



XR Standardization

The status quo and path ahead of us

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Overview Virtual Dimension Center (VDC)

- Germany's largest B2B network for VR / AR / MR
- start 2002 with 13 founding members . Today 100+ members and 30+ partners
- non-profit
- core tasks:
 1. information gathering
 2. contact match making
 3. technology marketing
 4. technology transfer
 5. project development on regional / national / EU level
 6. V/AR hardware assessment
 7. education & training
- certified, best-in-class organization
- staff: 8 employees
- 5-8 projects running (regional, national, EU)
- public relations:
 - 10.000+ calls of VDC website per month
 - 10.000+ impressions per month on social media
 - 4.000 newsletter recipients
 - 300+ news and events published per year
 - 70+ press articles with VDC per year
 - editorial contributions, interviews in

- (co-)organized events in 2022: 48
- recent VDC reports, studies, analyses:
 1. position paper on V/AR standardization
 2. position paper on VAR user interface design
 3. technology consequence analysis "future workplace"

numerous lab reports on V/AR hardware & software assessments including VR headset image quality, tracking systems, AR marker tracking, ergonomics

Whitepapers:

1. *VIAR in the creative industries*
2. *guideline "Collaborative XR"*
3. *guideline "360° streaming & VR broadcasting"*
4. *VR/AR/MR in aerospace applications*
5. *virtual acceptance & certification*
6. *VIAR education needs*
7. *VIAR consulting needs*
8. *opportunities of StartUp cooperations in the VIAR sector*





Industry



IT



Research & education

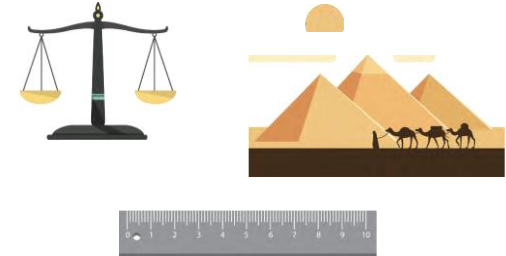


Others



Introduction

- standards support everyday life much more than people think
 - society recognized importance of standardized measurements thousands of years ago: e.g. weight, distance or length
 - development of a common reference system agreed upon people and institutions
-
- rapid technological progress -> need for standardization grows
 - especially in the area of Information and communications technologies (ICT)
 - standardization and standards boost progress and create basis upon which technology can evolve



What standards are (in a wide sense) and why they're needed

- The most general definition for a «Standard» may be «a widely agreed way of doing something »
- where, depending on the specific area of application, "*doing something*" may be replaced by, e.g., "*designing a product*", "*building a process*", "*implementing a procedure*" or "*delivering a service*".
- «Standard» (i.e. agreed and common) ways of doing things bring lot of benefits; our technological world without «Standards» simply **would not work (or, at least, it would be harder to make it work)**



What standards are (in a wide sense) and why they're needed

For instance, what if

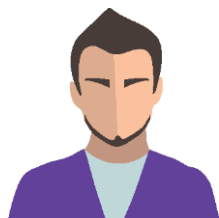
- each computer had its own type of keyboard
- each smartphone and PC had its own specific set of connectors and charger (though some have by choice „ . more on this in next slides)
- each device had its own protocol for interoperation



Two main different types of "*standards*"

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

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



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





Standards in everyday life

Using a Smartphone for browsing
(some of possibly involved standards) :

- User equipment regarding hardware
- characteristics, also taking into account safety issues
- Connectivity among user devices and wireless network as well as the functionality of the same network
- Functionality of the Internet and the protocols to support web browsing

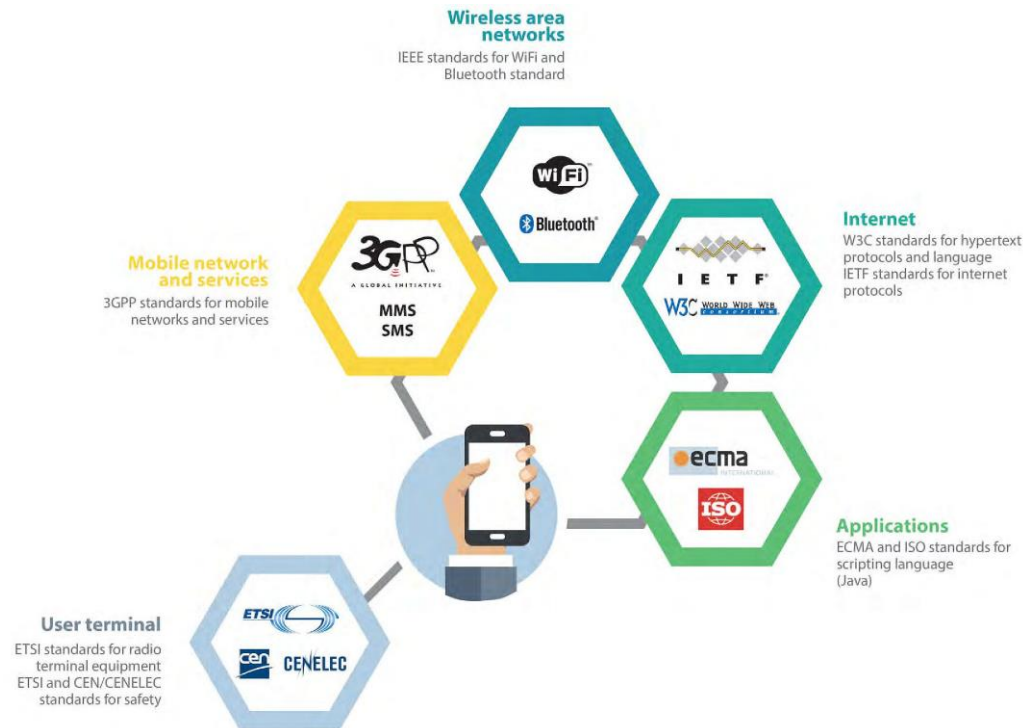


Fig. ETSI

Standards in everyday life

Using a Personal Computer
(some of possibly involved standards) :

- A 2010 paper (Biddle & al., 2010) identifies 251 technical interoperability standards implemented in a laptop computer, but total number estimated to be over 500
- out of the 251 identified standards, "202 (80%) were developed by SDOs and 49 (20%) by individual companies"

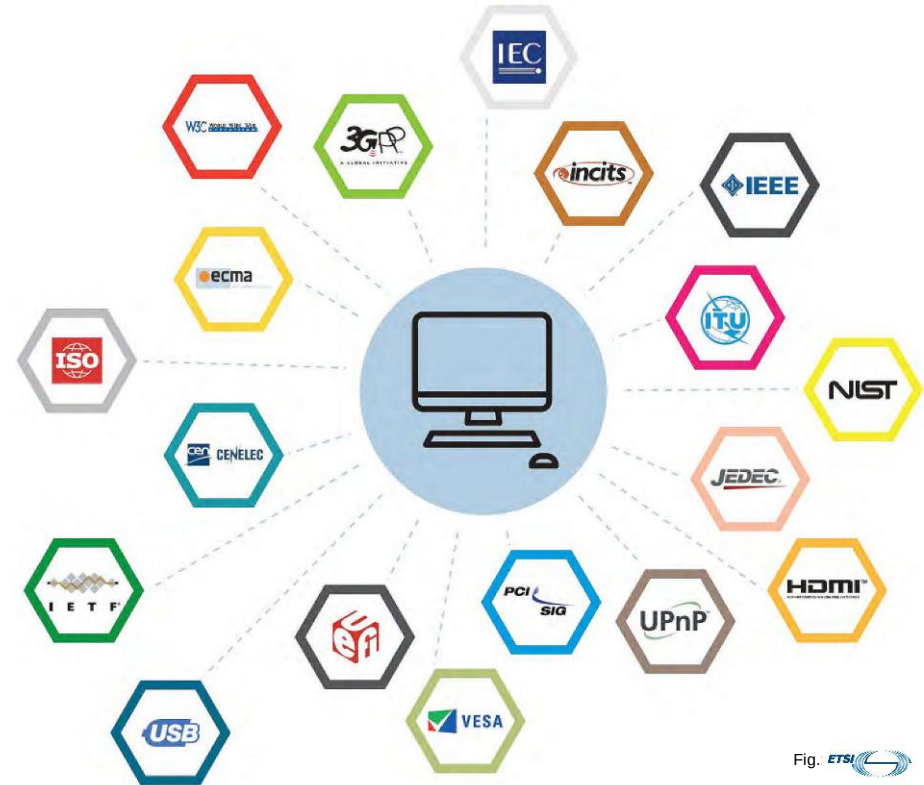


Fig. ETSI 

Formal standardization, SDO standards, and regulation

- Standards are NOT regulations.
- Standards are NOT a set of thorough design rules.
- Standards are voluntary NOT compulsory
- Yet, they may inspire both

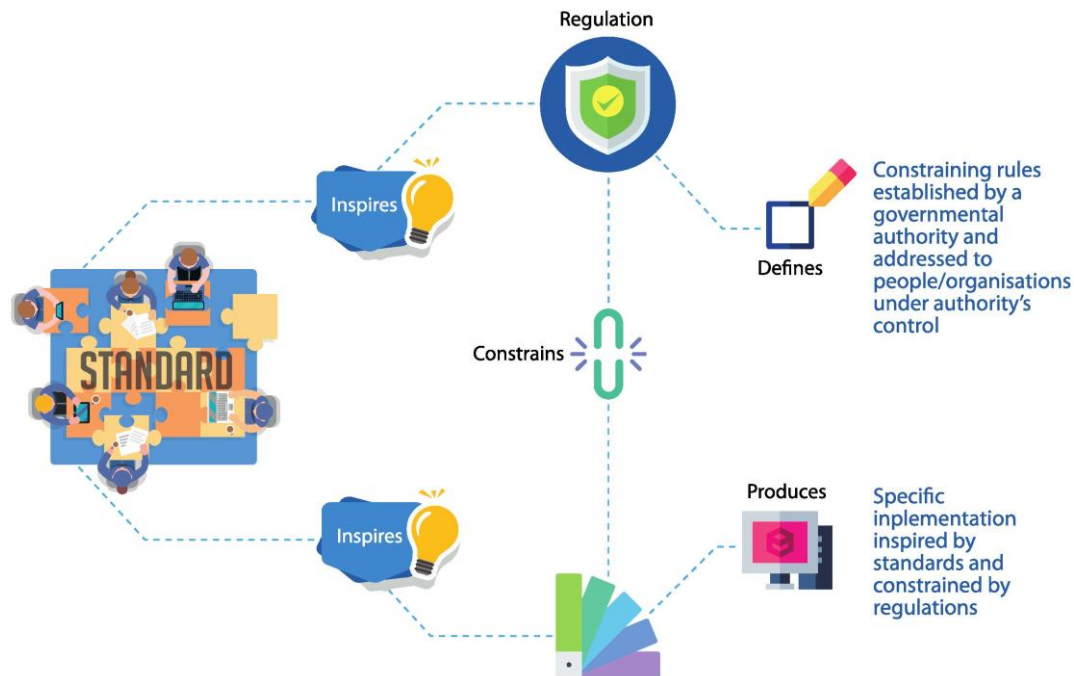
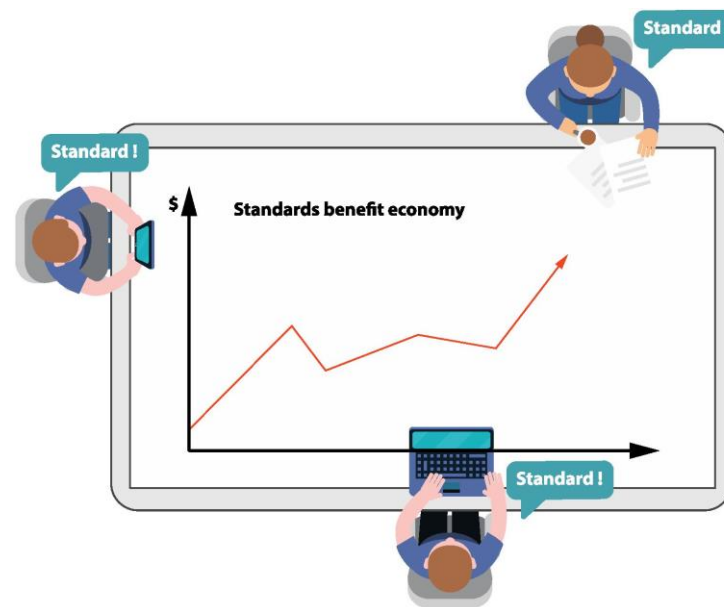


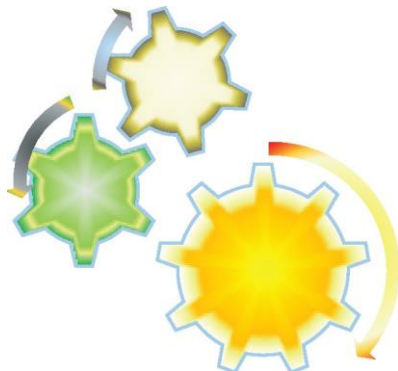
Fig. ETSI 

As a consensus-built set of rules for doing something, a Standard benefits the **economy** by

- incentivizing investments, as standards ensure the stability of the technology in a reasonable time frame
- enabling economy of scale
- facilitating trade thanks to common approaches among countries
- encouraging larger and fairer competition
- consolidation of new technologies and identifying evolution paths that are able to preserve past investments
- increasing collaboration opportunities among the companies, especially for small and innovative enterprises



As a consensus-built set of rules for doing something, a Standard benefits **innovation**, by



- reducing development time, costs and risks, by steering designers' activity, which facilitates the uptake of innovation in the marketplace



- improving quality
- decreasing time to market
- promoting the interoperability of products, services and processes
- attract customers

Standards benefit **economy**, (in particular newly established ones and SMEs)

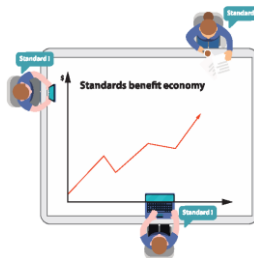
+ Innovation



— STANDARD —

- ease new developments
 - - risk,
 - - investment
 - + opportunities

+ trade and competition



- Enlarge potential market

+ safety and sustainability



- fairer competition and less risks of non-compliance (widespread and shared basic requirements)



standards may jeopardize innovation, as:

- when established, standards may limit or delay the introduction of innovative (disruptive) solutions in the market
- introducing innovation into standards may take a long time

measures SDOs put in place to minimize risks:

- effectively managing the standardization processes by being open and responsive to the market innovation trends and to research impulses from the experts involved in the standardization activities
- establish open expert groups to explore innovation



standards may jeopardize fair competition among industries and Countries, as :

- SDOs may be politicized, or unduly influenced by special interests

measures SDOs put in place to minimize risks:

- enlarge contributor base
- right balance between effectiveness and fairness



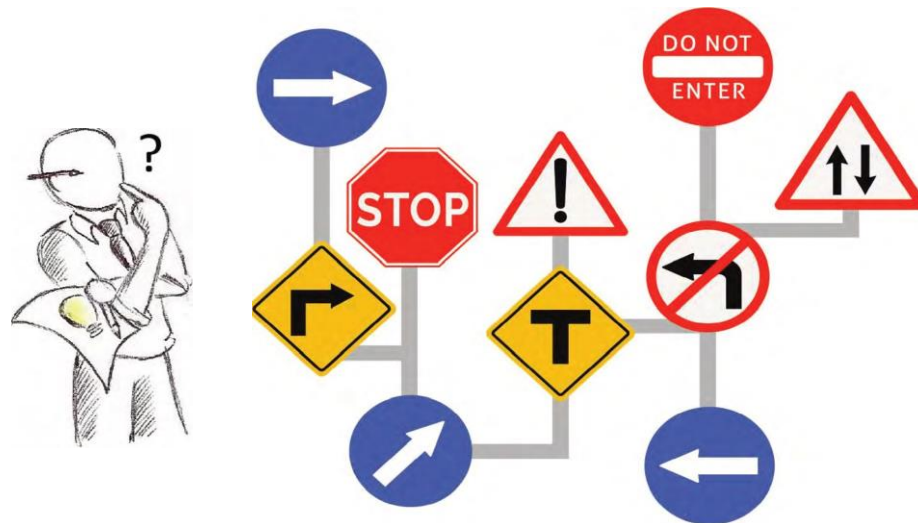
Fig. ETSI 

Varied standardization landscape may carry to inconsistencies, as:

- standards produced by different SDOs may be in competition or partially overlap; consequent production of inconsistent or, at least, redundant requirements may strongly jeopardize standardization benefits
- risk of unfairness as some SDO may be misused for local or specific interests

measures to put in place to minimize risks

- users and contributors to standards must select the most appropriate SDO
- SDOs need to promote liaisons and collaboration among themselves





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)



