

Human-Driven Industrial Metaverse

VTT initiative on Finnish industrial action

Focus on Common Cockpit vision for future of
remote operation



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Houston, we have a problem

Road transport & broader mobile work machines

Bus and coach drivers' shortage grew 54% in 2023, IRU calculates. 80% of operators face difficulties filling positions

Europe's bus and coach driver shortage widens 54%, according to IRU. 105,000 driver positions are missing, 10 percent of the total professional driver population. Over 80% of bus and coach operating companies face severe difficulties to fill driver positions. And driver shortages are forecast to more than double in five years, reaching 275,000. The above-mentioned [...]

Seafarer Labor Shortage Reaches 17-Year High Reports Drewry

Maritime

Aviation

A shortage of qualified staff could put aviation safety under pressure this summer, warns the European Union's Aviation Safety Agency (EASA) in a safety bulletin.

The industry lost many employees during the Covid-19 pandemic. Too few staff were then available to manage the flow of passengers when demand for international air travel increased rapidly last year. Airlines, airports, air traffic controllers and maintenance companies are still struggling to find enough qualified staff this year, notes EASA.

We Can't Find Enough Skilled Workers: Can Automation Fill The Gaps?

Manufacturing and supply chains

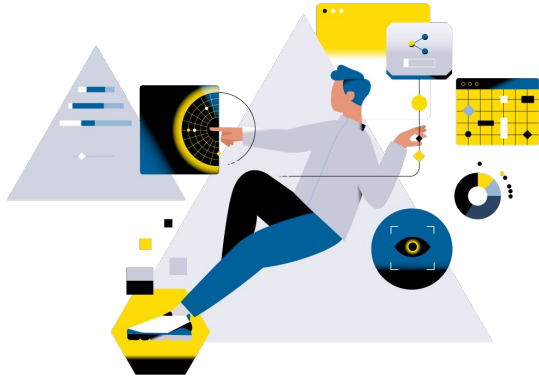
By 2030, it's likely that more than 85 million jobs could go unfilled globally because there aren't enough skilled people to take them, according to a recent Korn Ferry [analysis](#). "Signs are already emerging that within two years there won't be enough talent to go around. In countries with low unemployment and booming manufacturing production, a labor shortage has already accelerated automation and increased use of robotics—not to replace people, but because there aren't enough of them to fill the factories."

The iconic American hard hat job that has the highest level of open positions ever recorded

Construction

- The construction industry in America is facing an extreme labor shortage, roughly 650,000 workers, slowing completion of construction projects from residential homes to infrastructure to hospitals.
- The shortage of construction workers has many causes: the pandemic, and shifts in American cultural values and workforce demographics.
- The solution, according to experts, is a balance between immigration policy, greater use of technology, and efforts to raise the profile of construction as a career path.

Industrial metaverse – major opportunity for transformation of industrial work



WHY:

- Prevailing **labour crisis** in all industrial nations with aging population
- **Lack of appeal** in industrial work for present and future workforce
- Existing **small scale point solutions** for specific use cases in remote industrial work

WHAT:

- Enable meaningful, inspiring industrial careers for future workforce based on hybrid and remote work – **uniting blue collar and white collar**, not only for the PC/meeting crowd
- Establish new sustainable, flexible and productive ways of working in **distributed organizations as “gig workers”**

HOW:

- Develop desirable, viable, acceptable and technologically feasible **cross industry solutions** enabling radical business renewal
- Boost scalability from **convergence** of private and professional solutions, similar to mobile phone revolution

