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Introducing "Augmented Virtuality" to Industry 4.0 and Beyond

16th of June 2022 | Technical Topic Webinar

Presented By:

Dr. Akhlaqur Rahman | EIT Lecturer and Course Coordinator, Industrial Automation Engineering

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Dr. Akhlaqur Rahman (AK)

Akhlaqur is an academic with almost 10 years of experience in teaching various Electrical Engineering and Industrial Automation courses at Australian and overseas universities.

Akhlaqur is currently the Course Coordinator and Lecturer for Industrial Automation discipline at EIT. Besides that, he has been involved in industry funded projects with several top universities and government institutes. His PhD project was mainly focused on developing task offloading algorithms for Cloud Robotics applications of Industry 4.0.

Akhlaqur is also involved with professional bodies such as IEEE and Engineers Australia, where he is volunteering as a Senior member of IEEE, current Secretary of IEEE Victoria, Secretary of IEEE Communications Society (Victoria) as well as an active committee Member of Engineers Australia ITEE (Control and Telecommunications) Board for Victoria.

From an academic point of view, his current research interests lie in the area of Industrial IoT, Cloud Robotics and Virtual Manufacturing System with a focus on improving efficiency through network optimization.

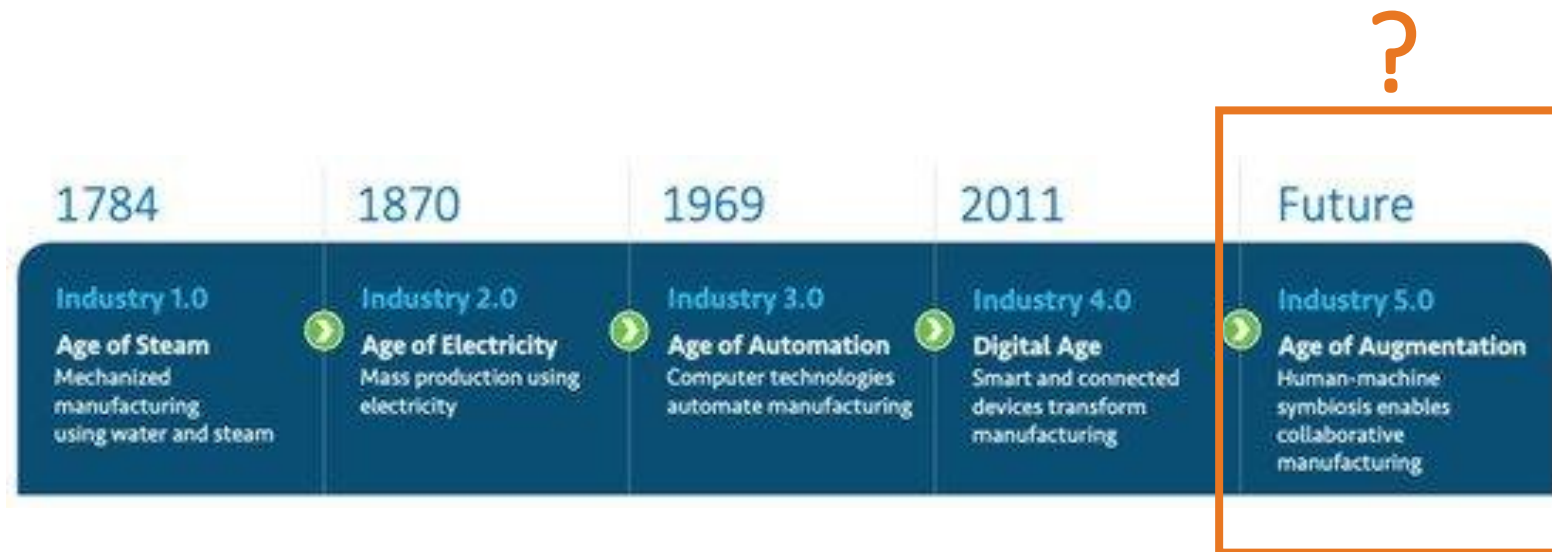
Agenda

1	Introduction to Industry 4.0 and IIoT
2	Virtual Reality and Industry 4.0
3	Augmented Reality and Industry 4.0
4	Introducing Mixed Reality and “Augmented Virtuality”
5	Scope and Use Cases of MR and AV in Industry 4.0
6	What’s Next (Beyond Industry 4.0)
7	Summary



Introduction to Industry 4.0 and IIoT

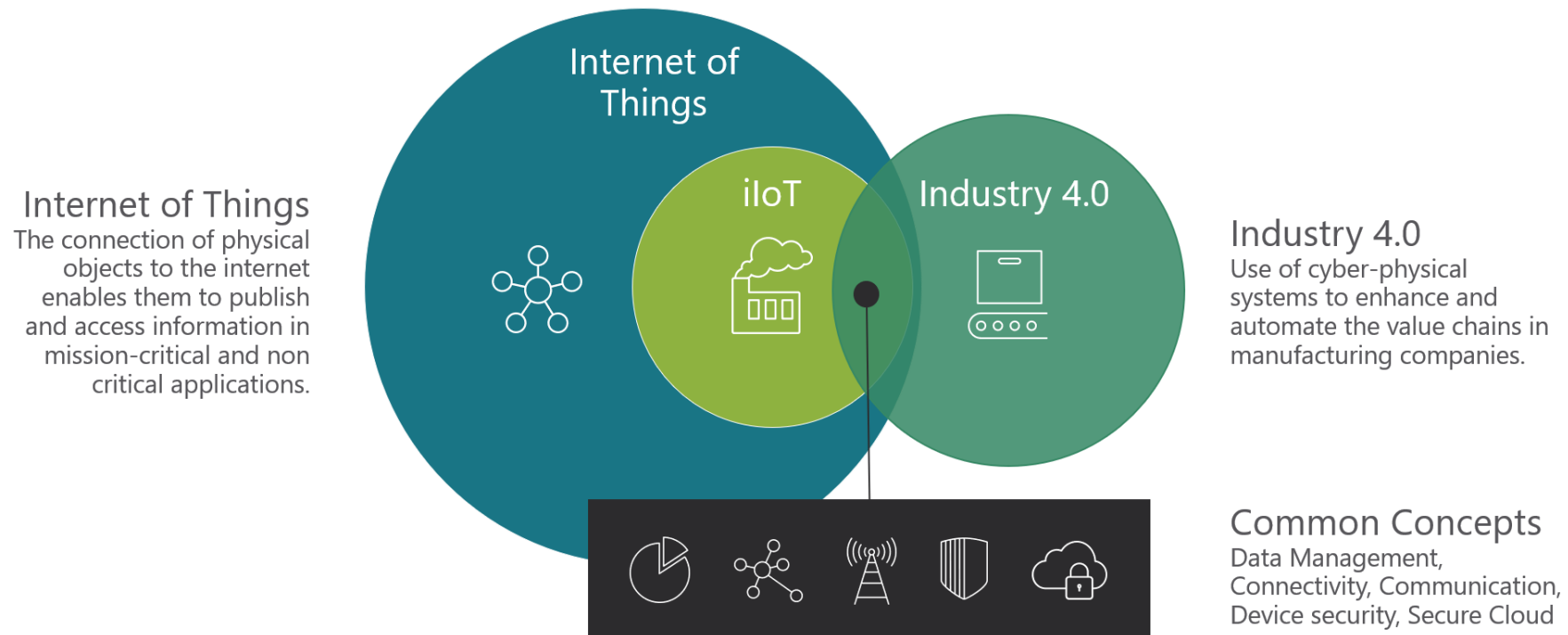
Industry 4.0 and IIoT



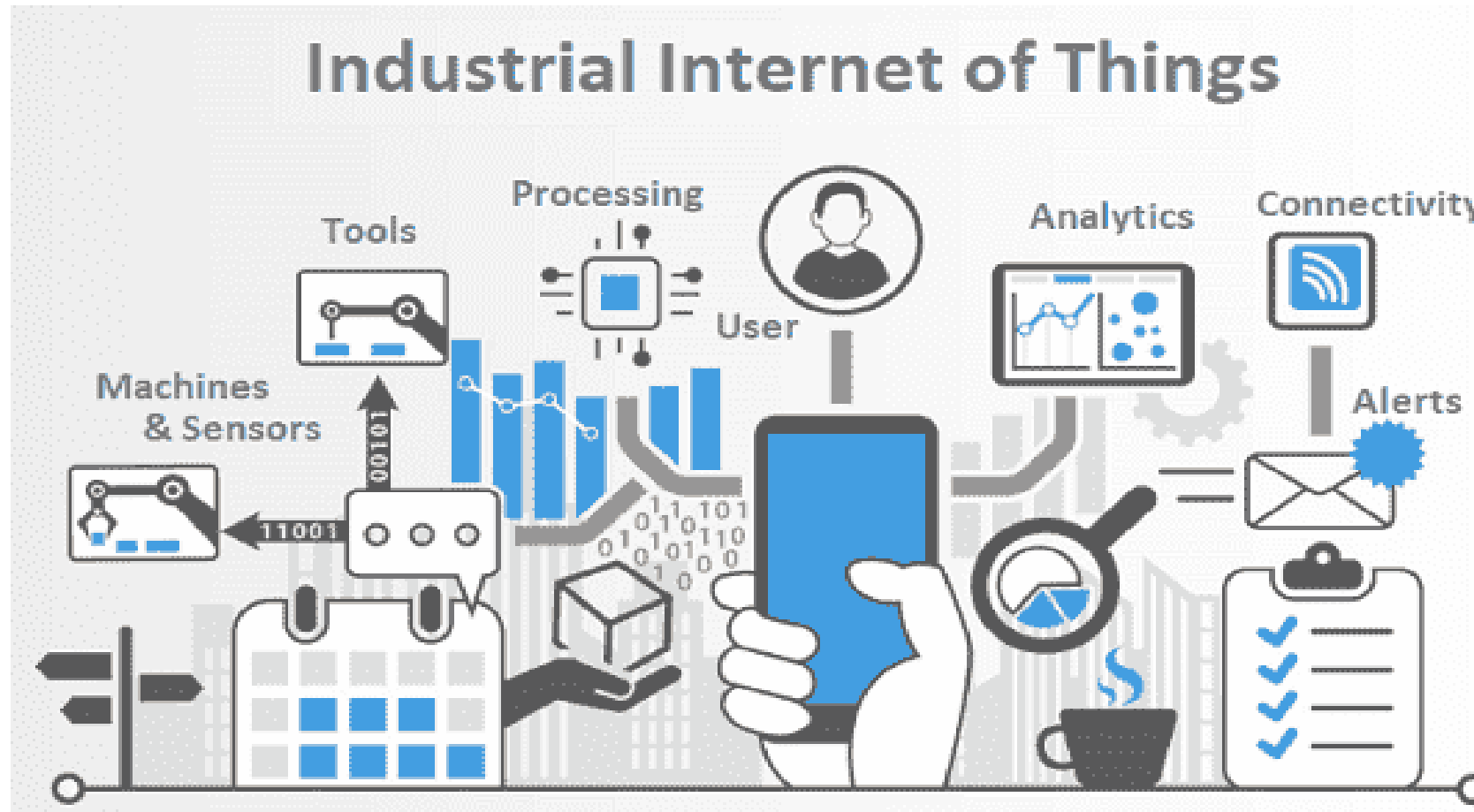
Longo, F.; Padovano, A.; Umbrello, S. Value-Oriented and Ethical Technology Engineering in Industry 5.0: A Human-Centric Perspective for the Design of the Factory of the Future. Appl. Sci. 2020, 10, 4182.