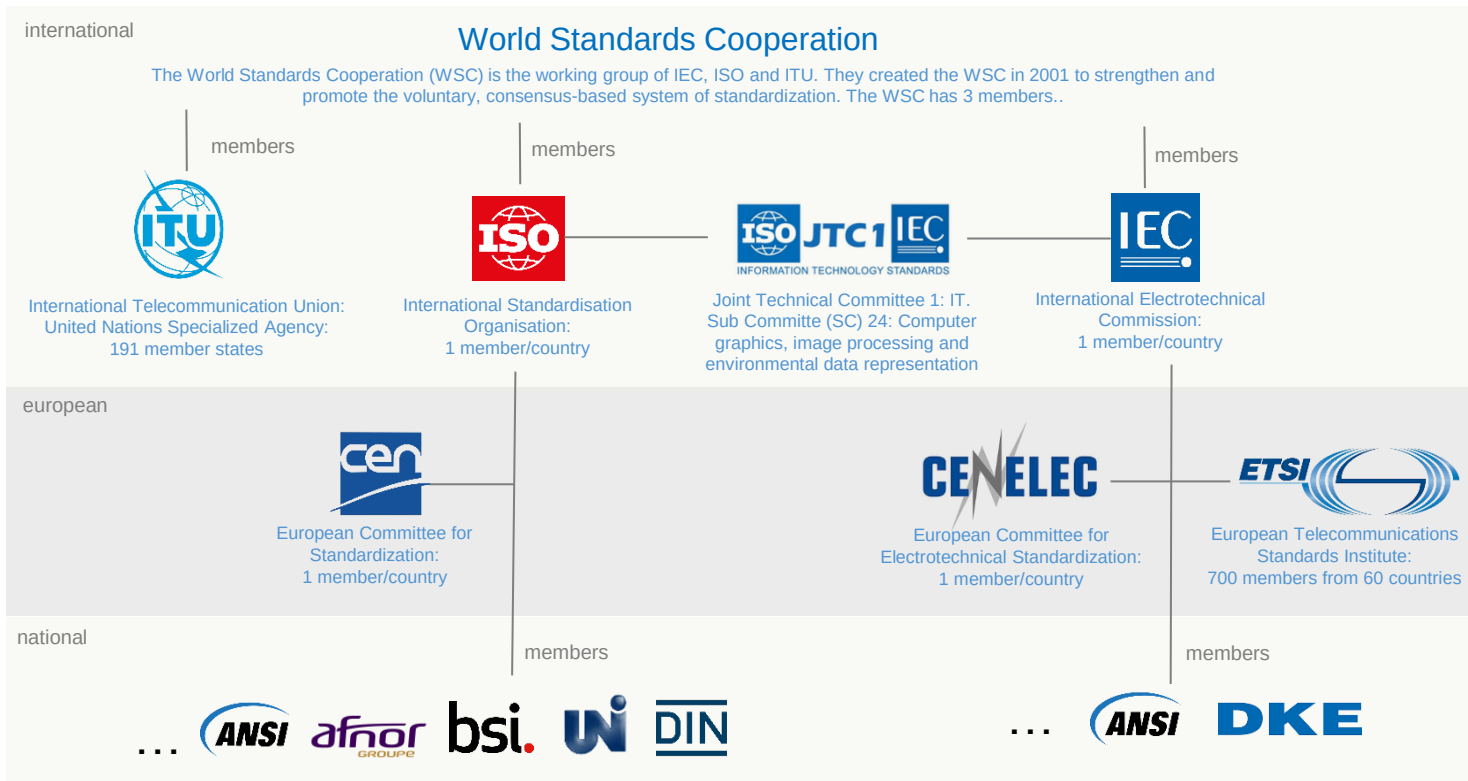
Not Recognized Organizations:

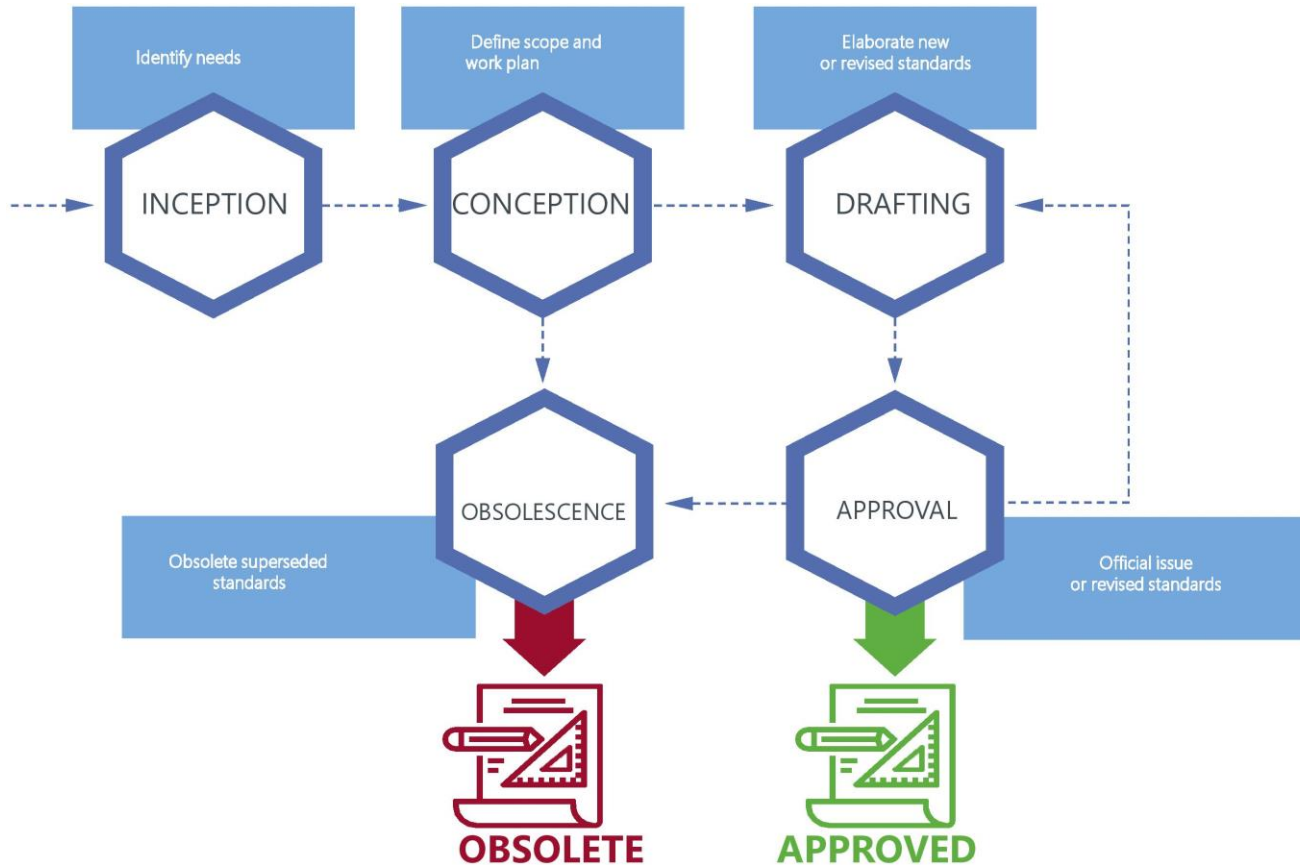
- These are not recognized by any political bodies
- IEEE is a primary SDO with a large number of active technical standards, ranging from wireless communications and digital health to cloud computing, power and energy, 3D video, electrical vehicle standards, and the Internet of Things. It was created 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.

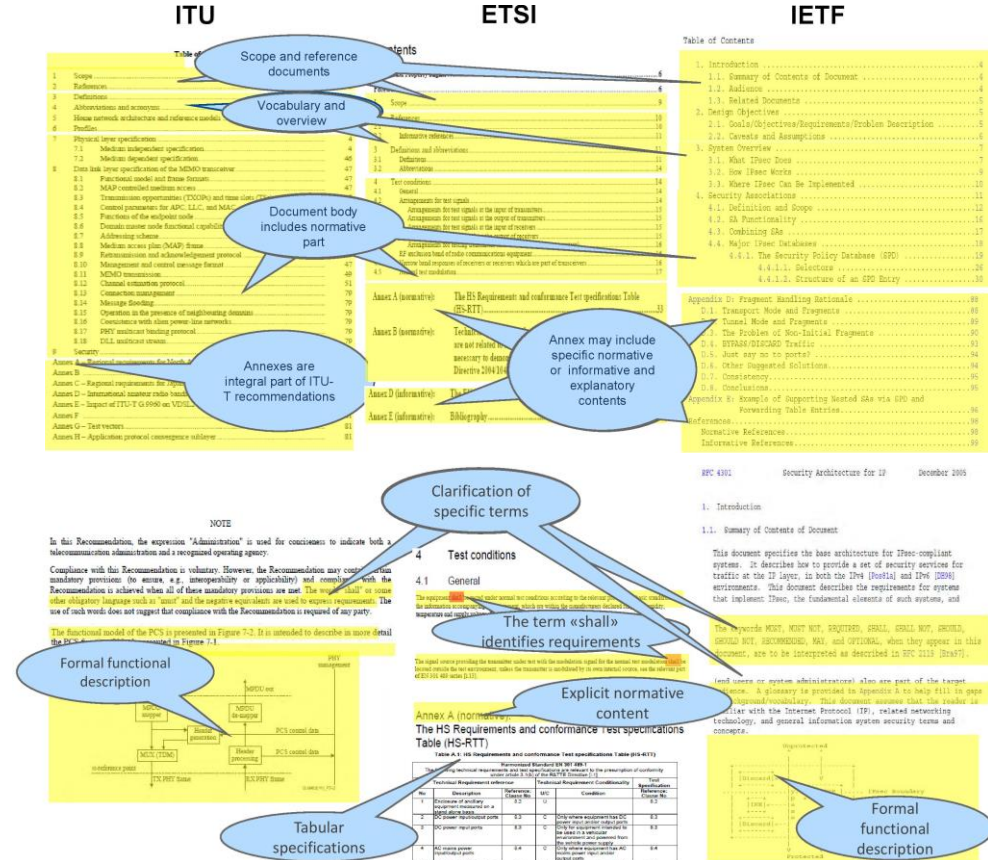






How to find a standard and its contents

- select relevant SDOs by technical and geographical scope
- identify selected SDOs' relevant specification documents and their relevance
- all SDOs make their documents available online access may be restricted to authorized users -> check access
- clearly identify standard document's scope and objectives
- clearly identify standard document's objectives and area of application
- identify the list of other reference documentation
- discriminate document sections and between normative and informative parts





Anything about XR in this topic?!



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

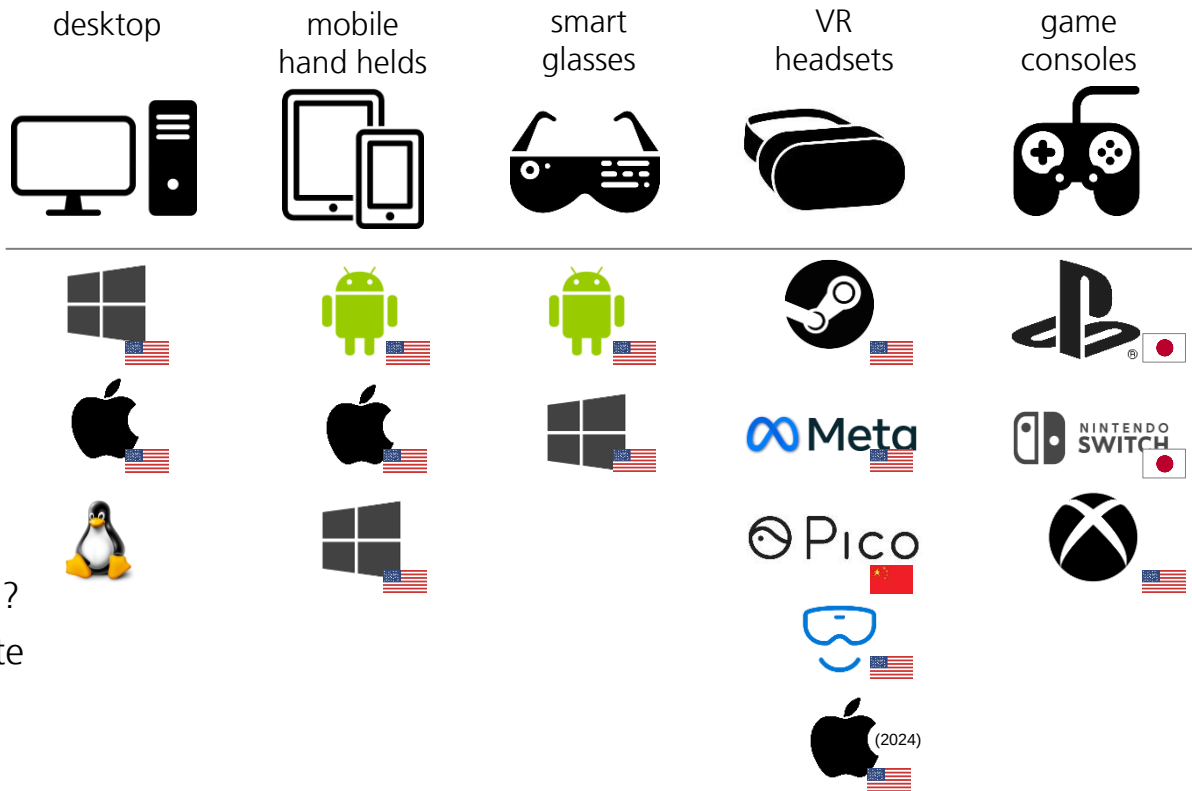
problem:

- 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!**





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.



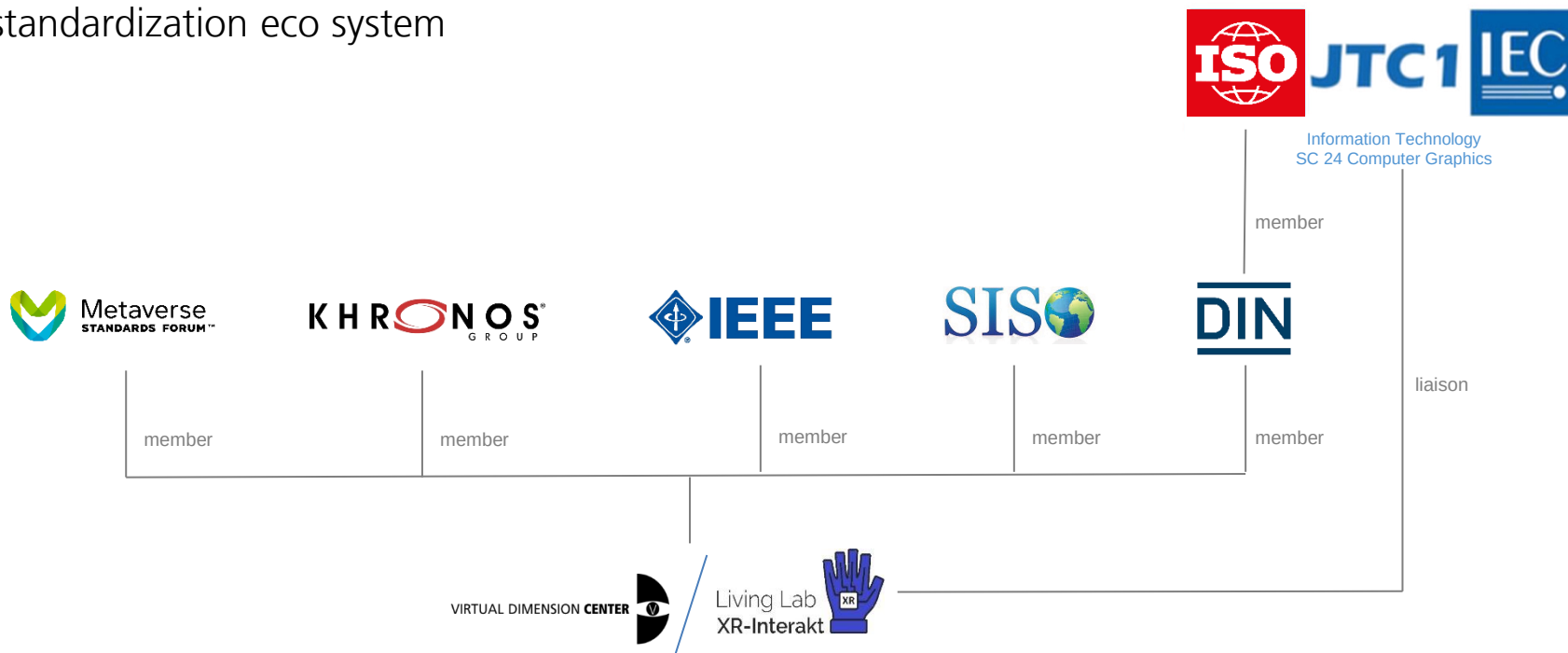
Experts that reviewed the proposal at the request of POLITICO said it risks violating principles of privacy and freedom | Jade Gao/AFP via Getty Images

