

# Digitalization, Automation, 4<sup>th</sup> Industrial Revolution

## Nokia Conscious Factory

19<sup>th</sup> November, 2018

Tomislav Borosa, Sales

Nokia, Zagreb

# Oulu Factory, Finland

200 km



- Personnel ~ 500
- Production floor ~ 16k m<sup>2</sup> (Oulu site ~ 75k m<sup>2</sup>)
- 6 SMD lines, 35 million component placement capacity in a week
- 8-10 new products ramp-up & transfers annually
- **Automation index 71%**

- 100% use of renewable energy
- 100% waste utilization rate
- 70% recycling/re-use rate
- WWF Green Office certified

- 1490 Kaizens implemented
- ~ 600 SMT boards

As a manufacturer Nokia is facing exactly the same challenges as any manufacturing companies,...

## Challenges

Improve productivity and safety along entire value creation process

Increase flexibility and agility to quickly change production lines and introduce new products

Increase level of automation to gain efficiency

Maximize uptime to minimize business interruption

Improve competitiveness by being more customer centric across all operations

Reduce carbon emissions and energy consumption according to Horizon 2020

## Enablers

- Sensors, actuators, valves, gateways to gather all kind of data
- Carrier grade technology to meet manufacturing requirements from ultra low latency to extended battery lifetime
- Device management and data collection platform

- Edge processing capabilities distributed along the entire network infrastructure to meet latency requirements and relieve networks
- Self learning, artificial intelligence to understand health status of assets and root causes
- AR / VR for training and simulations

... hence, we are building the factory of the future in Oulu and Chennai to achieve our goal in becoming best in class manufacturer in our industry



Our factories act as a live lab to test the use cases and proof of concepts for our customers benefit

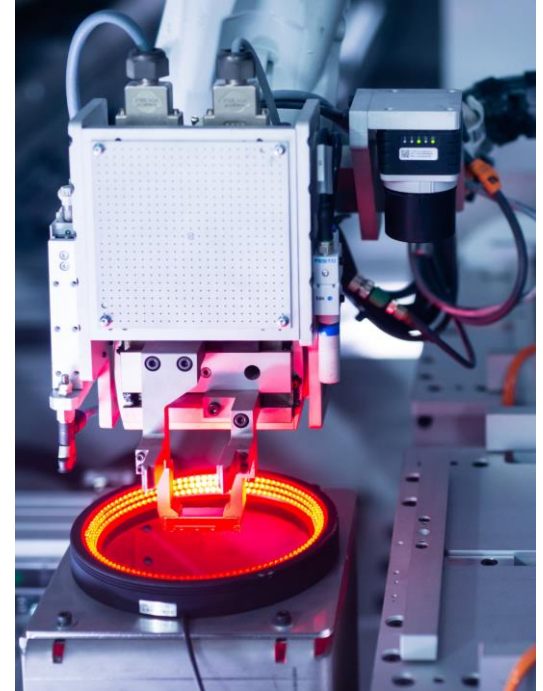
Own live lab

We use our latest technology such as private LTE, 5G, IoT and Multi-Access Edge computing at our factories