Making Sense of the Trends

The big picture of IoT and Industry 4.0

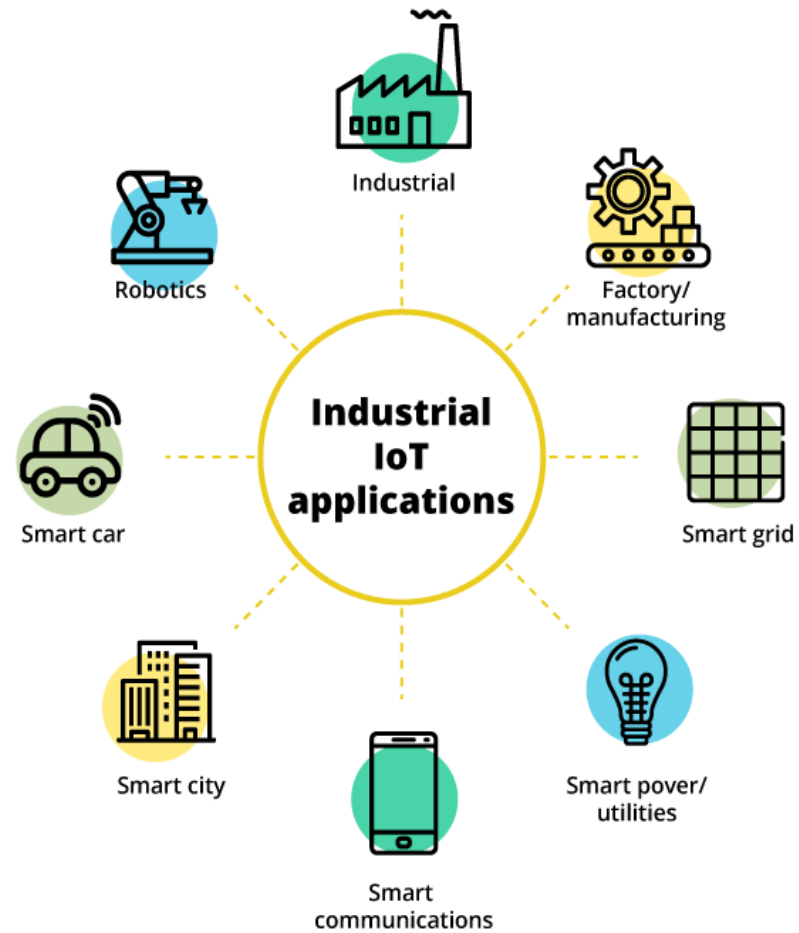


<https://medium.com/the-industry-4-0-blog/industrial-iiot-vs-industry-4-0-vs-industry-5-0-a5f9541da036>



<https://www.rfpage.com/applications-of-industrial-internet-of-things/>

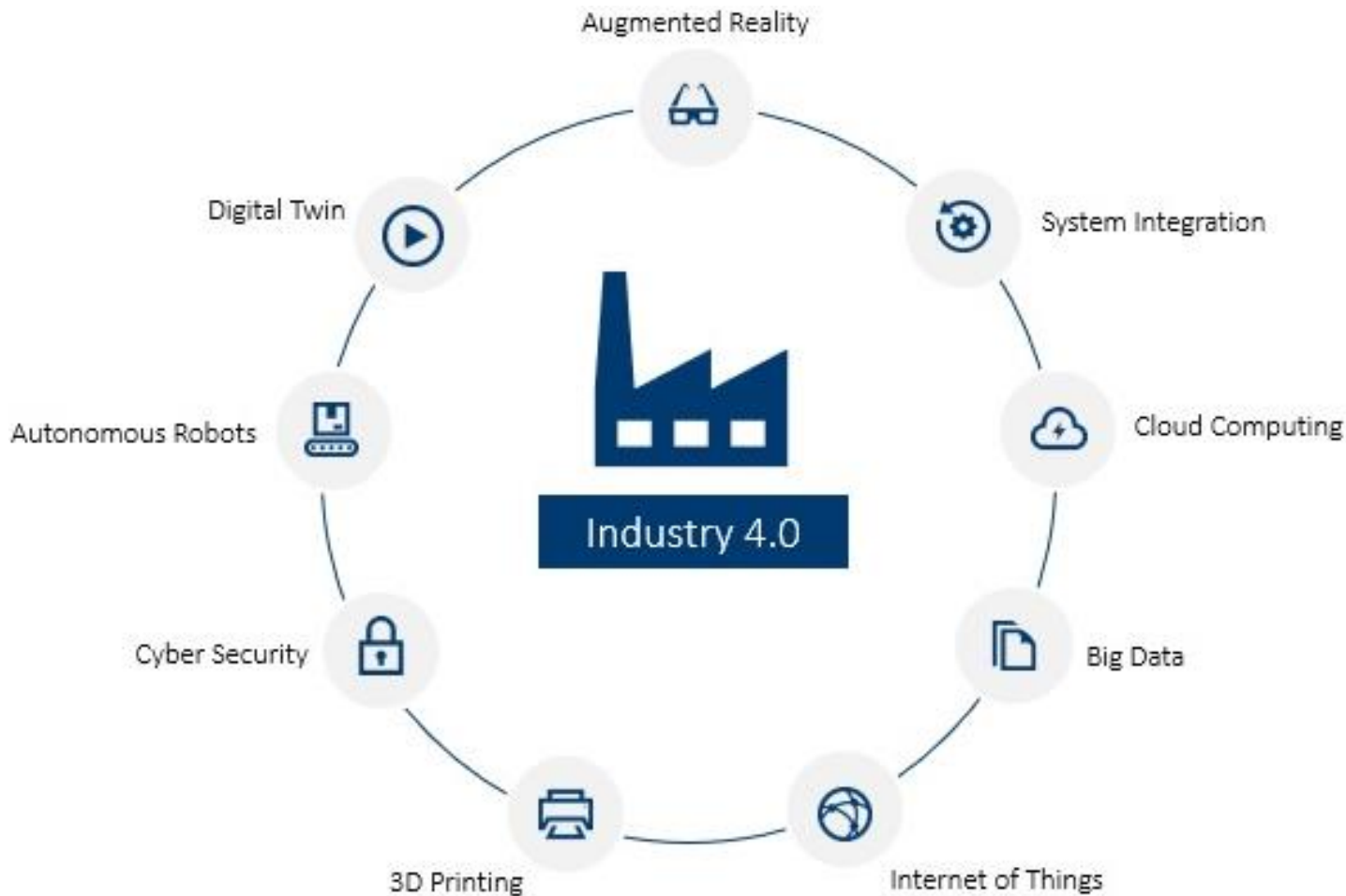
Applications of IIoT/ Industry 4.0



<https://medium.com/sciforce/how-to-recognize-industrial-internet-of-things-f27ccae1ac69>

Key Components of Industry 4.0

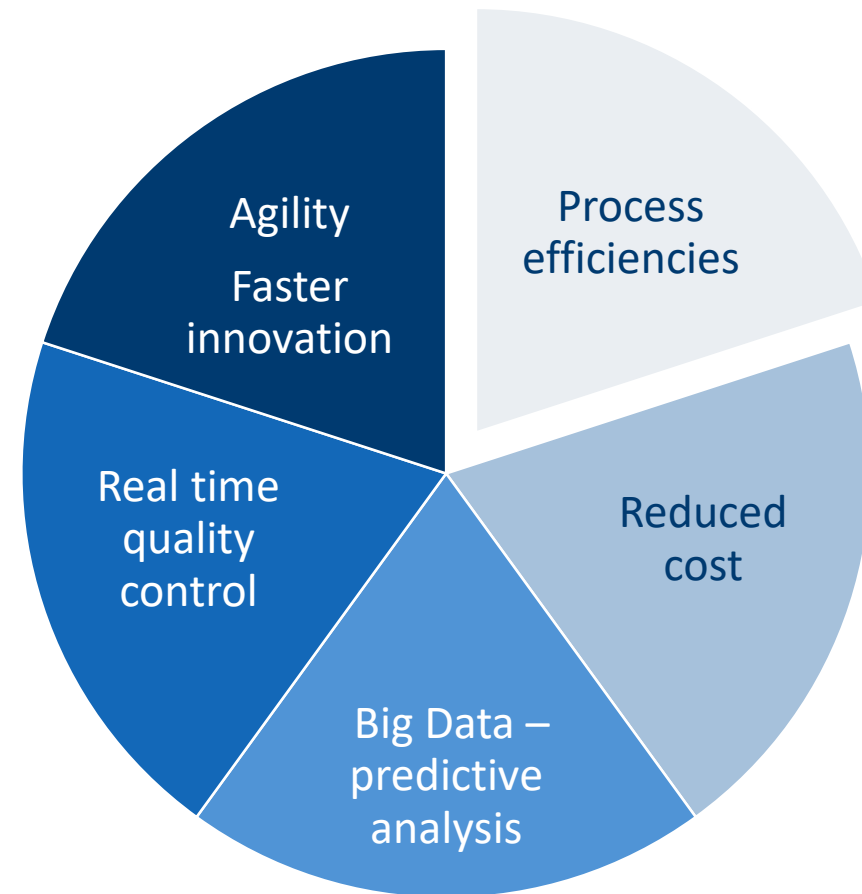
Key Components of Industry 4.0



Industry 4.0 is the integration of these 9 pillars to create an efficient industrial ecosystem that is not just automated but intelligent.