BY GIAN VOLPICELLI

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



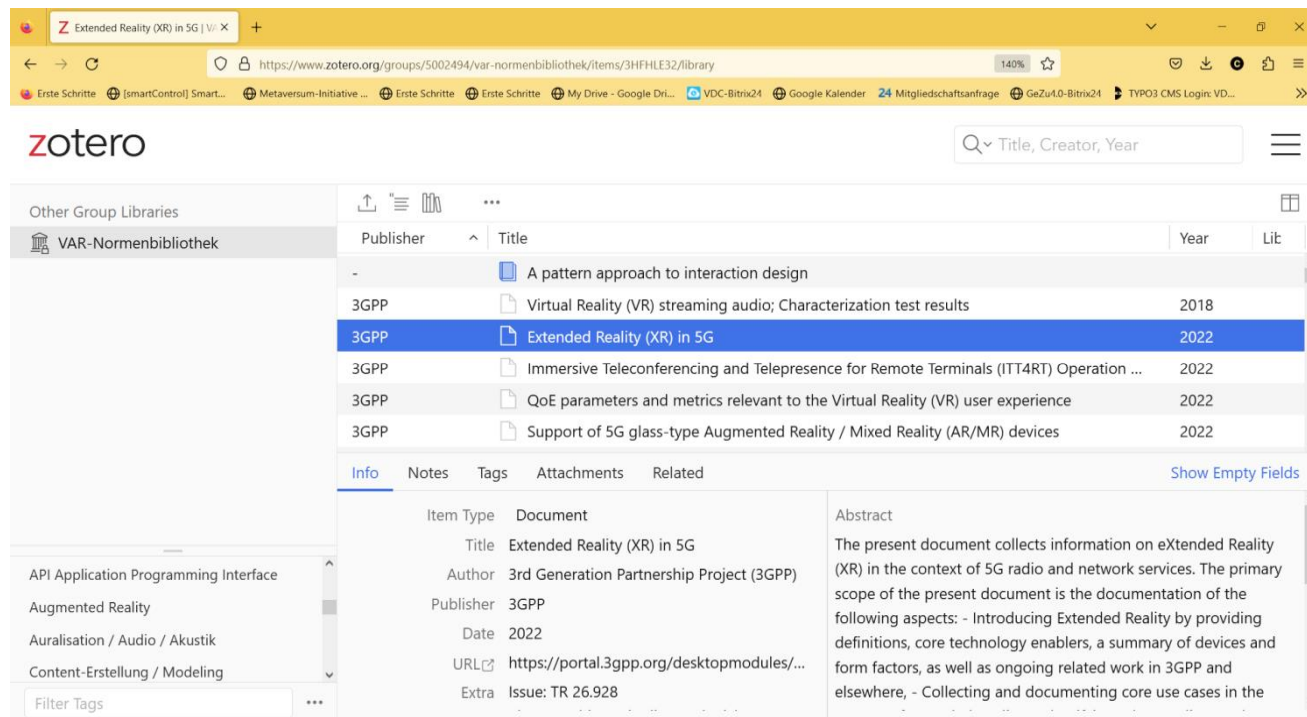
We got involved in the
standardization eco system



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



The screenshot shows a web browser window displaying a Zotero library page. The URL is <https://www.zotero.org/groups/5002494/var-normenbibliothek/items/3HFHLE32/library>. The page title is "Extended Reality (XR) in 5G | VDC". The Zotero logo is visible in the top left. A search bar on the right contains the text "Title, Creator, Year". Below the search bar, there is a table of documents. The table has columns for "Publisher", "Title", "Year", and "Lit". The document "Extended Reality (XR) in 5G" is highlighted in blue. Below the table, there is a section for "Info" with fields for "Item Type", "Title", "Author", "Publisher", "Date", "URL", and "Extra". The "Abstract" section is also visible, containing text about the document's scope and content.

Publisher	Title	Year	Lit
-	A pattern approach to interaction design		
3GPP	Virtual Reality (VR) streaming audio; Characterization test results	2018	
3GPP	Extended Reality (XR) in 5G	2022	
3GPP	Immersive Teleconferencing and Telepresence for Remote Terminals (ITT4RT) Operation ...	2022	
3GPP	QoE parameters and metrics relevant to the Virtual Reality (VR) user experience	2022	
3GPP	Support of 5G glass-type Augmented Reality / Mixed Reality (AR/MR) devices	2022	

Info Notes Tags Attachments Related Show Empty Fields

Item Type Document

Title Extended Reality (XR) in 5G

Author 3rd Generation Partnership Project (3GPP)

Publisher 3GPP

Date 2022

URL <https://portal.3gpp.org/desktopmodules/...>

Extra Issue: TR 26.928

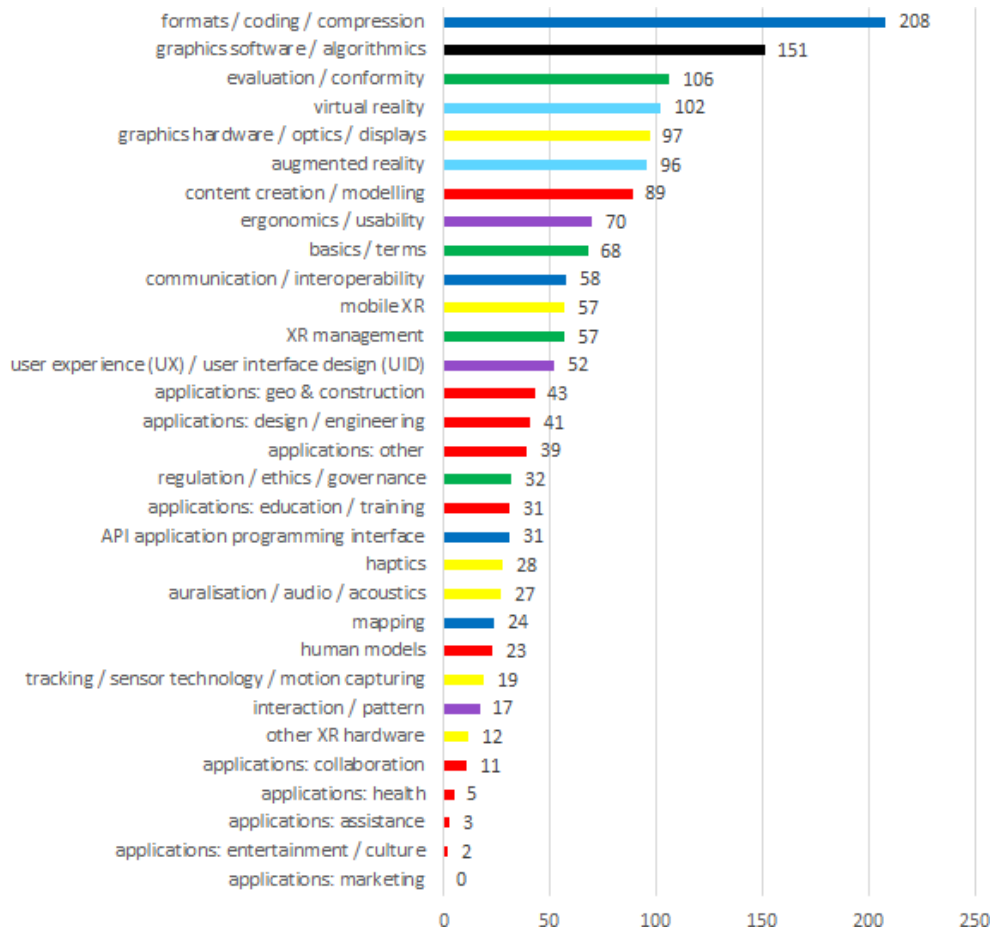
Abstract

The present document collects information on eXtended Reality (XR) in the context of 5G radio and network services. The primary scope of the present document is the documentation of the following aspects: - Introducing Extended Reality by providing definitions, core technology enablers, a summary of devices and form factors, as well as ongoing related work in 3GPP and elsewhere, - Collecting and documenting core use cases in the



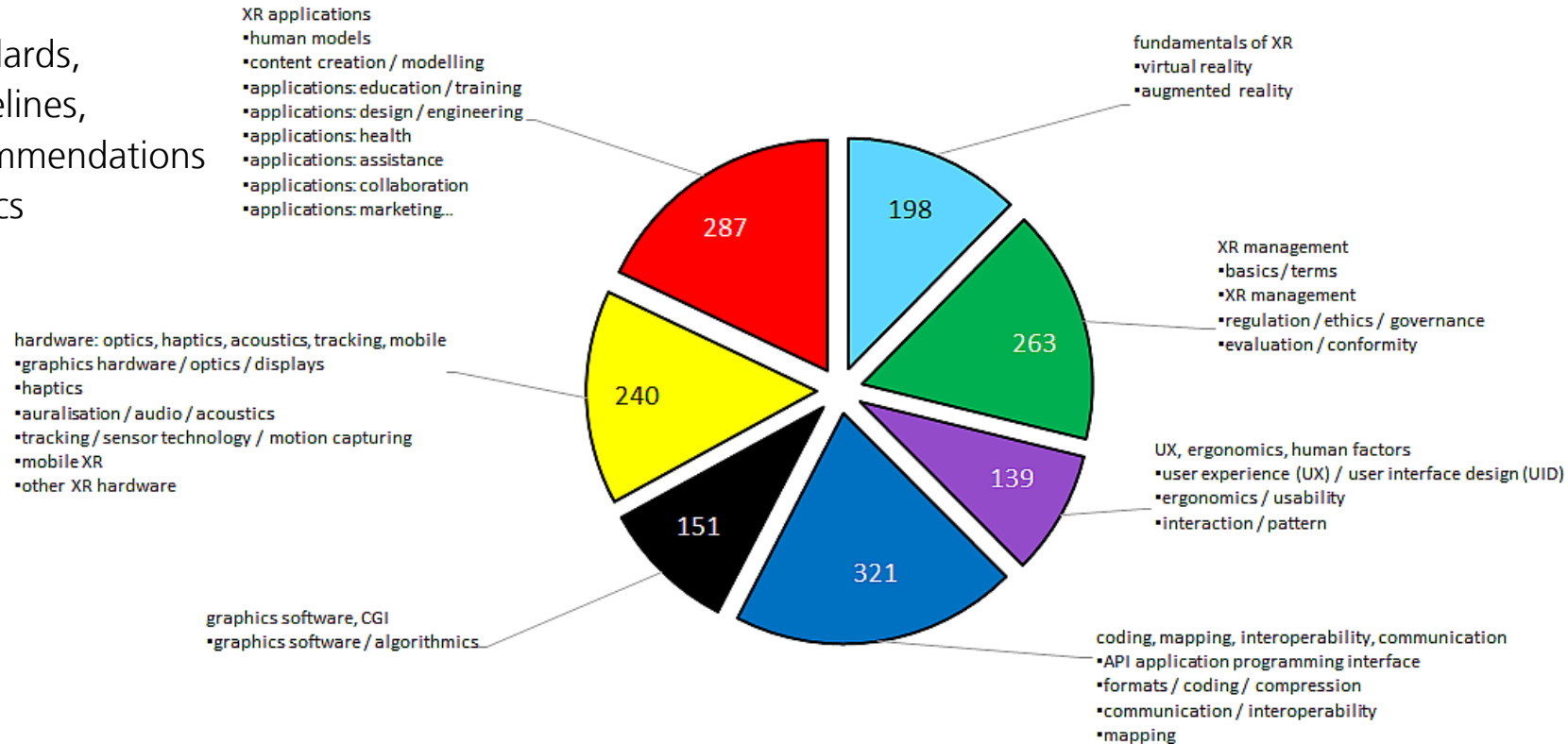
ranking

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



clustering

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





XR metrology standards on the table

- IEEE P3333.1.1 Standard for Quality of Experience (QoE) and Visual-Comfort Assessments of Three-Dimensional (3D) Contents Based on Psychophysical Studies
- IEEE P3333.1.2 Standard for the Perceptual Quality Assessment of Three Dimensional (3D), Ultra High Definition (UHD) and High Dynamic Range (HDR) Contents
- IEEE P3333.1.3 Standard for the Deep Learning-Based Assessment of Visual Experience Based on Human Factors
- ISO/IEC 15938-16:2021 Information technology - Multimedia content description interface - Part 16: Conformance and reference software for compact descriptors for video analysis
- ISO-IEC 26511 Systems and software engineering – Requirements for managers of information for users of systems, software, and services
- NATO HFM-297 RTG Assessment of augmentation technologies for improving human performance, TAP, 6 Apr 2017
- NATO MSG-181 Physics-Based Electro-Optic/Infrared Simulations – Best Practice Recommendations for Decision Support
- NATO MSG-ET-049 High-Fidelity Electro-Optic/Infrared Scene Simulation for Decision Support
- NATO MSG-ET-052 Common Framework for the assessment of XR Technologies for Use in Training and Education
- 3GPP TR 26.929 QoE parameters and metrics relevant to the Virtual Reality (VR) user experience
- ASTM F 1181 Standard Test Method for Measuring Binocular Disparity in Transparent Parts
- DIN EN ISO 15536-2 Ergonomie – Computer-Manikins und Körperumriss-Schablonen – Teil 2: Prüfung der Funktionen und Validierung der Maße von Computer-Manikin-Systemen
- DIN EN ISO 9241-331 Ergonomie der Mensch-System-Interaktion - Teil 331: Optische Eigenschaften von autostereoskopischen Displays
- DIN EN ISO 9241-333 Ergonomie der Mensch-System-Interaktion - Teil 333: Stereoskopische Displays unter Verwendung von Brillen
- ETSI 126929 V 16.1.0, 3GPP TR 26.929 Version 16.1.0 Release 16 5G - QoE parameters and metrics relevant to the Virtual Reality (VR) user experience (3GPP TR 26.929 version 16.1.0 Release 16)
- IEC 63145 Eyewear display - Part 1-1: Generic introduction
- IEC 62629-22-1 3D-Anzeigen - Teil 22-1: Messverfahren für auto-stereoskopische Anzeigen - Optisch
- IEC 62629-41-1 ED1 3D Display devices - Part 41-1: Generic introduction of holographic display
- IEC 62629-62-11 3D Display Devices - Measurement methods for transparent virtual-image type - Optical
- IEC 62629-62-11:2022 3D display devices - Measurement methods for virtual-image type - Optical
- IEC 62908-12-20 Touch and interactive displays - Part 12-20: Measuring methods of touch displays - Multi-touch performance
- IEC 62908-1-3 Touch and interactive displays - Part 1-3: General introduction of pen touch technology
- IEC 63145-20-10 Eyewear display - Part 20-10: Fundamental measurement methods. Optical properties
- IEC 63145-20-20 Eyewear display - Part 20-20: Fundamental measurement methods - Image quality
- IEC 63145-21-20 Eyewear display - Part 21-20: Specific measuring methods for VR type. Image quality
- IEC 63145-22-10 Eyewear display - Part 22-10: Specific measurement methods for AR type - Optical properties
- IEC 63203-402-1 Tragbare elektronische Geräte und Technologien - Teil 402-1: Produkte und Systeme - Zubehör - Prüf- und Bewertungsverfahren für handschuhartige Bewegungssensoren zur Messung der Fingerbewegungen
- IEC TR 62629-41-1:2019 3D Display devices - Part 41-1: Generic introduction of holographic display
- IEC TR 62629-51-1:2020 3D display devices - Part 51-1: Generic introduction of aerial display
- IEC TR 63145-1-1:2018 Eyewear display - Part 1-1: Generic introduction
- ISO 20685 3D-Scanverfahren für international kompatible anthropometrische Datenbanken
- ISO 17901-1 Optics and photonics - Holography - Part 1: Methods of measuring diffraction efficiency and associated optical characteristics of holograms
- ISO 17901-2 Optics and photonics - Holography - Part 2: Methods for measurement of hologram recording characteristics
- ISO 20685-1 3D-Scanverfahren für international kompatible anthropometrische Datenbanken – Teil 1: Prüfprotokoll für aus 3D-Scans extrahierte Körpermaße
- ISO 20685-2 3-D-Scanning-Methoden für international kompatible anthropometrische Datenbanken – Teil 2: Bewertungsprotokoll der Oberflächenform und Wiederholbarkeit der relativen Positionen von Orientierungspunkten
- ISO-IEC 25062 Software engineering -- Software product Quality Requirements and Evaluation (SQuaRE) -- Common Industry Format (CIF) for usability test reports
- ISO-IEC 23090-6 Informationstechnik - Kodierte Darstellung immersiver Medien - Teil 6: Metriken für immersive Medien
- ISO-IEC 23090-6 DAM1 Informationstechnik - Kodierte Darstellung immersiver Medien - Teil 6: Metriken für immersive Medien - 1. Änderung: Immersive Media-Metriken für V3C-Daten und OMAF
- ITU 1035 Influencing factors on quality of experience for virtual reality services
- SAE J1050_200902 Describing and Measuring the Driver's Field of View
- SID IDMS v1.1a Information Display Measurements Standard
- XRSI The promise of immersive healthcare The promise of immersive healthcare
- IEC 62908-12-10 Touch and interactive displays - Part 12-10: Measurement methods of touch displays - Touch and electrical performance



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 mesure de l'efficacité de diffraction et
caractéristiques optiques associées aux hologrammes*



Reference number
ISO 17901-1:2015(E)

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INTERNATIONAL STANDARD

**ISO/IEC
23090-6**

First edition
2021-06

Information technology — Coded representation of immersive media — Part 6: Immersive media metrics



Reference number
ISO/IEC 23090-6:2021(E)

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IEC 62908-13-10

Edition 1.0 2016-11

INTERNATIONAL STANDARD



Touch and interactive displays –
Part 13-10: Reliability test methods of touch displays – Environmental durability
test methods

