



Mixed Reality in Lehre,  
F&E und Third Mission



christian geiger  
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- **Professur Mixed Reality und Visualisierung:** Lehre im Bereich Medieninformatik, Medientechnik, Mediendesign in Düsseldorf
- **Lehre, Forschung und Entwicklung:** Projekte mit wirtschaftlichen, kulturellen und karitativen Partnern



- **Innovationshub Düsseldorf:** Gemeinsame Arbeits- und Lernumgebung mit zwei Firmen aus den Bereichen Filmproduktion und Messe/Eventtechnik
- **Interdisziplinäre Arbeit:** Teamarbeit mit Technikern, Gestaltern, Managern, Soziologen, Künstlern, Mediziner, Patienten, Schülern,....

# My background

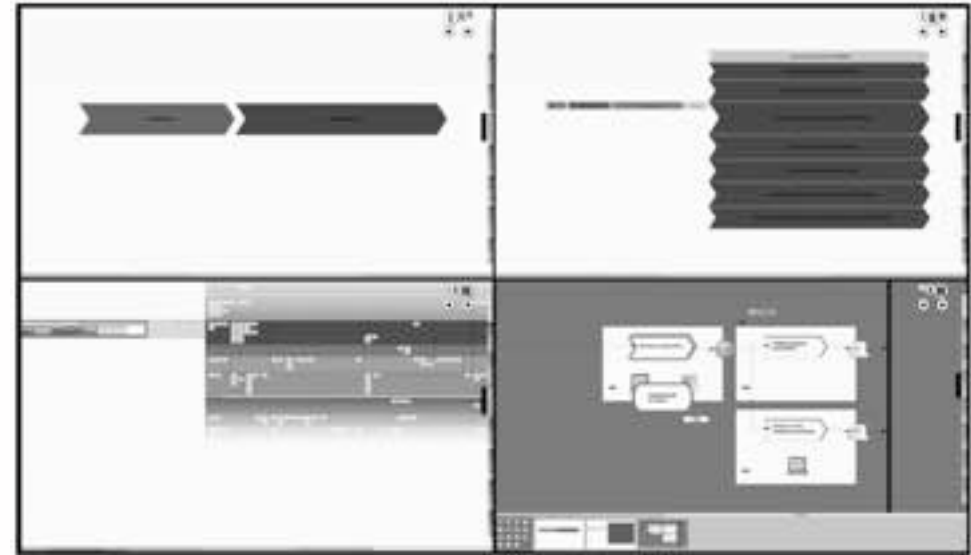
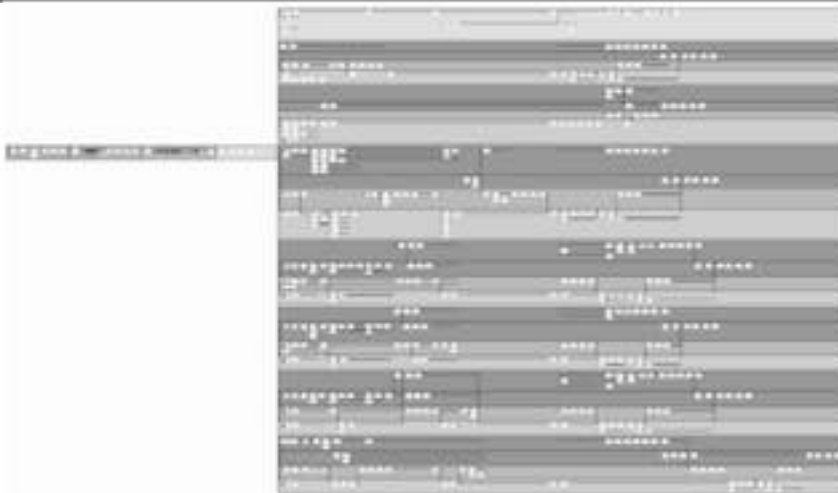


-1993 Computer Science with minor in Business Management, U Paderborn, freelance programmer (Bertelsmann, driving schools)  
 1994 PhD work on 3D animation and AI  
 1997 Project manager for 3D multimedia at Siemens  
 2000 First mobile AR project (AR-PDA) worldwide  
 2002 Professor for 3D and Animation, HS Harz  
 2004 Professor for Mixed Reality+Visualization, HS Düsseldorf  
 2015 Founder Innovationhub - ThinkTank with SMEs

