



Horizon 2020
Programme

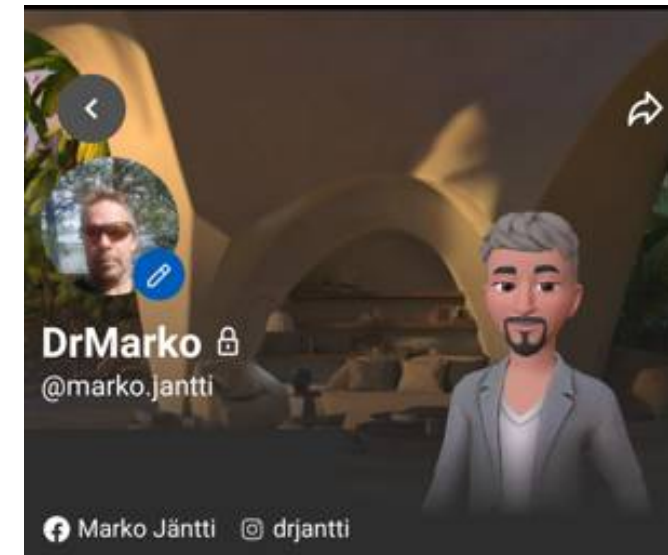


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Towards Virtual Job Onboarding Environment with XR technology: Case Motoajo

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Leverage from
the EU
2014–2020



1. Introduction

- Digital transformation projects, such as creating virtual collaboration spaces with Extended Reality (XR), require new types of skills and knowledge from software engineers.
- **Extended Reality**
 - Virtual Reality (VR)
 - Augmented Reality (AR)
 - Mixed Reality (MR)
- A **metaverse** is a collective virtual 3D shared space, created by the convergence of virtually enhanced physical and digital reality.¹

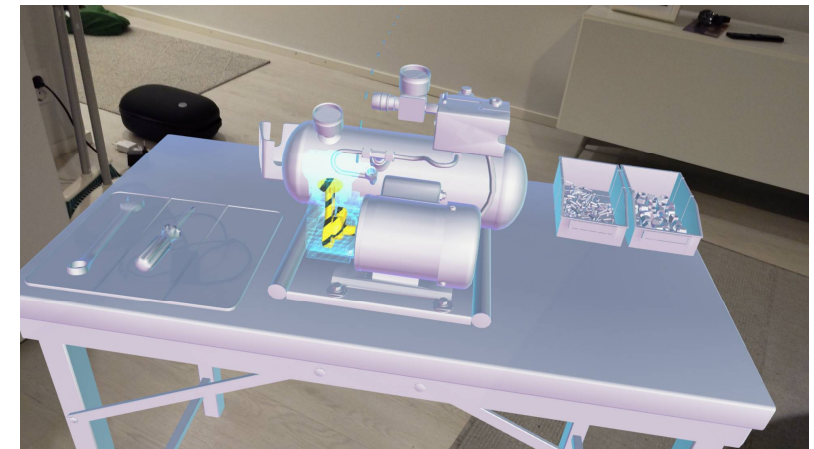
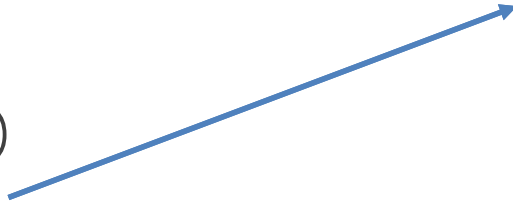


Figure: Microsoft Dynamics 365 Guides

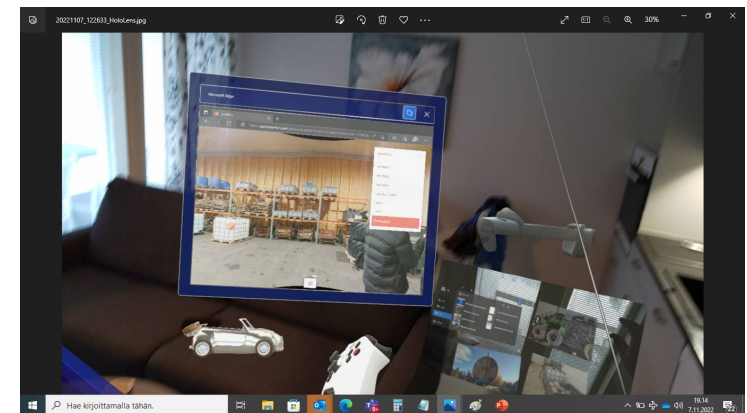


Figure: Microsoft Mesh

¹Gartner:<https://www.gartner.com/en/information-technology/glossary/metaverse>

1.1. What type of metaverse do you like?

- Microsoft Mesh
- Meta Horizon
- Shibaverse
- Spatial
- Roblox
- Others...?

