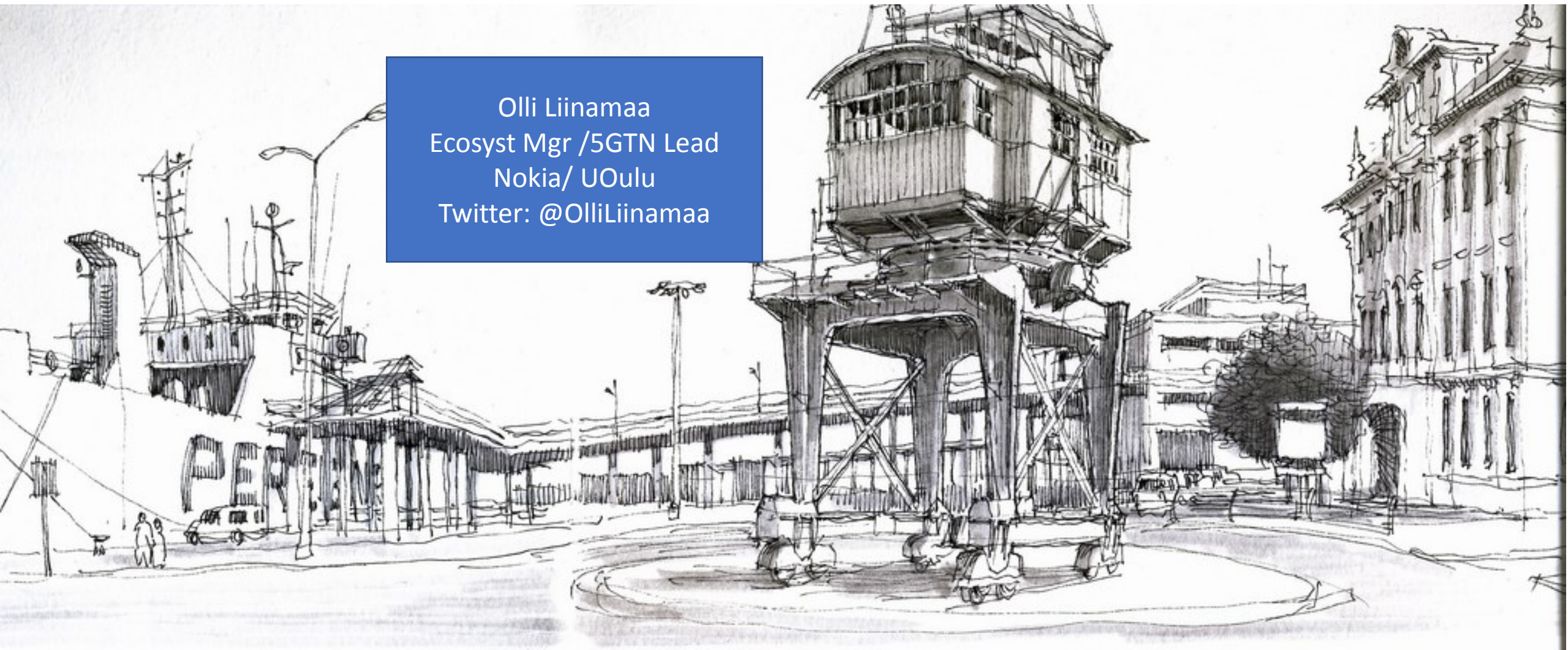


5G Satamien Vauhdittajana



Olli Liinamaa
Ecosyst Mgr /5GTN Lead
Nokia/ UOulu
Twitter: @OlliLiinamaa



T-Mobile Building Out 5G in 30 Cities This Year ...and That's Just the Start



February 26, 2018

Three Korean operators launch 5G networks

By Steve McCaskill December 03, 2018 Networking

Operators bring forward South Korea 5G launch.