Advantageous features of Industry 4.0

- › Scalability
- › Security
- › Control and Visibility
- › Customer Satisfaction
- › Customization



What's in it for me?

Questions to Ponder

- › Do you believe that the digital transformation to industry 4.0 could/has boosted global competitiveness?
- › To what extent are you integrating different aspects of Industry 4.0 in your work application/industry?
- › Can VR/AR be part of this transformation for you?

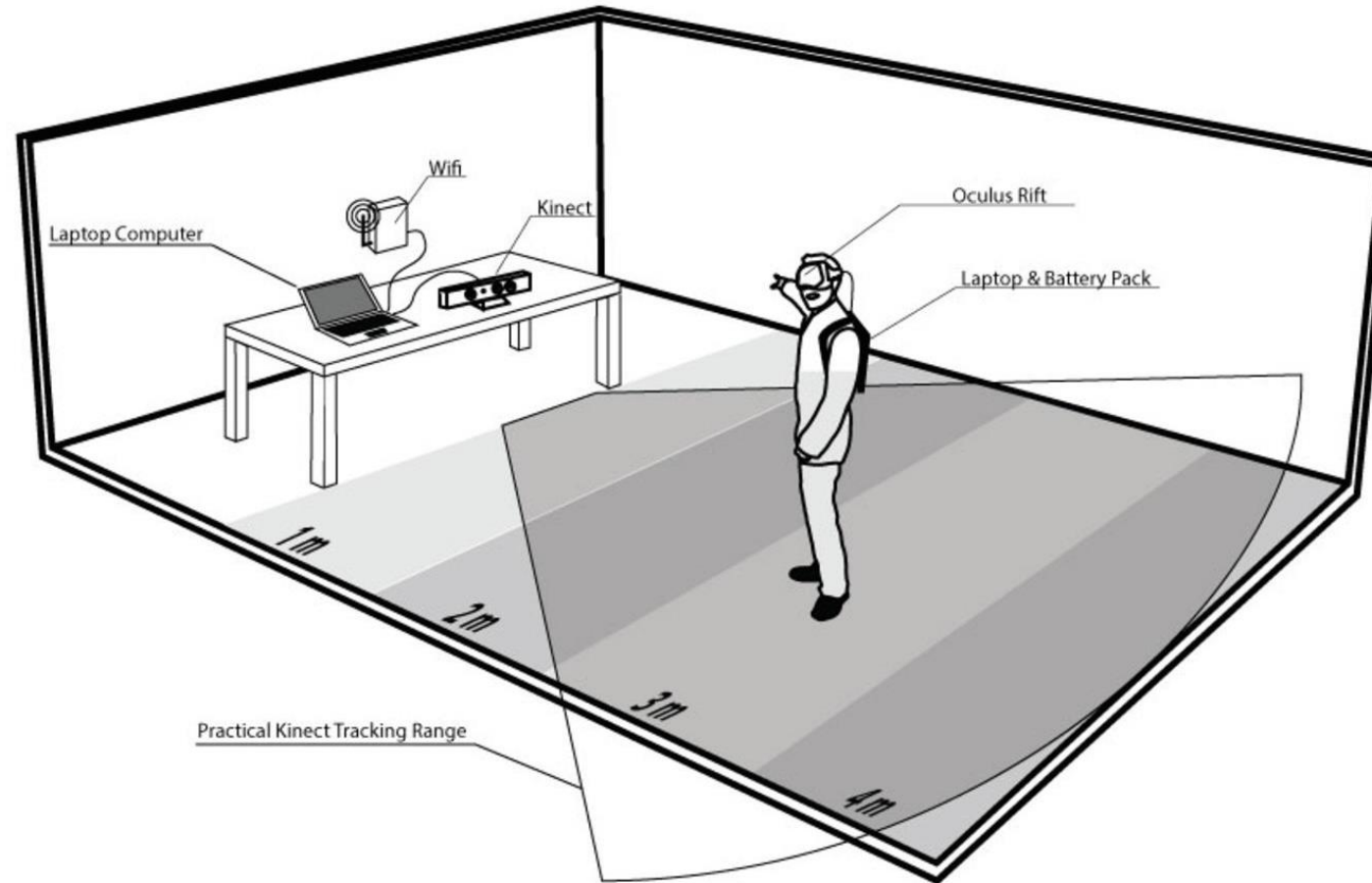
Virtual Reality and Industry 4.0

What is Virtual Reality

- › What is VR?
- › Have you ever used a VR Gadget?
- › In which application?



How to build a simple VR system?



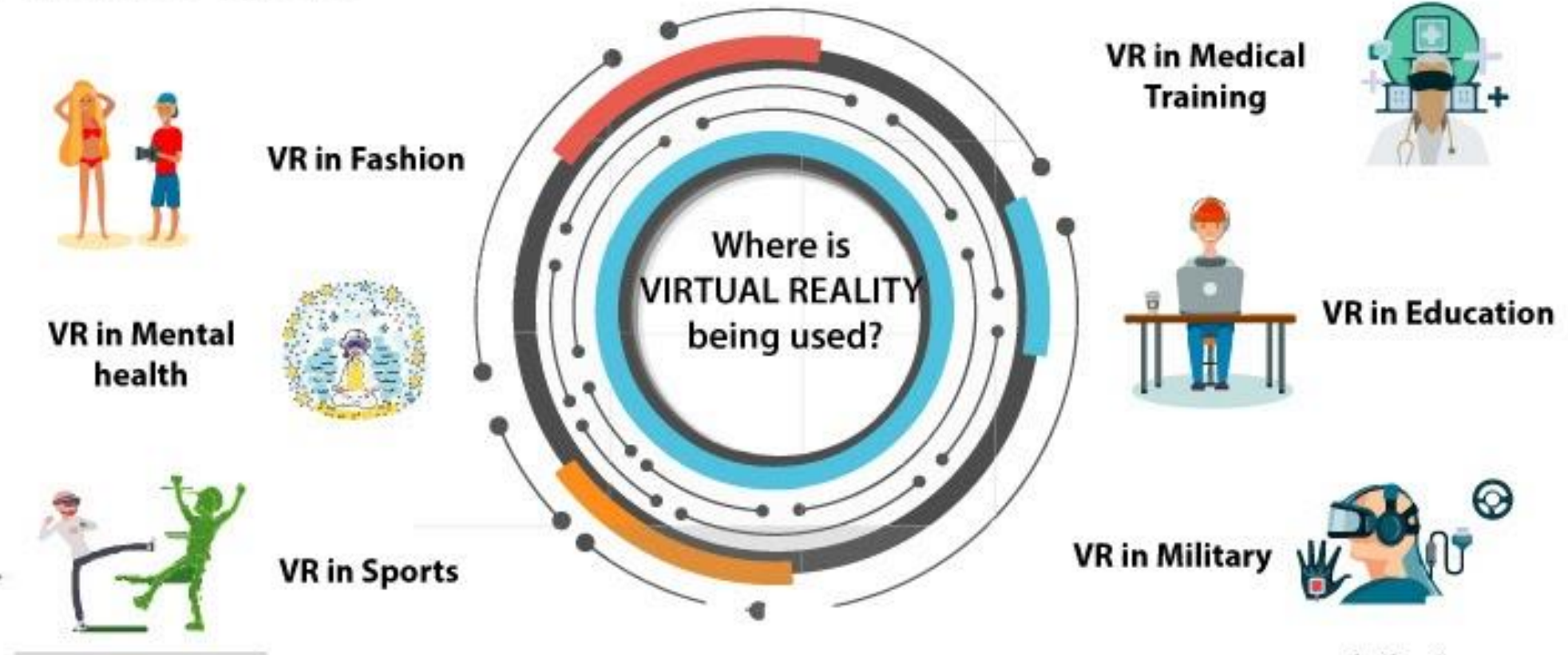
<https://www.iflscience.com/technology/how-build-virtual-reality-system-%E2%80%93-your-living-room/>

How to build a simple VR system?



<https://www.citrix.com/blogs/2016/12/13/keeping-it-real-unleashing-virtual-reality-within-the-enterprise-part-ii/#>

analytic Steps



www.analyticssteps.com

VR Applications in Industry 4.0

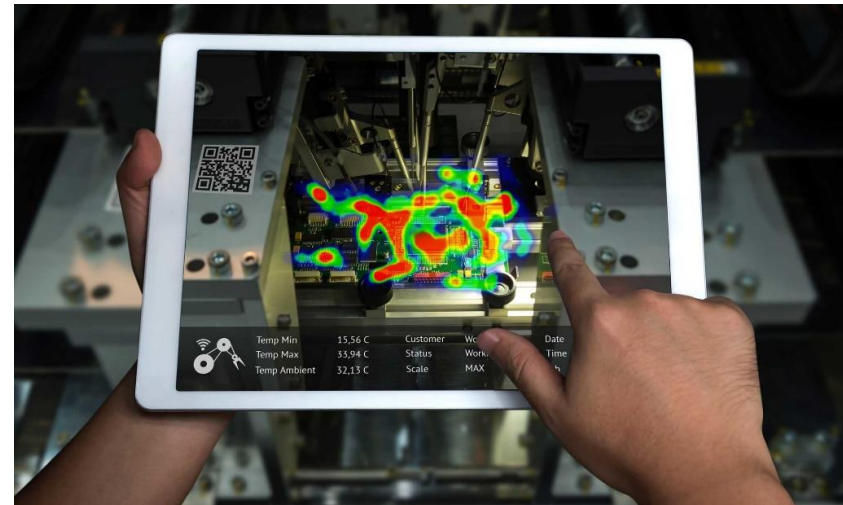
- › VR in Industrial Training
- › VR in Industrial Design
- › VR in Flexible Communication/Collaboration
- › VR in Factory Planning and Inspection