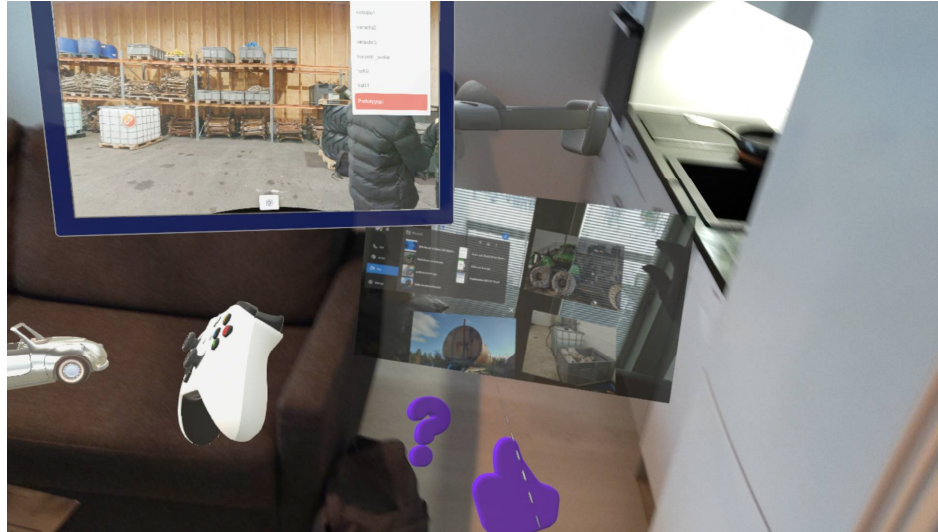


Figure: Microsoft Mesh



Figure: Oculus Venues (now Horizon Worlds)

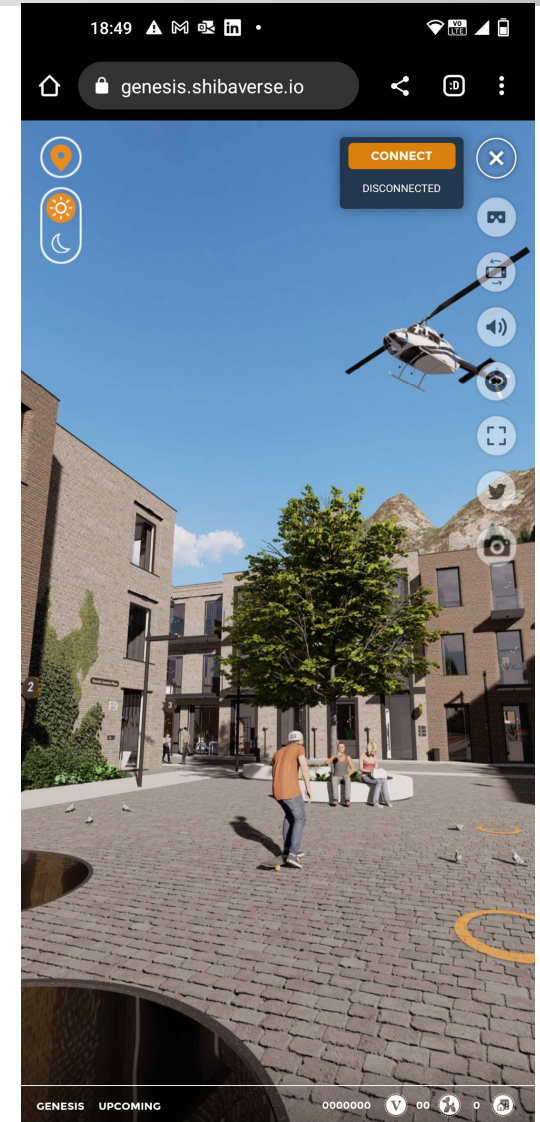
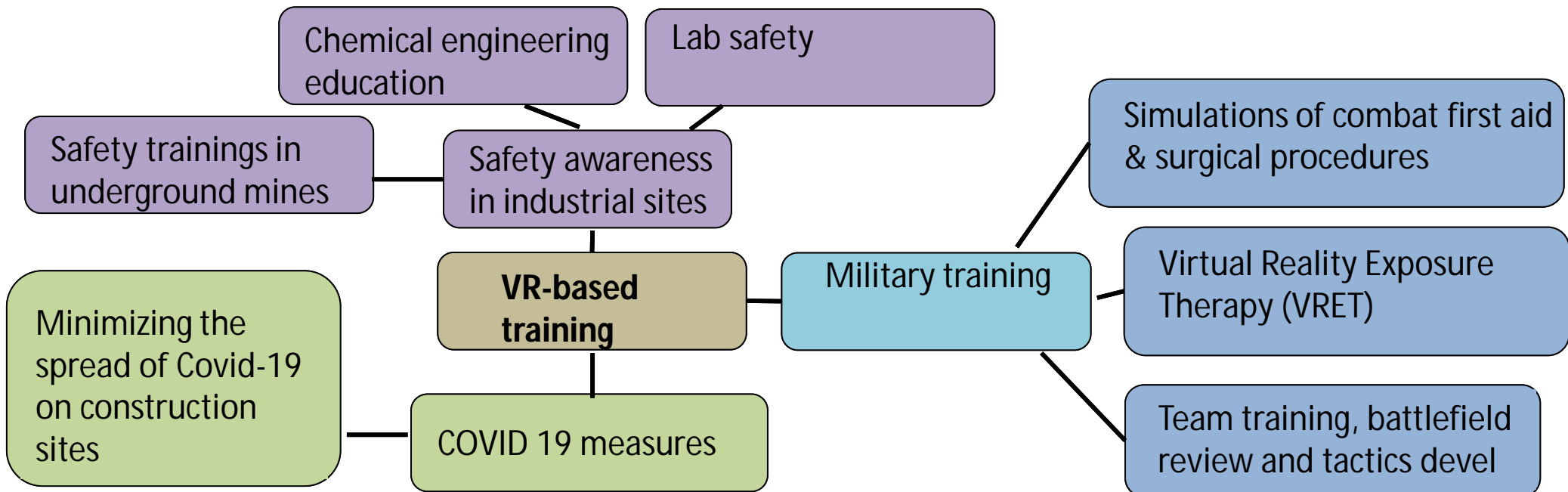


