



Self positioning & industry perspective on XR in Germany 2023

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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 2021: 45
- 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





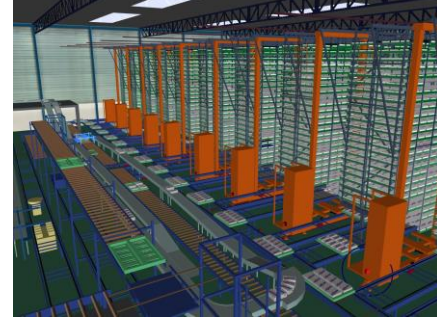
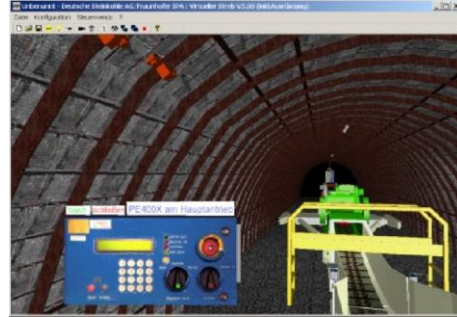
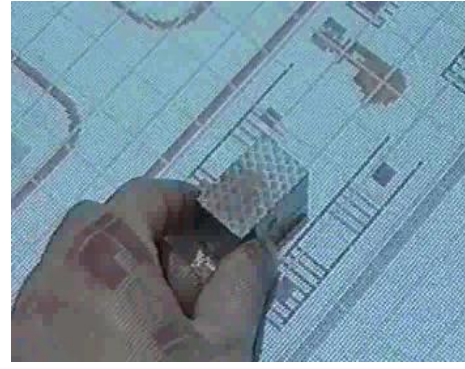
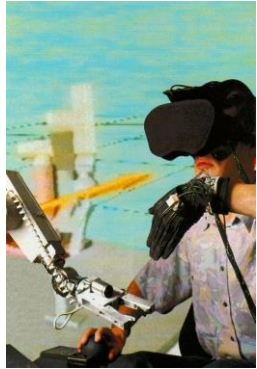
Virtual Reality: 1965



Augmented Reality: 1975



Where we come from: my colleagues & me in the 90s...





Potential for adoption and disruption by XR

Level of uptake and disruption Low Medium High Technology not relevant	Applications	Manufacturing (by NACE technology level)		Healthcare	Construction and architecture
		Low/Medium-low e.g. food products, textiles, plastic products, wood products	Medium-high/High e.g. chemicals, electrical equipment, motor vehicles, pharmaceutical products, air and spacecraft, computer and electronics		
Manufacturing processes	Assembly	✓	✓	✓	✓
	Maintenance	✓	✓	✓	✓
	Raw material preparation	✓	✓	✓	✓
	Set-up and production	✓	✓	✓	✓
Product development	Product design	✓	✓	✓	✓
	Prototyping and sampling	✓	✓	✓	✓
Collaborative working	Conduct meetings	✓	✓	✓	✓
	Supervision of activities/remote guidance	✓	✓	✓	✓
Customer relationship	Marketing and advertisement	✓	✓	✓	✓
	Sales and customer experience	✓	✓	✓	✓
Horizontal activities	Data visualisation and video production	✓	✓	✓	✓
	Administrative tasks	✓	✓	✓	✓
	Training	✓	✓	✓	✓
	Logistics	✓	✓	✓	✓
	Health & safety	✓	✓	✓	✓