AT&T launches 5G network: What you need to know as Verizon, T-Mobile, Sprint race to catch up

Kim Komand  AY
Published 9:39

There's been a lot of talk about 5G. Comp download a full HD movie in less than 10

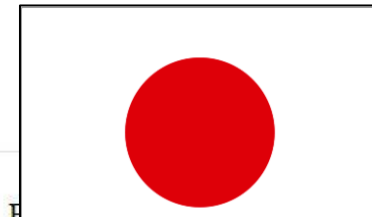
And until 5G hits your home, you can dra with a little-known secret setting. You do

The 5G revolution is also aimed at deliver more devices online, from sensors and ro next generation of wireless tech is handin need to know about the coming of 5G.

Super-fast 5G mobile network coming 1 year early in 2019


By SHINYA TOKUSHIMA/ Staff Writer

October 4, 2018 at 18:10 JST



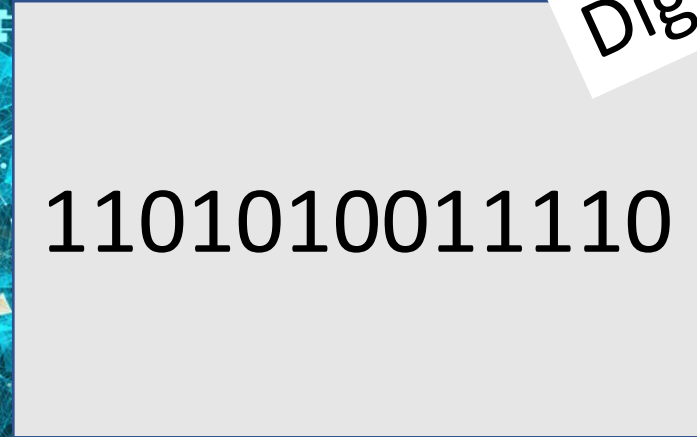
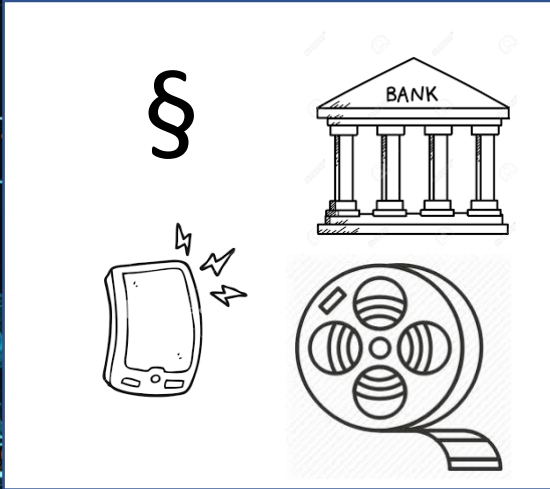
communications technology will be introduced in 2019 a year ahead of schedule, Japan's big three mobile carriers said on Oct. 3.

Evolution of mobile communications system

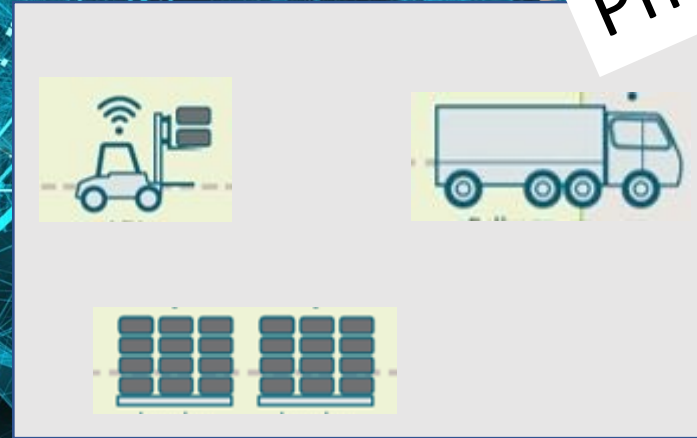
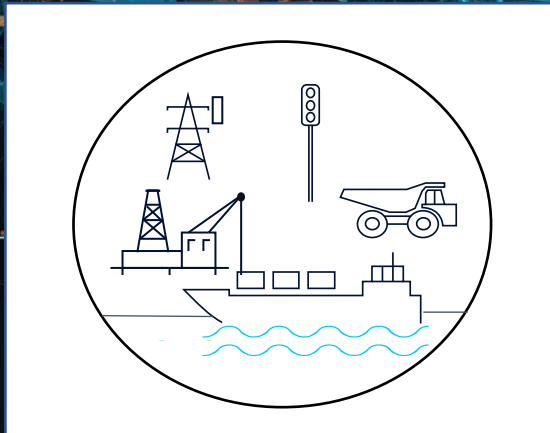
Standard	Launch year	Maximum speed	Main use
1G	1980s	—	Phone calls 