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ICS 31.120

ISBN 978-2-6322-3795-3

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DIN EN ISO 20685		DIN
ICS 13.180	Ersatz für DIN EN ISO 20685:2006-02	
3D-Scanverfahren für international kompatible anthropometrische Datenbanken (ISO 20685:2010); Deutsche Fassung EN ISO 20685:2010 3-D scanning methodologies for internationally compatible anthropometric databases (ISO 20685:2010); German version EN ISO 20685:2010 Méthodologies d'exploration tridimensionnelles pour les bases de données anthropométriques compatibles au plan international (ISO 20685:2010); Version allemande EN ISO 20685:2010		
Gesamtumfang 25 Seiten		
Normenausschuss Ergonomie (NAErg) im DIN		
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RE37 - 3D-Scanverfahren für international kompatible anthropometrische Datenbanken - Stand 2016-11

ETSI TR 126 929 V17.0.0 (2022-05)

TECHNICAL REPORT

**5G;
QoE parameters and metrics relevant to the Virtual Reality (VR)
user experience
(3GPP TR 26.929 version 17.0.0 Release 17)**

A GLOBAL INITIATIVE

This is a preview - click here to buy the full publication

IEC **IEC 62629-62-11**
Edition 1.0 2022-11

**INTERNATIONAL
STANDARD**

**3D display devices –
Part 62-11: Measurement methods for virtual-image type – Optical**

INTERNATIONAL
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ICS 31.120; 31.260 ISBN 978-2-8322-6006-7

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XR metrology standards to come

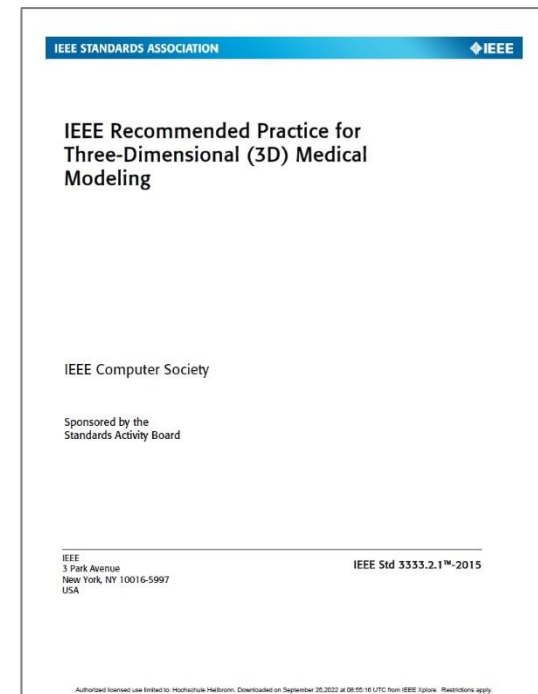
- IEC 62629-502-1 3D Display devices - Measurement method of plane-symmetrical real-image-forming optics for aerial display
- IEC 62629-52-1 ED1 3D Display devices - Part 52-1: Fundamental measurement methods of aerial display - Optical
- IEC 62629-62-12 ED1 3D display devices - Measurement methods for virtual-image type - Image Quality
- IEC 63145-201-10 Eyewear display – Part 201-10: Measurement methods for VR type – Optical properties of a single component lens used for eyepieces
- IEC 63145-22-20 Eyewear display - Part 22-20: Specific measurement methods for AR type – Image quality
- IEC 63145-30 Eyewear display – Durability test methods of eyewear display
- IEC 63145-40 Eyewear display – Measurement methods of specific functions with sensors for eyewear display
- IEC 63203-301-1 Tragbare elektronische Geräte und Technologien - Teil 301-1: Prüfverfahren für elektrochrome Filme für tragbare Geräte
- IEC PWI 110-17 ED1 Electronic displays: Measurement method of holographic display - optical
- IEC PWI 110-22 ED1 Electronic displays: Measurement method of Volumetric display
- IEC PWI 110-28 ED1 Electronic displays: Specific measurement methods for AR type - Image quality (future IEC 63145-22-20)
- IEC PWI 110-30 ED1 Electronic displays: Measurement of autostereoscopic display – image quality
- IEC PWI 110-36 ED1 Electronic displays: Durability test methods of eyewear display
- IEC PWI 110-38 Electronic displays: Measurement methods of specific functions with sensors for eyewear display
- IEC PWI 110-46 Electronic displays: Specific measurement methods for VR type - Optical properties
- IEC PWI 110-56 ED1 Electronic displays: Optical measuring methods for light sensing interactive displays
- IEC PWI 110-8 ED1 Electronic displays: Measuring methods of haptic devices
- IEC 62908-42-10 Measurement methods of motion-tracking image-control response time for interactive projection display: PNW 110-1467 ED1
- IEEE P7004.1 Recommended Practices for Virtual Classroom Security, Privacy and Data Governance
- IEEE P2843 Standard for Measuring Accessibility Experience and Compliance
- ISO-IEC Mixed Method for UX Evaluation in MAR/VR

Examples of XR standards for healthcare



The generation and practical use of medical three-dimensional (3D) modeling for diagnostics and therapeutic applications is described in this standard.

Volume rendering and surface rendering techniques for 3D reconstruction from two-dimensional (2D) medical images and a texturing method of 3D medical data for realistic visualization are included.

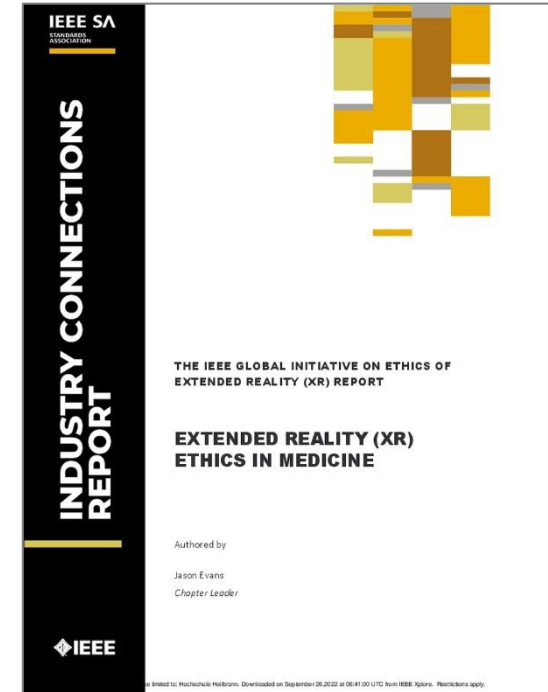




Examples of XR standards for healthcare



Extended Reality (XR) for medical use cases is proving to be beneficial to both patients and healthcare professionals as well as all other stakeholders throughout the healthcare industry. Some of the XR use-cases include helping surgeons better perform surgeries, immersing patients and healthcare professionals in medical information and education, and training all within XR environments. This report highlights the need for an ethical framework that is evolved from best practices throughout medical and technological fields to help ensure safe and equitable usage of the technology.





Examples of XR standards for healthcare



Immersive technology has provided new and enhanced healthcare solutions and treatments over recent decades. As the technology matures, there are great expectations of its potential to further promote the advancement of medicine through a wide range of new and enhanced devices and treatments. This IET document seeks to provide insight into key issues, views and recommendations given at the Think Big: Future Health and Life Sciences Unconference, jointly hosted by the IET, Immerse UK and Hatsumi VR in November 2019. It contains a summary of key recommendations from participants, data and ethical challenges and case studies.



Examples of XR standards for healthcare



[under development!]

This document specifies a reference model for VR based clinical practice simulation. The model defines components, relations, data element and types, and roles of the users.



Menu

← ICS

ISO/AWI TS 16551

Health informatics — Reference model for VR based clinical practice simulation

Abstract

This document specifies a reference model for VR based clinical practice simulation. The model defines components, relations, data element and types, and roles of the users.

General information

Status : Under development

Edition : 1

Technical Committee : ISO/TC 215 Health informatics

ICS :

Life cycle

Now

Under development

ISO/AWI TS 16551

Stage: 20.00

Examples of XR standards working groups on medical/healthcare

3141 - 3D Body Processing

This group addresses the anthropometric and topo-physiological attributes that contribute to the quality of experience of 3D body processing, as well as identifying and analyzing metrics and other useful information, as well as data relating to these attributes.

<https://standards.ieee.org/industry-connections/3d/bodyprocessing/>

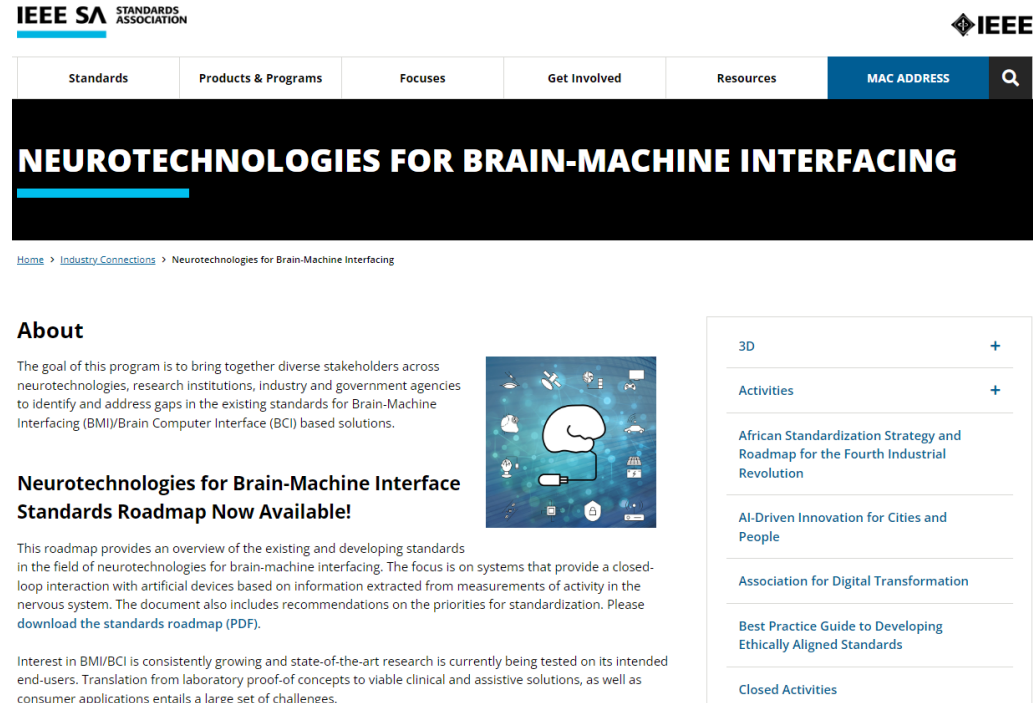
Standards	Products & Programs	Focuses	Get Involved	Resources	MAC ADDRESS
Industry Connections and Standards Group for 3D Body Processing (3DBP) The motivations and goals of this program are to bring together diverse stakeholders from across technology, retail, research and standards development to build thought leadership around 3D body processing technology standards in areas such as 3D capture, processing, storage, sharing and (augmented) representation. Exploration of this activity may include: - Identify and classify types of 3D body processing technologies - Identify and classify use cases of 3D body processing - Identify gaps in existing nascent standards and recommended practices as 3D body processing spreads beyond first adopters - Identify need and propose PARs for new standards and best practices for 3D body processing and adjacent technologies (like 2D augmented reality) - Identify guides & recommendations for consuming or using body measurements, to better understand the benefits and limitations of this type of data Please help the 3D Body Processing Industry Connections group understand the advantages and challenges with 3D Technology in the Retail industry by taking a short survey. The survey will be anonymous and should only take about 10 minutes of your time. Take the Survey					3DRC Collaboration Events White Papers Get Involved
					Resources and Links ICAID How Can the Internet of Clothing Benefit Our Wellbeing and Environment? P3141 - Standard for 3D Body Processing 3DBP Member Area

Examples of XR standards working groups on medical/healthcare

Neurotechnologies for Brain-Machine Interfacing

The goal of this program is to bring together diverse stakeholders across neurotechnologies, research institutions, industry and government agencies to identify and address gaps in the existing standards for Brain-Machine Interfacing (BMI)/Brain Computer Interface (BCI) based solutions.

<https://standards.ieee.org/industry-connections/neurotechnologies-for-brain-machine-interfacing/>



The screenshot shows the IEEE SA Standards Association website. The header includes the IEEE SA logo and navigation links: Standards, Products & Programs, Focuses, Get Involved, Resources, and MAC ADDRESS. A search icon is also present. The main banner reads "NEUROTECHNOLOGIES FOR BRAIN-MACHINE INTERFACING". Below the banner, a breadcrumb trail shows: Home > Industry Connections > Neurotechnologies for Brain-Machine Interfacing.

About

The goal of this program is to bring together diverse stakeholders across neurotechnologies, research institutions, industry and government agencies to identify and address gaps in the existing standards for Brain-Machine Interfacing (BMI)/Brain Computer Interface (BCI) based solutions.

Neurotechnologies for Brain-Machine Interface Standards Roadmap Now Available!

This roadmap provides an overview of the existing and developing standards in the field of neurotechnologies for brain-machine interfacing. The focus is on systems that provide a closed-loop interaction with artificial devices based on information extracted from measurements of activity in the nervous system. The document also includes recommendations on the priorities for standardization. Please [download the standards roadmap \(PDF\)](#).

Interest in BMI/BCI is consistently growing and state-of-the-art research is currently being tested on its intended end-users. Translation from laboratory proof-of concepts to viable clinical and assistive solutions, as well as consumer applications entails a large set of challenges.



3D +

Activities +

African Standardization Strategy and Roadmap for the Fourth Industrial Revolution

AI-Driven Innovation for Cities and People

Association for Digital Transformation

Best Practice Guide to Developing Ethically Aligned Standards

Closed Activities



Examples of XR standards working groups on medical / healthcare



Consumer Healthcare Alliance (CHA) is a community of global industry and academic leaders dedicated to improve consumers' daily health life with innovations in healthcare electronics. As technology advanced in the past years, more and more healthcare electronics has been developed and shipped directly to consumers. It is important that this trend be standardized, documented and systematically improved with cooperation among industry and academic leaders in the area. .

IEEE STANDARDS ASSOCIATION
IEEE

Consumer Healthcare Alliance

Industry Connections Activity Initiation Document (ICAID)

Version: 2.0, 25 May 2018

IC16-005-03 Approved by the IEEE-SA SB 14 June 2018

Instructions

- Instructions on how to fill out this form are shown in red. It is recommended to leave the instructions in the final document and simply add the requested information where indicated.
- Shaded text indicates a placeholder that should be replaced with information specific to this ICAID, and the shading removed.
- Completed forms, in Word format, or any questions should be sent to the IEEE Standards Association (IEEE-SA) Industry Connections Committee (ICCom) Administrator at the following address: industryconnections@ieee.org.
- The version number above, along with the date, may be used by the submitter to distinguish successive updates of this document. A separate, unique Industry Connections (IC) Activity Number will be assigned when the document is submitted to the ICCom Administrator.

1. Contact

Provide the name and contact information of the primary contact person for this IC activity. Affiliation is any entity that provides the person financial or other substantive support, for which the person may feel an obligation. If necessary, a second/alternate contact person's information may also be provided.

Name: Xiache Chen
Email Address: chen.xh@siat.ac.cn
Employer: Chinese Academy of Sciences
Affiliation: Chinese Academy of Sciences

2. Participation and Voting Model

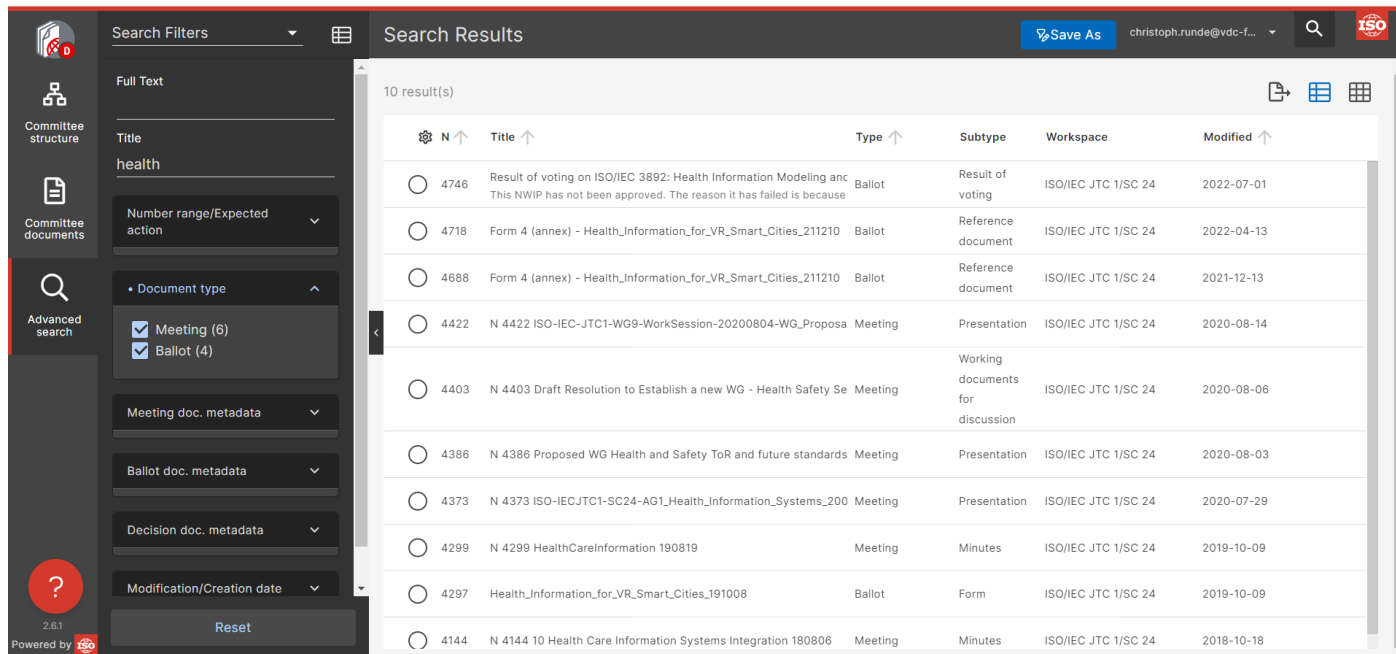
Specify whether this activity will be entity-based (participants are entities, which may have multiple representatives, one-entity-one-vote), or individual-based (participants represent themselves, one-person-one-vote).