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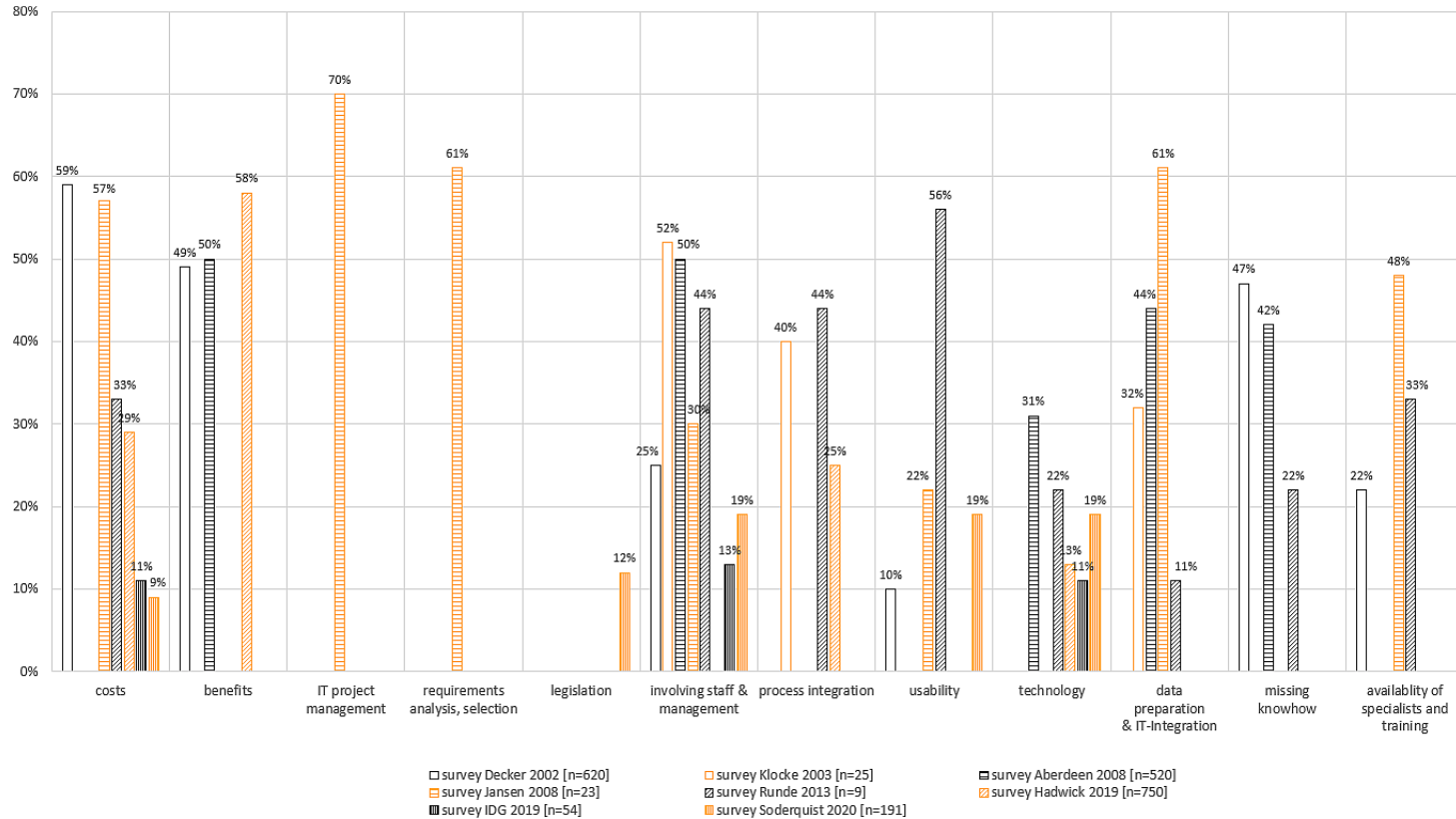
Vigkos, Alexandros; Pauer, Andreas; Bevacqua, Davide; Turturro, Luca; Kulesza; Marta: XR and its potential for Europe.
Ecorys: Brüssel, April 2021

Why we do not progress: XR diffusion barriers 2002-2020 (challenge #1)