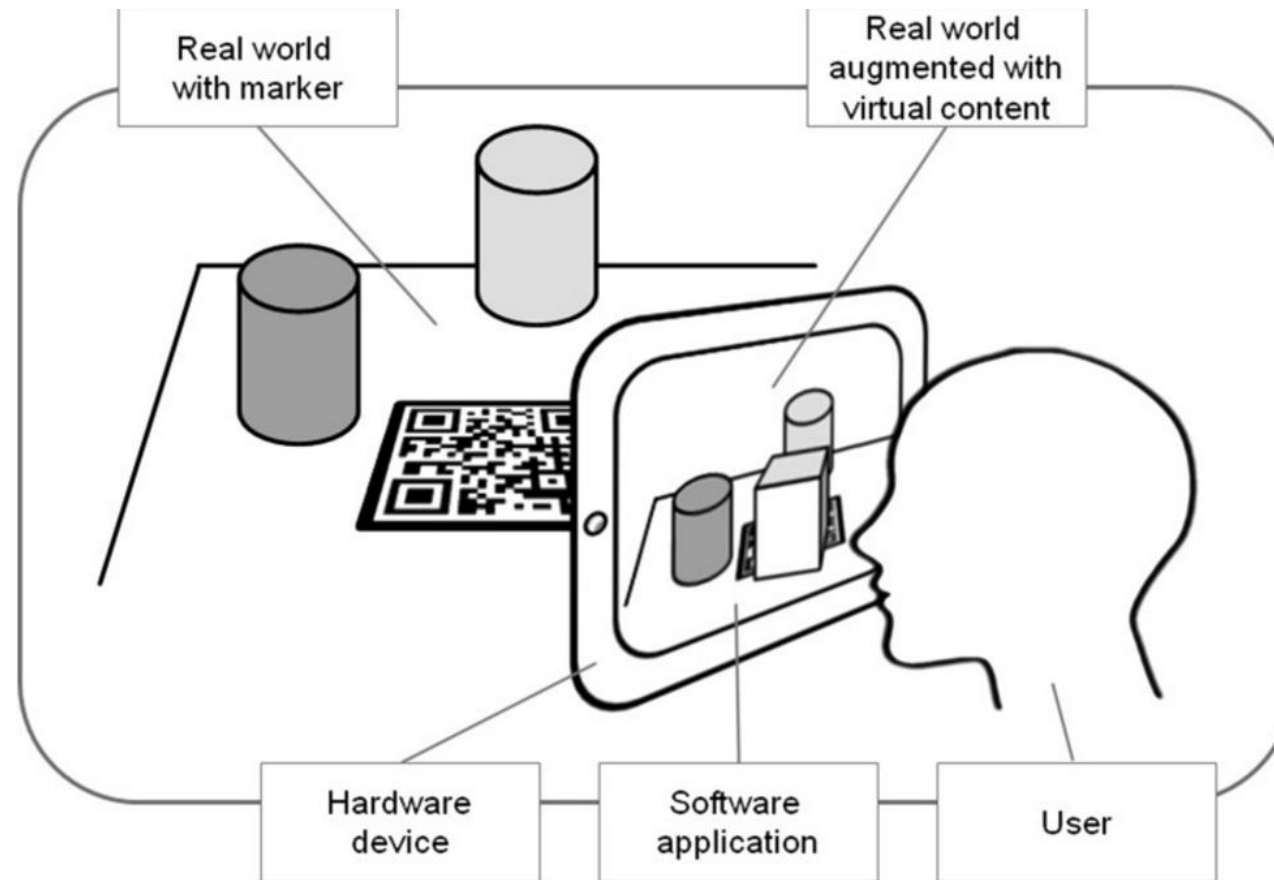
<https://www.xrtoday.com/virtual-reality/the-role-of-virtual-reality-in-industry-4-0/>

Augmented Reality and Industry 4.0

Augmented Reality

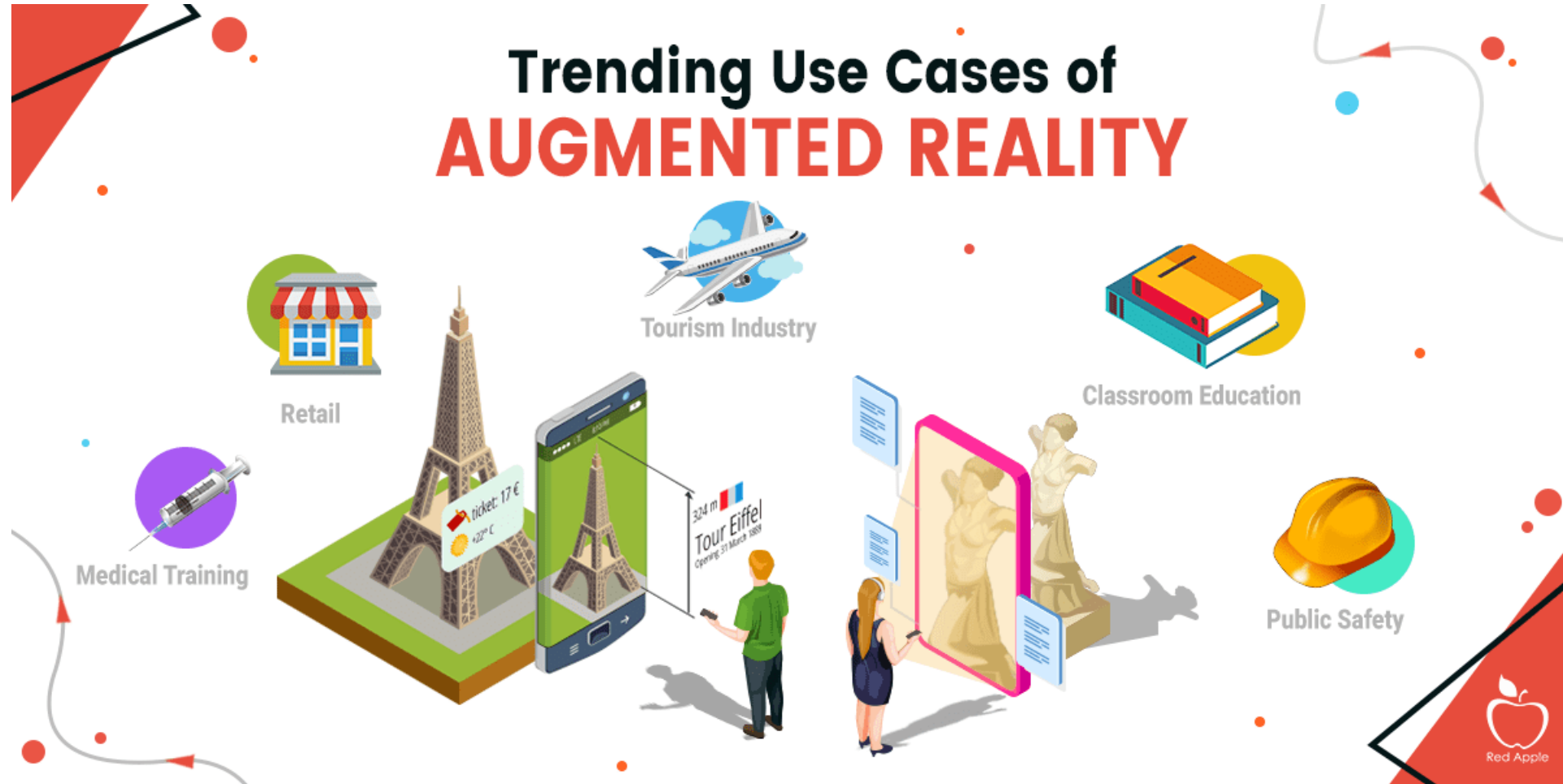


How to build a simple AR system?



<https://link.springer.com/article/10.1007/s40037-013-0107-7>

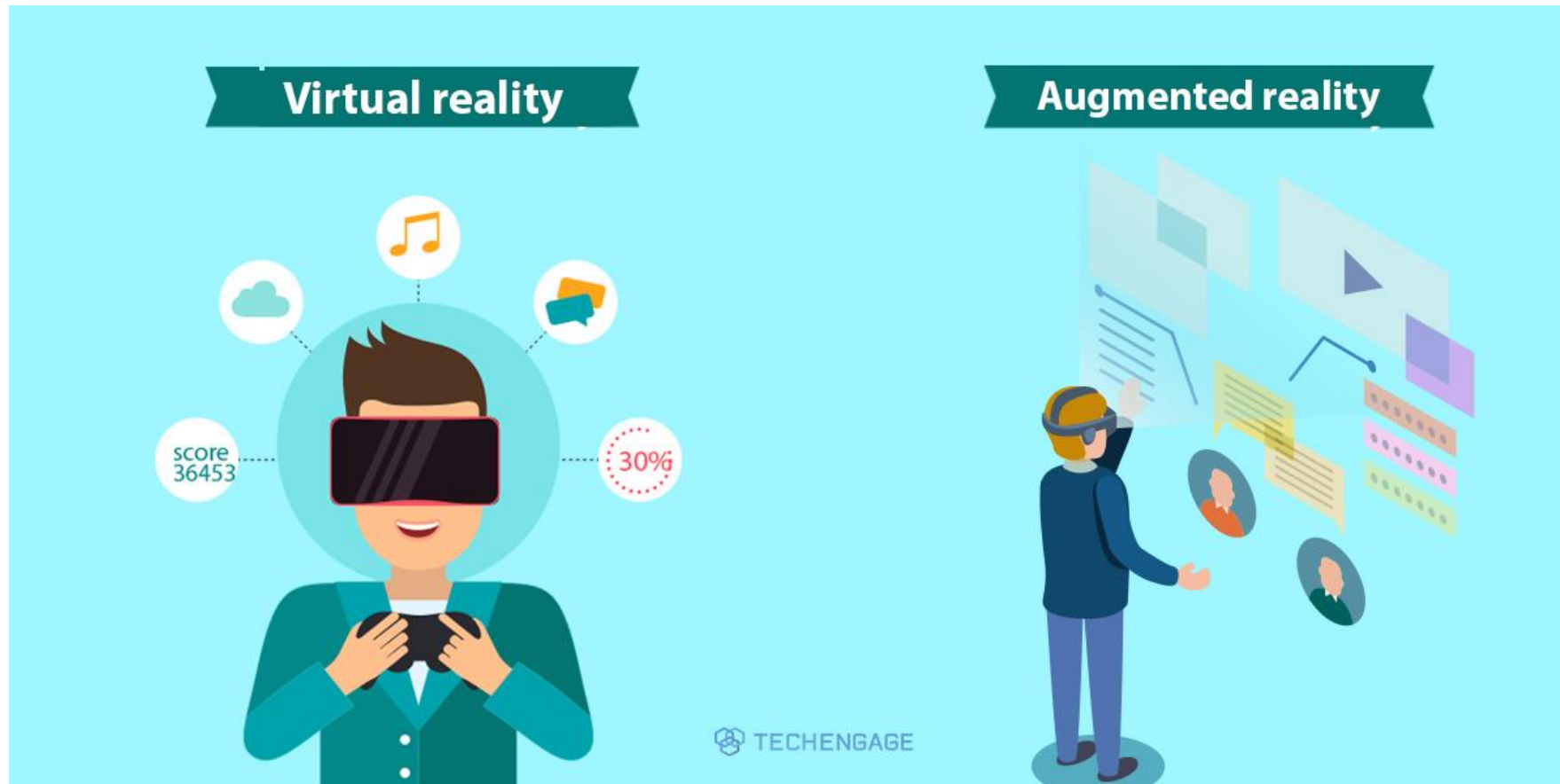
Trending Use Cases of **AUGMENTED REALITY**



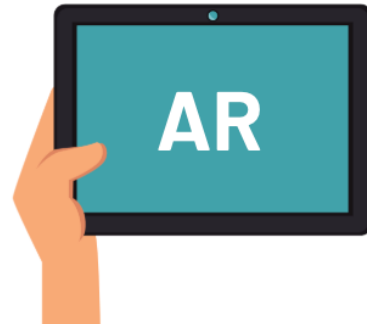
Virtual Reality vs Augmented Reality

What is Augmented Reality and Virtual Reality

What's the difference?