- 1993 ConFuP
- 1994/95 Oz+Fuzzy
- 1996-1998 PJ+AAL
- 1997-2000 i4D
- 2001 AR-PDA



- Technical Features: Tracking, Rendering, Mobile Device
- Application Areas: Production, Sales, Maintenance
- Scientist, Programmer
- Not User Centred
- No Design
- No Art



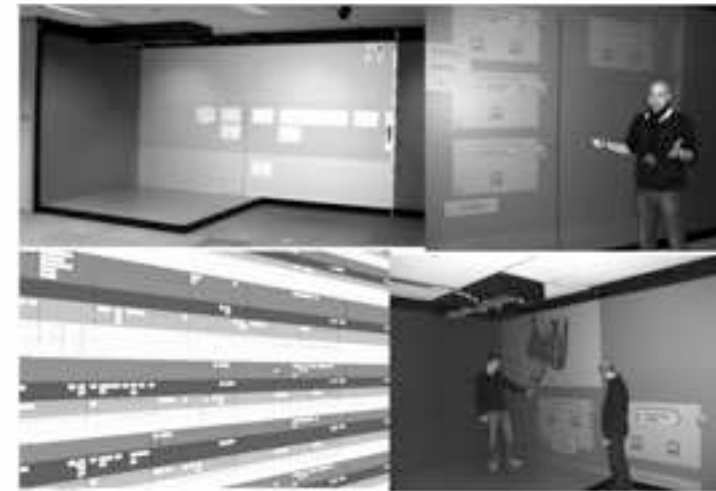
## Eine Benutzerschnittstelle zur Visualisierung komplexer Diagramme

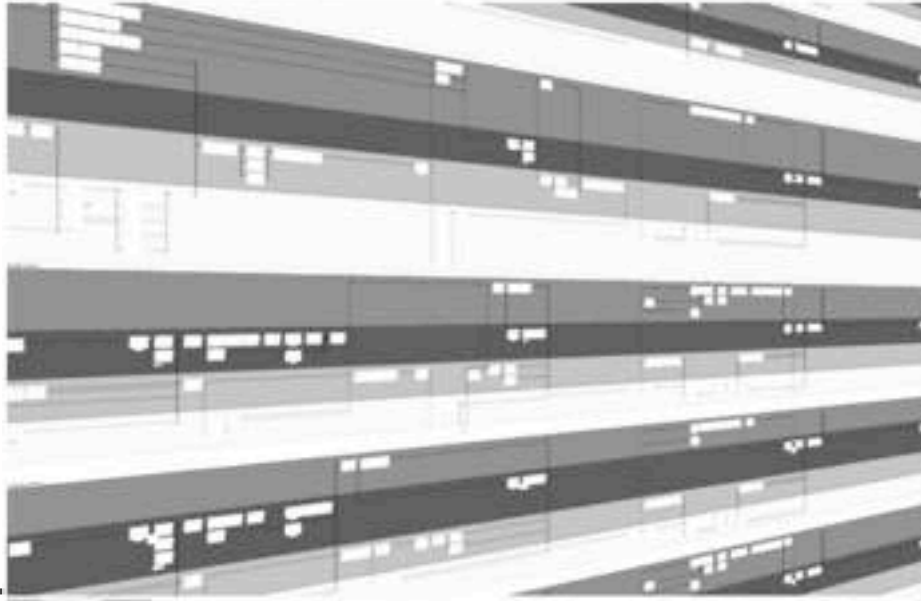
S. Müller, B. Schimmel, H. Reckter, P. Weinreich, S. Schulze, C. Geiger, R. Dumitrescu