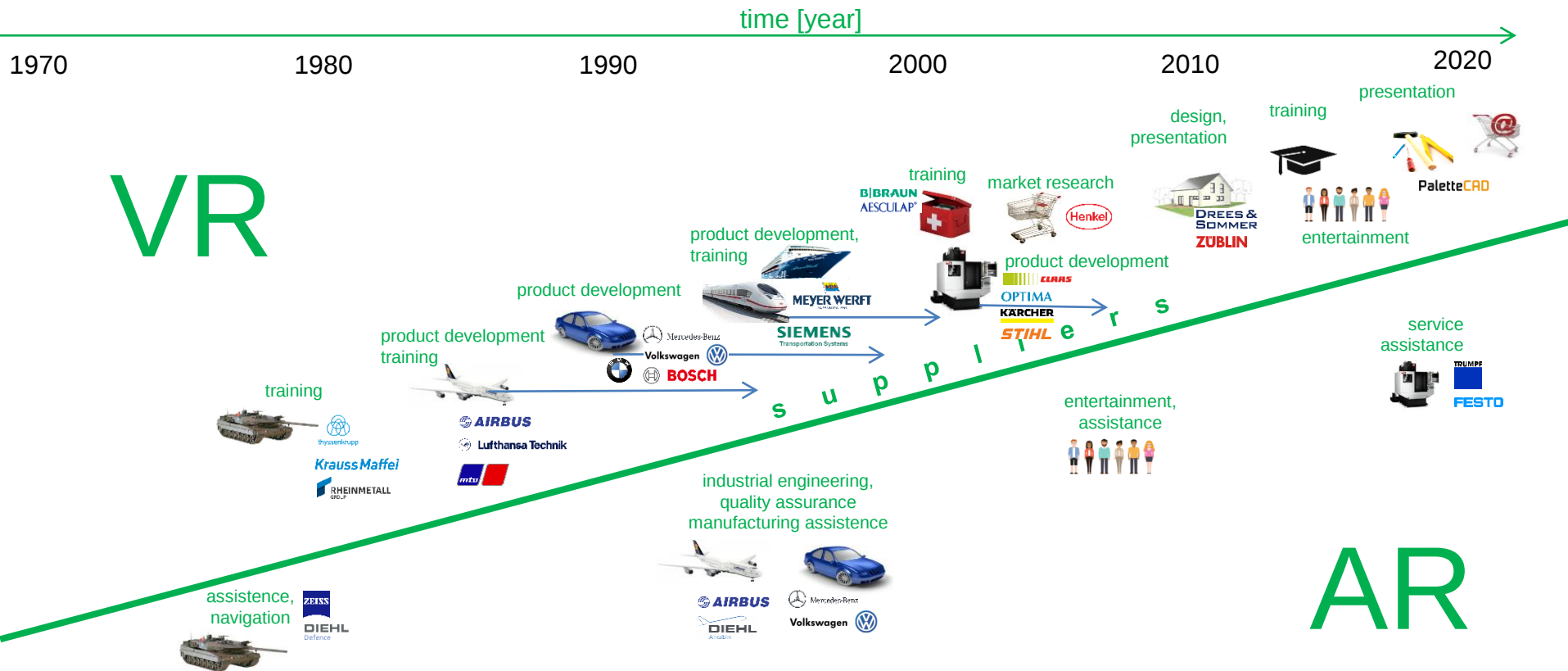


meta study of 8 surveys
from 2002 to 2020
asking for industrial XR
implementation
barriers. Answers were:

- high costs
- unclear benefit
- bad IT project management
- lack of requirements
- legislation
- involving staff and management
- lack of process integration
- bad usability
- immature technology
- data preparation
- missing knowhow
- availability of specialists



XR diffusion in Germany in the last 5 decades





XR companies in Germany

- significantly growing number, but
- very scattered with lot of micro-enterprises

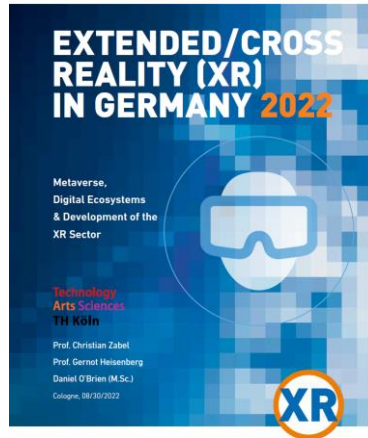
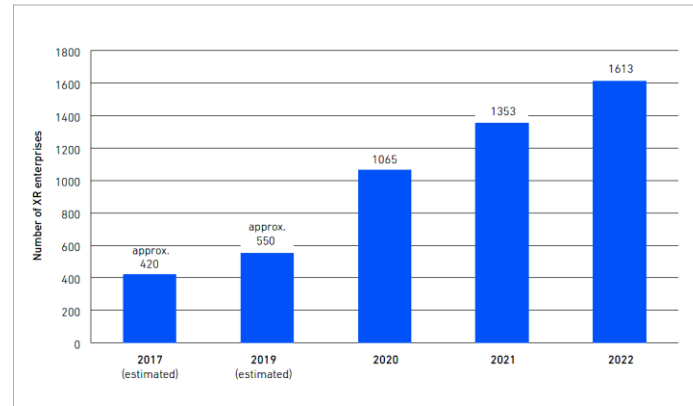
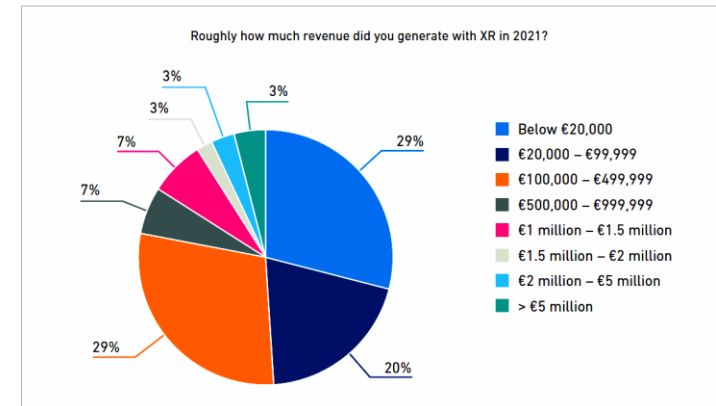


Figure 2: Number of XR enterprises between 2017 and 2022



Source: Own data obtained by means of desk research;
based on a projection of the XR enterprises researched in NRW for 2017 and 2019