Entity-Based

Examples of XR standards working groups on medical/healthcare



ISO-IEC JTC 1 IT /SC 24
WG 11:
Health, safety, security,
and usability of augmented
and virtual reality
<https://www.iso.org/committee/45252.html>
(internal!)



The screenshot shows the ISO search interface. On the left, the 'Search Filters' panel is active, showing 'Full Text' search results for 'health'. The 'Document type' filter is expanded, showing 'Meeting (6)' and 'Ballot (4)' are selected. The 'Search Results' panel on the right shows 10 results. The table below lists the search results:

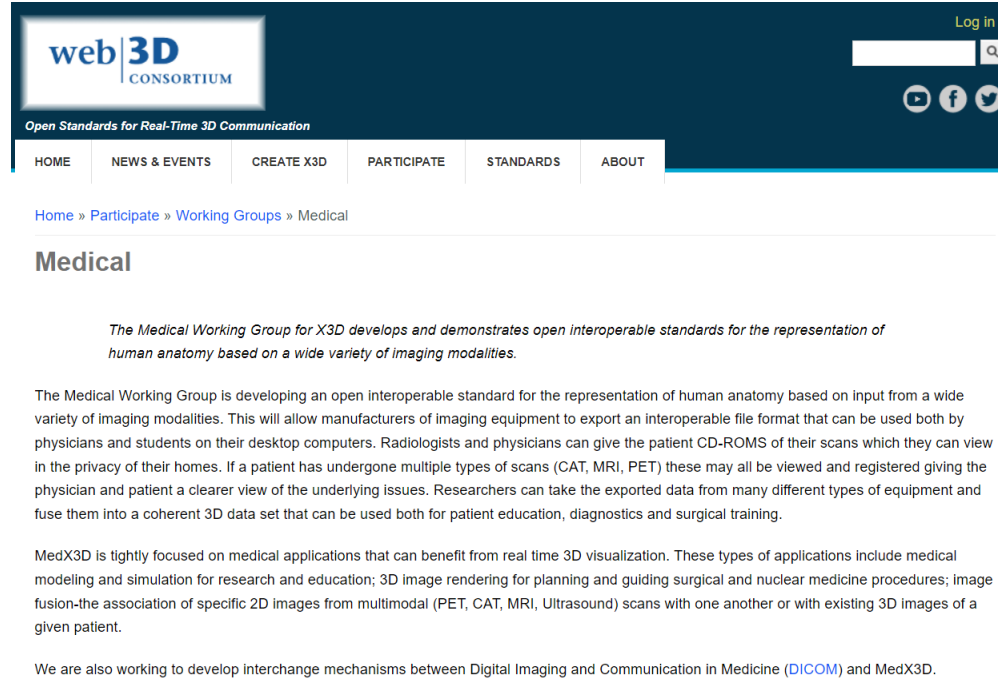
	N ↑	Title ↑	Type ↑	Subtype	Workspace	Modified ↑
☐	4746	Result of voting on ISO/IEC 3892: Health Information Modeling and... This NWIP has not been approved. The reason it has failed is because	Ballot	Result of voting	ISO/IEC JTC 1/SC 24	2022-07-01
☐	4718	Form 4 (annex) - Health_Information_for_VR_Smart_Cities_211210	Ballot	Reference document	ISO/IEC JTC 1/SC 24	2022-04-13
☐	4688	Form 4 (annex) - Health_Information_for_VR_Smart_Cities_211210	Ballot	Reference document	ISO/IEC JTC 1/SC 24	2021-12-13
☐	4422	N 4422 ISO-IEC-JTC1-WG9-WorkSession-20200804-WG_Proposa	Meeting	Presentation	ISO/IEC JTC 1/SC 24	2020-08-14
☐	4403	N 4403 Draft Resolution to Establish a new WG - Health Safety Se	Meeting	Working documents for discussion	ISO/IEC JTC 1/SC 24	2020-08-06
☐	4386	N 4386 Proposed WG Health and Safety ToR and future standards	Meeting	Presentation	ISO/IEC JTC 1/SC 24	2020-08-03
☐	4373	N 4373 ISO-IEC.JTC1-SC24-AG1_Health_Information_Systems_200	Meeting	Presentation	ISO/IEC JTC 1/SC 24	2020-07-29
☐	4299	N 4299 HealthCareInformation 190819	Meeting	Minutes	ISO/IEC JTC 1/SC 24	2019-10-09
☐	4297	Health_Information_for_VR_Smart_Cities_191008	Ballot	Form	ISO/IEC JTC 1/SC 24	2019-10-09
☐	4144	N 4144 10 Health Care Information Systems Integration 180806	Meeting	Minutes	ISO/IEC JTC 1/SC 24	2018-10-18

Examples of XR standards working groups on medical/healthcare

Web3D Consortium “Medical”

The Medical Working Group for X3D develops and demonstrates open interoperable standards for the representation of human anatomy based on a wide variety of imaging modalities.

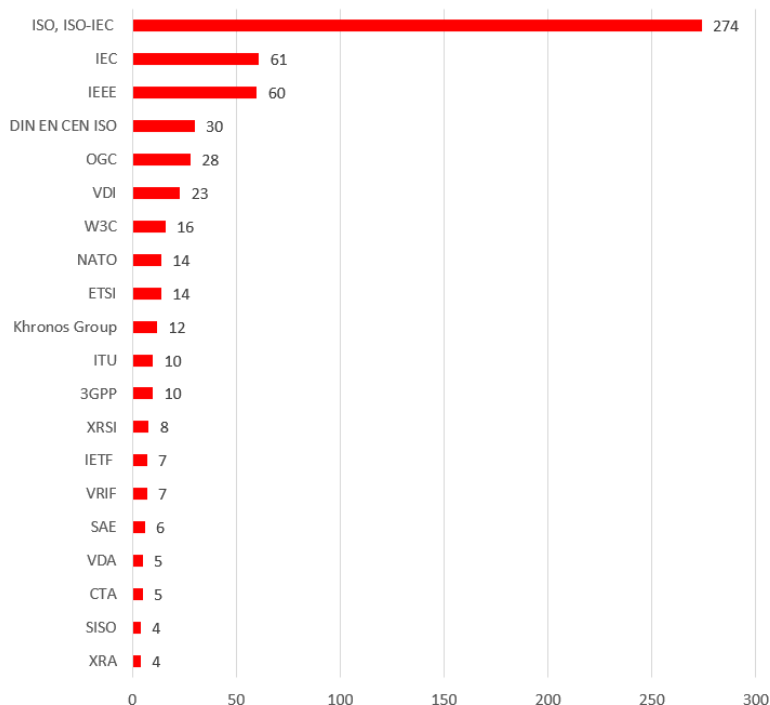
<https://www.web3d.org/working-groups/medical>



The screenshot shows the Web3D Consortium website. The header features the Web3D Consortium logo and a navigation menu with links: HOME, NEWS & EVENTS, CREATE X3D, PARTICIPATE, STANDARDS, and ABOUT. Below the navigation menu, there is a breadcrumb trail: Home » Participate » Working Groups » Medical. The main heading is "Medical". The text describes the Medical Working Group for X3D, stating that it develops and demonstrates open interoperable standards for the representation of human anatomy based on a wide variety of imaging modalities. It mentions that the group is developing an open interoperable standard for the representation of human anatomy based on input from a wide variety of imaging modalities. This will allow manufacturers of imaging equipment to export an interoperable file format that can be used both by physicians and students on their desktop computers. Radiologists and physicians can give the patient CD-ROMS of their scans which they can view in the privacy of their homes. If a patient has undergone multiple types of scans (CAT, MRI, PET) these may all be viewed and registered giving the physician and patient a clearer view of the underlying issues. Researchers can take the exported data from many different types of equipment and fuse them into a coherent 3D data set that can be used both for patient education, diagnostics and surgical training. The text also mentions that MedX3D is tightly focused on medical applications that can benefit from real time 3D visualization. These types of applications include medical modeling and simulation for research and education; 3D image rendering for planning and guiding surgical and nuclear medicine procedures; image fusion-the association of specific 2D images from multimodal (PET, CAT, MRI, Ultrasound) scans with one another or with existing 3D images of a given patient. Finally, it states that they are also working to develop interchange mechanisms between Digital Imaging and Communication in Medicine (DICOM) and MedX3D.



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

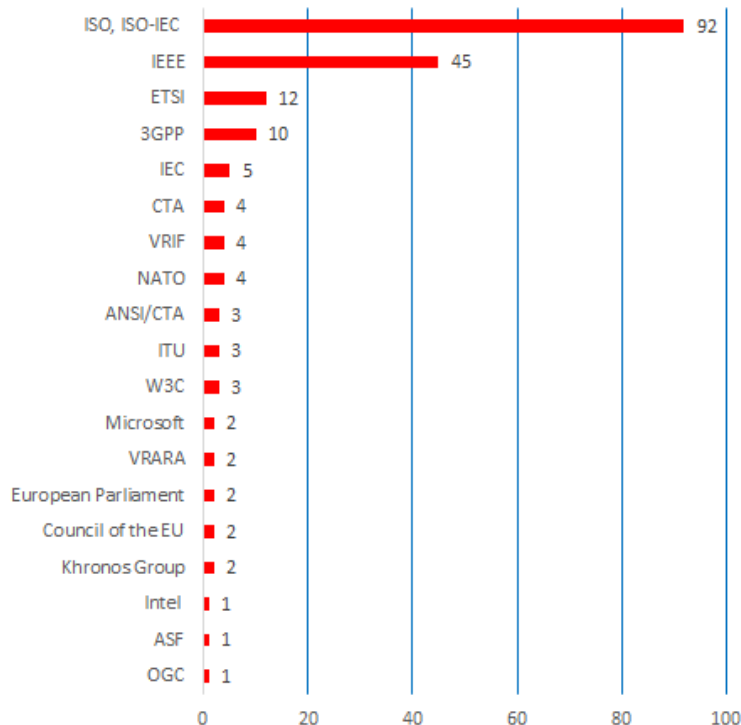




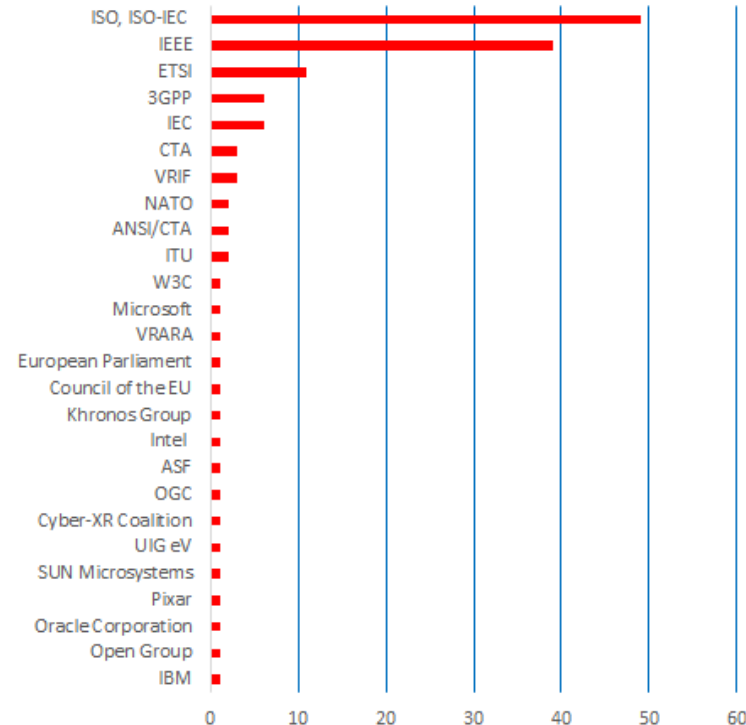
analysis on the right hand side shows XR SDOs contributing with own documents to certain XR fields.

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

fundamentals of XR



UX, ergonomics, human factors

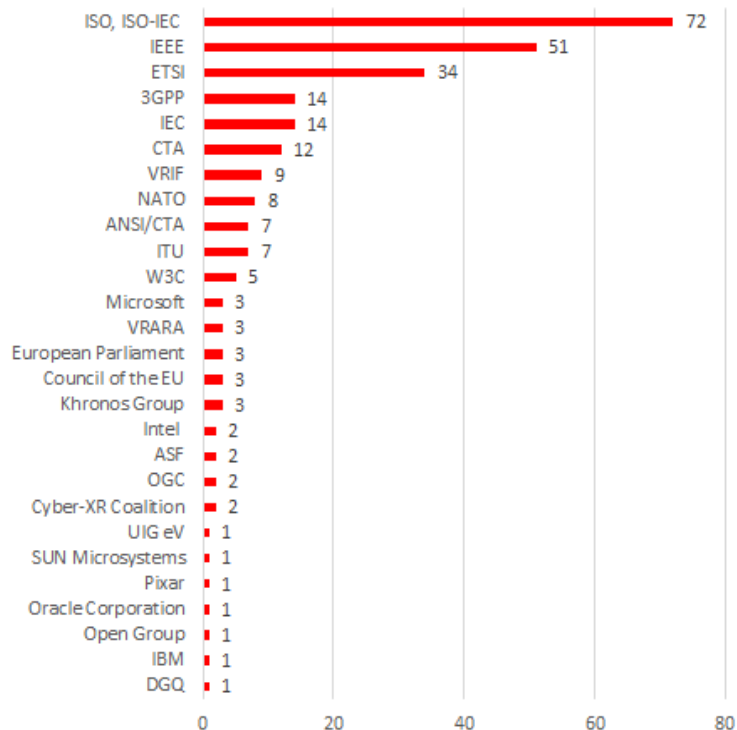




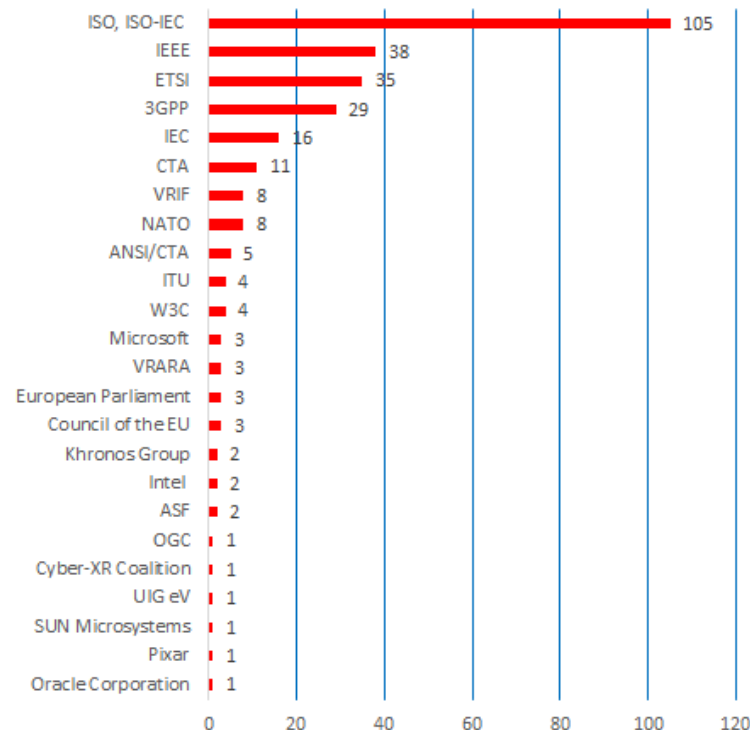
analysis on the right hand side shows XR SDOs contributing with own documents to certain XR fields.