ly launched commercial 5G ntry in the world – after the US

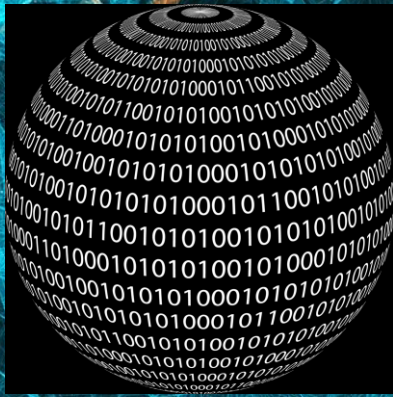
Tale of Two Industries



Digital

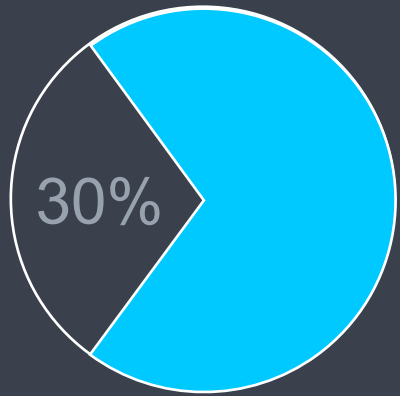


Physical

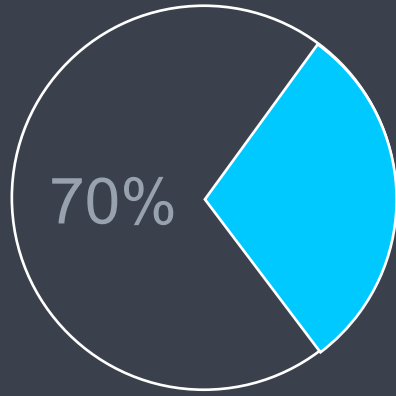


Two industries not transforming equally

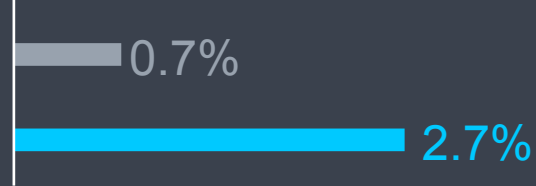
Investment in ICT



Share of GDP



Annual productivity growth (15 year average)