Hochschule Harz, FH-Düsseldorf, HNI Paderborn

### Zusammenfassung

Wir präsentieren das Design, die Implementierung und eine erste Evaluation einer skalierbaren Benutzerschnittstelle für die Präsentation großer Visualisierungsmodelle eines komplexen mechatronischen Systems. Die hierarchische Struktur der Modelle wird mittels einer visuellen Notation dargestellt und besteht aus über 10000 Elementen. Eine effiziente Präsentation dieses komplexen Modells wurde durch eine skalierbare Benutzerschnittstelle realisiert, die auf einer großen Virtual Reality Wall mit hohen Auflösung (3860 x 2160) wiedergegeben wird. Wir sind überzeugt, dass diese Visualisierungsart kombiniert mit geeigneten Interaktionstechniken für die Selektion und Navigation die kognitive Belastung eines rezipierenden (passiven) Publikums reduziert und das Verständnis komplexer hierarchischer Strukturen unterstützt. Um diese Annahme zu prüfen arbeiten wir an einer Evaluation, welche die traditionellen Visualisierungstechniken mit der neuen Präsentationsform vergleichen soll.





## Referenz

Prof. Dr.-Ing. Roman Dumitrescu  
Direktor

Fraunhofer-Institut für Entwurfstechnik  
Mechatronik IEM  
Zukunftsmeile 1  
33102 Paderborn

- Project-oriented wherever possible
- **Interdisciplinary** team work – work with other experts
- **Theory** as little as possible as much as necessary
- **Listen to user** and their needs
- Become an **ad hoc expert** very soon
- **Focus** on user, interface, content, technology
- **Exploit** existing tools & frameworks, combine technology
- Large part of work (teach & RD) happens at Innovation Hub