What is Augmented Reality and Virtual Reality

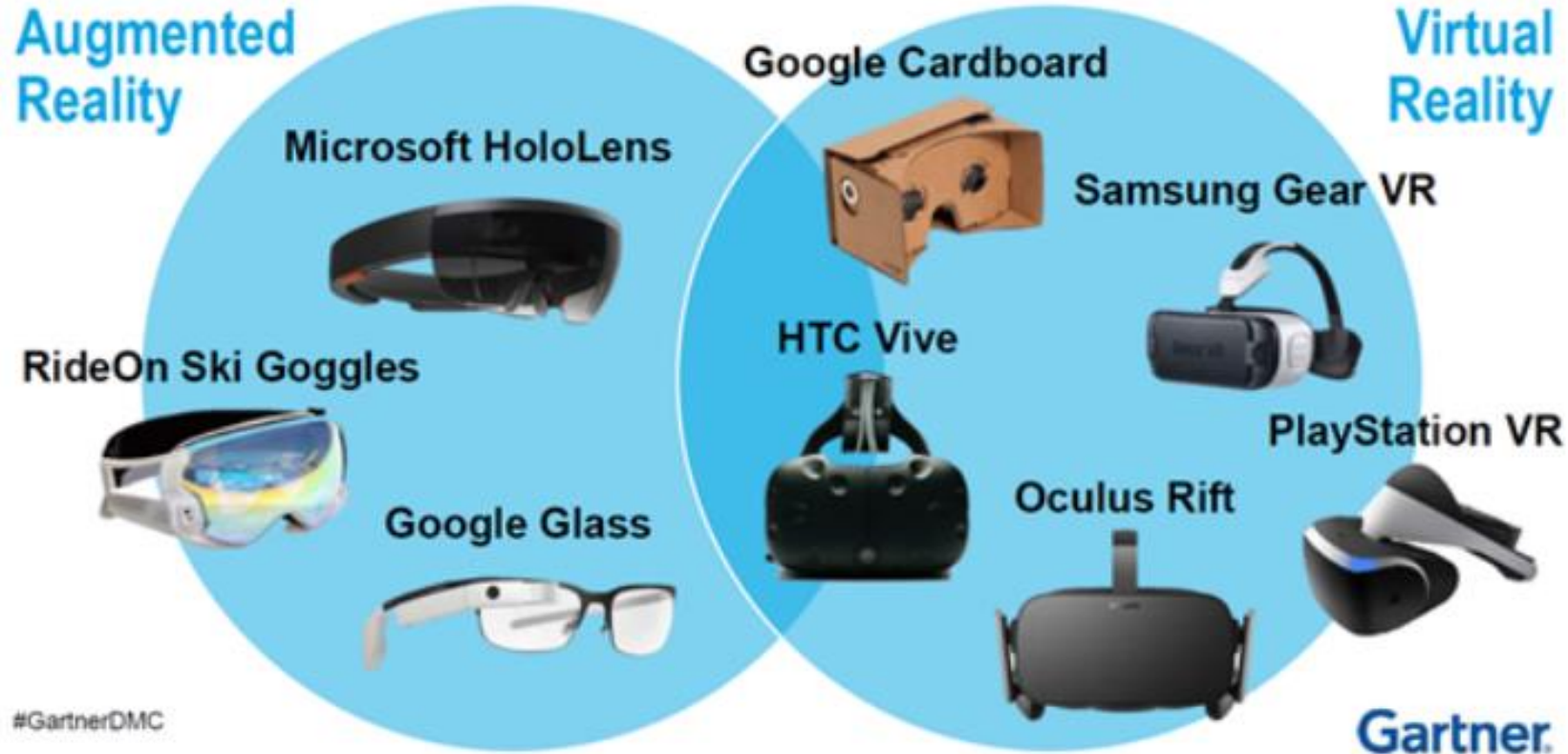


- User is immersed in a mix of the real world and a virtual world
- Interact with both worlds and clearly distinguish between them
- Uses a smartphone, tablet, or other mobile device

- User is immersed in an entirely virtual world
- Hard to differentiate between reality and virtual reality
- Uses head-mounted display or glasses