Physical industries
Digital industries

Taking benefits from the few to the many unlocks massive opportunity

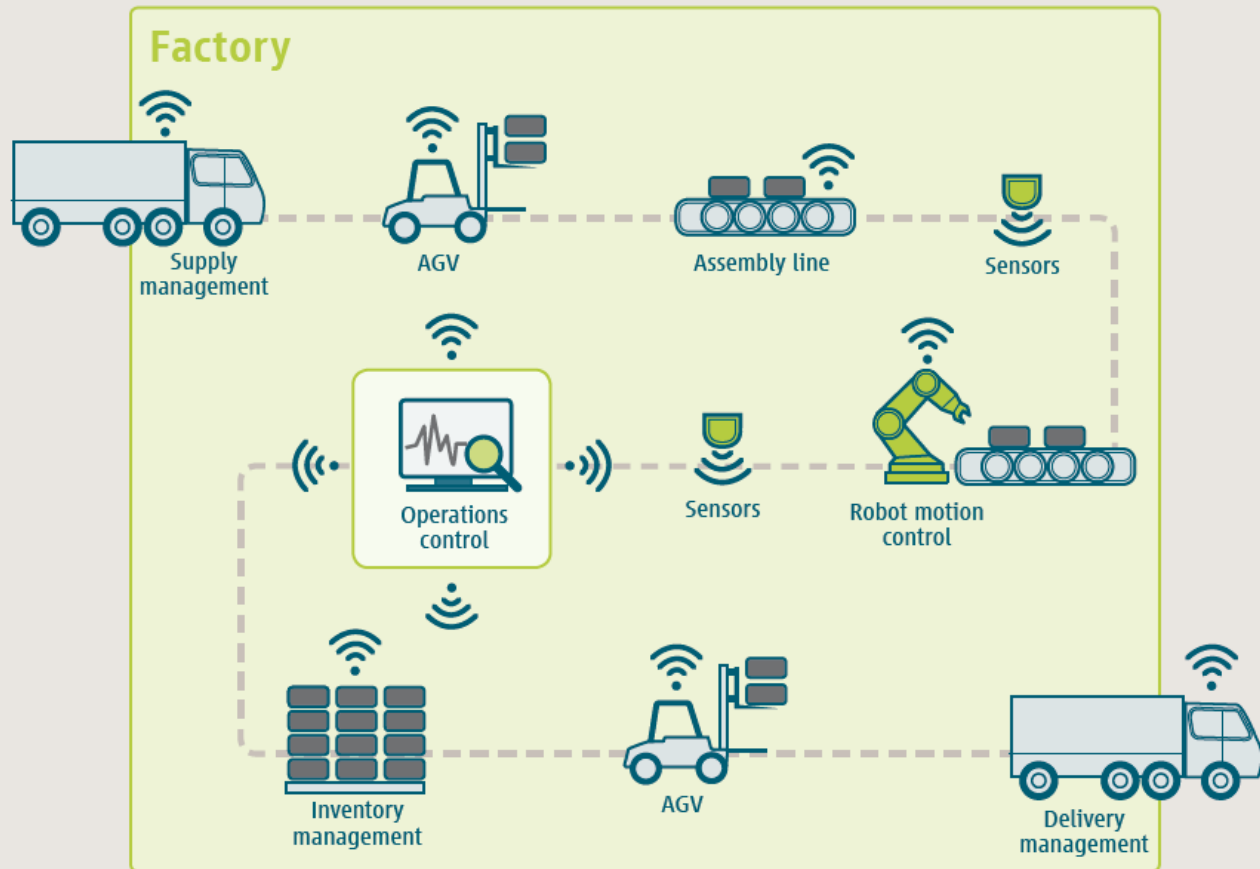
**\$3.8T
to \$11T**

Economic value
of IoT (by 2025)

**up to
11%**

of global economy
(in 2025)

