

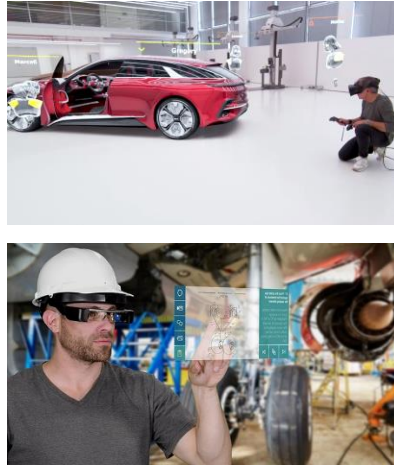
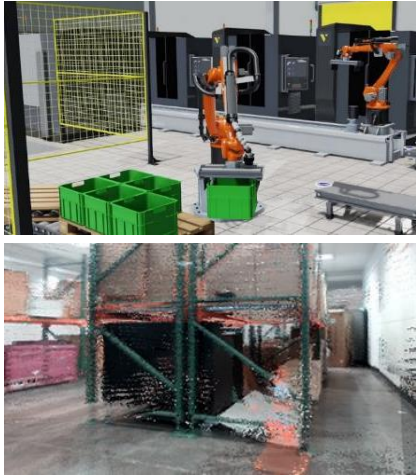
# Opportunities in Industrial Metaverse

- Use cases and network requirements

Dr. Julien Maisonneuve  
Nokia, Strategy and Technology

The Nokia logo is displayed in white, uppercase letters within a dark blue circular area. This circle is surrounded by a thick white ring, which is itself set against a larger, lighter green circular background. The overall design is clean and modern, with a strong emphasis on the company's branding.

# Metaverse is more than 3D immersive VR consumer experience



## Metaverse Industry

- Private networks enabling I4.0
- Industrial automation
- Digital twin for production optimization
- 3D map for autonomous mobile robots

## Metaverse Enterprise

- Digital and collaborative 3D design
- Augmented worker
- Immersive team collaboration
- Training and simulations

## Metaverse Consumer

- Gaming & entertainment
- Social interactions
- Shopping
- Immersive social Virtual Reality
- Smart City augmentations

# Why Industrial metaverse is ahead of the consumer?



Metaverse for industry : an appealing cost VS benefits trade-off

- Several use-cases with immediate RoI
- Affordable prices for industries
- Increased safety and optimization



Closer to deployments  
at scale



Metaverse for consumer : still in early adoption phase

- Gaming centric initially
- Price, QoE and form factors require further improvements for mass scale deployments