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

XR management



XR applications

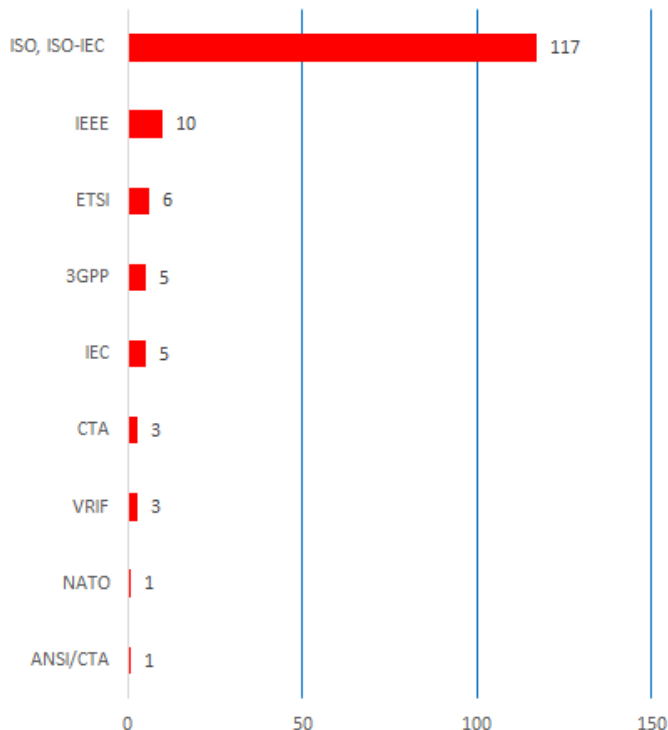




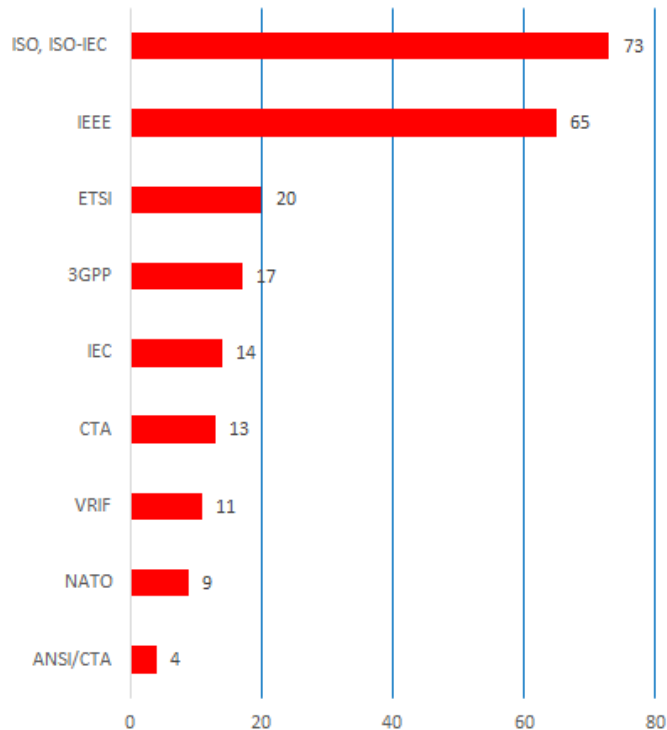
analysis on the right hand side shows XR SDOs contributing with own documents to certain XR fields.

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

graphics software, CGI

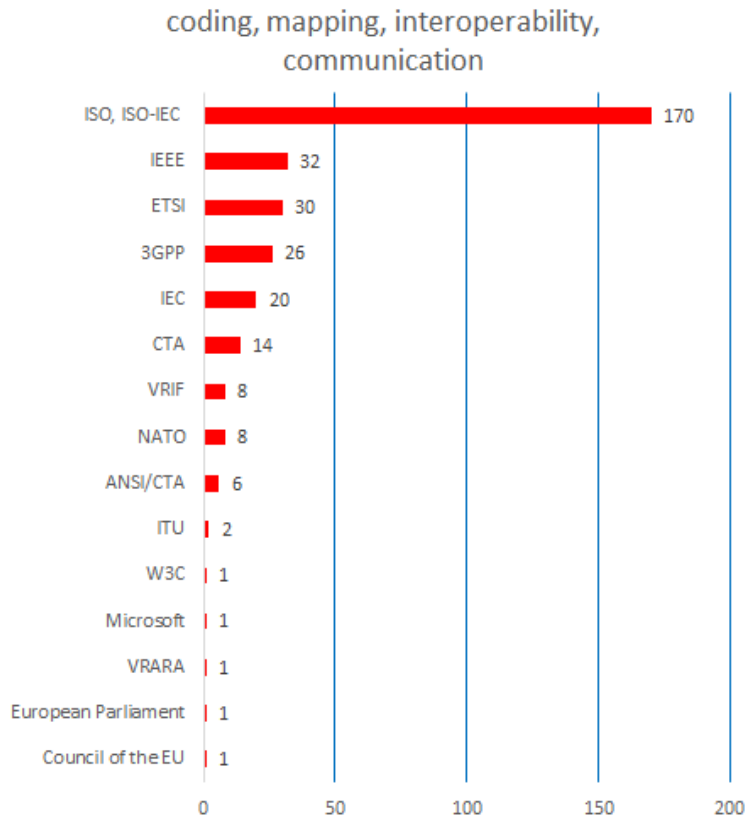


hardware: optics, haptics, acoustics, tracking, mobile



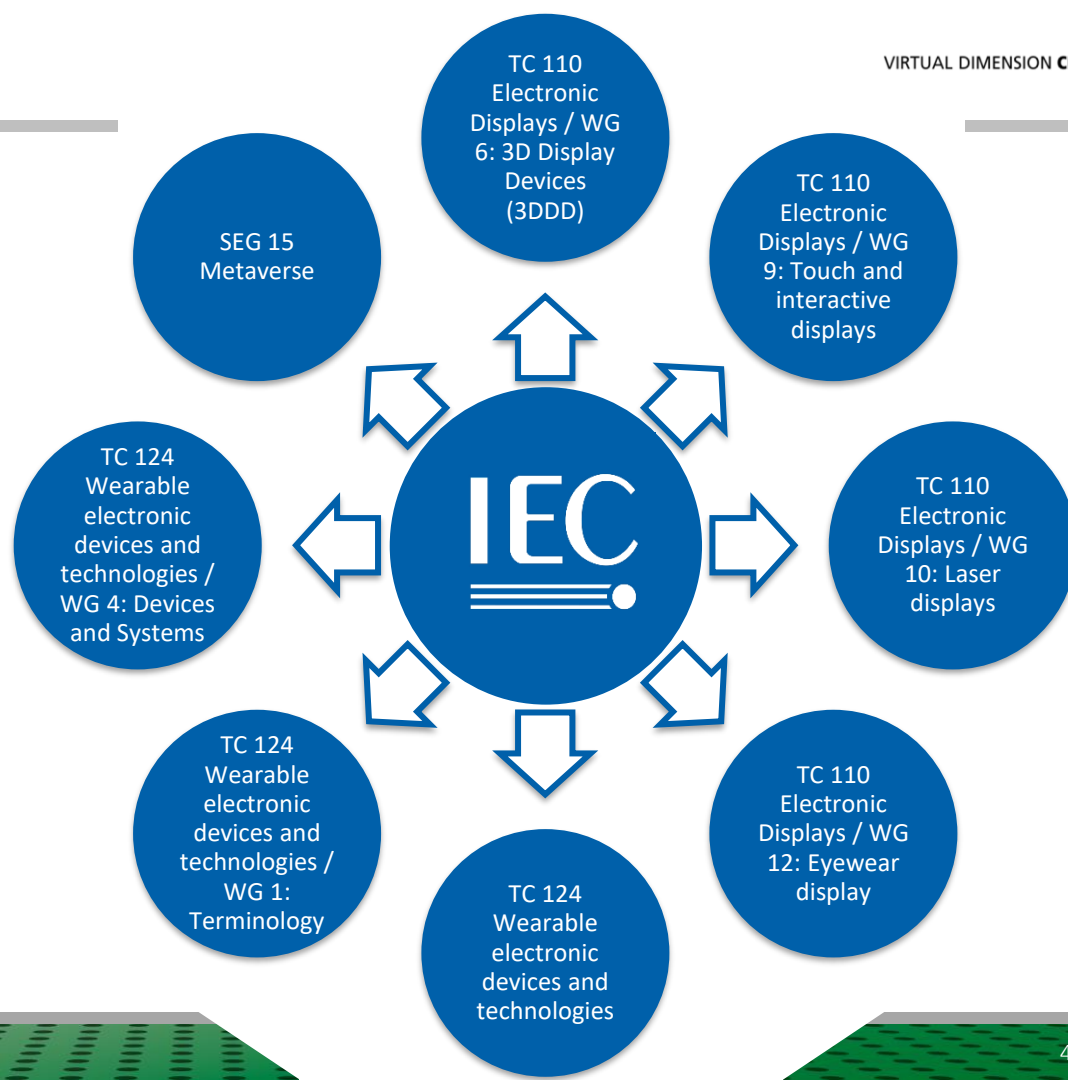
analysis on the right hand side shows XR SDOs contributing with own documents to certain XR fields.

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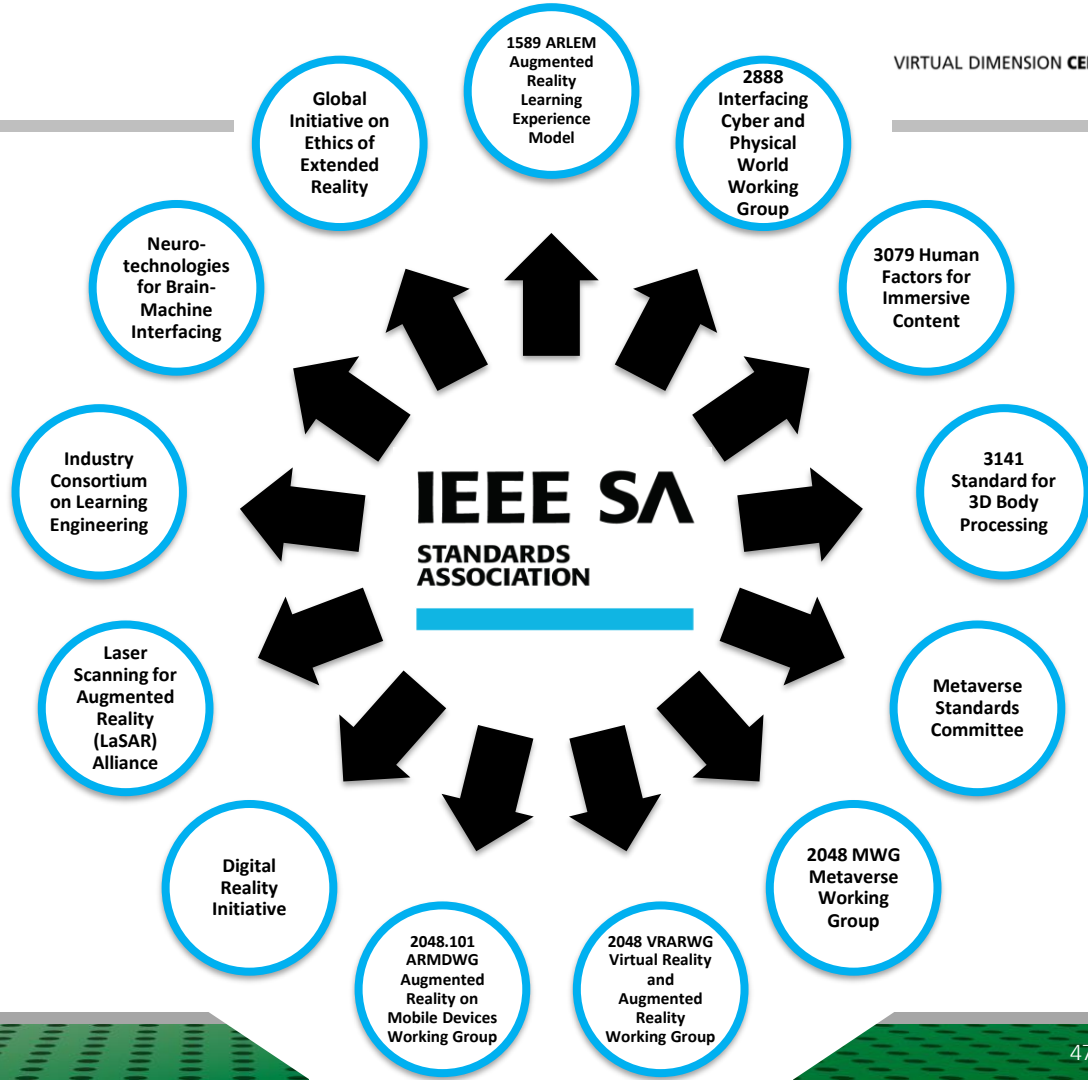


The **International Electrotechnical Commission (IEC)** is an international standardization organization for standards in the field of electrotechnology and electronics, based in Geneva. Some standards are developed jointly with ISO (International Organization for Standardization). IEC was founded in 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.



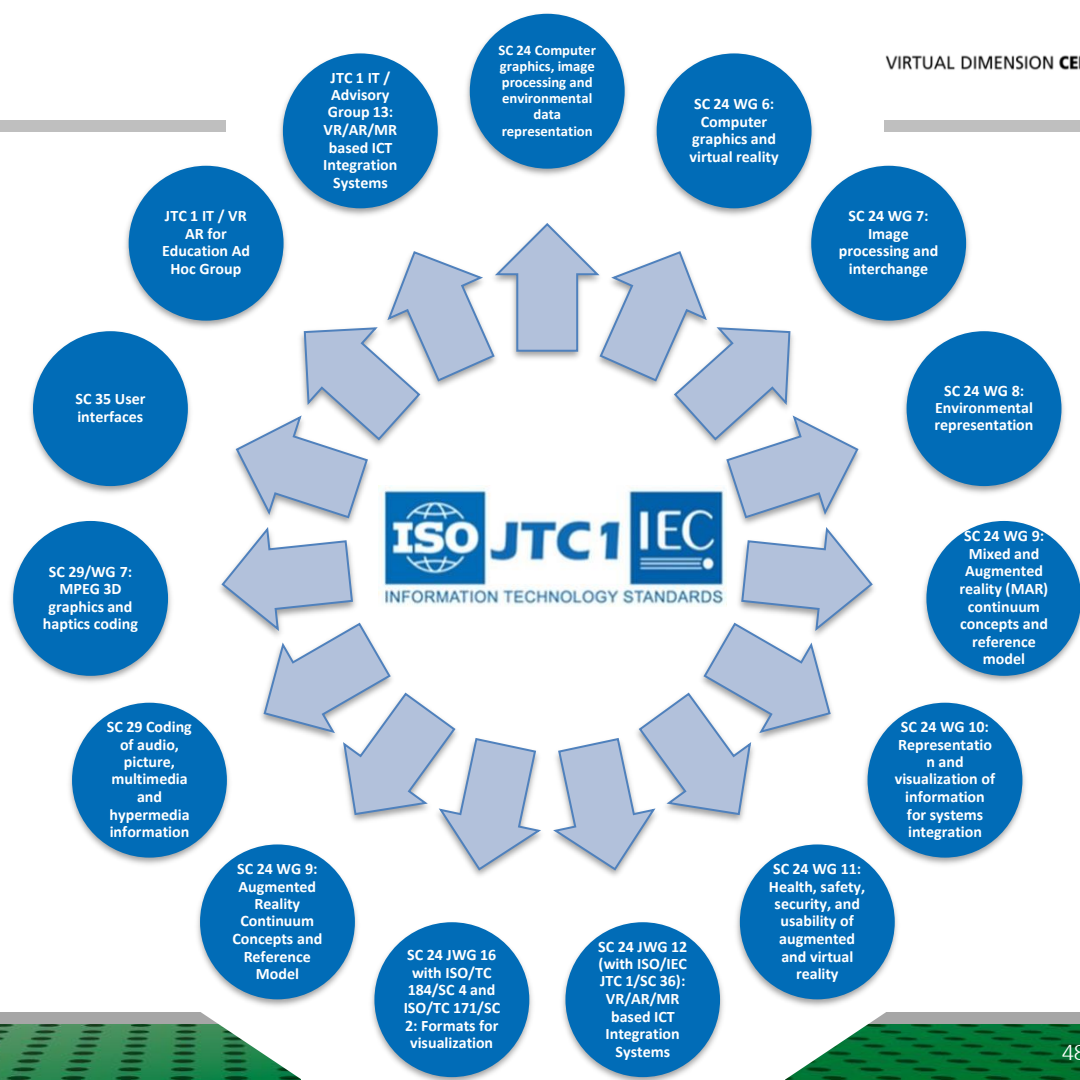


The **Institute of Electrical and Electronics Engineers (IEEE)** is a global professional association of engineers primarily from the fields of electrical engineering and information technology, legally based in New York City with operational headquarters in Piscataway, New Jersey. It organizes professional 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..

