



Metaverse: Introduction and Use-Cases



SUPSI – APM Ticino

20 November 2024, Lugano Viganello



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The Metaverse

What it is and what it isn't (yet)



What is the Metaverse?

A virtual, shared space enabled by technologies such as virtual/augmented/mixed reality, and persistent online (“always-on”) environments. It represents a convergence of physical and digital experiences.

*Is The Metaverse The Next
Iteration Of The Internet?*



What is the Metaverse?

- Key features: Persistence, Openness, Immersivity, Mobility, Interactivity.
- Applications: gaming, virtual events, immersive entertainment, training, education, real-time virtual expert assistance, augmented life, virtual tourism, better collaboration, more efficient R&D and prototyping, new retail experience, virtual fashion, virtual real estate, ...





Technologies powering the Metaverse

- VR/AR/MR devices: immersion and interaction.
- Blockchain: ownership, digital assets, decentralized governance.
- AI: smart NPCs, automated world-building, personalization.
 - GenAI helps filling empty spaces to avoid the metadesert.
- 5G/cloud computing: scalability and real-time connectivity.





What the Metaverse is NOT (yet)

- Not a singular, fully interconnected platform (no “one metaverse”).
- Lacks universal standards/protocols for interoperability between platforms.
- Immersive access remains niche (expensive, limited content).
- No mature regulatory framework to address safety, privacy, and ethics.
 - Concerns over data privacy, user profiling, moderation, and inclusivity.





What the Metaverse could become

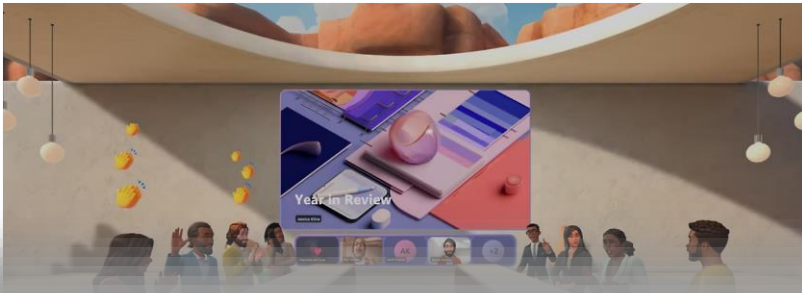
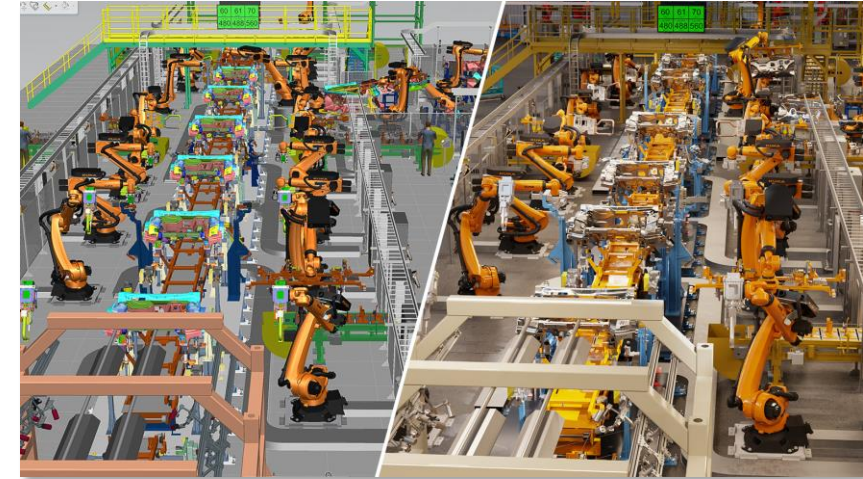
- Unified virtual worlds: seamless movement between digital spaces (interoperability).
- Economic system: decentralized ownership and tokenized economies (blockchain).
- Enhanced collaboration: bridging remote physical gaps in work, education, and healthcare.
- Blended realities: enhanced integration of AR/MR into everyday life.





Types of Metaverses today

- Industrial Metaverse: enhancing operations, manufacturing, and logistics.
 - Use cases: digital twins, predictive maintenance, real-time data visualization and monitoring.
 - Examples: Siemens Xcelerator, Industry 4.0, NVIDIA Omniverse, **V-Cockpit**.



