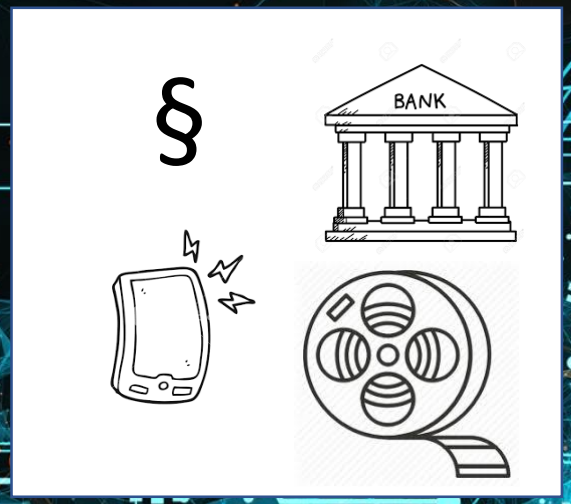
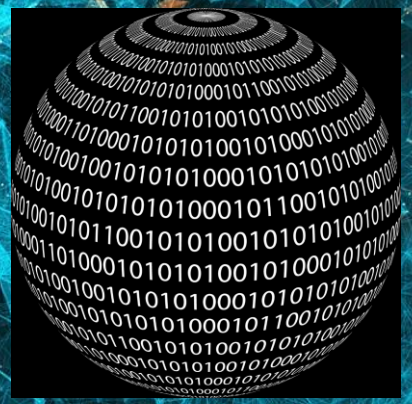
6G FLAGSHIP
UNIVERSITY OF OULU
NOKIA

5G for Business-Critical Industry Environment

Olli Liinamaa
Nokia / University of Oulu

Tale of Two Industries





Digital

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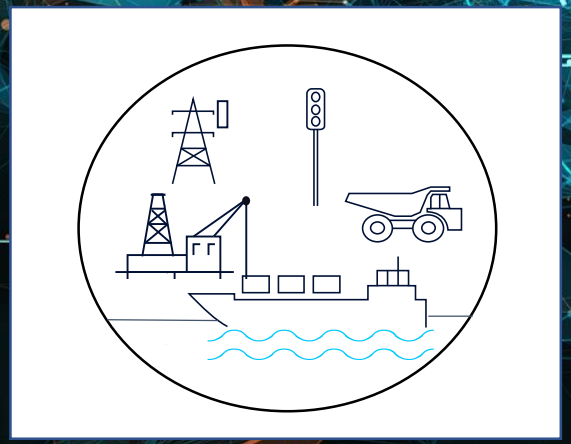
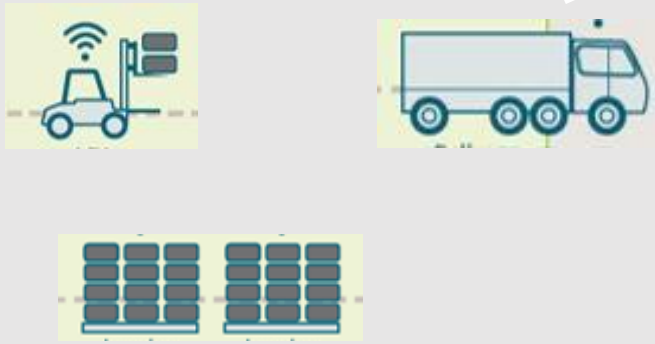