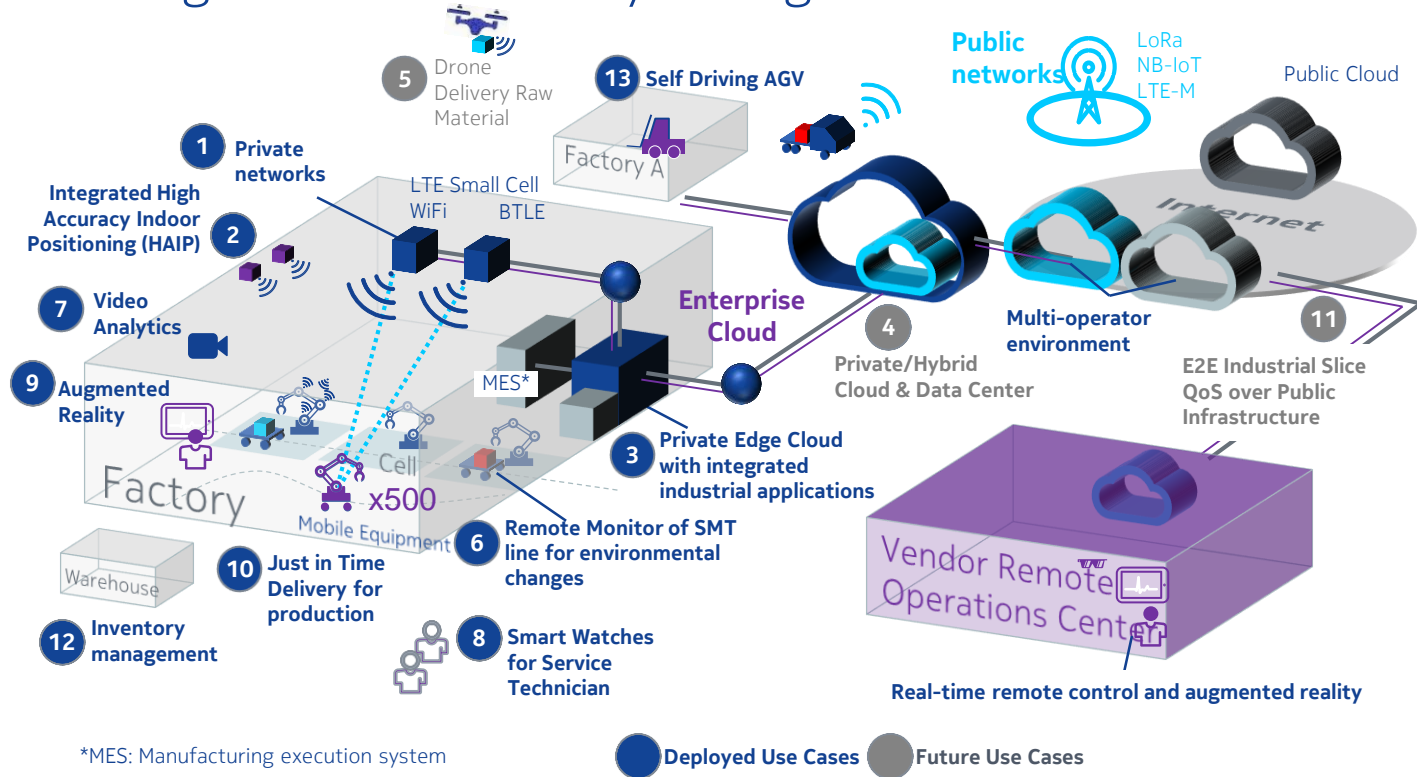
Latest technology

Kaizen Award for the best Continuous Improvement System 2017, Lean Project Award for improved productivity and reduced lead times in 2016, Quality award in 2015

Award winning factories



# 4<sup>th</sup> industrial revolution already happening at Nokia's Conscious Factory – enabling customer centricity through full automation and flexibility