Control physical using digital



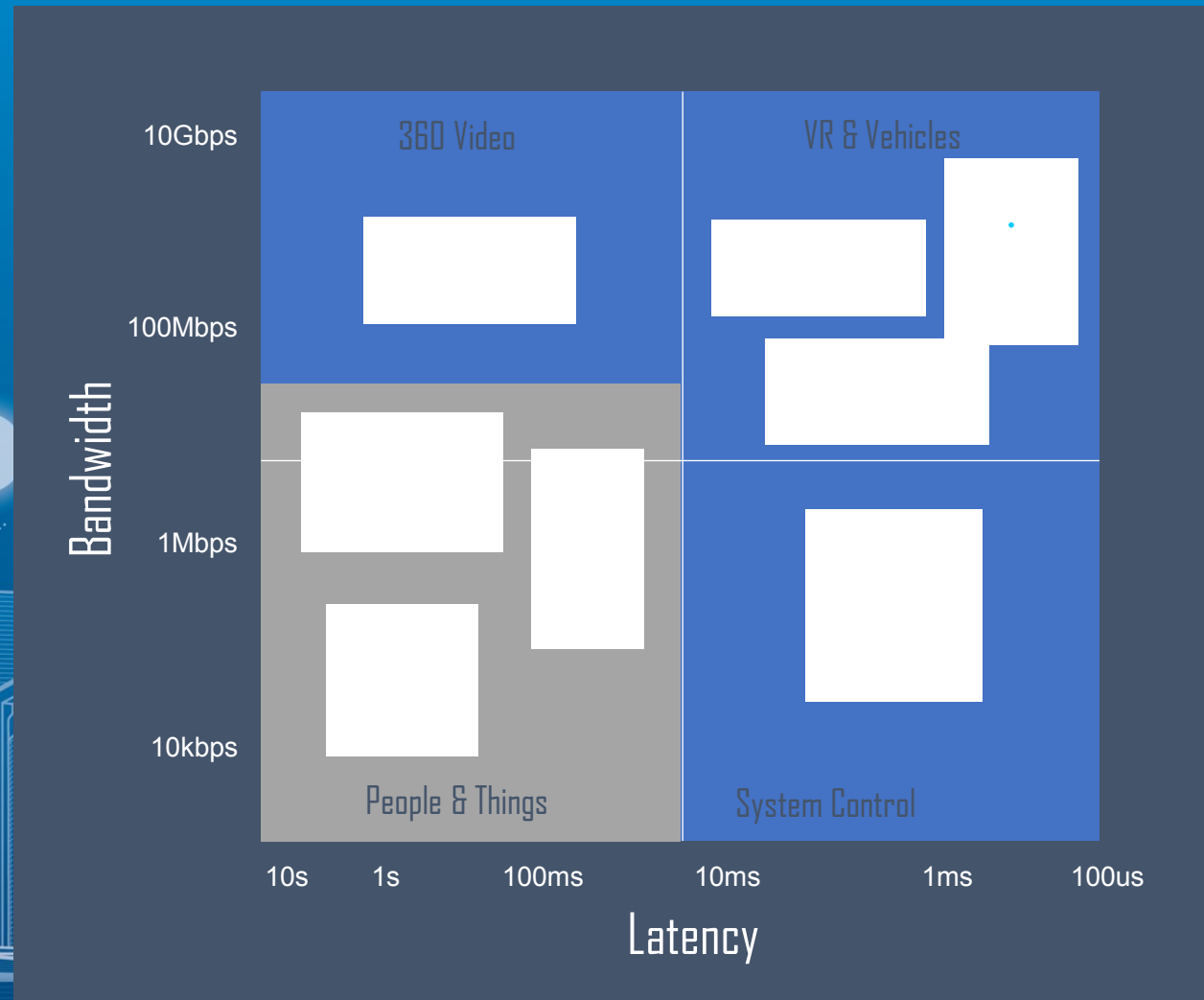
Source: ZVEI

Convert machines to mobile devices

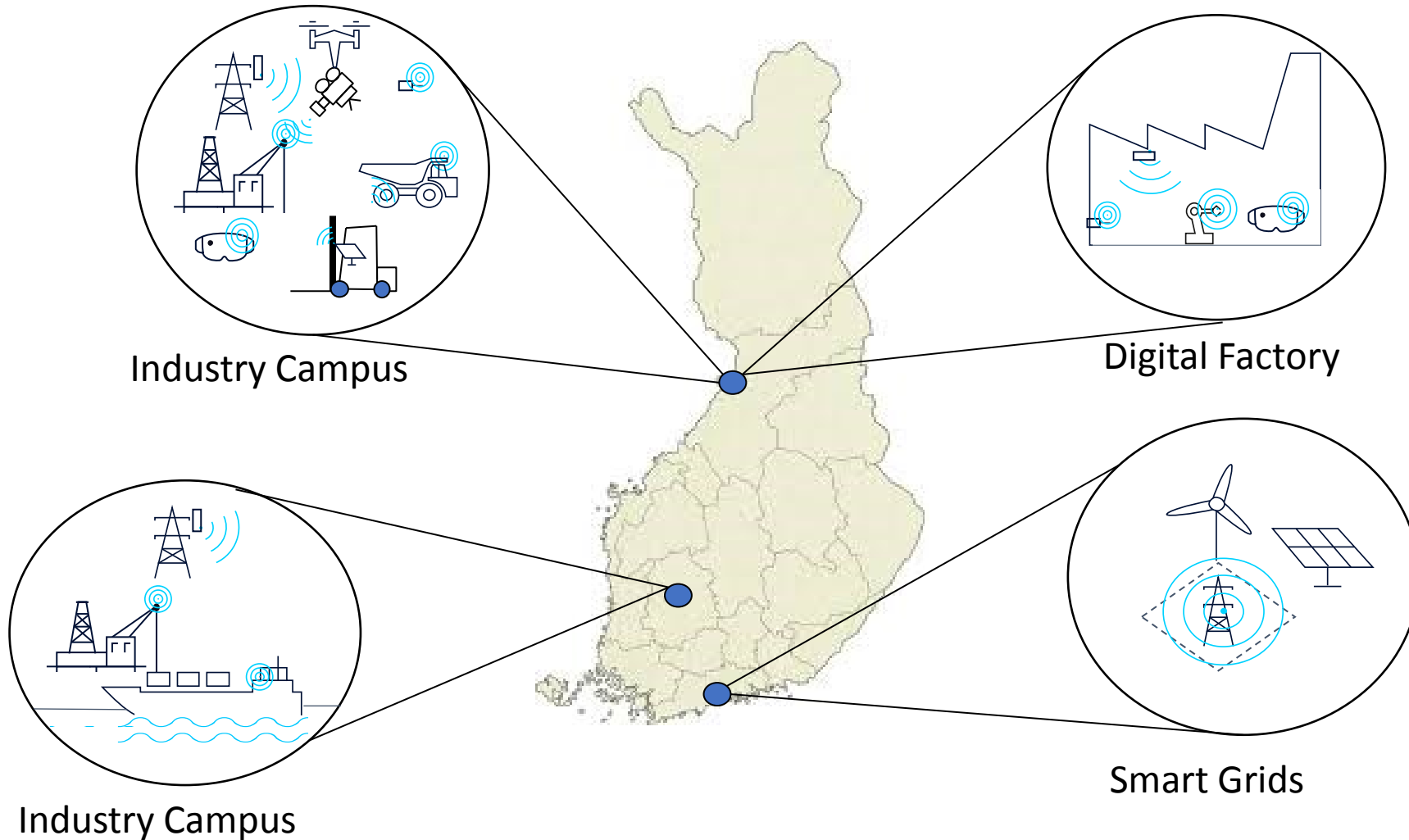