- Business Metaverse: virtual workspaces, remote collaboration.
 - Use cases: virtual meetings, immersive training, co-creation platforms.
 - Examples: Meta's Horizon workrooms, Microsoft Mesh, **V-Cockpit**.

“The Industrial Metaverse will be a place where we innovate at the speed of software”

Roland Busch, Siemens CEO



Types of Metaverses today (cont.)

- Social/Entertainment Metaverse: gaming, social interaction, media consumption.
 - Use cases: virtual concerts, online communities, immersive gaming.
 - Examples: Roblox, Fortnite, Decentraland.



- Educational Metaverse: learning in simulated environments.
 - Use cases: virtual classrooms, skill simulations, XR-driven training.
 - Examples: **V-Machina**.



(Temporary) conclusion

- The metaverse is evolving and multifaceted, with its full potential yet to be realized.
 - “It’s a marathon not a sprint”.
 - Mark Zuckerberg said he will need 10 years (2 years ago).
- Current forms like industrial and business metaverses already add value.
- Future success depends on innovation, collaboration, and addressing challenges.



Two example use-cases

Metaverses in practice

V-Machina

- Integration of VR-based simulation for the safe interaction and practice of students and workers with machinery and robots.
- In collaboration with CEA, LS Group, Festo Didactics, RISE, AGIE Charmilles, TTB Engineering.
- Funding scheme: H2020 EIT Manufacturing
- Tech used: Unity 3D, Interact X3D, motion capture, data science for human behavior, digital twin

<https://v-machina.supsi.ch/>



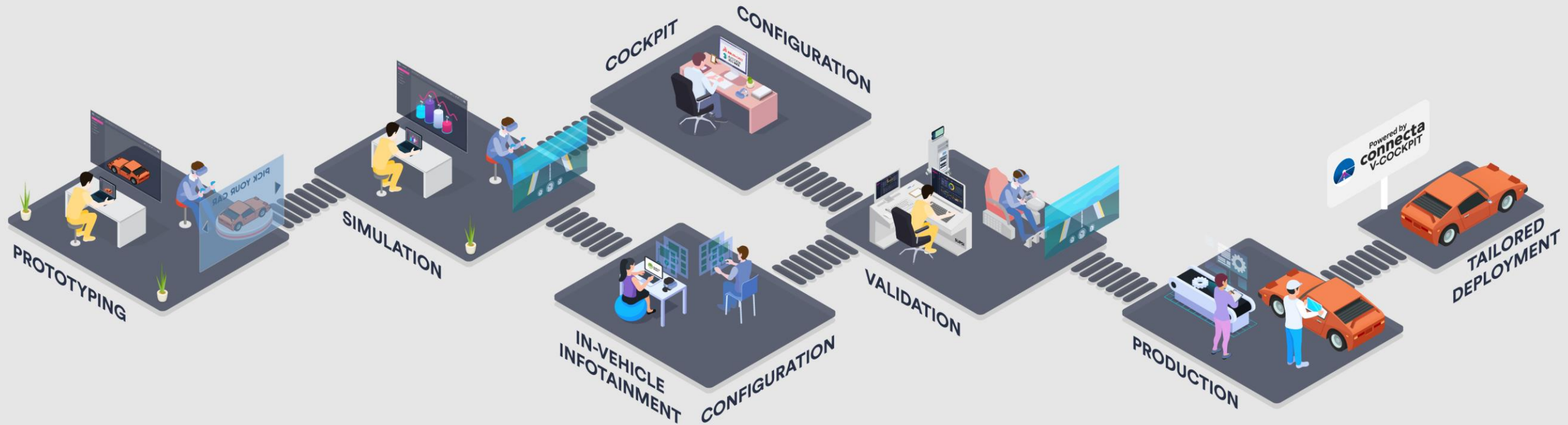
V-Cockpit

- Shifting the design, testing, and validation of car infotainment systems from the physical world to VR by also integrating real/simulated hardware and behavioral analysis algorithms to reach optimal ergonomics at reduced costs.
- In collaboration with Connecta Automotive.
- Funding scheme: Innosuisse Innovation project
- Tech used: Unity 3D, VR, motion capture, data science for human behavior, digital twin, cloud computing, web development