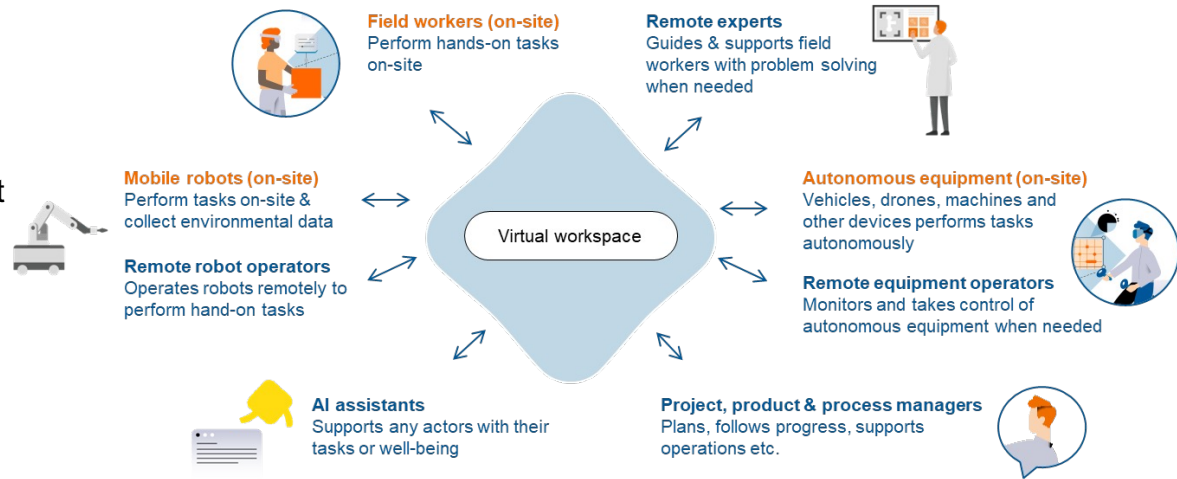
Human-Driven Industrial metaverse vision and definition

Industrial Metaverse is a virtual workspace connecting and providing access to geographically separated experts, objects, information and work environments.

People can work in a purely virtual environment or in a hybrid environment that combines both virtual and physical environments in order to support individual or collaborative work.

Shared Reality (SR) will be the next step going beyond eXtended Reality (XR)

Dynamic, emotion recognition based user interface technologies will emerge for workload adaptation and well-being.





Vision for Finland, 203X

VTT

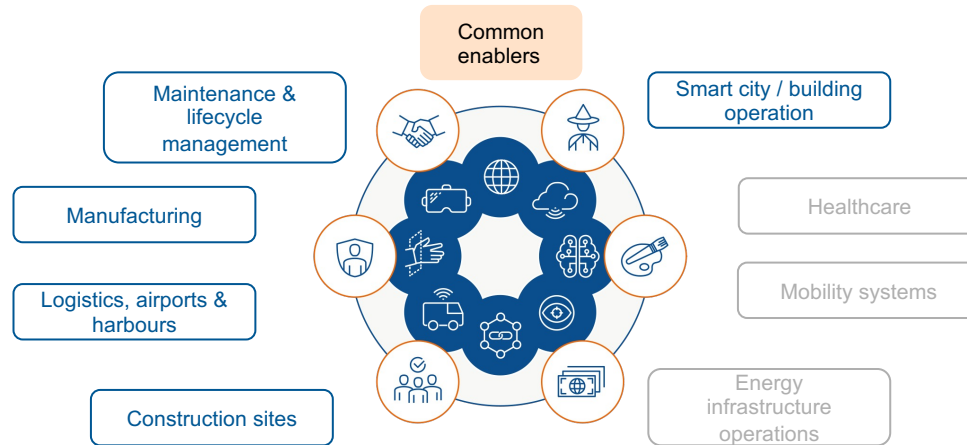
Appealing and productive careers in location independent industrial work in all human-centric verticals from manufacturing, maintenance, construction to logistics and mobility systems