Hardware: AR vs VR

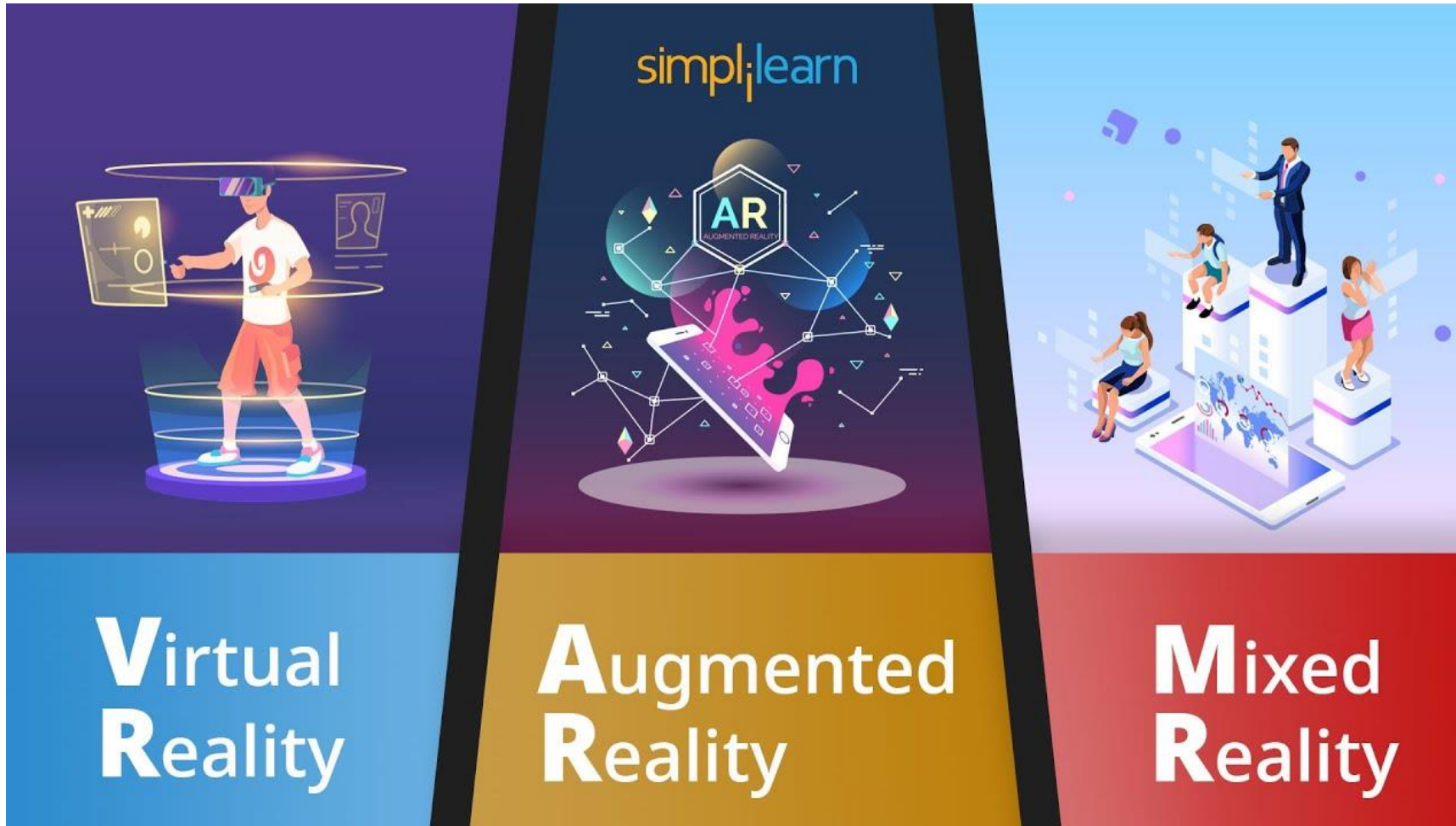


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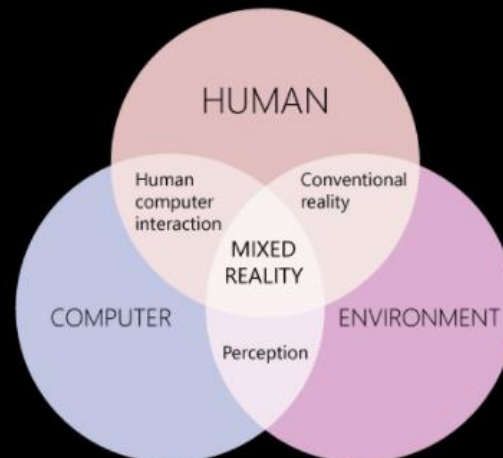
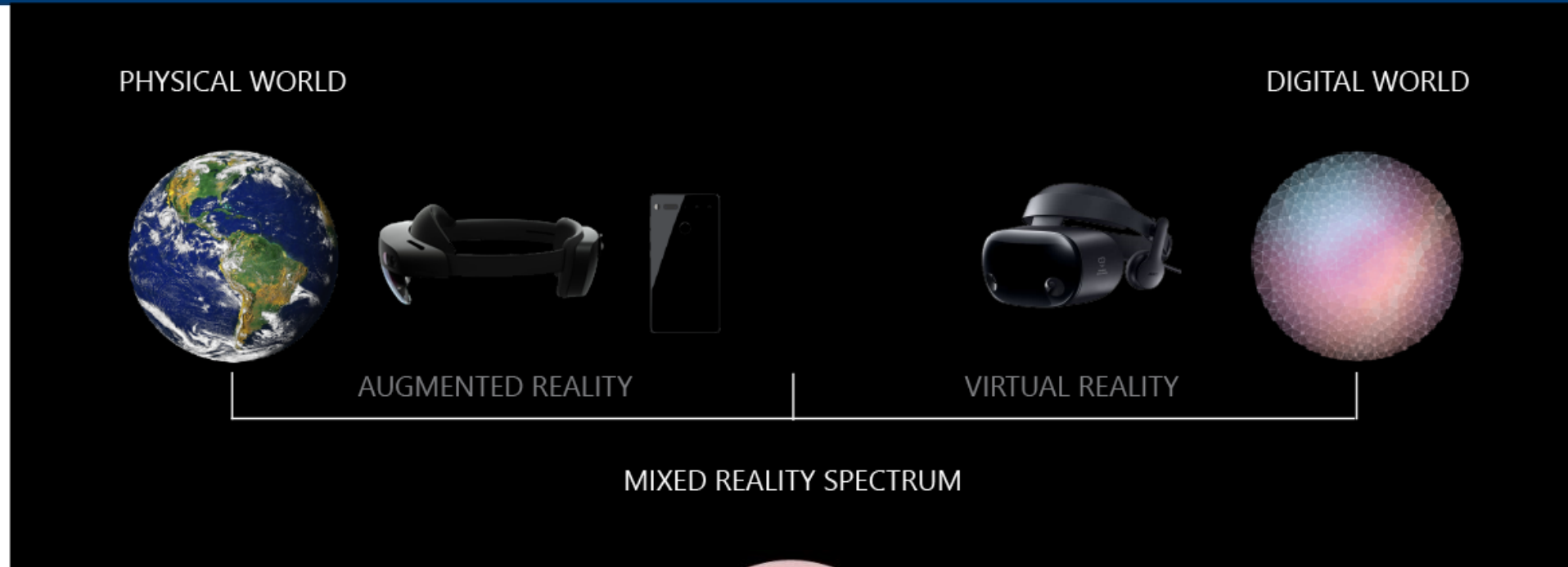
Gartner, "Hype Cycle for Consumer Services and Mobile Applications, 2015," 21 July 2015 (G00274100)

Mixed Reality and Augmented Virtuality

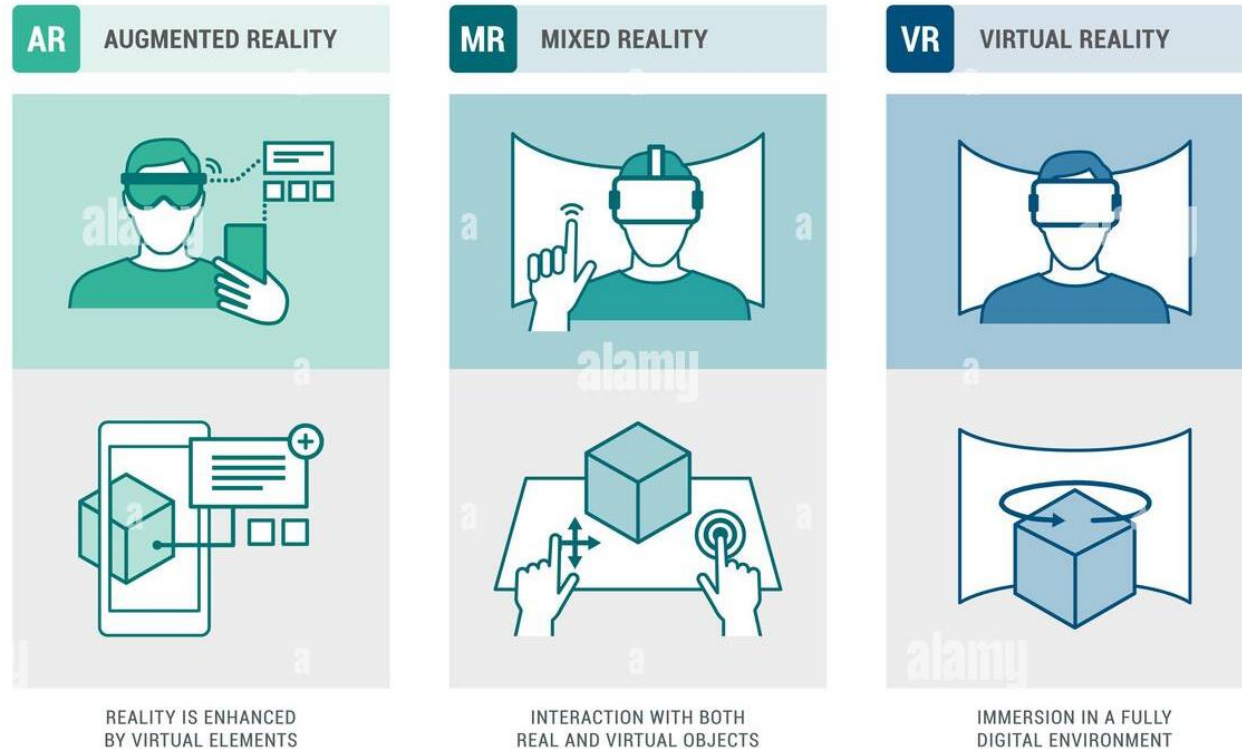
Mixed Reality!



Mixed Reality!



AR vs VR vs MR

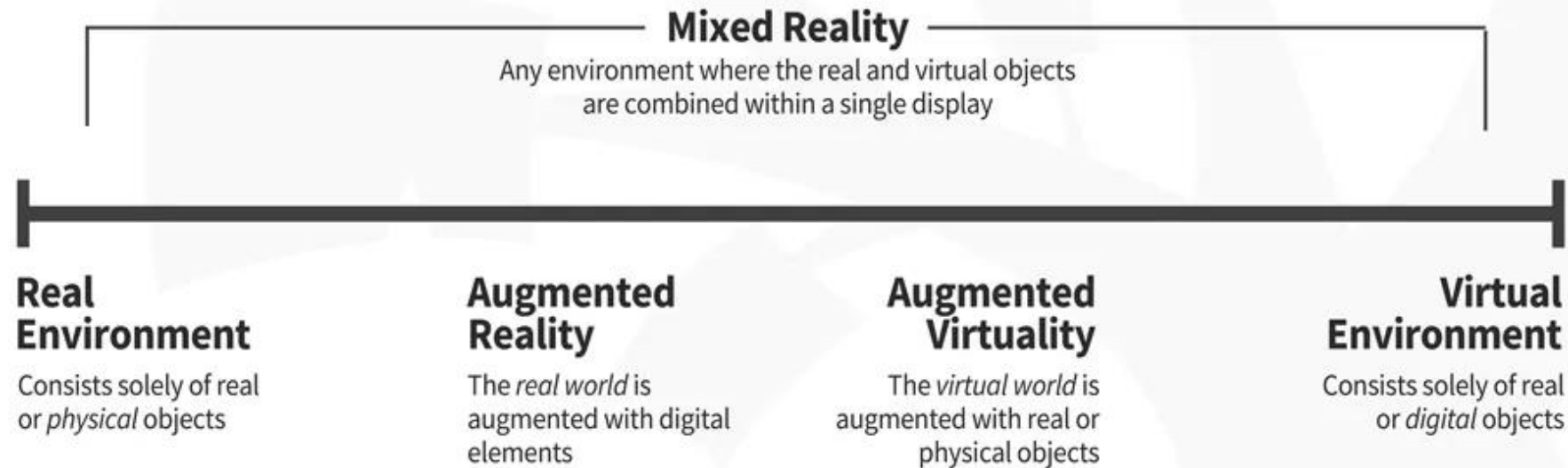


alamy

Image ID: 2ATDY6D
www.alamy.com

<https://www.alamy.com/augmented-reality-mixed-reality-and-virtual-reality-infographic-user-interacting-with-devices-environments-and-objects-image342055461.html>

Augmented Virtuality



https://www.interaction-design.org/literature/article/beyond-ar-vs-vr-what-is-the-difference-between-ar-vs-mr-vs-vr-vs-xr?fbclid=IwAR13CFPMBI6Z8LXetIQnsBSdUU6_6UK0sxHjL9mC_yWZID2zQiPjyurY9kg

Mixed Reality/Augmented Virtuality in Industry 4.0

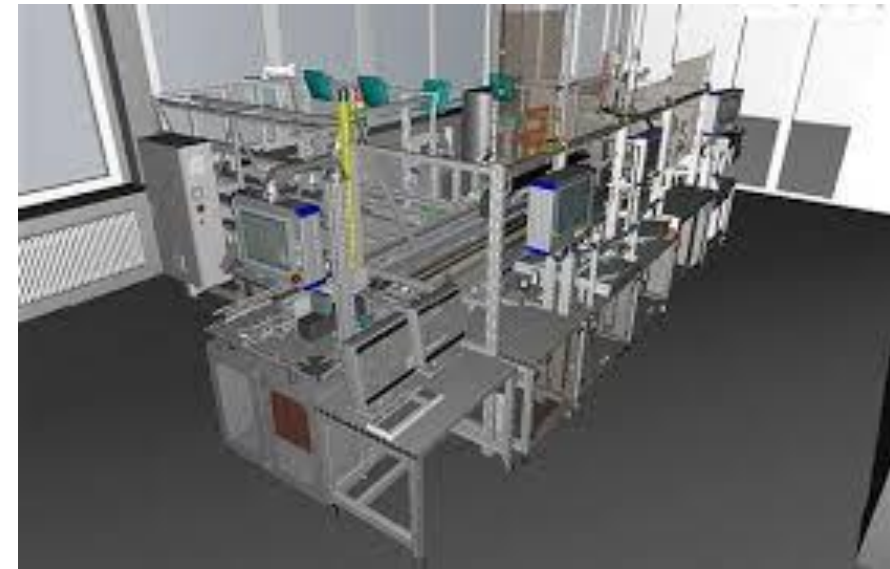
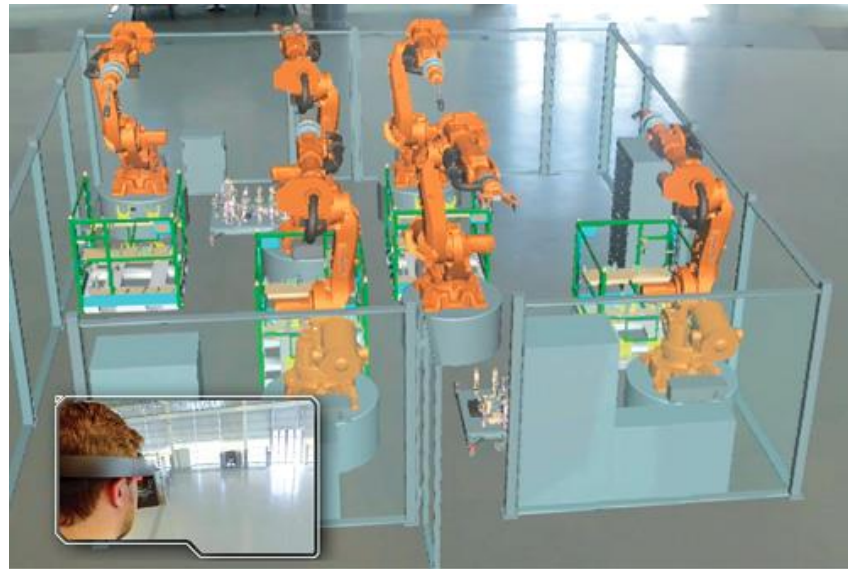
MR/AV in Automotive Industry