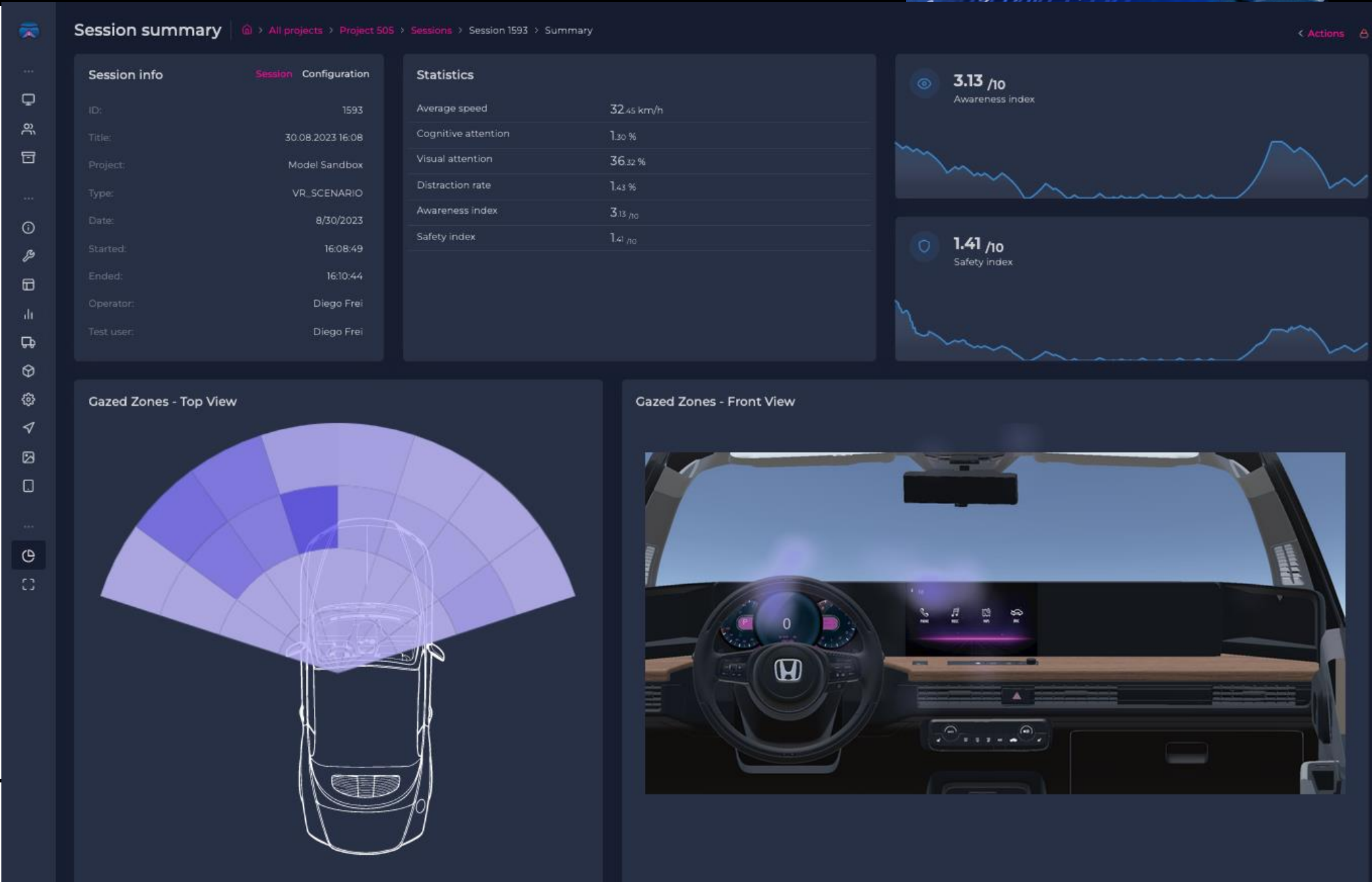




V-Cockpit: journey



V-Cockpit: analytics



V-Cockpit: analytics

Session Information

Title:	Nicholas FT (2/3)
Project:	Analytics session
Type:	VR_SCENARIO
Date:	9/19/2023
Started:	08:49:19
Ended:	08:51:28
Operator:	Diego Frei
Test user:	Nicholas Sala