Figure 3: Revenue generated by XR companies with XR in 2021



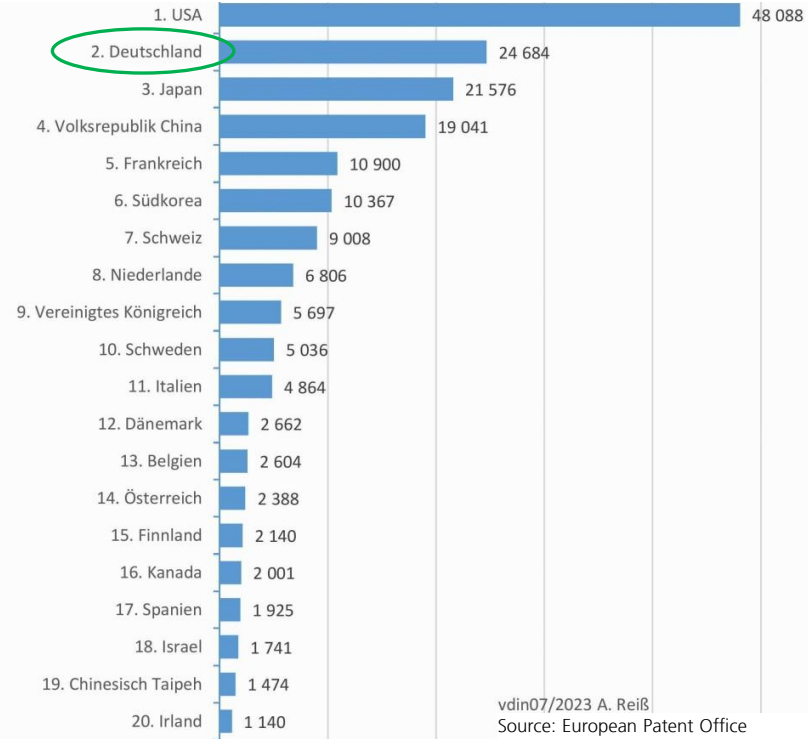
Source: Own data obtained by means of the representative online survey (n=118, no data: n=12, outliers are unweighted)

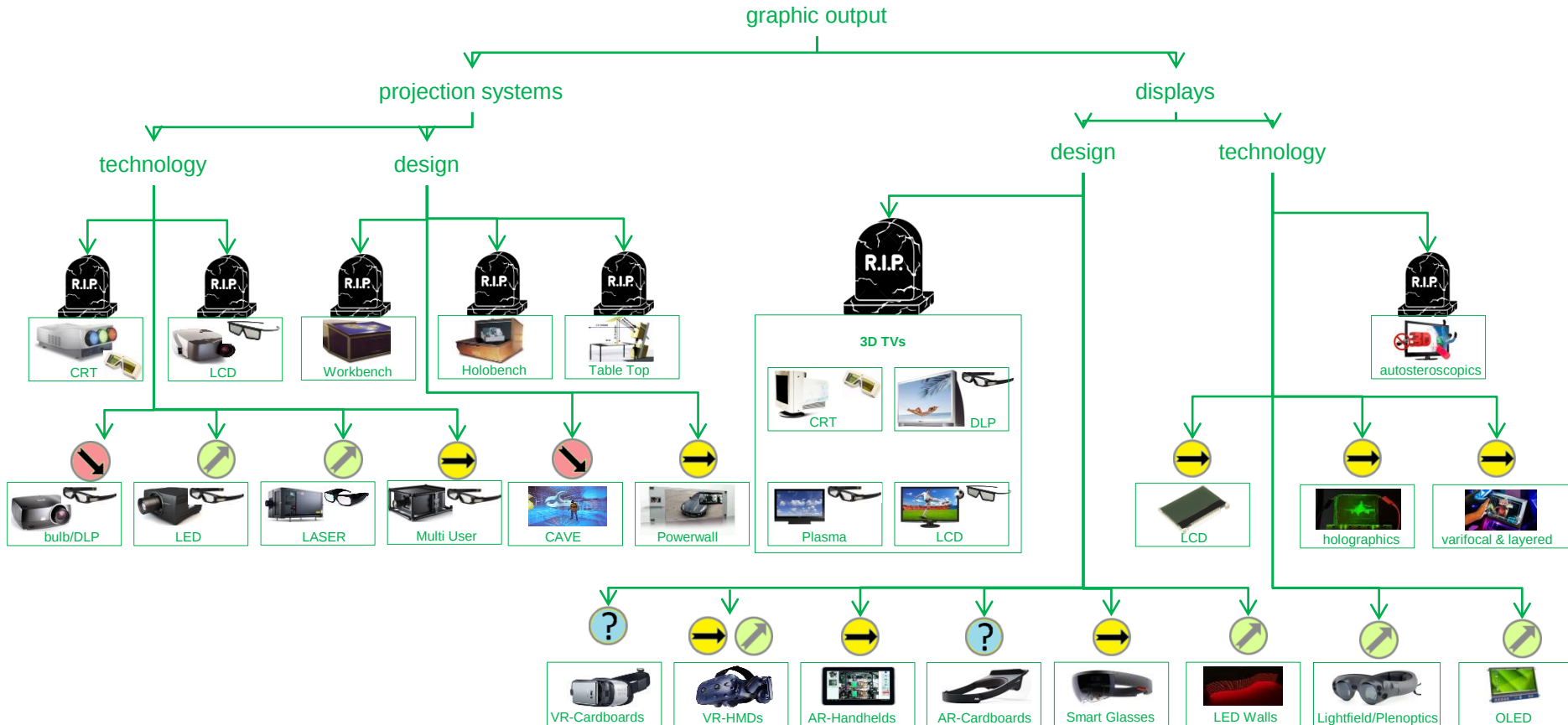


Germany is excellent on patents:
invention level top

(but: for innovation you need
invention AND a business case...)