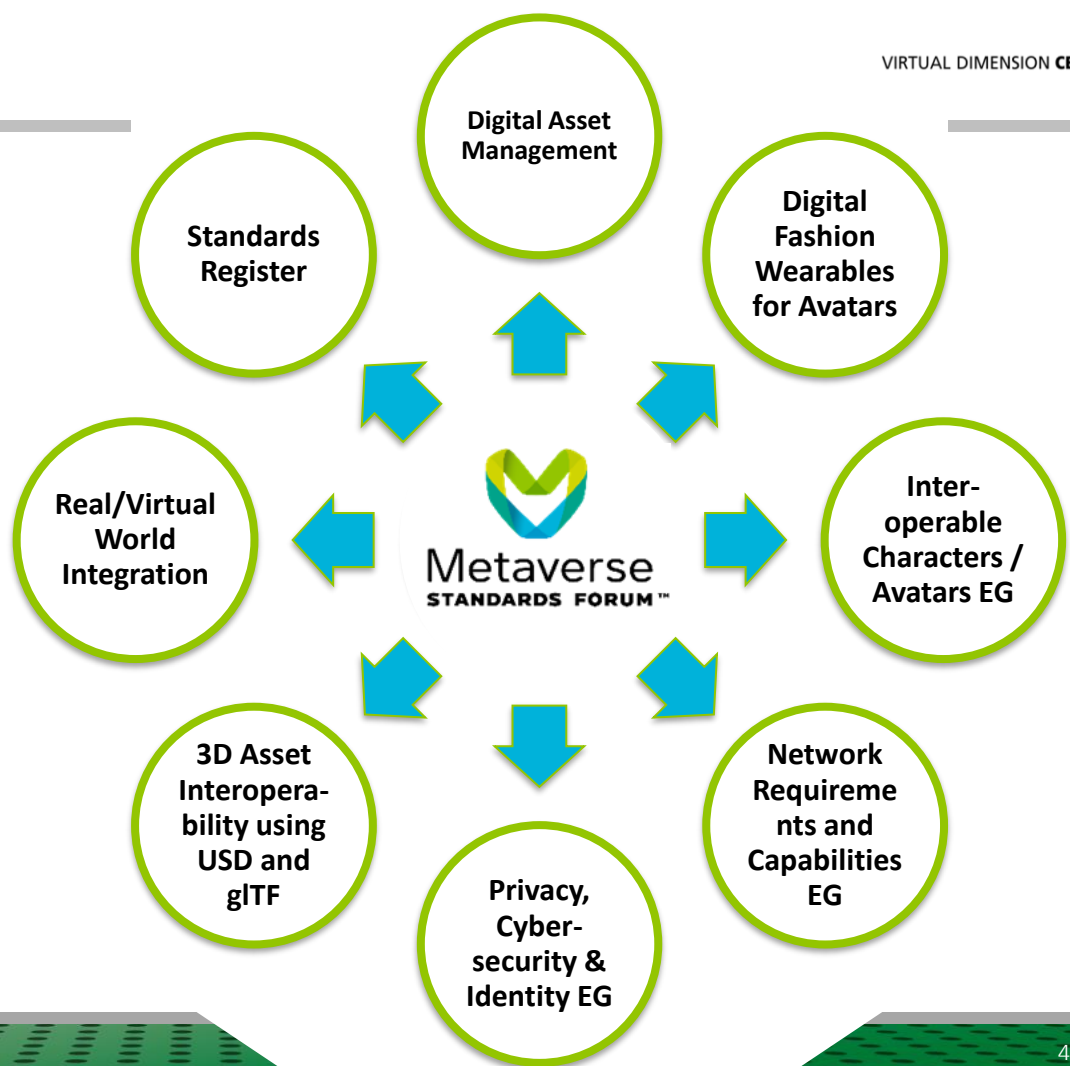




The **International Organization for Standardization (ISO)** is an independent, non-governmental organization, whose members consist of various national standardization bodies. As of 2022, there are 167 members who represent ISO in their country, with each country having only one member. The organization 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.

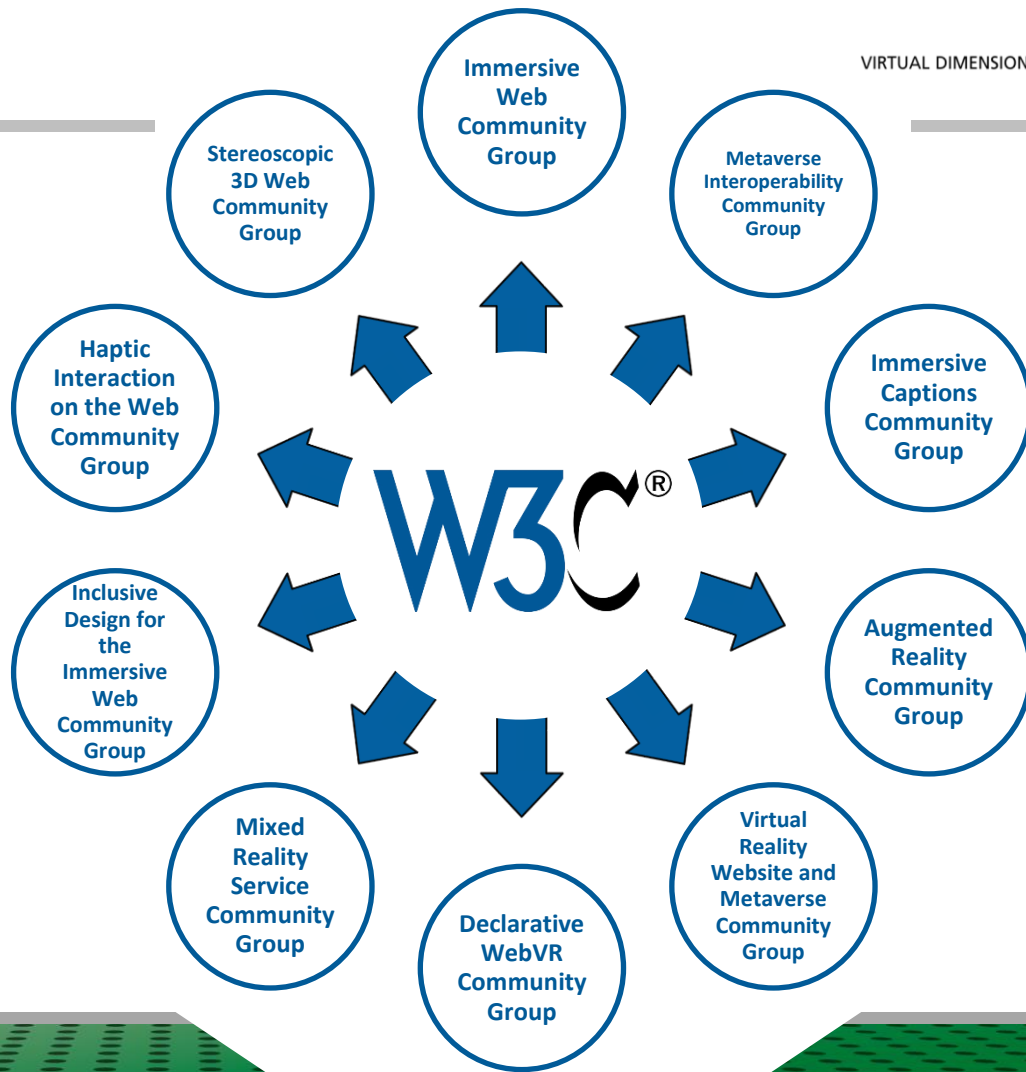


The **Metaverse Standards Forum (MSF)** was founded in June 2022 to foster the development of interoperability standards for an open and inclusive metaverse, and accelerate their development and deployment through pragmatic, action-based projects. Since the vision of the metaverse is still a work in 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.



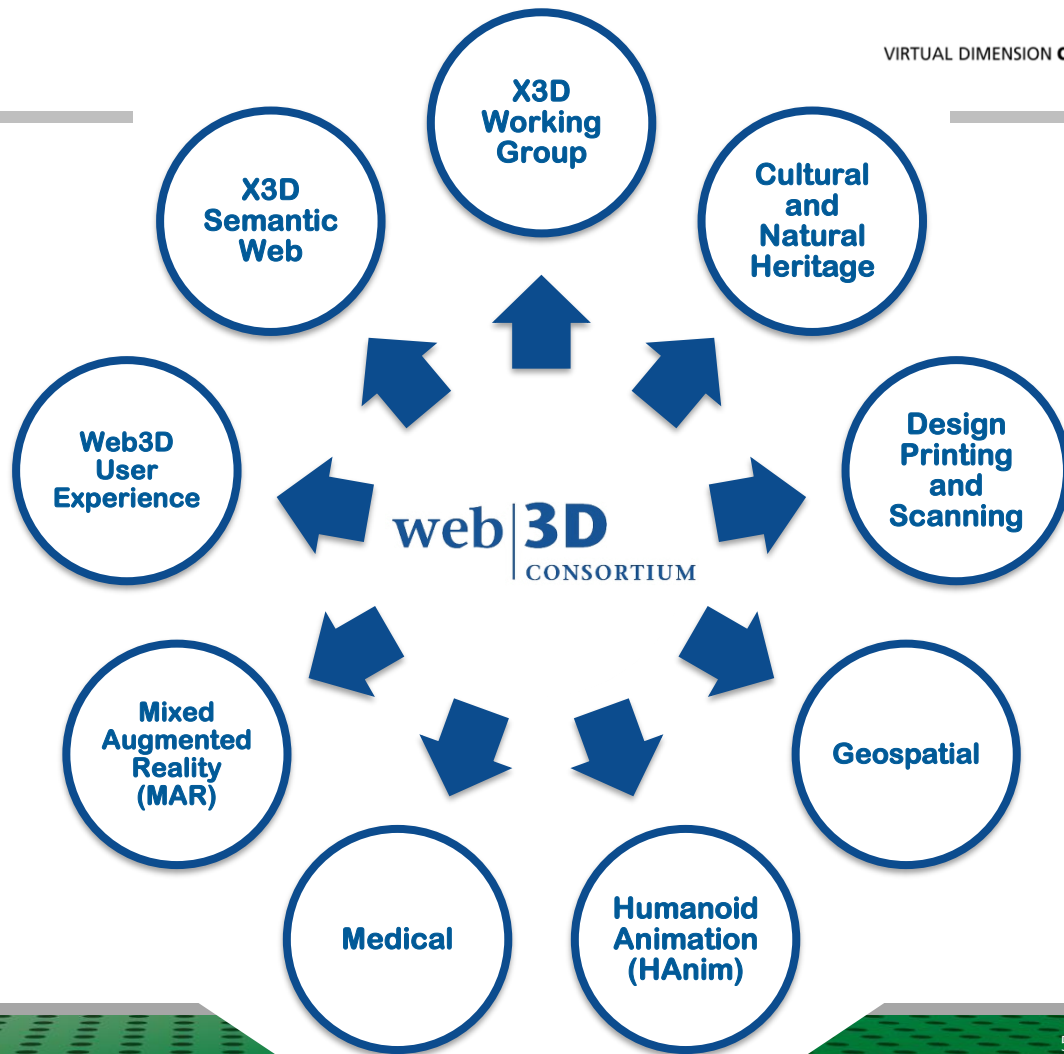


The **World Wide Web Consortium (shortly W3C)** is the body responsible for standardizing technologies on the World Wide Web. It was founded on October 1, 1994, at the MIT Laboratory for Computer Science in Cambridge, Massachusetts. The W3C is a membership organization. It develops technical specifications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



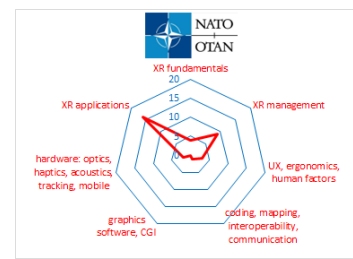
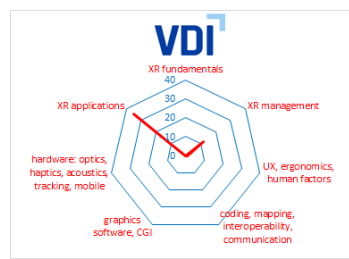
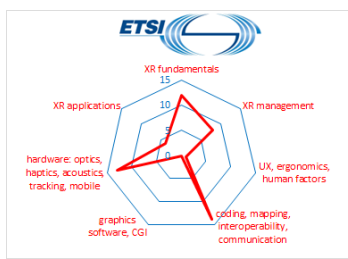
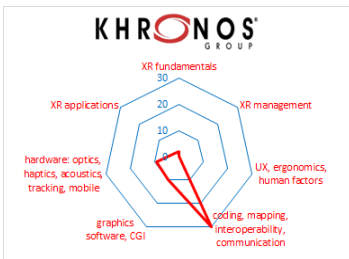
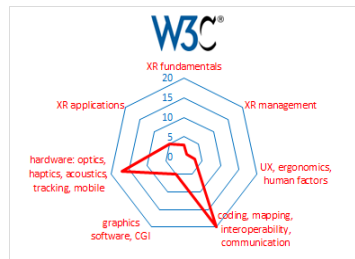
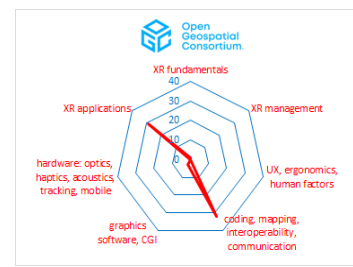
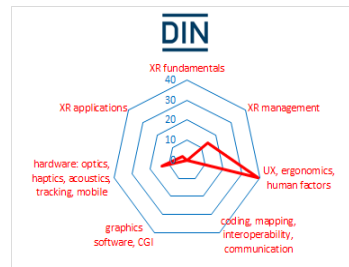
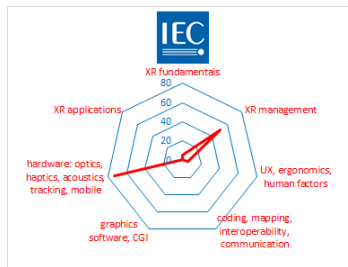
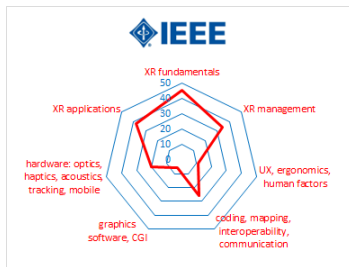
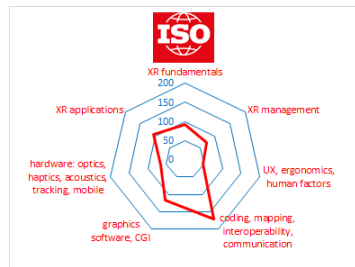


The **Web3D Consortium** is an international, non-profit, member-funded, industry organization dedicated to the development of standards (SDO) established in 1997. The Web3D Consortium champions the deployment of ISO-ratified X3D standards for communicating interactive 3D scenes across various applications, 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..



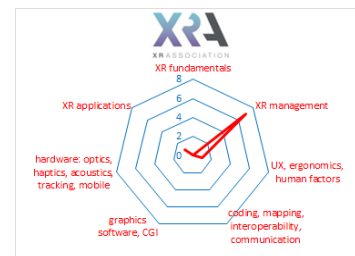
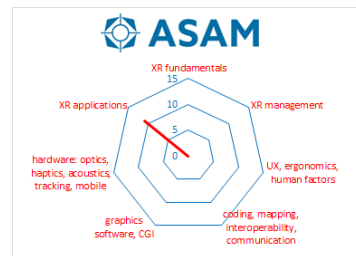
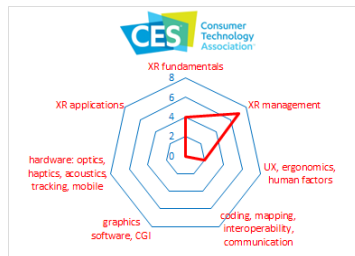
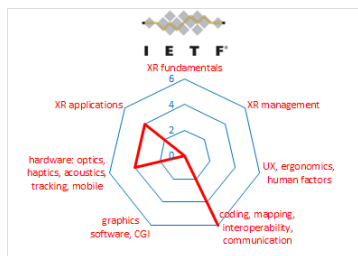
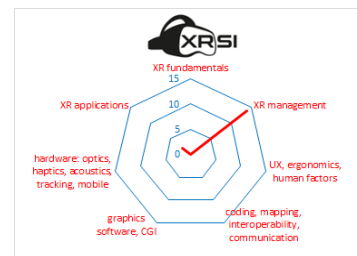
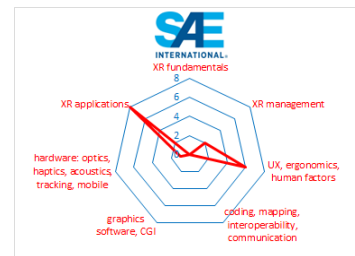
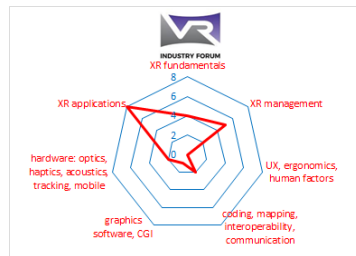
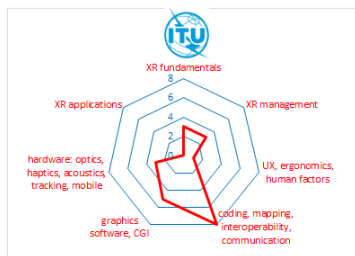
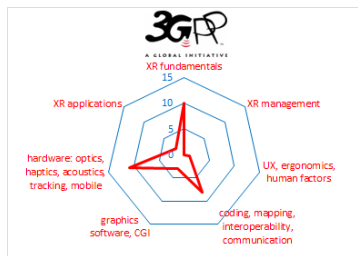