Living Lab, leading Europe as the best place for R&D in metaverse solutions

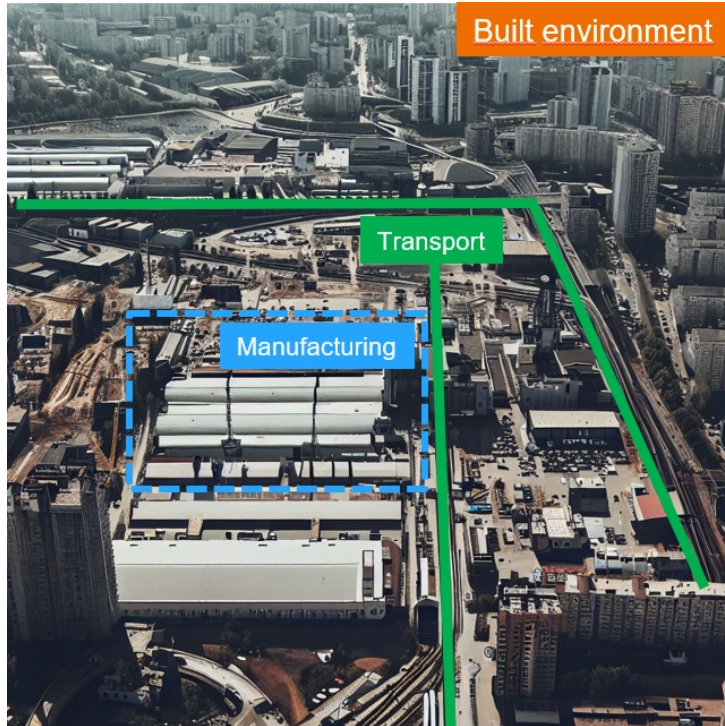
Attract people to move to Finland to enjoy the metaverse, merger of physical and virtual worlds where life and work converge



Humiverse project 2022-2023 for cross industry opportunity identification



We are now working on a high impact industrial partnership project portfolio



Built environment

Manufacturing

Transport and mobility

Immersive digital life and work in built environment (MetaBEE)

Meaningful industrial work in hybrid human-technology-AI teams (Hi-Five)

Common Cockpit for Remote monitoring and operation of autonomous fleets (COCO)

Human Resources and global expert pools in Industrial Metaverse (HRIM)

Common Cockpit vision for future of remote operation

Common Cockpit vision for remote monitoring and operation of autonomous fleets

WHAT IF...

All autonomous equipment, from mobile work machines in isolated forests & mines to trucks and cranes in fenced harbours & airports to maintenance vehicles and public transport in populated areas, mobile robotics and even future unmanned drones and aviation would be remotely monitored and operated by an **emerging new profession “remote operator”**.

These remote operators, certified for various remote operation tasks, not only driving but also supporting roles, based on their interest, seniority and experience, would form a **global pool of experts**, employed by staffing companies or as freelancers, available for **pre-planned or ad-hoc demand based operator intervention, using AI based situational awareness capabilities**.

Connecting the operator to the vehicle would happen instantly through **interconnection of metaverse platforms of the vehicle owner/customer and the staffing company**, covering also advance resource planning, operator authentication, cybersecurity and commercial transactions. Everything based on “gig economy” driven by workforce of the future.

The operator would work in a regulated **Common Cockpit – workspace based on dominant design** that fits anywhere, from hybrid offices to living room corner or summer cottage - with novel Shared Reality and haptics based control, providing an enriched ergonomic experience (from interactive AI assistants and 3D see-through to cognitive monitoring & adaptation).

Value generation: Resource efficiency for equipment operators, attractive jobs and wellbeing for humans, transaction business for staffing platform developers and agencies, scalable solutions via dominant design to workspace & user interface companies, connectivity service revenue for telcos.



Monitoring and operation of all autonomous mobile equipment...



... flexibly and securely from anywhere...



...with haptics and SR enabling a virtual cockpit for multiple use cases.

Remote operation of autonomous fleets and traffic systems

(example companies already contacted or illustrative)