Countries with the most patent applications in 2022



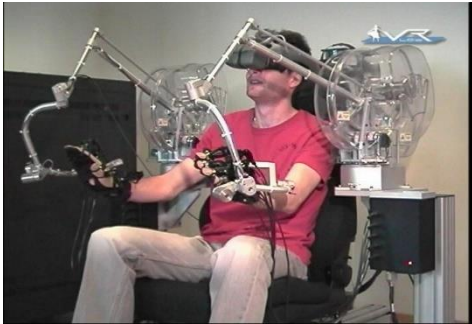




Toshiba prototype „Bubble Helmet“, 2006



Somniacs Birdly



Cyberglove Systems „Haptic Workstation“



Feelreal Helmet



Virtuesphere



stereoscopic filtering technology,
alternative to shutter and polarization



global provider
of best-in-class tracking



3D visualization software for automotive
designers and automotive engineers



world class VR solution



3D visualization software for automotive
designers and automotive engineers



world class game engine



world class AR library



global provider of eye tracking
solutions for XR



world class AR library





~~INFITEC[®]~~
Excellence in 3D

ART ▶
Advanced Realtime Tracking

3S **3DEXCITE**



esi
get it right[®]



AUTODESK



visionLib



ARKit

~~metaio~~

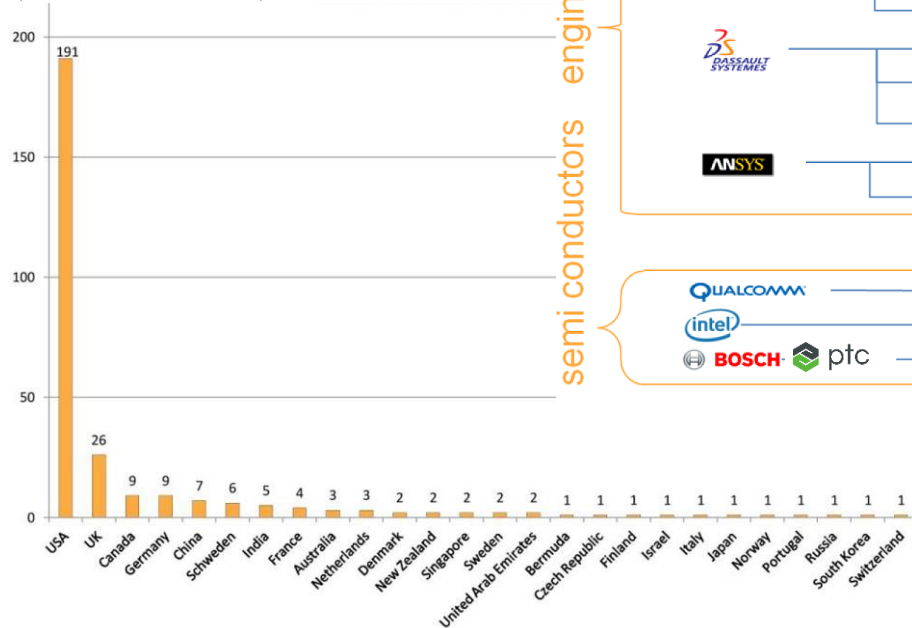


Challenge #3: the departure of high tech

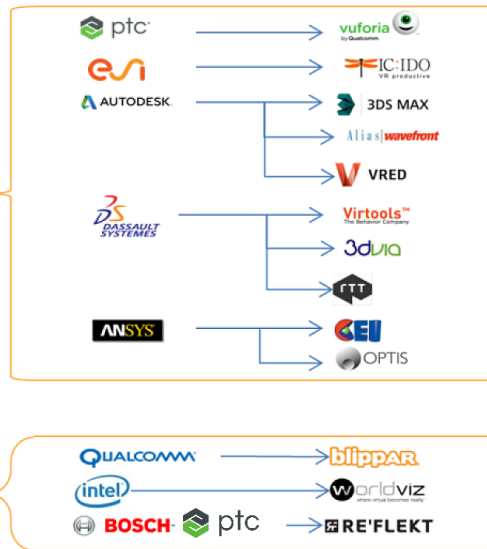