- › Enhance the initial design phase of a car
- › Automate automobile manufacturing stages
- › Automobile prototype discussion in the virtual world
- › Employees using MR for virtual training



MR/AV in Smart Manufacturing

- › Employee Training
- › Visual Sequencing
- › Quality Assurance
- › Production Control



MR/AV in Power Industry

- › Data generation
- › Inventory management
- › Employee Instruction
- › Efficient Utility Operation
- › Improved Customer Service



<https://energycentral.com/o/trimble/free-demand-webcast-augmented-reality-utilities-here>

MR/AV in Mining Industry

- › Increased safety
- › Real-life testing technology
- › Data Collection and Visualization
- › Equipment Maintenance



<https://www.bbntimes.com/technology/how-virtual-augmented-reality-are-revolutionizing-the-mining-industry>

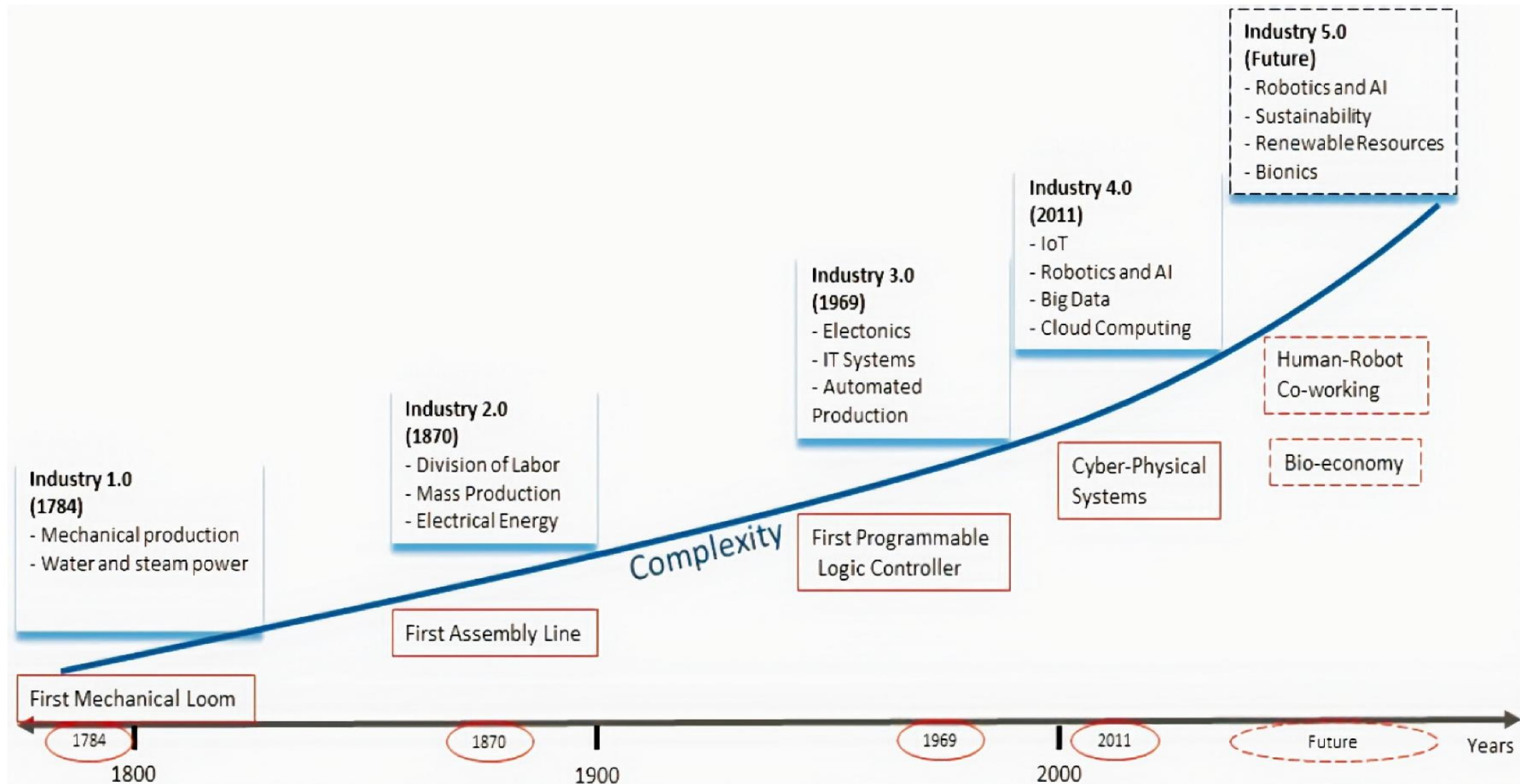
MR/AV in Healthcare Industry

- › Remote Visitation
- › Virtual Operating Theaters
- › **Instant diagnoses**
- › Efficient Medical training
- › **Enhanced surgery**

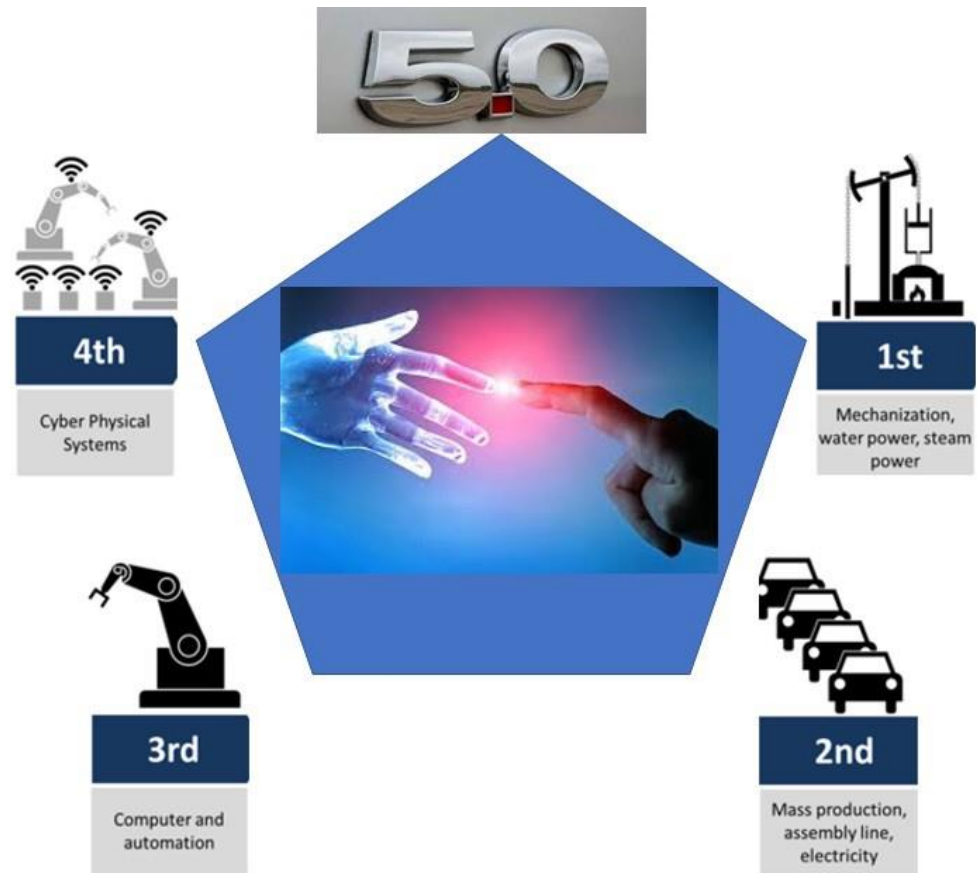


What's Beyond Industry 4.0?