Motion control
Mobile robots
Mobile control panels
Safety functions
Augmenting the physical infrastructure

Service Requirements ?

Evolution to business-critical applications



5G VIIMA - 5G Industry Research and Experiments



5G VIIMA:

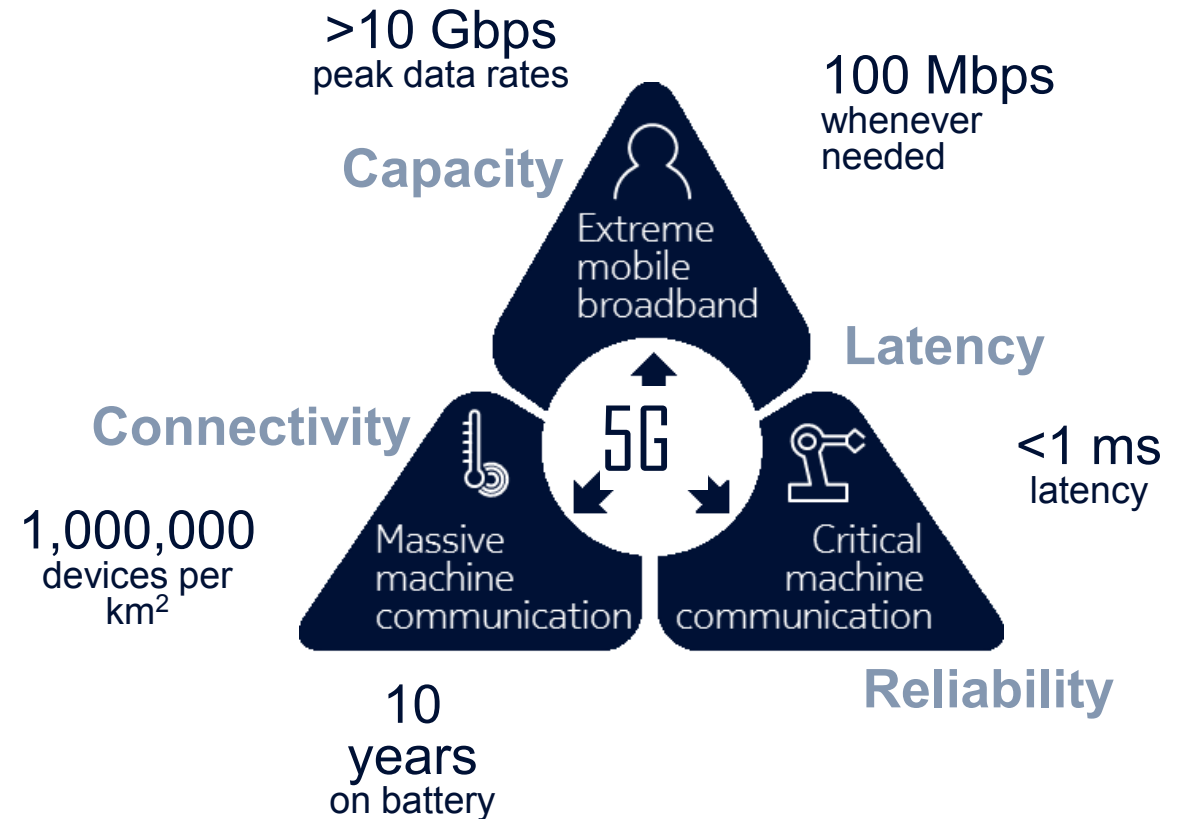
- 7 academic
 - 22 industry
 - 3 other parties
- 13 industry projects