Figure: Shibaverse

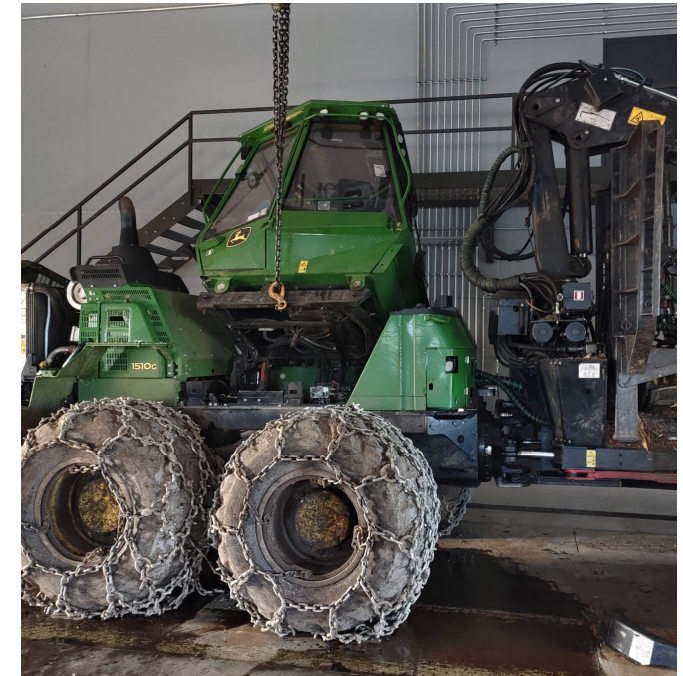
1.2. Virtual learning / training

- Digital transformation is changing the way how organizations are training their employees, partners and end-users.
 - An increasing number of training events is organized in virtual learning platforms instead of traditional classrooms.
 - The job onboarding is a business process where quality of training and introduction plays a critical role.
- Previous research on VR-based training and learning shows various use cases:



3. Case Virtual Job Onboarding

- **Two research questions:**
 1. What are the **benefits** of virtual onboarding from employees' viewpoint?
 2. What types of **challenges** exist in creating virtual job onboarding environments?
- **Case organization:** Motoajo Oy (SME) is a family-owned professional forestry contractor company with around 70 employees.
- **Location:** Nurmes, Eastern Finland
- Motoajo pays a lot of attention to environmental aspects in forestry operations
- Quality standards guide the operations
- Job onboarding is important for Motoajo because
 - it is effective way to increase productivity of employees
 - it is directly linked to occupational safety