Focuses of XR standardization organizations varying



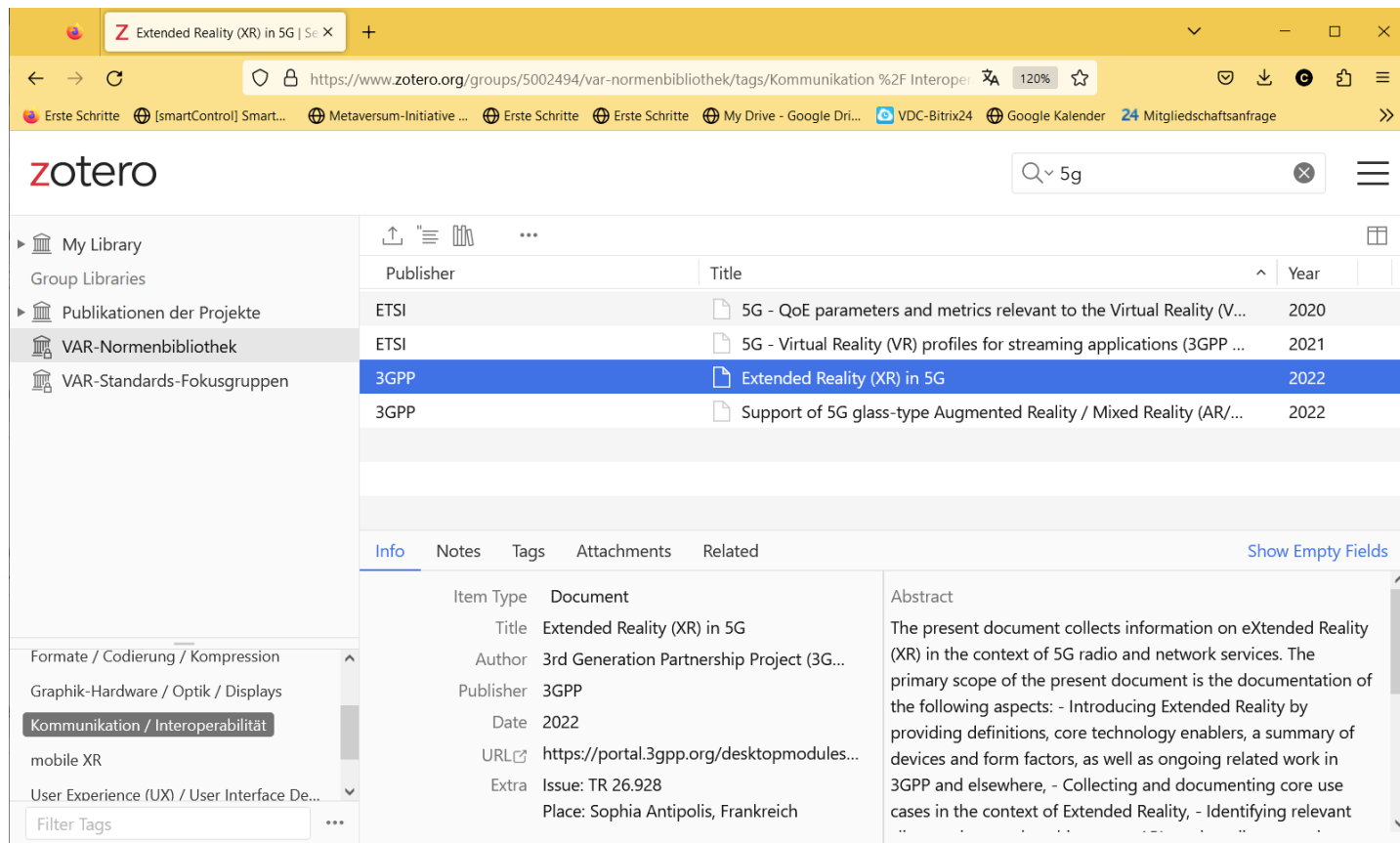


Focuses of XR standardization organizations varying



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.



The screenshot shows the Zotero web interface. The search bar at the top right contains the text "5g". The search results are displayed in a table with columns: Publisher, Title, and Year. The results are as follows:

Publisher	Title	Year
ETSI	5G - QoE parameters and metrics relevant to the Virtual Reality (V...	2020
ETSI	5G - Virtual Reality (VR) profiles for streaming applications (3GPP ...	2021
3GPP	Extended Reality (XR) in 5G	2022
3GPP	Support of 5G glass-type Augmented Reality / Mixed Reality (AR/...	2022

The "Extended Reality (XR) in 5G" entry is selected. Below the table, the "Info" tab is active, showing the following details:

Item Type	Document
Title	Extended Reality (XR) in 5G
Author	3rd Generation Partnership Project (3G...
Publisher	3GPP
Date	2022
URL	https://portal.3gpp.org/desktopmodules...
Extra	Issue: TR 26.928 Place: Sophia Antipolis, Frankreich

The "Abstract" tab is also visible, showing the following text:

The present document collects information on eXtended Reality (XR) in the context of 5G radio and network services. The primary scope of the present document is the documentation of the following aspects: - Introducing Extended Reality by providing definitions, core technology enablers, a summary of devices and form factors, as well as ongoing related work in 3GPP and elsewhere, - Collecting and documenting core use cases in the context of Extended Reality, - Identifying relevant



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.

The screenshot shows the Zotero web interface. The browser address bar displays the URL: [https://www.zotero.org/groups/5025618/var-standards-fokusgruppen/tags/mobile XR/items/HWCV](https://www.zotero.org/groups/5025618/var-standards-fokusgruppen/tags/mobile%20XR/items/HWCV). The page title is "Cultural and Natural Heritage".

On the left sidebar, under "My Library", the "VAR-Standards-Fokusgruppen" group is selected. Below it, a list of tags is shown: Grundlagen / Begriffe, Haptik, Kommunikation / Interoperabilität, Mapping, Menschmodelle, **mobile XR**, Regulierung / Ethik / Governance, and sonstige XR-Hardware. A "Filter Tags" input field is at the bottom.

The main content area displays a list of items. The selected item is "Cultural and Natural Heritage" by the "Web3D Consortium". Below the list, the "Info" tab is active, showing the following details:

Item Type	Document
Title	Cultural and Natural Heritage
Editor	Web3D
Publisher	Web3D Consortium
URL	https://www.web3d.org/working-groups...
Date Added	13.4.2023, 09:22:41
Date Modified	13.4.2023, 09:22:41
Added By	Virtual Dimension Center (VDC) w.V.

On the right, the "Abstract" is displayed:

Die Arbeitsgruppe Kultur- und Naturerbe (Heritage) erforscht die Erstellung, Handhabung und Darstellung von digitalen 3D-Daten für das Kultur- und Naturerbe.

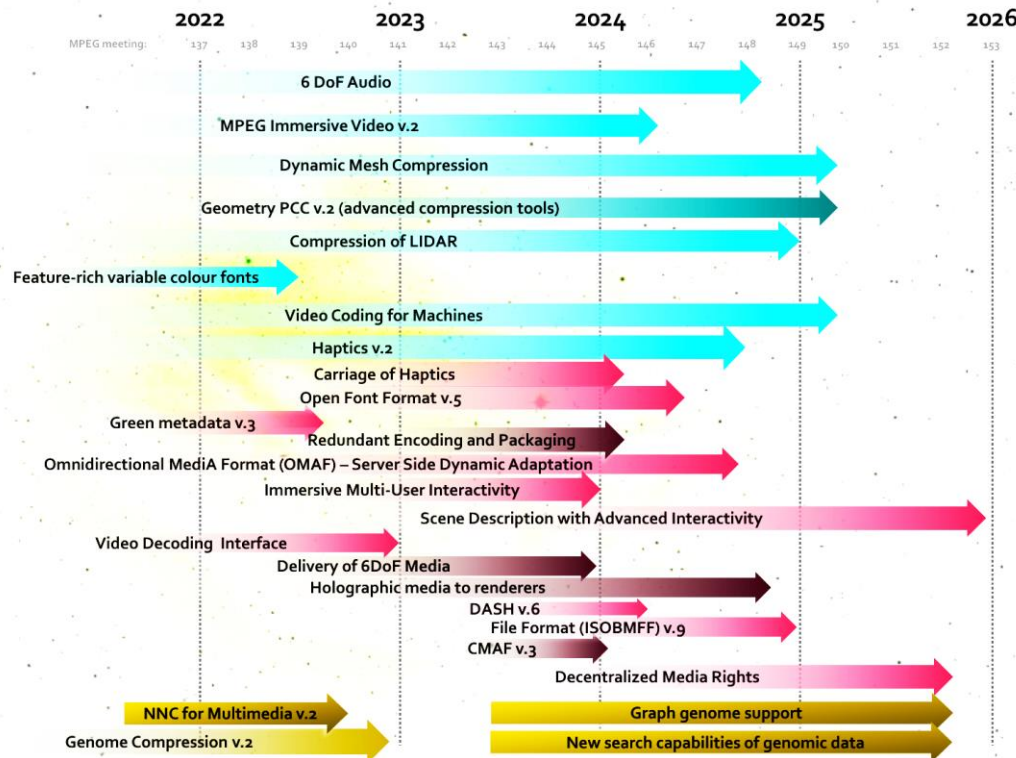
What's further interesting?

Many SDOs publish standardization roadmaps.

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

This could well help to find a good starting point for an engagement.

Example on the right hand side: the MPEG roadmap



Media
Coding

Systems
and Tools

Beyond
Media

Example here: the OGC (Open Geospatial Consortium) roadmap

OGC Standards Roadmap

Progress of Official OGC Standards **OGC** & **Community Standards** **Community** 2021-05-27

	SWG Work / Work Item	OAB Review	OGC-NA Review	Public Review	Prepare for Approval	TC Approval to Vote	TC Vote	PC Vote	Public Release
Proposed Standards									
OGC Abstract Spec Topic 0 04-004		✓	✓	✓	✓	✓	✓	✓	✓
OGC Abstract Spec Topic 2 - Referencing by Coordinates 18-005		✓	✓	✓	✓	✓	✓	✓	✓
OGC Abstract Spec Topic 20 - Observations, Measurements and Samples 20-002		✓	✓	✓	✓	✓	✓	✓	✓
OGC Abstract Spec Topic 21 - DGGS v. 2.0 20-040		✓	✓	✓	✓	✓	✓	✓	✓
OGC Abstract Spec Topic 22 - Tiling 19-014		✓	✓	✓	✓	✓	✓	✓	✓
OGC Abstract Spec Topic 6 - Schema for coverage geometry and functions		✓	✓	✓	✓	✓	✓	✓	✓
OGC CDB 1.2		✓	✓	✓	✓	✓	✓	✓	✓
OGC CDB 2.0		✓	✓	✓	✓	✓	✓	✓	✓
OGC CityGML 3.0		✓	✓	✓	✓	✓	✓	✓	✓
Community CityJSON		✓	✓	✓	✓	✓	✓	✓	✓
OGC Common Object Model Container SWG		✓	✓	✓	✓	✓	✓	✓	✓
OGC Coverage Implementation Schema - ReferenceableGridCoverage Extension 1.1 18-003b		✓	✓	✓	✓	✓	✓	✓	✓
OGC EO Extension for OpenSearch 13-029b		✓	✓	✓	✓	✓	✓	✓	✓
OGC EO Product Metadata GeoJSON/JSON-LD Encoding 17-003		✓	✓	✓	✓	✓	✓	✓	✓
OGC GeoAPI 09-003d		✓	✓	✓	✓	✓	✓	✓	✓
OGC GeoPackage 1.3 12-120b18		✓	✓	✓	✓	✓	✓	✓	✓
OGC GeoPose		✓	✓	✓	✓	✓	✓	✓	✓
OGC GeoTIFF 19-008		✓	✓	✓	✓	✓	✓	✓	✓
OGC GroundwaterML2 v2.3 19-013		✓	✓	✓	✓	✓	✓	✓	✓
OGC HDF5 Core 18-043		✓	✓	✓	✓	✓	✓	✓	✓
Community IMDF 19-009		✓	✓	✓	✓	✓	✓	✓	✓
OGC IndoorGML 1.1 19-011		✓	✓	✓	✓	✓	✓	✓	✓
OGC MetOcean Profile and Extensions to WCS 2.1 15-045, 15		✓	✓	✓	✓	✓	✓	✓	✓
OGC Moving Features Encoding Extension - JSON 19-045		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Common 18-072		✓	✓	✓	✓	✓	✓	✓	✓

	SWG Work / Work Item	OAB Review	OGC-NA Review	Public Review	Prepare for Approval	TC Approval to Vote	TC Vote	PC Vote	Public Release
OGC OGC API - Coverages		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Environmental Data Retrieval 18-006		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Features - Part 1: Core 17-069		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Features - Part 2: Coordinate Reference System by Reference 18-050		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Features - Part 3: Filtering and the Common Query Language (CQL) 19-079		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Features - Part 4: Create, Replace, Update and Delete 20-002		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Features - Part 5: OpenAPI 3.1		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Maps		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Processes		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Records		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Styles		✓	✓	✓	✓	✓	✓	✓	✓
OGC OGC API - Tiles		✓	✓	✓	✓	✓	✓	✓	✓
Community OpenFlight 16.0		✓	✓	✓	✓	✓	✓	✓	✓
OGC OpenSearch GeoJSON/JSON-LD Response Encoding 17-047		✓	✓	✓	✓	✓	✓	✓	✓
OGC PipelineML 18-073		✓	✓	✓	✓	✓	✓	✓	✓
OGC Semantic Sensor Network Ontology 18-079		✓	✓	✓	✓	✓	✓	✓	✓
OGC SensorML 2.1 12-000d1		✓	✓	✓	✓	✓	✓	✓	✓
OGC SensorThings API 1.1 - Part 1 18-008		✓	✓	✓	✓	✓	✓	✓	✓
OGC Symbology Conceptual Model: Core 18-067		✓	✓	✓	✓	✓	✓	✓	✓
OGC Time Ontology in OWL 18-071		✓	✓	✓	✓	✓	✓	✓	✓
OGC TimeseriesML 1.3 15-042b		✓	✓	✓	✓	✓	✓	✓	✓
OGC Two Dimensional Tile Matrix Set 17-003		✓	✓	✓	✓	✓	✓	✓	✓
OGC Well Known Text Representation of Coordinate Reference Systems 18-010		✓	✓	✓	✓	✓	✓	✓	✓
Community Zarr		✓	✓	✓	✓	✓	✓	✓	✓



What's further interesting?

Some SDOs and more often consultants and policy makers publish standardization requirements.

These requirement analyses could provide a valuable starting point to start own initiatives together with an SDO.

Virtual world requirements

1. Representation and exchange of three-dimensional data assets

2. Cross-platform data/asset exchange APIs

3. Extended reality (XR), including virtual reality (VR), augmented reality (AR) and mixed reality (MR) APIs and SDK

4. Real/virtual world integration, including positioning and orientation in 3D and 4D space

5. Avatars/characters interoperability

6. Identity, cybersecurity and privacy preservation

7. Networking protocols

8. Metadata and asset discoverability

Standardisation initiative

- Graphics Language Transmission Format - glTF (Khronos Group)
- GL Binary - GLB (Khronos Group)
- Universal Scene Description - USD (Pixar)
- COLLABorative Design Activity - COLLADA (Khronos Group)
- Virtual Reality Modeling Language - VRML

- MPEG-V
- Khronos 3D Commerce

- OpenXR (Khronos group)
- OpenVR (Valve corporation)
- WebXR (W3C groups)

- GeoPose (Open Geospatial Consortium - OGC)

- Avatar API (ReadyPlayerMe)
- HAnim (Humanoid Animation)
- VRM (Khronos Group)

- Decentralised Identifier - DID
- OpenID Connect - OIDC
- OAuth 2.0
- InterPlanetary File System - IPFS

- Hyperspace Modeling Language - HSML

- Cross-platform metadata - XMP (Adobe Systems)
- Dublin Core

Standards requirements from initiative paper „Next Generation Virtual Worlds“ (European Commission, July 2023)



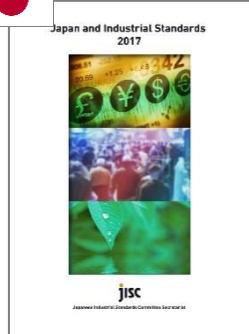
- Actively promote the consistent worldwide application of internationally recognized principles in the development of standards.
- work to prevent standards and their application from becoming technical trade barriers to U.S. products and services.
- Strengthen international outreach programs to promote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



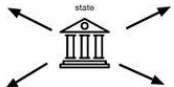
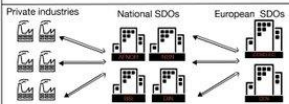
- International and European trade is facilitated by standardization
- Standardization relieves the burden on government regulation and supports it
- Germany is driving forward standardization worldwide in future topics by networking stakeholders, establishing new processes and open platforms for coordination.
- 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



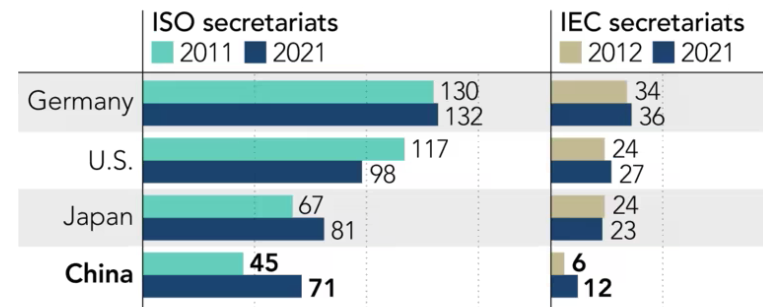
Setting standards in China, Europe and the US

 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'Ifri, 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

- as cross-cutting technology, XR standardization is scattered among many organizations: thus hard to get an overview.
- individuals and companies are apparently not totally aware of what's on the table; lack of tech transfer
- state support could be an idea, the national approaches worldwide are different anyhow
- there is a already vast number of XR standards out there.
- they provide an excellent basis to build on, avoiding to re-invent the wheel and ensuring to concentrate on the real innovative aspects of one's work
- standards pave the way for today's and future markets

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





*„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.

XR Standardization The status quo and path ahead of us.