Sell out of German and European XR technology

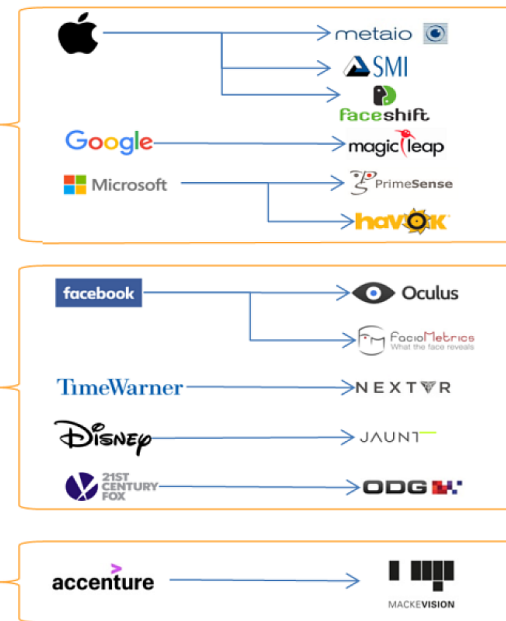
Global XR take-overs by countries
(data derived from crunchbase)



semi conductors engineering IT



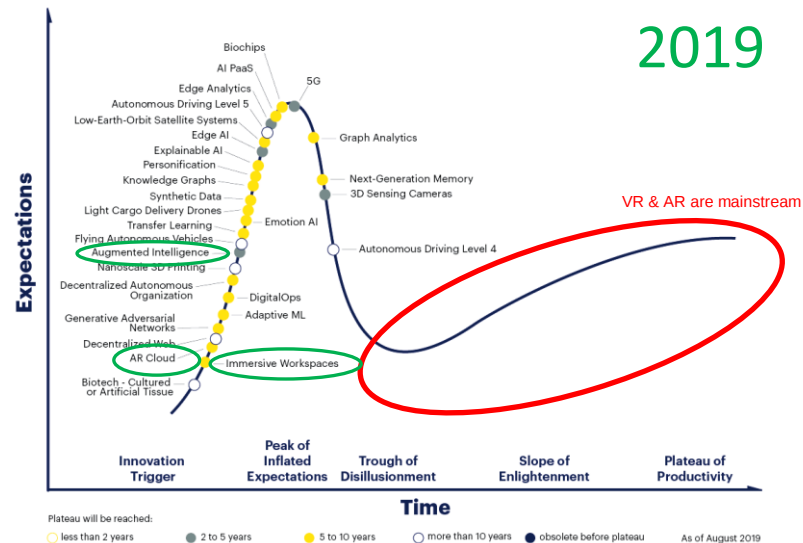
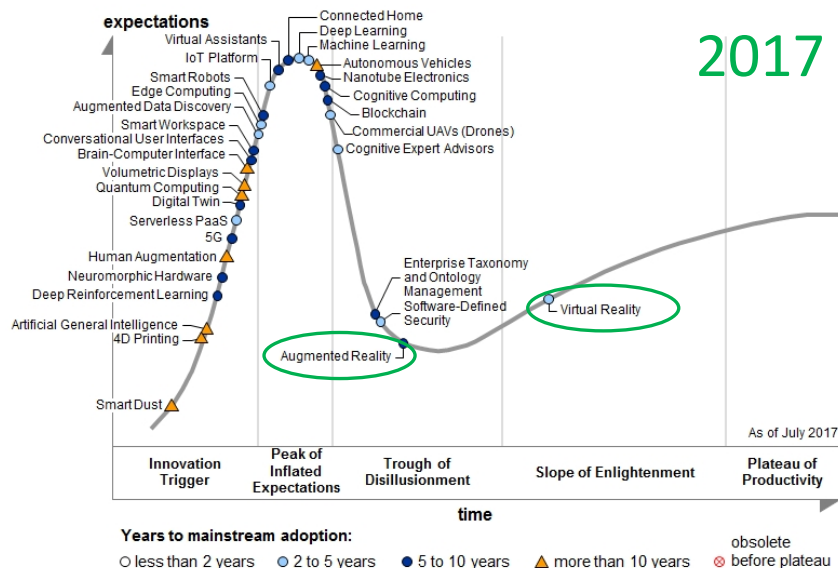
consultancy entertainment platforms



Challenge #4: positioning ourselves in future topics



Gartner hype cycles of „Emerging Technologies“: a comparison between 2017 and 2019



New topics mentioned: immersive workspaces, AR cloud, augmented Intelligence

Challenge #4: positioning ourselves in future topics: metaverse



assuming the metaverse to be a combination of

1. collective & persistent 3D spaces ↑ ,
2. digital twin methods → , and
3. seamless, ubiquitous XR interaction spaces ↙ .

Who can deliver industrial metaverse solutions?

The „usual metaverse suspects“ like Meta, Sandbox, Decentraland, etc. will probably not be the ones.