2.2. Data collection

- The data collection for the study was performed by Arctic Data Intelligence Digital Innovation Hub:
 - **Documentation:** Quality manual, experiment handbook, 3D model import guidelines document
 - **Archival records:** Job onboarding material in Google forms, video scenarios from a foreman
 - **Interviews/discussions:** Focused interview with CEO (February 9th, 2022, 30 min), discussions with virtual space providers
 - **Participative observation:** Field visits in Motoajo's storage, participation in digital experiment work meetings, Towards digital and sustainable forestry webinar (Youtube)
 - **Direct observation:** Observations during the field visit in logging destination, how a forest machine driver operates in the forest, how fuel container has been placed on the logging site.
 - **Physical artifacts:** Matterport 3D models, plastic IBC containers, recycling containers



3. Results: Design & Implementation of a virtual job onboarding environment

- Three phases of service engineering:
 1. Service design
 2. Service implementation
 3. Testing and evaluating the service



3.1 Service design

- Service design started with a site visit to Motoajo's storage
- Design activities included
 - Implementation of IoT based monitoring system for forestry liquids including Tekelek tank level sensors
 - Development of mobile app (managing refilling process, monitoring liquid levels, alerts on critical levels)
 - Creating first draft of the virtual job introduction environment by using 360 viewer Lapentor
 - Creating 3D models of the storage
 - Recording videos for hotspots both in logging destination and in storage



3.1. Service Design

Narratives related to benefits of virtual learning environment:

- "We have been thinking forest machine -related job onboarding. The forest side is even more important for **productivity** than recycling-related job onboarding."
- "This job onboarding system could be **sold to any other domain**, not only for forest domain."
- "It would be great if a new employee would watch the job onboarding video material during the first working days. Then, he/she would be much **more prepared for work tasks**."
- "An employee can **watch videos and repeat them as many times** as needed."
- "Job onboarding needs to be well documented. It gives as a lot of **credibility**."
- " Previously, we have provided personal job onboarding. However, if the new employee is going to work in Vehmersalmi, it's a **long way to travel there to take care of job onboarding**."



3.2. Service implementation

- The prototype of virtual job introduction was created by using open source 360 virtual tour service Lapentor
- Video content was captured by using mobile phone and was later uploaded to Vimeo video sharing platform and embedded to Lapentor hotspots. →
- These videos dealt with several work scenarios, such as
 - sorting metal waste and oil canisters,
 - placing a warning sign for a logging site,
 - operating safely with liquids and maintenance of a fuel pump.→
- Transition from a 360 environment to a virtual collaboration space
 - 3D models captured by Matterport
 - A virtual reality storage was implemented with Glue Collaboration by importing custom 3D models



A virtual job onboarding environment in Lapentor



3.3. Testing and Evaluating Service

- Our aim was to create a digital twin of an IBC container that would provide realistic real time data on the liquid levels.
- Creating a digital twin required a significant amount of work effort such as
 - purchasing, installing and configuring sensors,
 - setting up IoT dashboards,
 - creating a mobile app for retrieving data on container refilling events
- Development of real time liquids monitoring system and integrating data to the job onboarding system required more SE expertise than XR engineering.
- The virtual job onboarding system was presented to the case organization multiple times.
- Foreman of the case organization used both laptop and Oculus Quest 2 VR glasses.