Develop new interfaces using design thinking and iterative prototyping

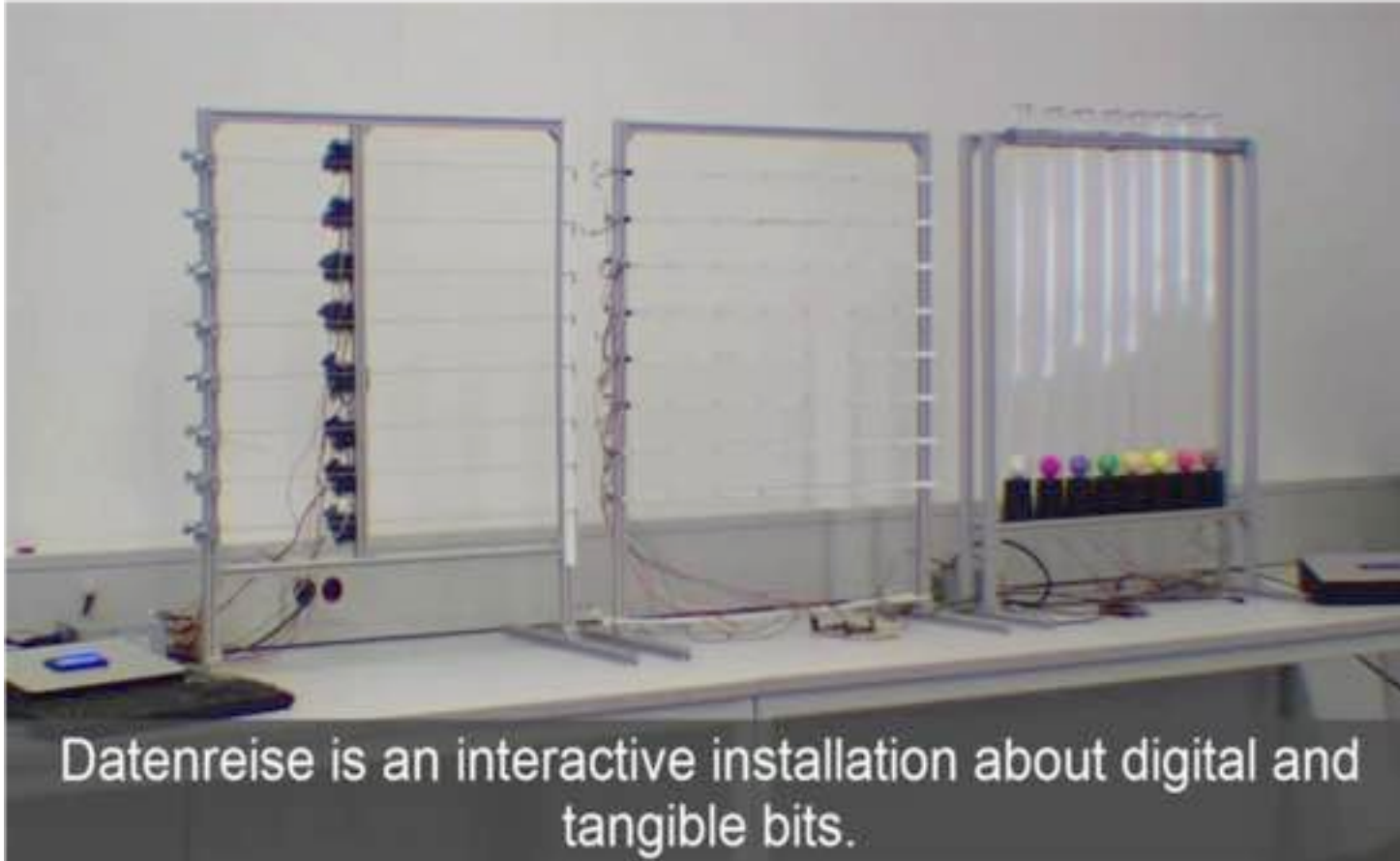
Joint class with design department

User Research and Development





# More examples: Datenreise



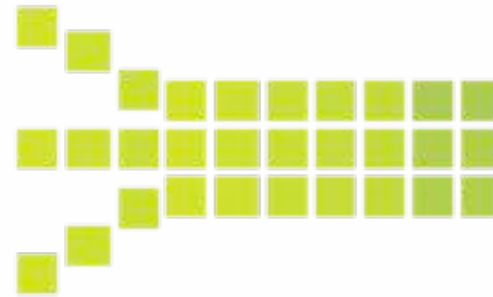
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concept