Total Volume 16M€

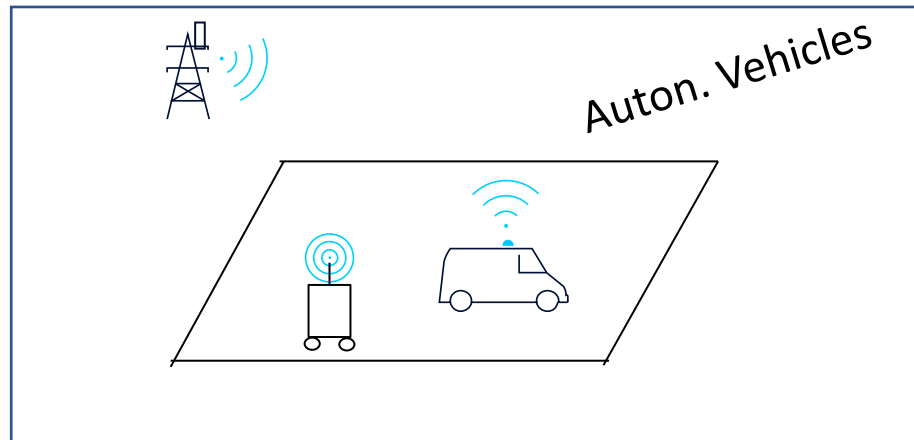
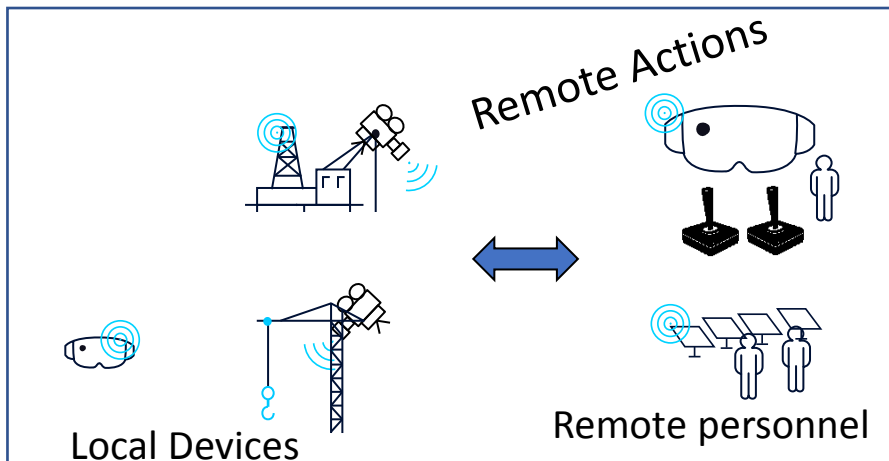
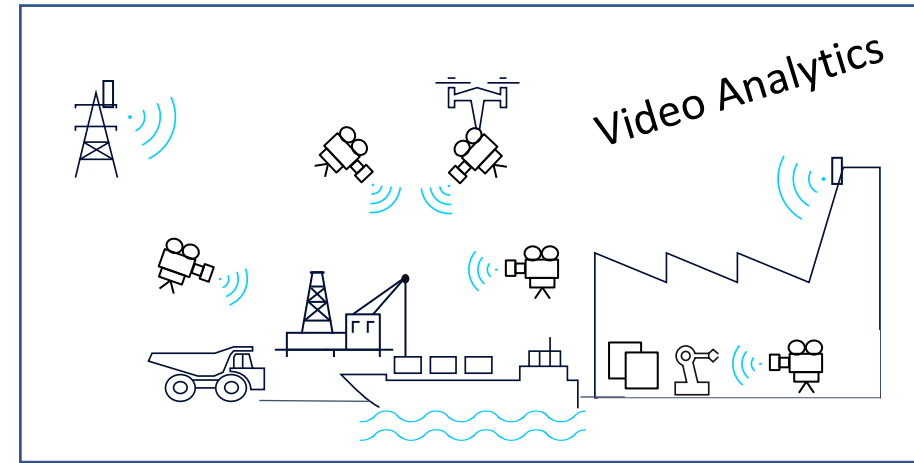
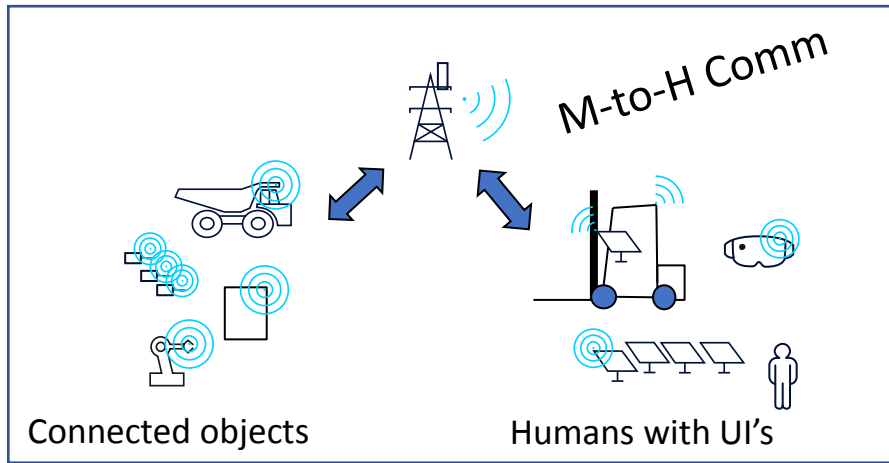
- Industry 10M€
- Academy 6M€

Critical 5G Network Technology Enablers...

- Live 5G & 4G - Interaction between local and wide-area network
- 5G-Modems integrated to machines
- edge cloud for service creation
- Network reliability to fulfil industry requirements (URLLC)
- Guaranteed quality per network user and/or service with slicing
- Accurate (<1m) indoor and outdoor positioning



...with relevant industry assets



To Solve Critical Harbour use cases

Tested in
Oulu &
Tampere

5G Network

- Live 5G Network performance
- 5G evolution: additional versions with 5G URLLC and slicing for guaranteed service

Harbour critical activities

- Location tracking of moving vehicles within the borders of the port
- Navigation for visiting trucks
- Weather condition information with sensors and/or cameras
- Cargo identification and tracking in logistic chain
- Cranes collecting cargo data using camera and/or sensors
- Warning solution for moving vehicles from other large moving vehicles within the port area
- Autonomous drones and maintenance vehicles on quays
- Remote control of cargo handling equipment
- Remote control of work machines in RemoteFeel context

Future X for industries

Business Applications



Digital Value Platforms



Multi-cloud



High Performance

Dedicated deep connectivity





Thank You