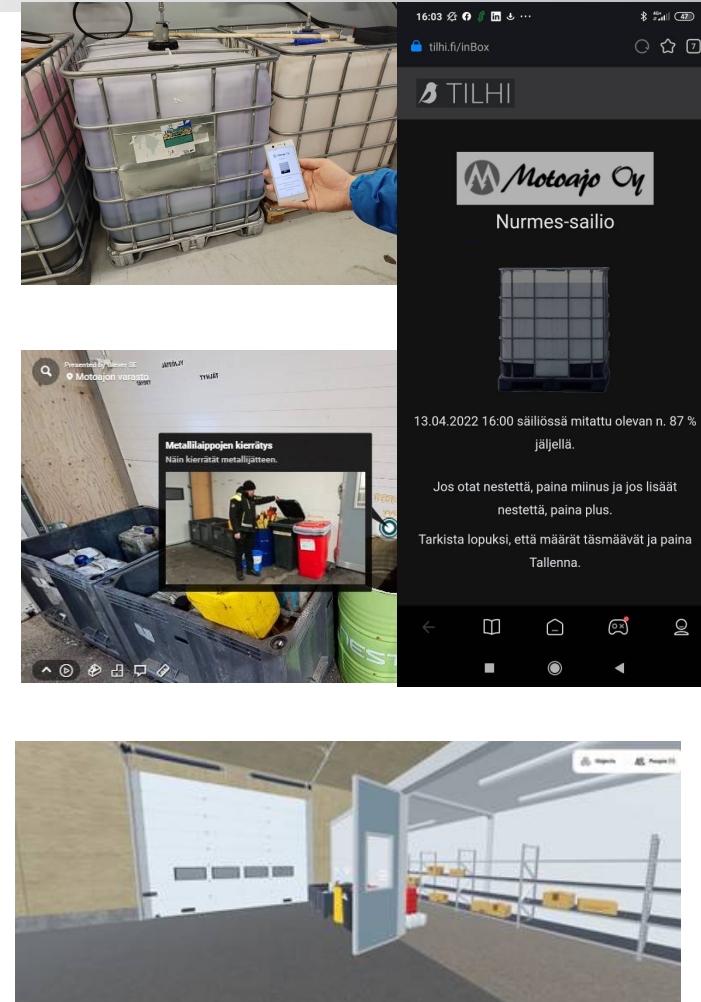


Figure: A customized virtual space in Mozilla Hubs

4. Analysis

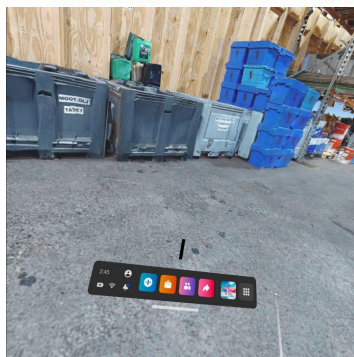
How employees express benefits of virtual job onboarding?

TABLE II. BENEFITS

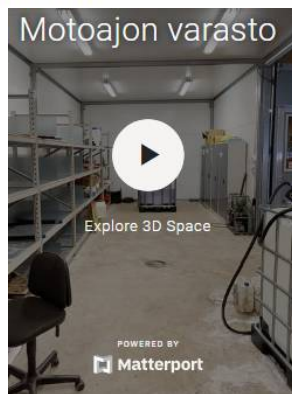
Source	Issue
INT	Enables repeated playing of onboarding content
INT	Prepares staff better for their job tasks
DIS	Saves travelling costs and time
DIS	Compliance with regulations
DIS	Eliminates unnecessary waste sorting
PO	Increases productivity
PO	Enables importing custom 3D models
PO	Collaboration in virtual space



Mozilla Hubs



Glue



Matterport

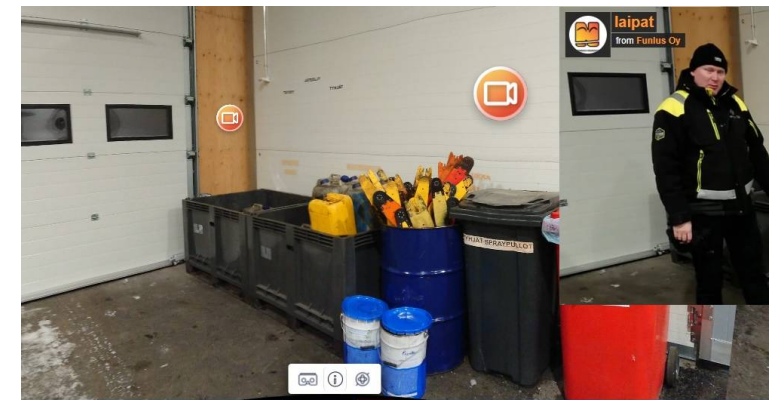
What types of challenges may exist in creating virtual job onboarding environments?

- Deciding which 360 platform or virtual collaboration platform could be best for our purposes
- Planning the **bidding process** for virtual spaces is difficult.
- Making a plan on **3D rendering**.
- Conducting video shootings and 3D model creation in winter conditions.
- **Creating digital twin** and integrating it to the virtual job onboarding system.
- Creating job onboarding video content without predefined scripts.
- Multi-provider network of actors.

5. Conclusions

- There is a lot of business potential in using XR technology in forestry domain
 - Training work practices for forestry employees 24/7
 - Showcasing products, services and processes for customers and partners
- Our digital experiment revealed both advantages and limitations of different types of XR platforms.
- Virtual learning spaces are not only for large organizations (open source tools are cost effective for SMEs)
- However, we are still far away from Metaverse

Further research: Virtual learning related to adjustment of forest machine settings



Jäntti, M., Aho, M. (2022). Improving the Quality of ICT and Forestry Service Processes with Digital Service Management Approach: A Case Study on Forestry Liquids. In: Vallecillo, A., Visser, J., Pérez-Castillo, R. (eds) Quality of Information and Communications Technology. QUATIC 2022. Communications in Computer and Information Science, vol 1621. Springer, Cham.

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Thank you!
Questions, comments?

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