content

technology



tennagels  
creative media technology



HSD

Innovationhub is a joint  
think tank of three  
organisations

„Perspective of small-sized protagonists“

# Mixed Reality and Visualization Group, HSD



Expo & Event & Entertainment

Team of 18 researchers and 20 students working in



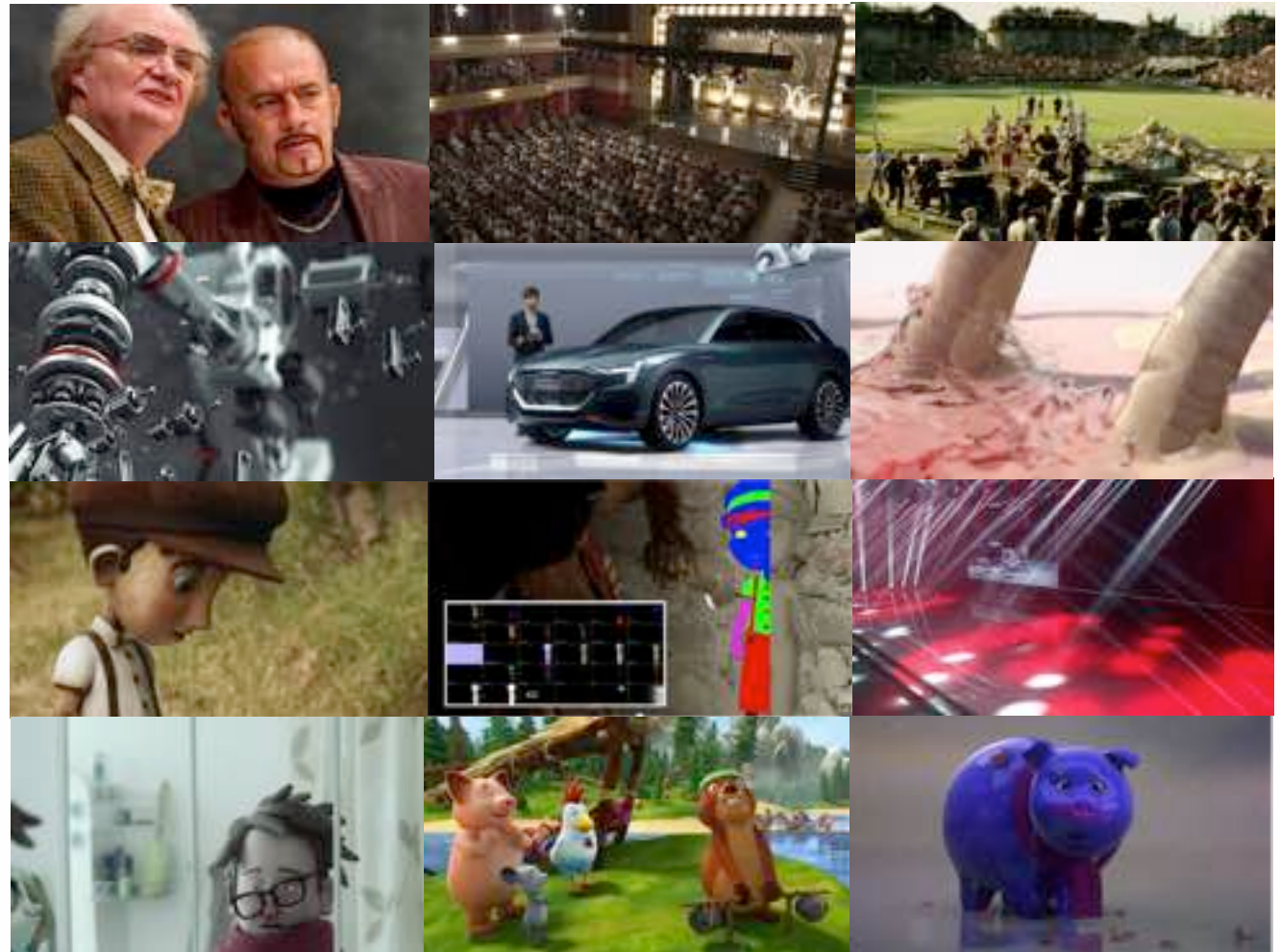
Creative Health



Digital Working & Learning  
Innovation Processes

User Experience Design  
and Engineering





Core business: Postproduction, DigitalEffects, 3D Content

Film production, ads, content for trade fairs / events

Visual Effects, CGI & Character Animation

located in Düsseldorf, Stuttgart, Berlin

30 people & freelancer

- Individual media and event technology
- custom LED, trade fair solutions, permanent installations
- 20 people, workshops and manufactory
- Individual concepts and realisations for ambitious clients