Remote operator in a Common Cockpit with virtual controls

BASEMARK®

framery

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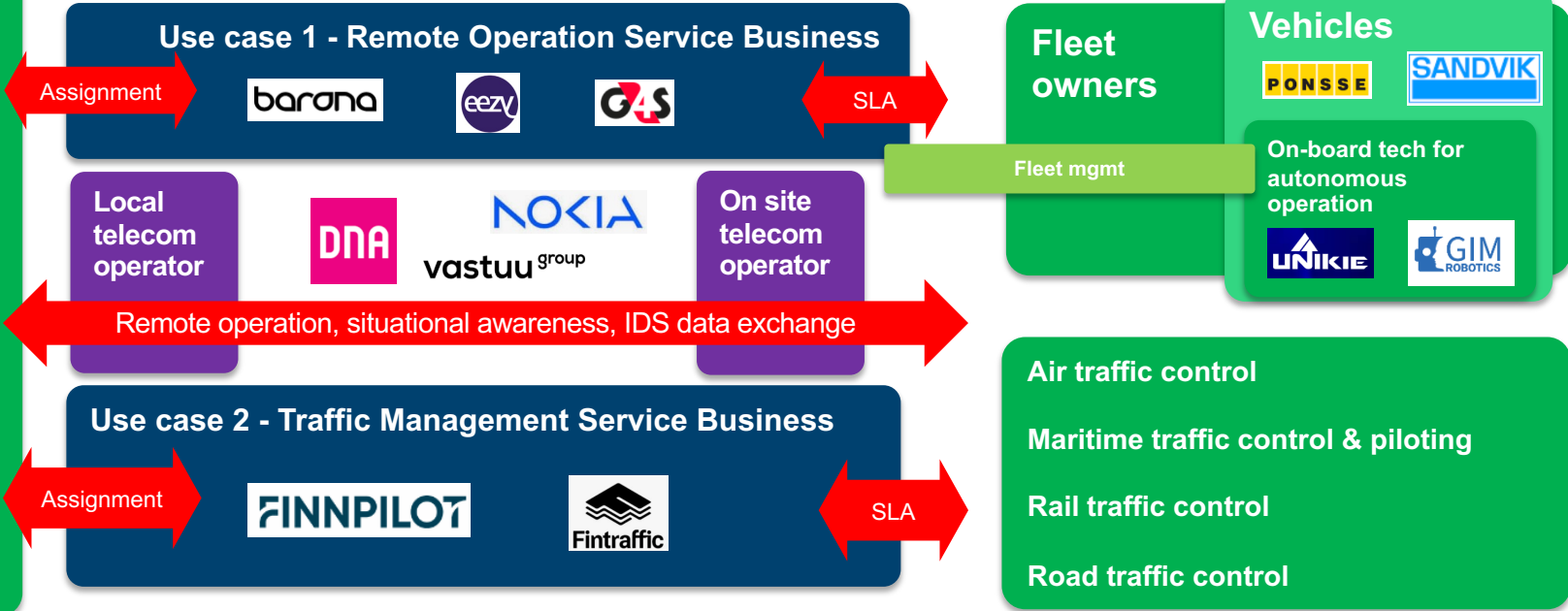
GIM
ROBOTICS