German companies doing projects with Nvidia Omniverse:

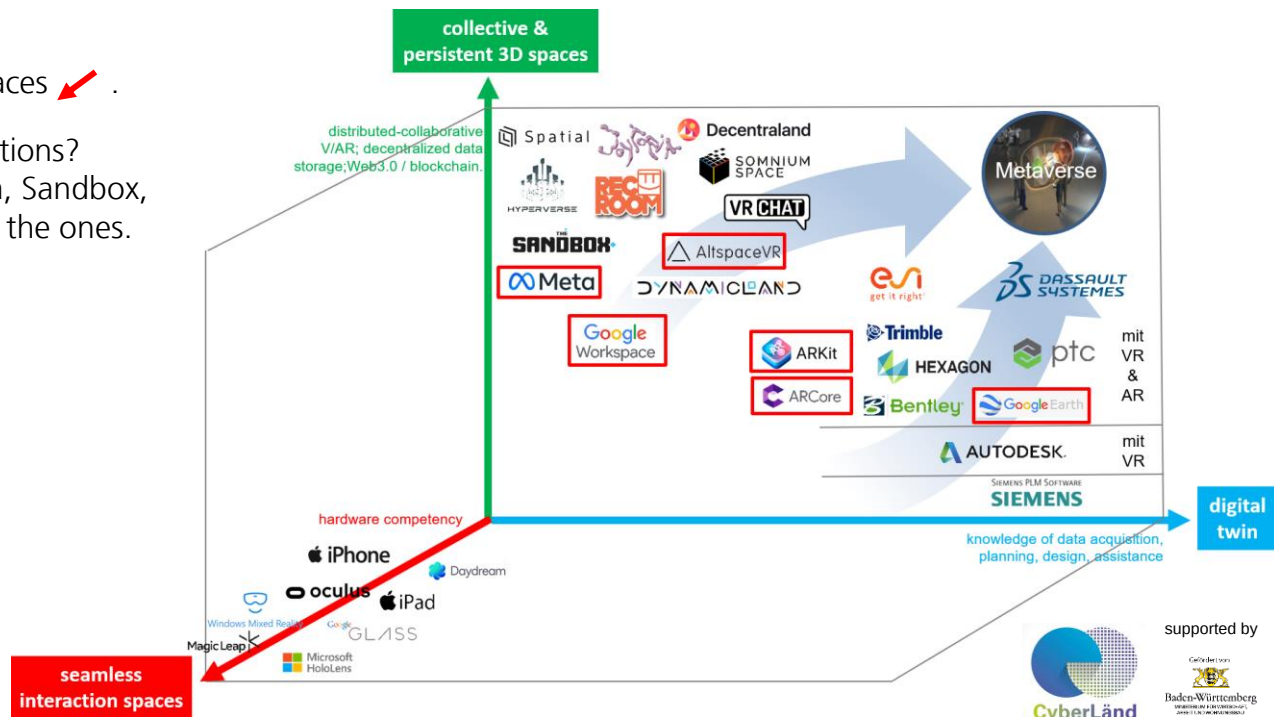


Mercedes-Benz

SIEMENS
energy



The 3 axes of the metaverse:



Challenge #4: positioning ourselves in future topics



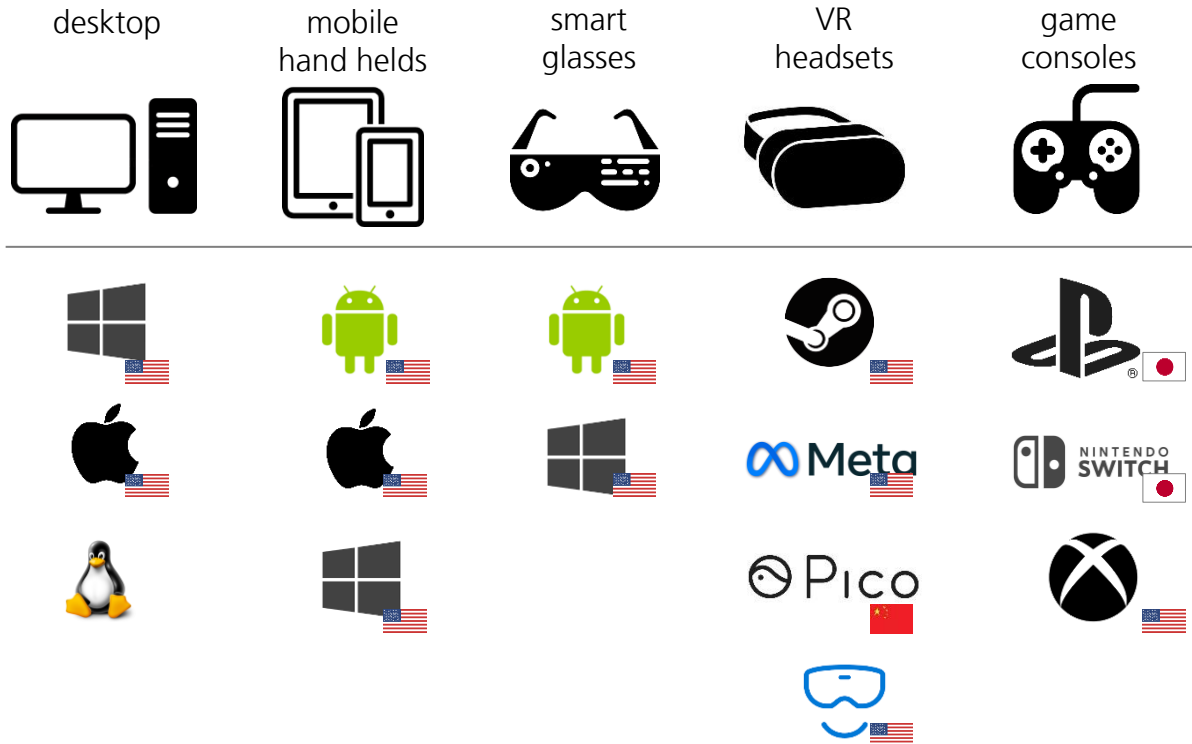
But: We find ourselves only at the sideline of a fight for global XR ecosystems.