Result:  
**+27% productivity**

# Nokia Conscious Factory of the future is available already today

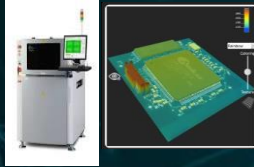


CNC



SPI & next generation

3D AOI



Modular Automation line

Concept



VR / AR utilization



Video Analytics



Digital Twin



Filter Auto-tuning



Dream Cell concept



Multiscrew feeding & fixing



Autonomous vehicle



5G OTA



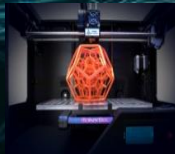
Conscious warehouse



Latest generation SMT



3D printing



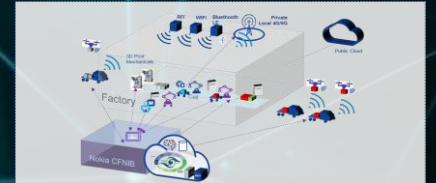
Standalone production automation



Intelligent SMT material flow



Conscious Factory



2014

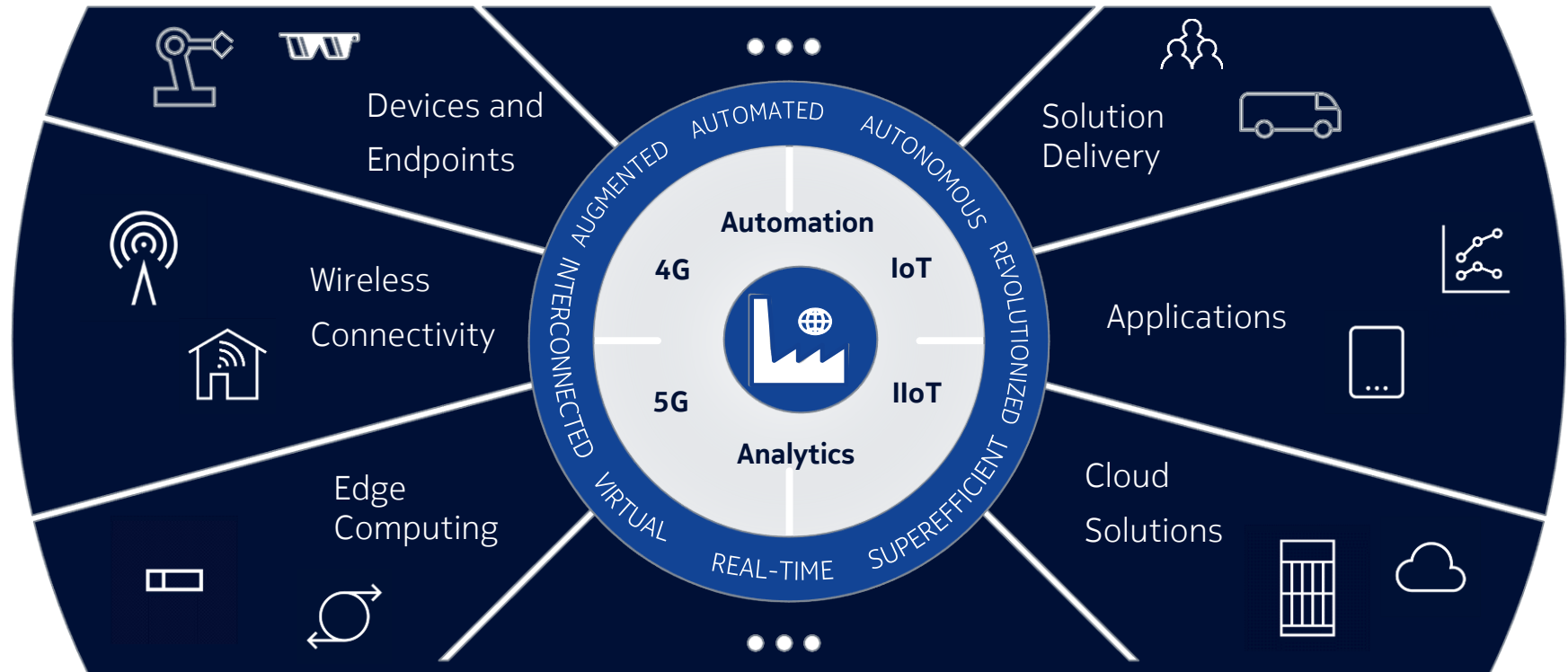
2015

2016

2017

2018

# Building Blocks of Conscious Factory - everything already available and ready for 5G connectivity



# Take away

To build conscious factory many new innovations are needed:

- networked equipment to support automation, remote monitoring and predictive maintenance applications
- Diverse devices that communicate with, and control, other objects
- Digital supply chains for higher efficiency and lower costs
- Digital production/facility operations for high agility

Technologies such as

- 5G,
  - Private LTE,
  - The Internet of Things (IoT),
  - cloud and intelligent software (ML/AI) ...
- will empower digital manufacturing to become more responsive, productive and efficient... conscious factories

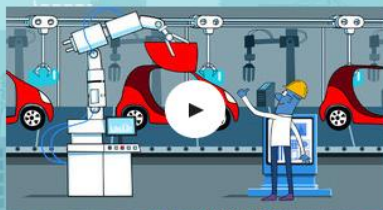
**Nokia conscious factory solutions and wireless connectivity can help manufacturing industry to transform the business for improved efficiency and increased business value**



# Go Allwhere

Networking solutions for the new age of industry

Take a 90-second trip to Allwhere



[www.nokia.com/networks/go-allwhere](http://www.nokia.com/networks/go-allwhere)



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