BRIGHTHOUSE
INTELLIGENCE

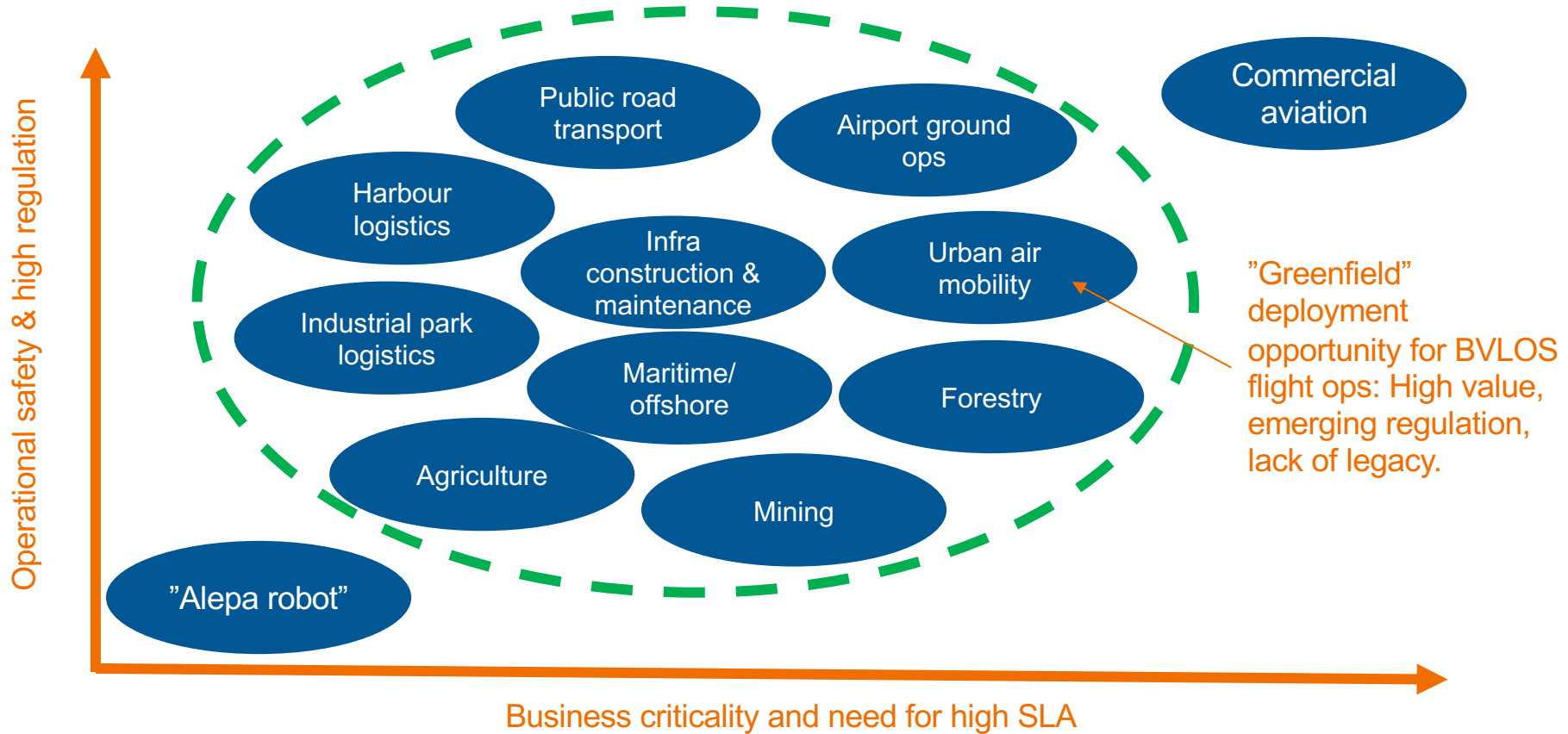
Research topics for co-innovation:

- AI assisted remote operations, situational awareness, rew & fast forward for recommended operator ad-hoc or planned intervention
- Operator alertness monitoring with cognitive state via biosensors
- Dynamic operator assignment based on availability, skills and real time cognitive load
- Concept of operations and safety in different segments
- 5G+ C2 connectivity and cybersecurity end-to-end
- Data Spaces based sharing architecture and business model

FORUM
VIRIUM
HELSINKI



Operational environments for remote operation – sweet spot for business impact?



Potential roadmap & parallel solutions towards the vision

(example maritime www.seafar.eu)

The screenshot shows the Seafar website header with the logo, social media icons, and navigation links: Home, Company, Services (highlighted), Jobs, and Contact. There are also buttons for 'Partner Portal' and 'EN'. Below the header are three service cards, each with a background image and a title: 'Crew supported navigation' (showing a ship's bridge), 'Crew reduced navigation' (showing a ship), and 'Unmanned navigation' (showing a ship on a water track).

Services
Crew supported navigation

Services
Crew reduced navigation

Services
Unmanned navigation

Expand vessel capabilities by integration of the Seafar control system and services.

- Extend navigation time (crew working time restrictions)
- Optimize crew time efficiency on board
- Achieve optimal performance of your vessels

Operation of highly automated ships manned by reduced crews and the support of the Seafar Shore Control Center.

- Operates vessels with reduced crew
- Extend navigation time (crew working time restrictions)
- Achieve maximum efficiency of your vessel

Unmanned navigation with automated vessels on fixed trajectories, with the goal to increase the competitiveness of small sized vessels.

- No crew onboard
- Maximum efficiency
- Expand time of operation
- OPEX/APEX optimization

Would Common Cockpit enable industrial dream jobs?

- Today's 12-year-olds live in the virtual world, it is a natural environment for them
- When they reach working age, the "normal" for them is likely to be virtual rather than physical environments
- It makes sense to play to their strengths in planning their professional tools & world
- Future of industrial work as "gig work"?



In 2023?



In 2035?

bey⁰nd

the obvious