Still need a  
technological and usage  
breakthrough

# Professional Metaverse use cases survey



**Products Design and Engineering**



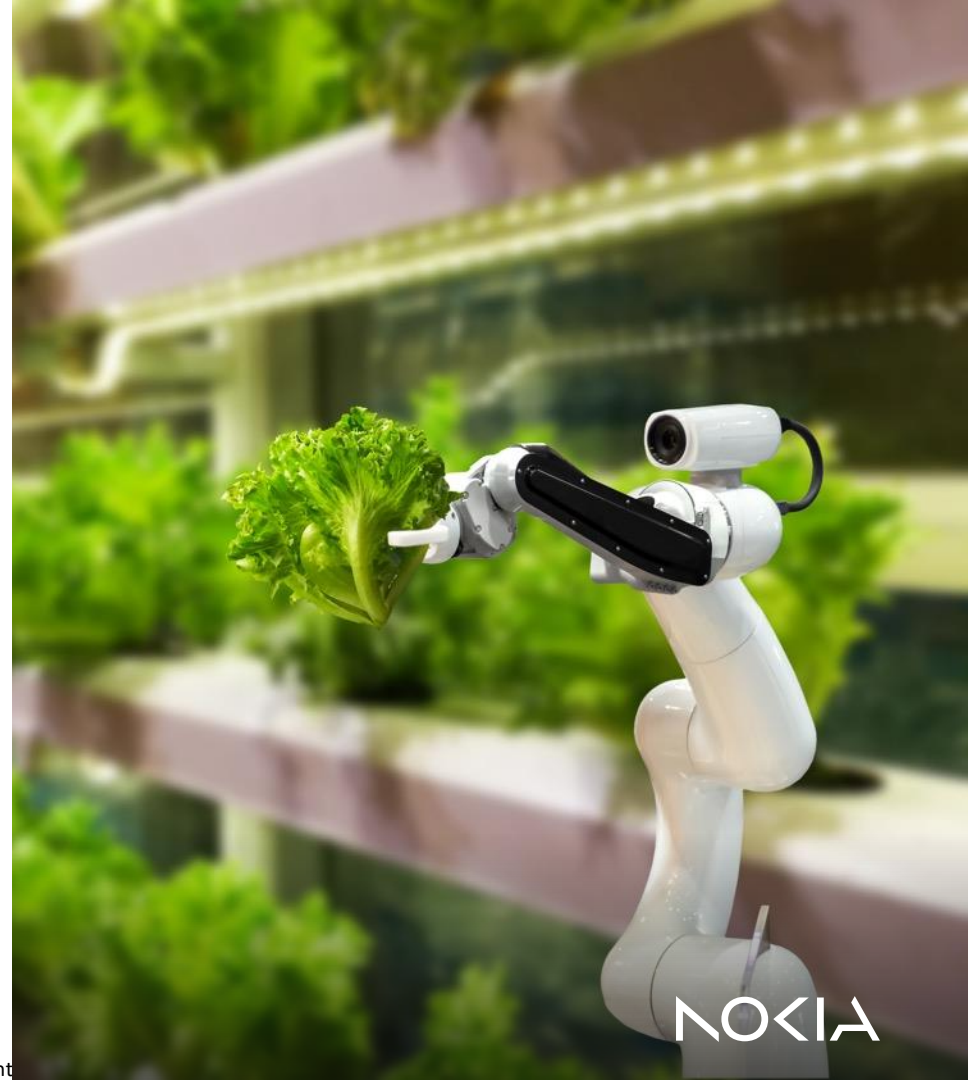
**Hands-on Training**



**Surgery Planning and Support**

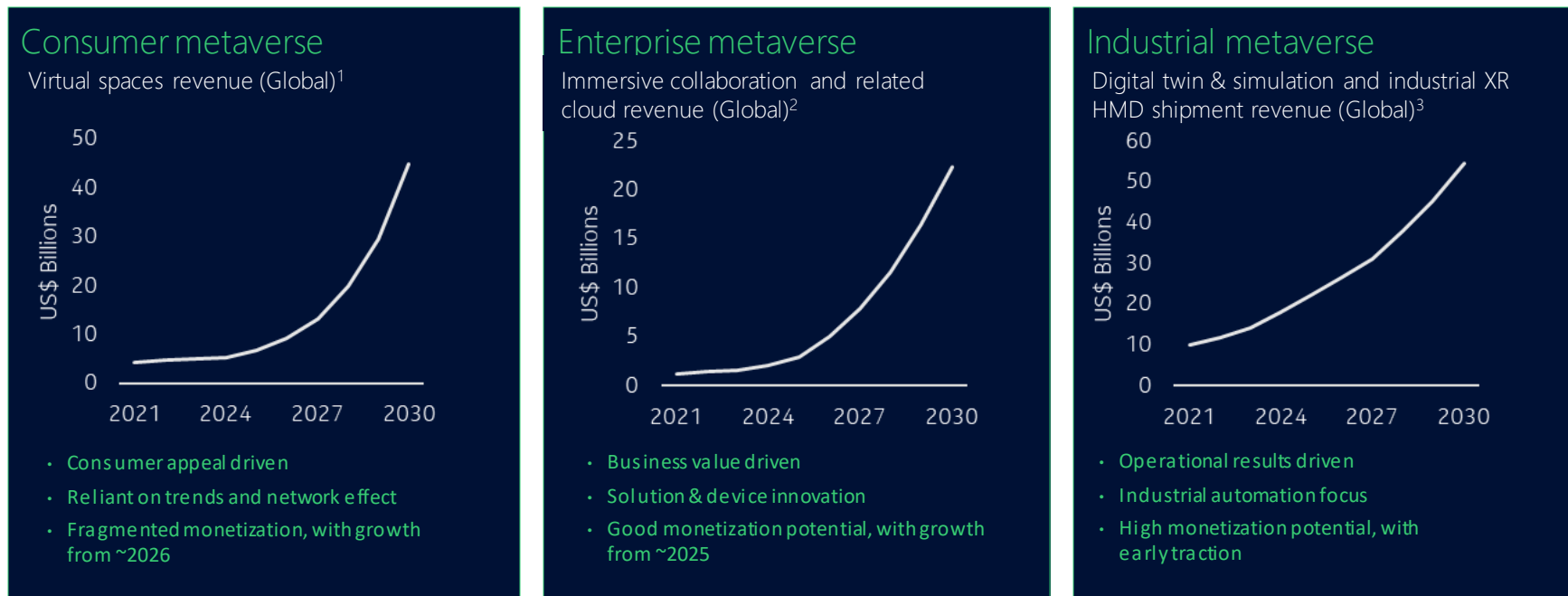


**Virtual Services for hands-on work**



**NOKIA**

# Industry is expected to lead metaverse commercialization



1 ABI Research: 2022 Consumer Metaverse Market Update, June 2022

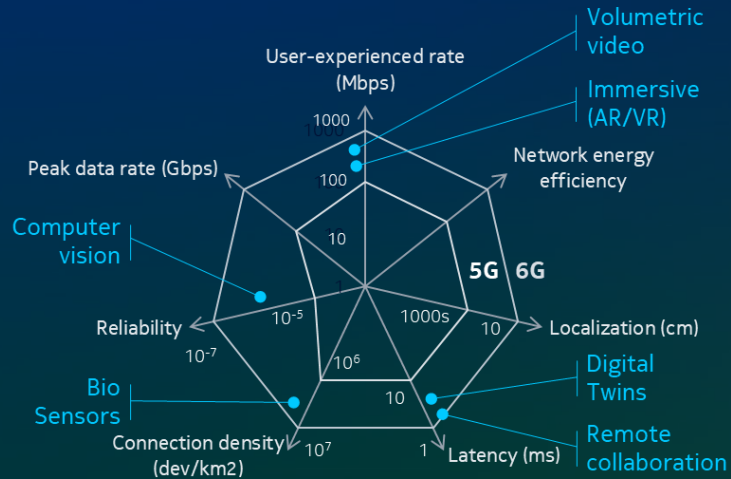
2 ABI Research: Enterprise Metaverse: Future of Work, March 2022

3 ABI Research: The Future of Work, Augmented and Mixed Reality, Virtual Reality Market Data, August 2022

# Metaverse and network evolution

...network will be key to realizing these opportunities

## New service needs



## New network capabilities



# The metaverse value chain

Collaborative actors building interoperability across the network and carving out early leadership in key control points

## Infrastructure & connectivity

Semiconductors  
Edge compute  
Storage  
Connectivity  
Cloud infrastructure

## Platform tools

Artificial intelligence  
Data & digital asset mgmt.  
Content services  
Software integrations

## Creator & dev tools

Engines and SDKs  
Low-code/no-code app  
Web3



## Devices

XR headsets  
Smartphones & tablets  
Wearables  
Robots, AMRs & cobots  
Sensors