problem:

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

questions:

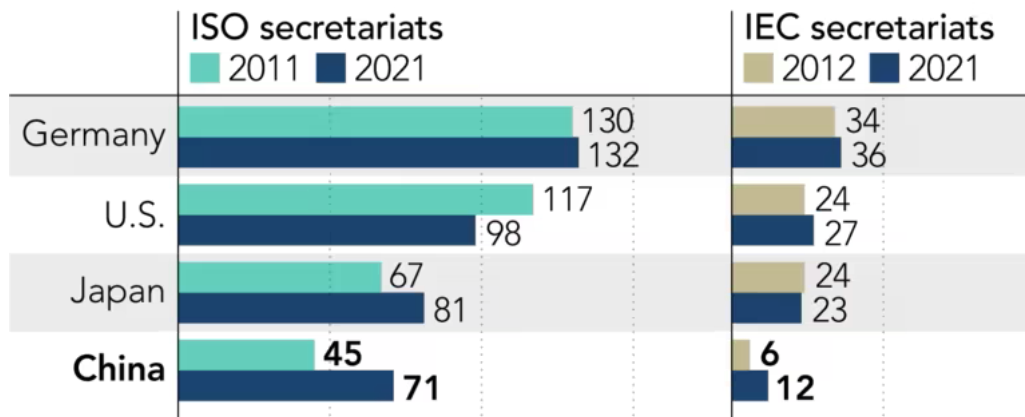
- what options for action do we have?
- what can be our future role to create added value and employment?





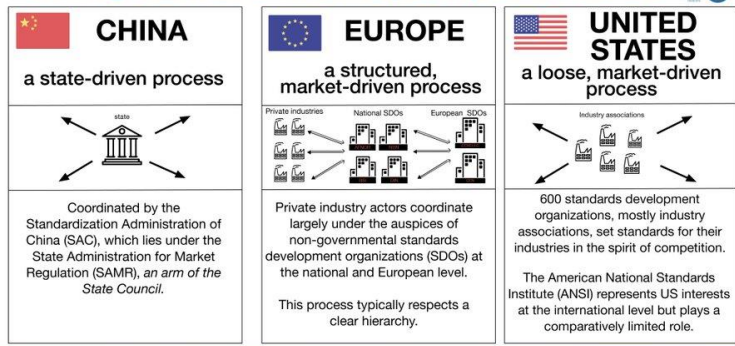
Germany is still excellent on norming and standardization:
top international influencing position
to ensure interoperability

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

Setting standards in China, Europe and the US



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



VIRTUAL DIMENSION **CENTER** Research

member of Khronos, IEEE, DIN, EuroXR



- 500+ published
XR norms,
XR standards,
XR recommendations,
XR guidelines
- 100+
XR norms,
XR standards,
XR recommendations,
XR guidelines
being created right
now
- 75+ active initiatives
actually working on
XR norms,
XR standards,
XR recommendations,
XR guidelines



- We do have a vibrant, growing XR scene in Germany with 1.600+ XR companies
- We are top in invention, based on patent statistics. We have profound XR knowhow and experience of 30+ years. We have all technologies needed to manufacture anything related to XR. We are delivering world class solutions to the global XR community.
- We have a problem in growing companies to a global relevant level. Our big software corporates such as Siemens PLM or SAP are not part of the game. Europe will probably not create a huge, global platform provider.
- We have a realistic opportunity to stay in the game developing dedicated, standardized XR solutions with our industrial global players
- We have a realistic opportunity to stay in the game developing standardized digital B2B twin solutions to connect to the metaverse in our respective strong areas.





Thank you for your attention.

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XR
EXPO
2023



15.-16. Juni 2023 - Stuttgart