Scenario

Phone call 2/2 (ST)

Guided scenario with:

- Reach a cruise speed
- Make a phone call

Preparing scenario

Currently gazing: **COCKPIT**

Speed: - km/h

Awareness: -

Timeline

Zoom: + - 🔍 ⚙️

Scenario Task: [end] 31.44s, Duration: 31.44s, Task: Reach the speed of 40Km/h

Call

Continue driving

IVI Interaction

Speed

Heart rate

Gaze

Gaze outside

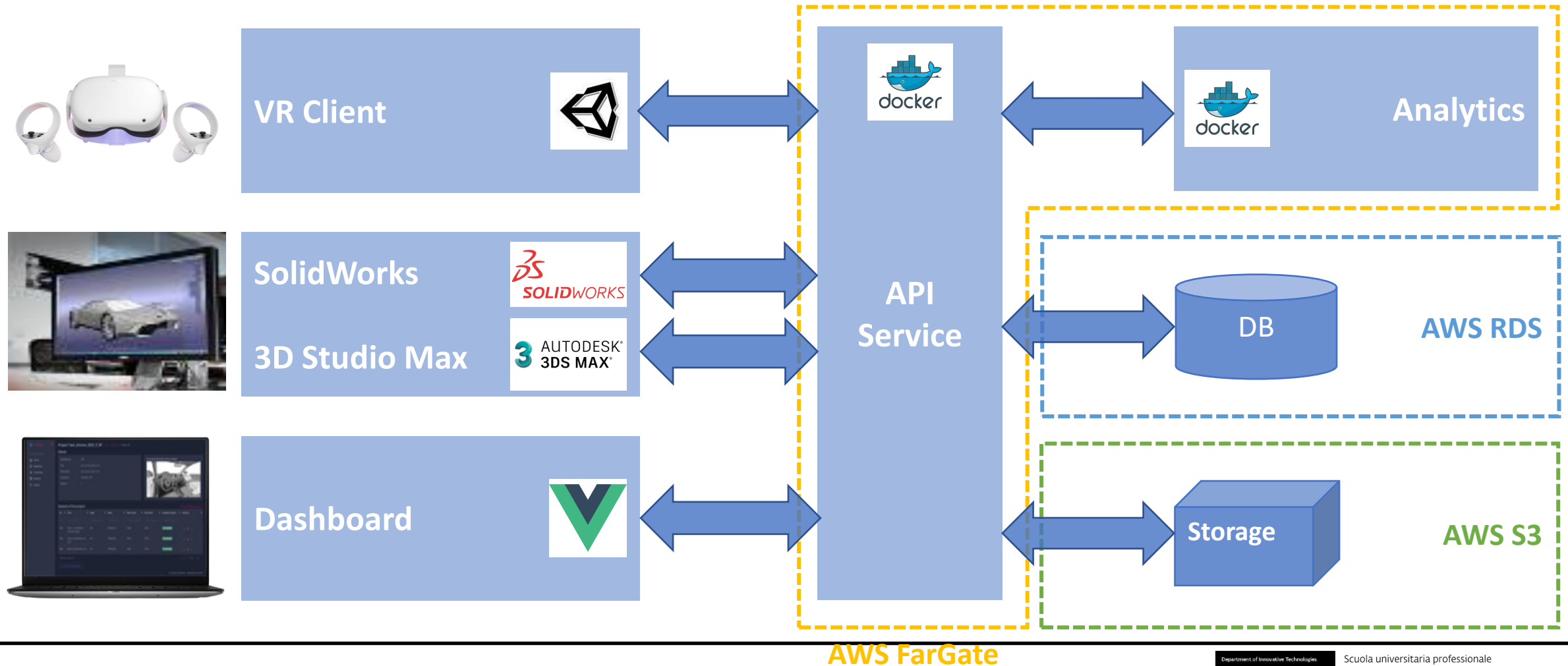
Gaze inside

Awareness

Safety



V-Cockpit: architecture







Thank you for your attention!

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