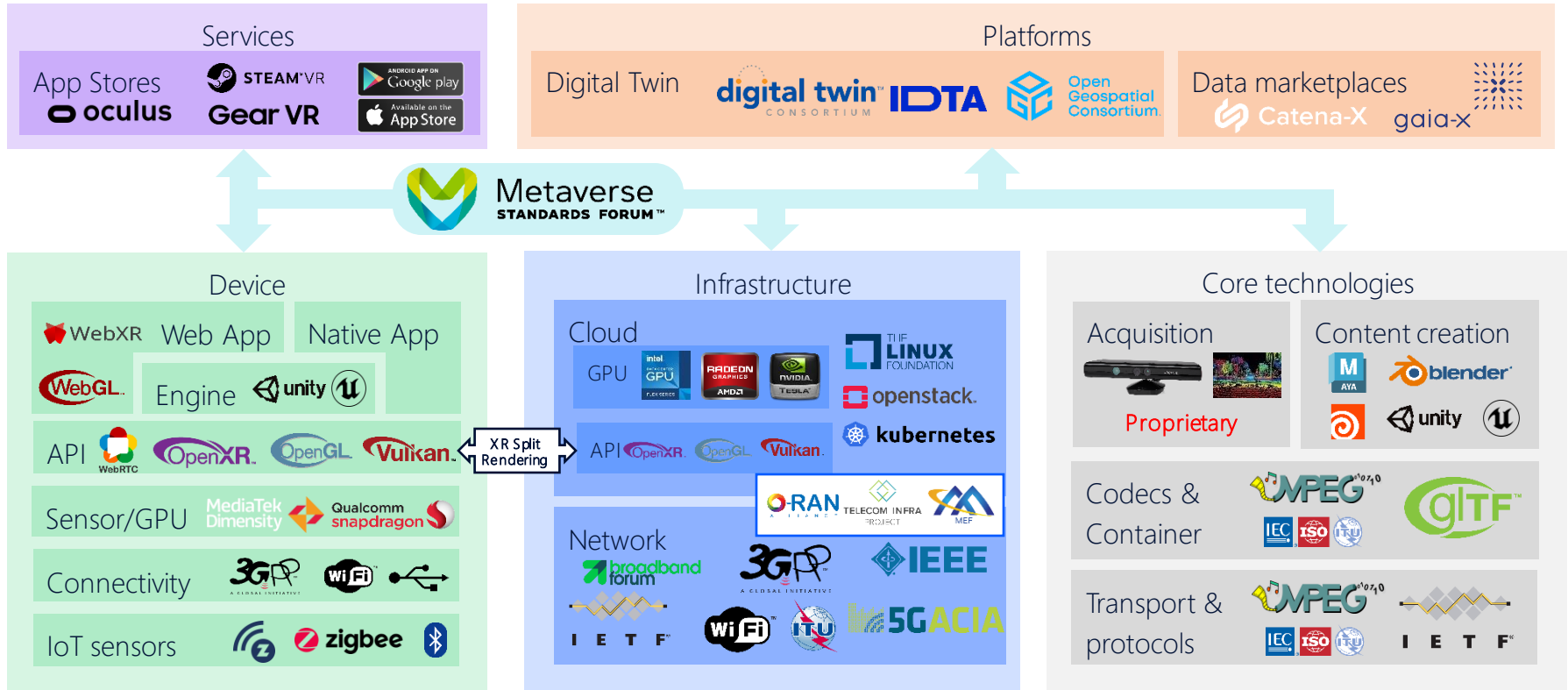
## Interfaces & apps

Natural language processing  
Computer vision  
Digital (AI) humans  
Human-brain interface

## Experience

Collaboration  
Virtual worlds  
Avatars

# Industry and ecosystem landscape for Metaverse





## How ITU can help

1

Coordinate Industry Foras with governments

2

Collection of realistic business and use cases from industry

3

Enhance interoperability to accelerate metaverse deployment



The metaverse will never move  
beyond our living rooms without  
a powerful network”

- Nishant Batra, CSTO of Nokia

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