LED behind concrete wall



transparent OLED



robotic displays, LED walls and curved objects



# What we do

**INNOVATIONSHUB**   
[www.innovationshub.de](http://www.innovationshub.de)



Create New Experiences



Apply Latest Technology

Distribute Know-How



Work Together



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**HSD**



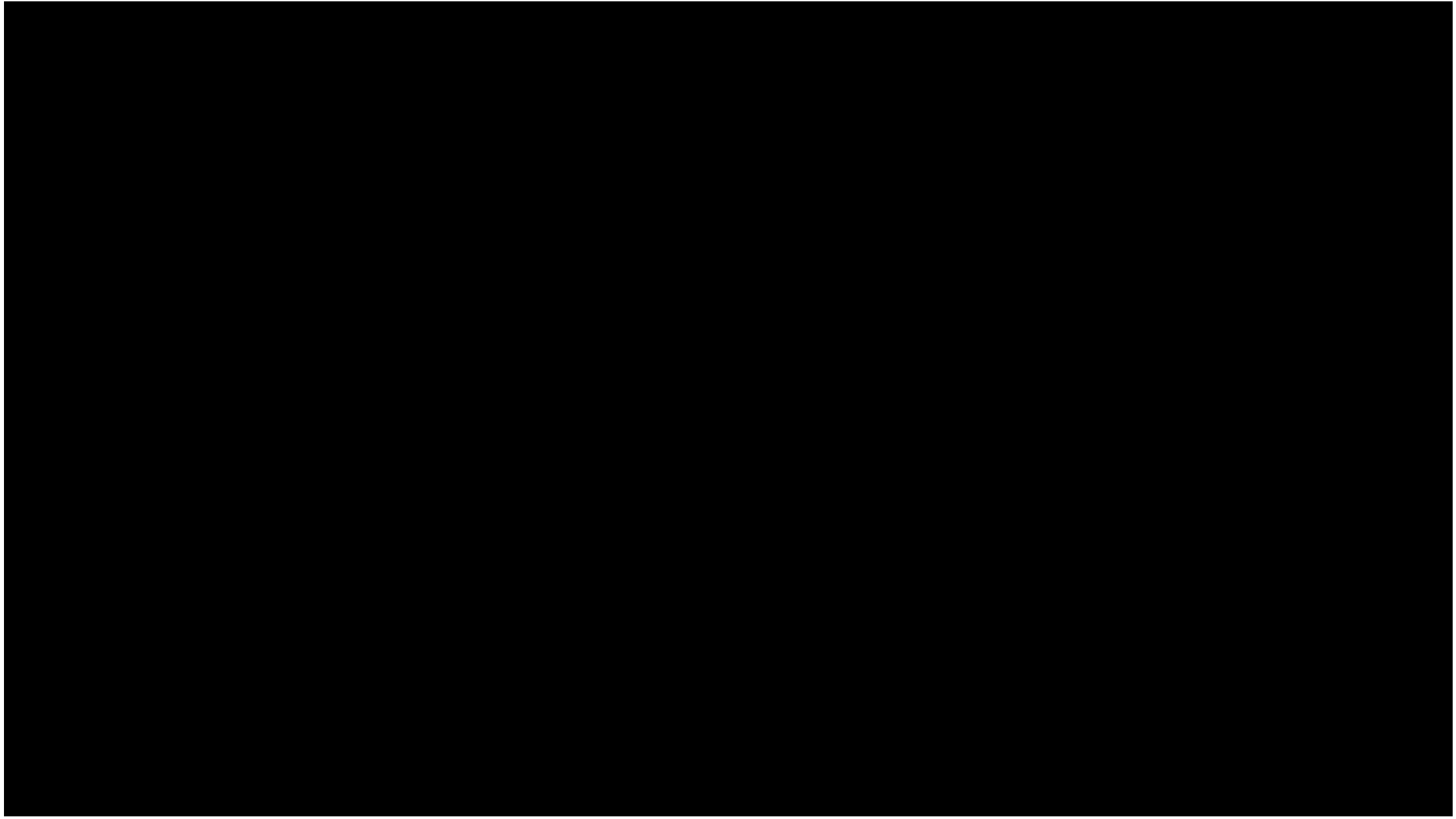
**tennagels**  
creative media technology

Always spreading the word





Videos unter [www.innovationshub.de](http://www.innovationshub.de)  
Weitere Projekte unter [www.mirevi.de](http://www.mirevi.de)



# In a nutshell: Democratization of Technology

Figure 1. Hype Cycle for Emerging Technologies, 2016



Source: Gartner (July 2016)










Source: Gartner (August 2016)

- **VR Technology:** High end technology becomes usable and affordable
- **VR Experience:** Technology fades into the background, user experience steps into focus
- **VR Innovation:** new, useful and sustainable
- **Future VR :** Multimodal interaction addressing all senses in a „magical“ holodeck scenario



# Talking 'bout my Generation...

**Talking a different language**

Formative experiences	<b>Maturists</b> (pre-1945) Wartime rationing Rock'n'roll Nuclear families Defined gender roles - particularly for women	<b>Baby boomers</b> (1945-1960) Cold War 'Swinging Sixties' Moon landings Youth culture Woodstock Family-orientated	<b>Generation X</b> (1961-1980) Fall of Berlin Wall Reagan/Gorbachev Thatcherism Live Aid Early mobile technology Divorce rate rises	<b>Generation Y</b> (1981-1995) 9/11 terrorists attacks Social media Invasion of Iraq Reality TV Google Earth	<b>Generation Z</b> (Born after 1995) Economic downturn Global warming Mobile devices Cloud computing Wiki-leaks
Attitude toward career	Jobs for life 	Organisational - careers are defined by employees	"Portfolio" careers - loyal to profession, not to employer	Digital entrepreneurs - work "with" organisations	Multitaskers - will move seamlessly between organisations and "pop-up" businesses
Signature product	Automobile 	Television 	Personal computer 	Tablet/smartphone 	Google glass, 3-D printing
Communication media	Formal letter 	Telephone 	E-mail and text message 	Text or social media 	Hand-held communication devices
Preference when making financial decisions	Face-to-face meetings	Face-to-face ideally but increasingly will go online	Online - would prefer face-to-face if time permitting	Face-to-face	Solutions will be digitally crowd-sourced

"As digital-first preferences continue driving more interest from Millennial buyers, we know that technology will play a critical role in engaging and connecting this generation to the art world."