Transition from Industry 4.0 to 5.0

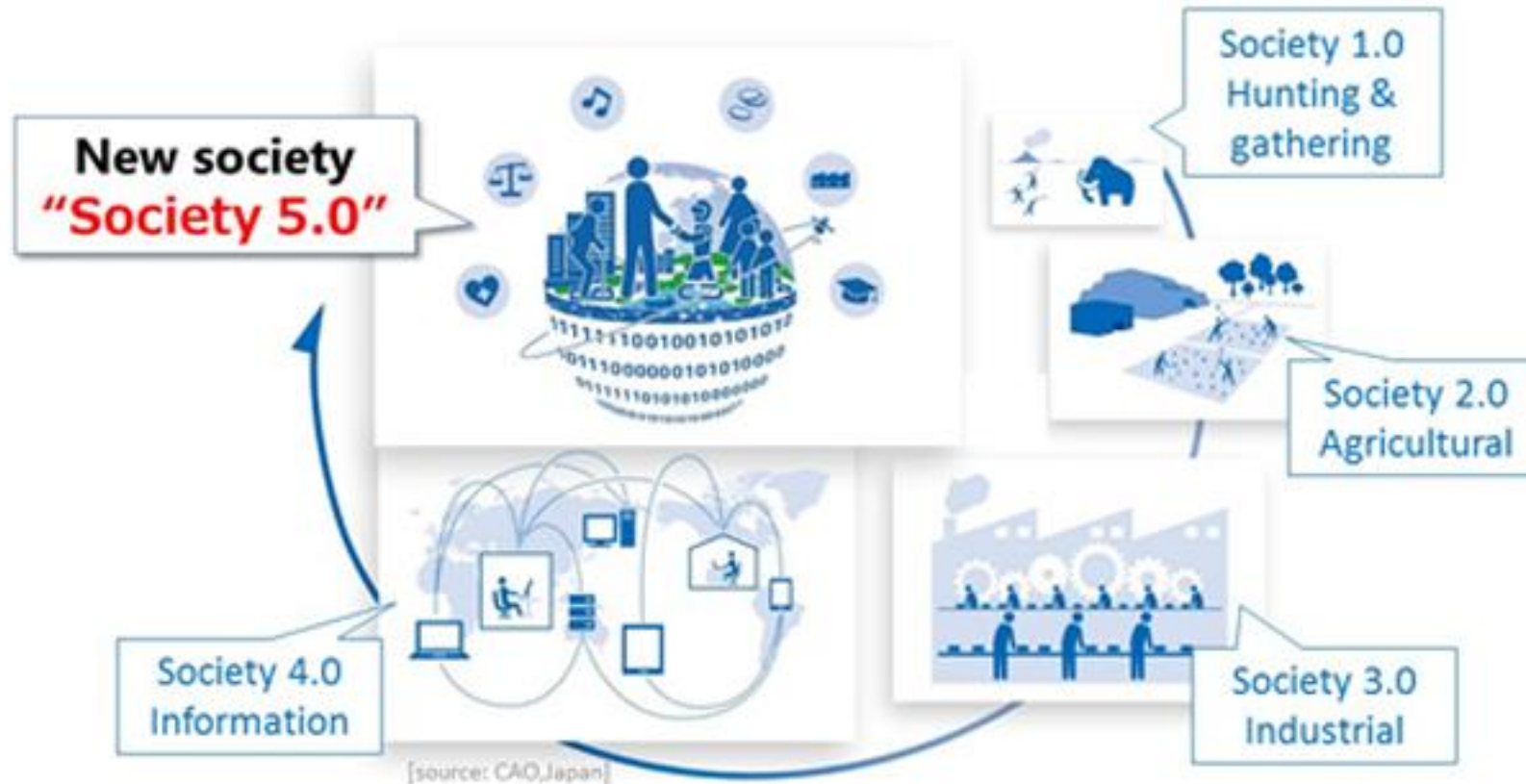


Industry 5.0



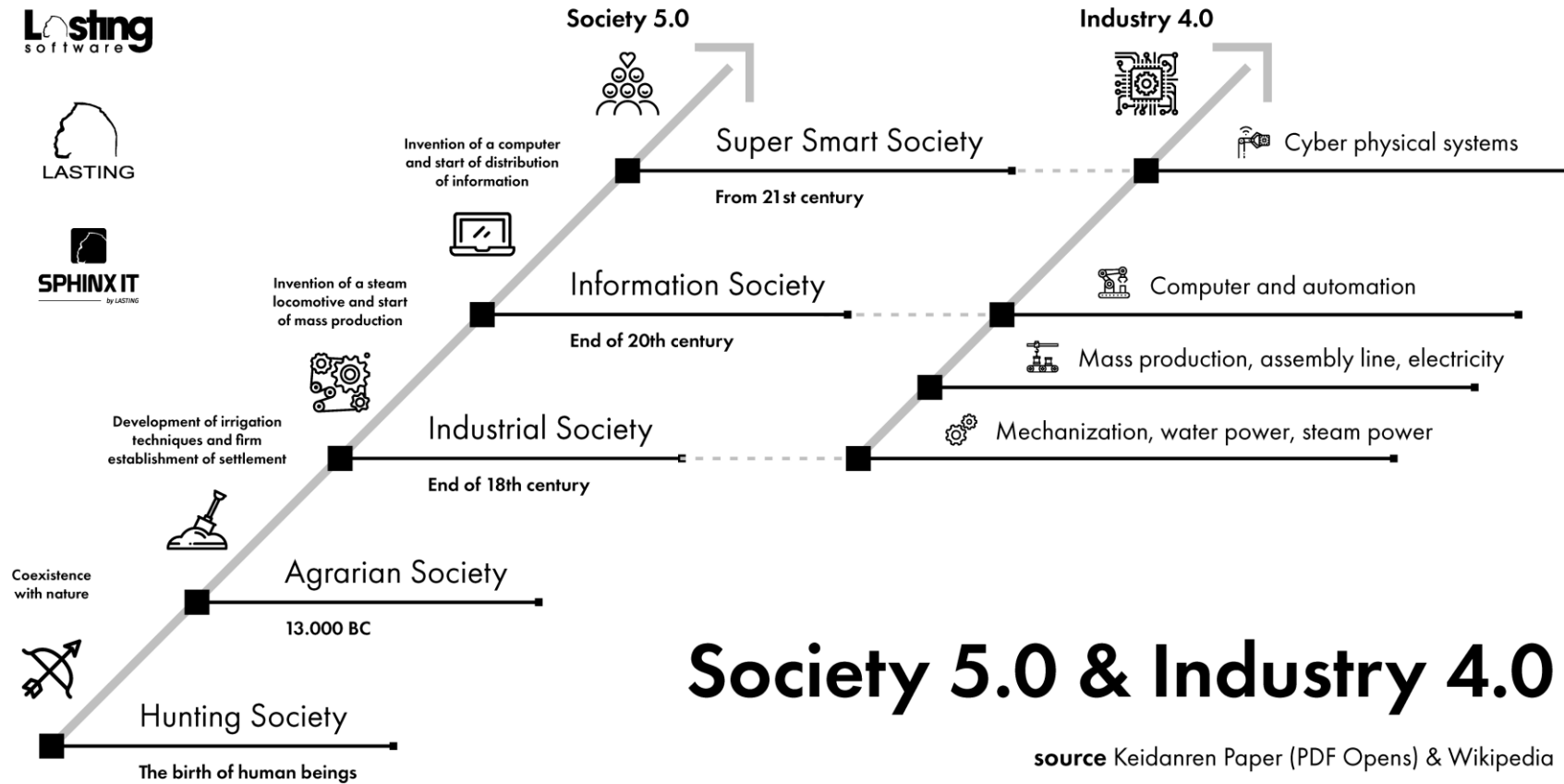
<https://michael-rada.medium.com/industry-5-0-definition-6a2f9922dc48>

Society 5.0



[Society 5.0 \(cao.go.jp\)](http://cao.go.jp)

Society 5.0 and Industry 4.0- “Connected”



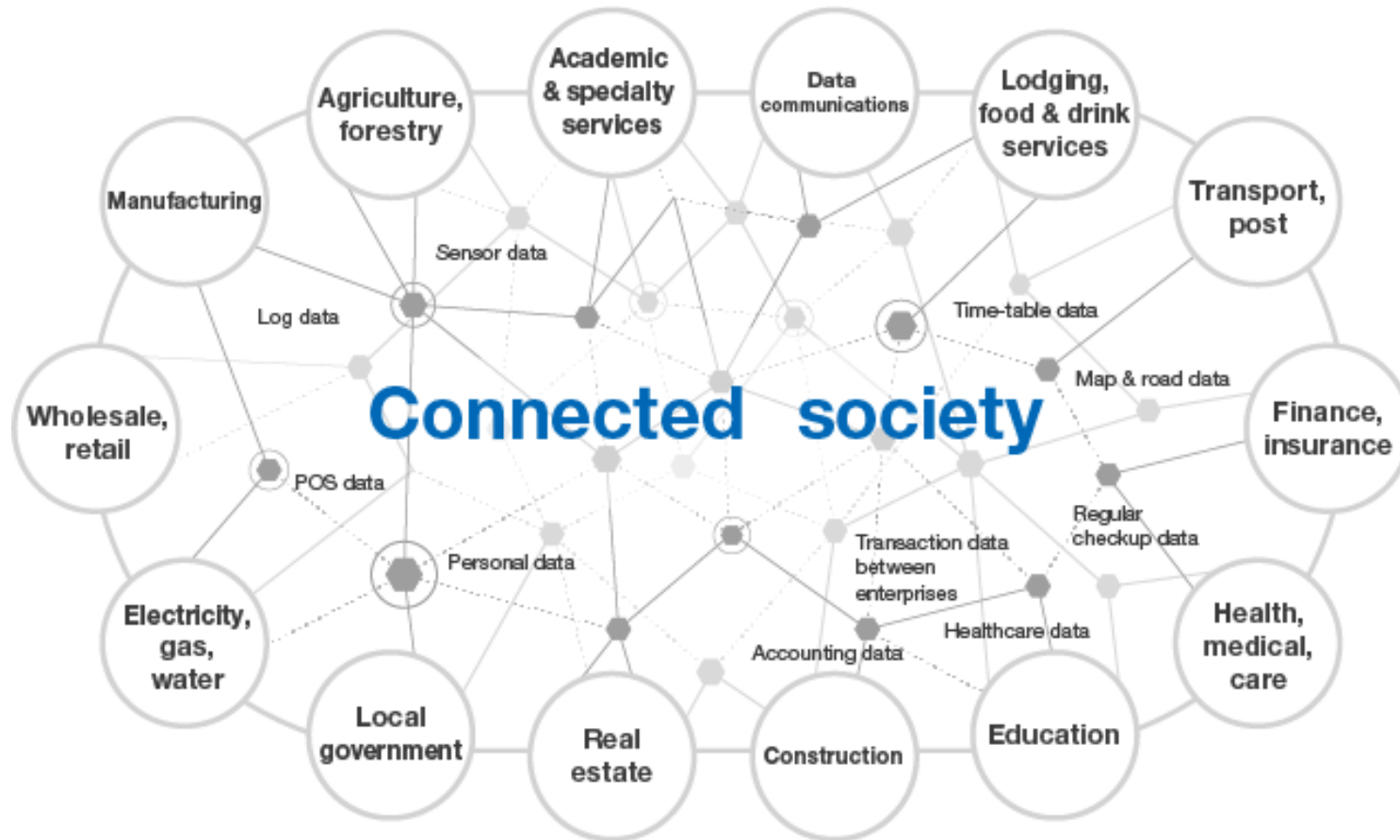
Society 5.0 & Industry 4.0

source Keidanren Paper (PDF Opens) & Wikipedia

<https://www.japanindustrynews.com/2017/08/japans-society-5-0-going-beyond-industry-4-0/>

Summary

Summary



<https://www.hitachi.co.jp/products/social/society5/en/business-opportunities/index.html>

<https://mytoastlife.com/here-are-5-ways-virtual-reality-could-positively-impact-society/>

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Industry Automation, Industry 4.0 and Smart Factories

Presented by
Dr. Ali Marzoughi - EIT Lecturer

11:00AM - 12:00PM (AWST)
Wednesday 29 June, 2022

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Presented by
Mr. Greg Sevel, Sentient Computing

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Thursday 21 July, 2022

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Q&A

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