeitig im Bilde zu sein und ggf. Einfluss zu nehmen

- VDC wird XR- und Metaverse-Normenwissen in diesem Jahr auf seiner Website öffentlich stellen.

=> Nutzen Sie XR- & MV-Normen und arbeiten Sie aktiv an deren Erstellung mit!

„*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.

Normung und Regulierung für eXtended Reality und das Metaverse

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