## Study: U.S. Millennials Prefer Instagram to Museums; Purchase & Discover Art Online

<http://news.invaluable.com/press-release/art-fine-art-antiques/study-us-millennials-prefer-instagram-museums-purchase-discover->

## Generation Z (1995-2010)

- Always on and connected to my(!) friends
- No separation between real and digital life
- Sharing instead of owning, experience is important
- Ephemerality as an alternative to permanence
- Ephemeral interaction is personal, worthy, supports self-confidence



### Sharing the Small Moments: Ephemeral Social Interaction on Snapchat

Joseph B. Bayer <sup>a</sup>  
Nicole Ellison, Ph.D. <sup>b</sup>  
Sarita Y. Schoenebeck, Ph.D. <sup>b</sup>  
Emily B. Falk, Ph.D. <sup>c</sup>

<sup>a</sup> Communication Studies, University of Michigan, Ann Arbor, USA  
<sup>b</sup> School of Information, University of Michigan, Ann Arbor, USA

Either way, there is a growing consumer demand for communication to be non-permanent and non-searchable. Gen Z is saying stop measuring me, stop quantifying me and stop targeting me... or if you're going to do it, then offer me a better experience. They don't want to put their lives on show for the world, they want to share with people they know.

Proved by a personal internal long  
term study, n=2,m=17, w=15

[reveriereport.com/ephemeral-and-private-the-generation-that-avoids-marketing](https://reveriereport.com/ephemeral-and-private-the-generation-that-avoids-marketing)

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# Mixed Reality? Any combination of virtual and real entities

**Real Environment**



**Augmented Reality (AR)**

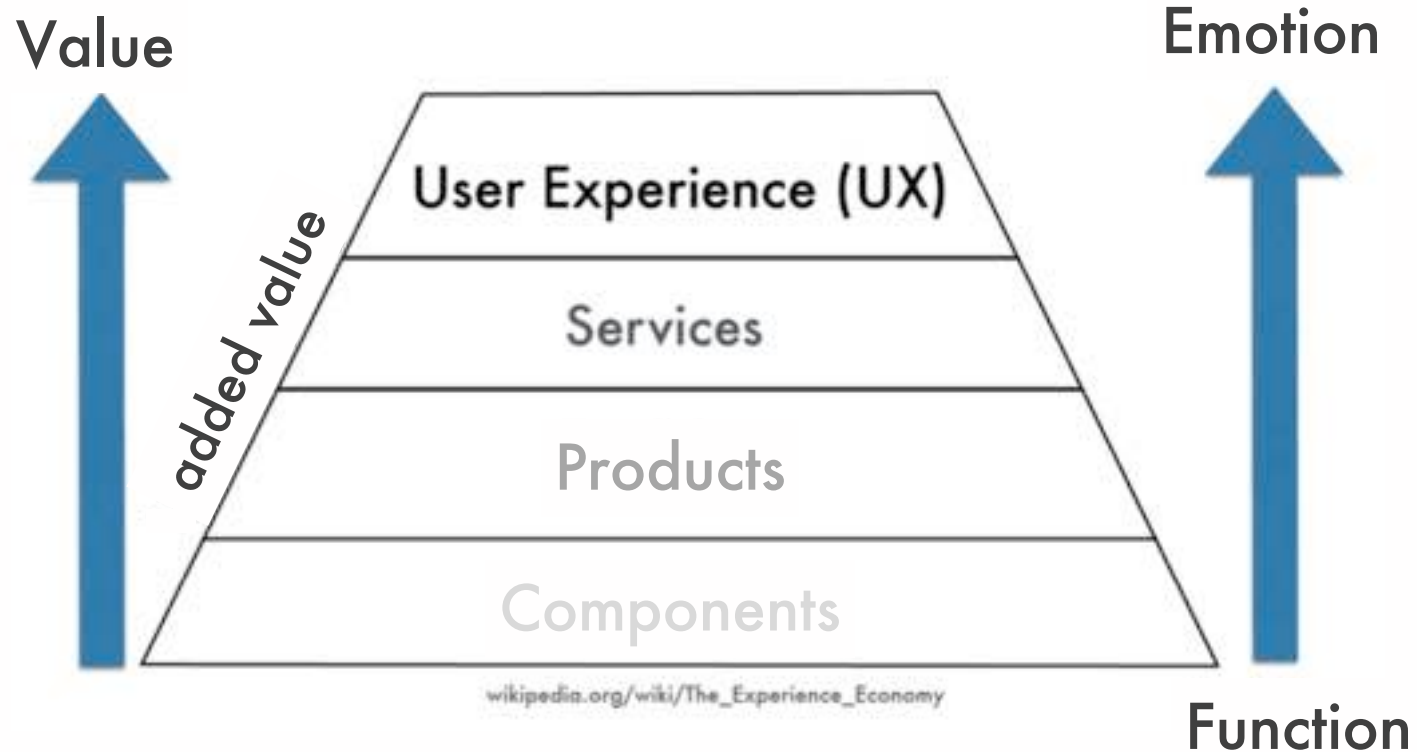


**Augmented Virtuality (AV)**



**Virtual Environment (VR)**





Experience economy is next economy after agrarian, industrial, service economy

- „The product is no longer the basis of value. The experience is.“

(V. Ramaswamy - The future of competition)

# Choose a topic



Public Brewing



Immersive News



Superhuman Sports



Escape Room



VR Trampoline



Interactive Sandbox



Virtual Tenor



Digital Grafitti



City Walk



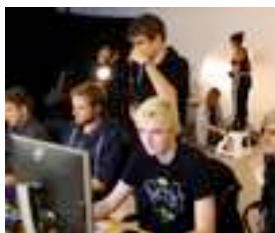
Dementia



HIVE Living Lab



AR documentary



Augmented Dance



Museum Exhibition



AR/VR for Industry



School projects



Future Projects



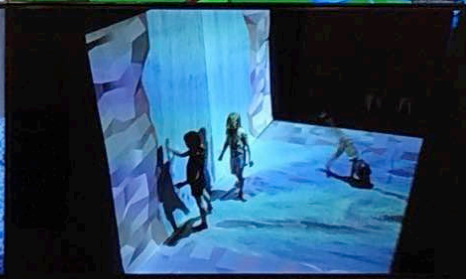
Ethics and Design

**Immersive  
Authoring**



prof.dr.christian.geiger





# INNOVATIONSHUB

# Augmented Reality Thesis Documentation





## **Thanks for listening !**

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Holodeck Interaction: Design and implementation of new UX as part of teaching and R&D

Robots everywhere: Human-Robot-Interaction beyond Industry4.0 is a focus for us

Data-Driven Storytelling and Immersive Visual Analytics

KI4all: Access to machine intelligence / deep learning for all user groups via high-level tools and open data

Think of privacy issues – value sensitive and user centred design

- Innovationshub is a successful R&D cooperation between HSD & SMEs at eye level
- This structure really makes sense for all stakeholders
- Sharing instead of owning (clients, ideas, technology)
- Networking and funding is most important
- Joint projects with focus on user experience and clients' needs



**Innovationstag 2018**  
**...was... 10. oct'18**

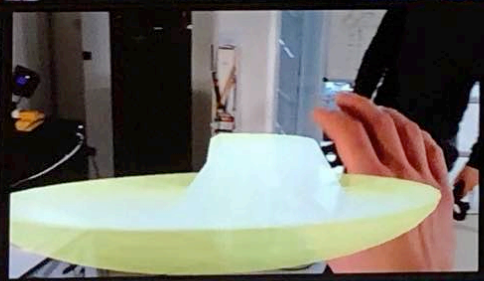
Meet us at Open Day, expos / events or contact us for an individual visit with or w/o your clients

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