Physical



Replacing physical with Digital

BookBeat

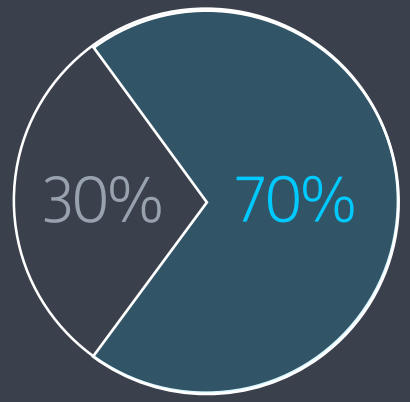
audible
an amazon compan

storytel

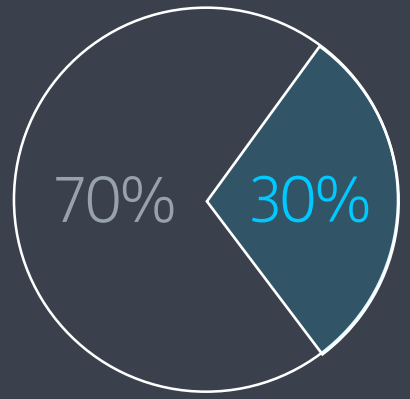
SCRIBD

Two industries not transforming equally

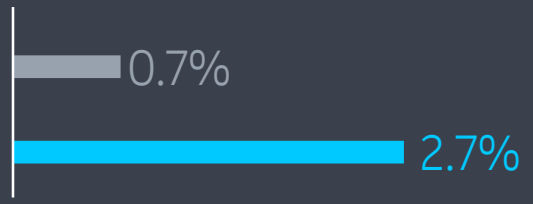
Investment in ICT



Share of GDP



Annual productivity growth (15 year average)



Physical industries

Digital industries

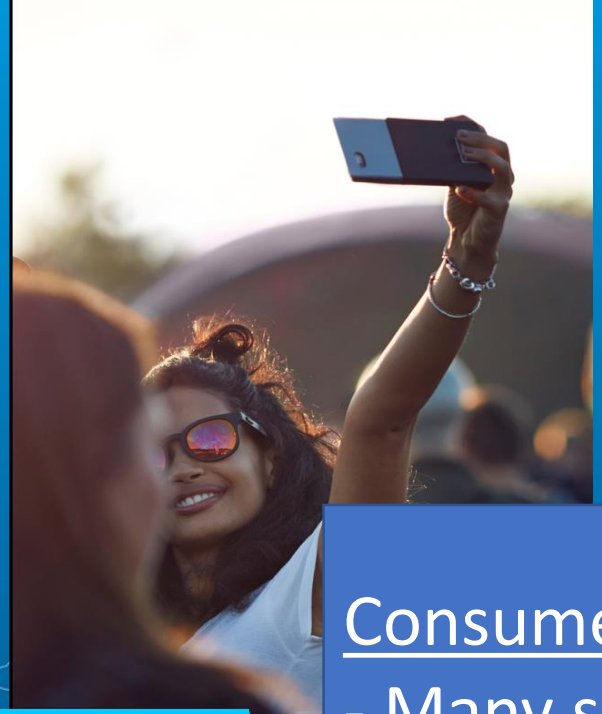
Taking benefits from the few to the many unlocks massive opportunity

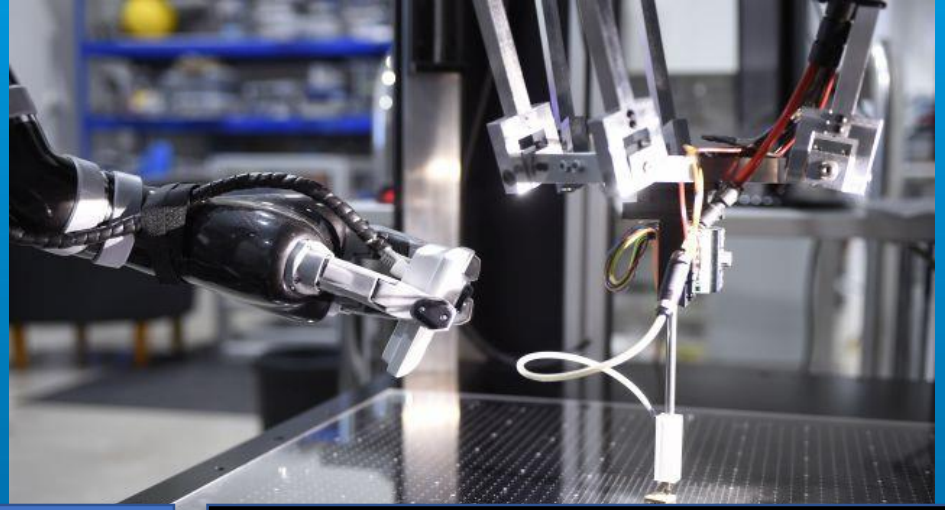
$3.8T to $11T

Economic value of IoT (by 2025)

up to 11%

of global economy (in 2025)



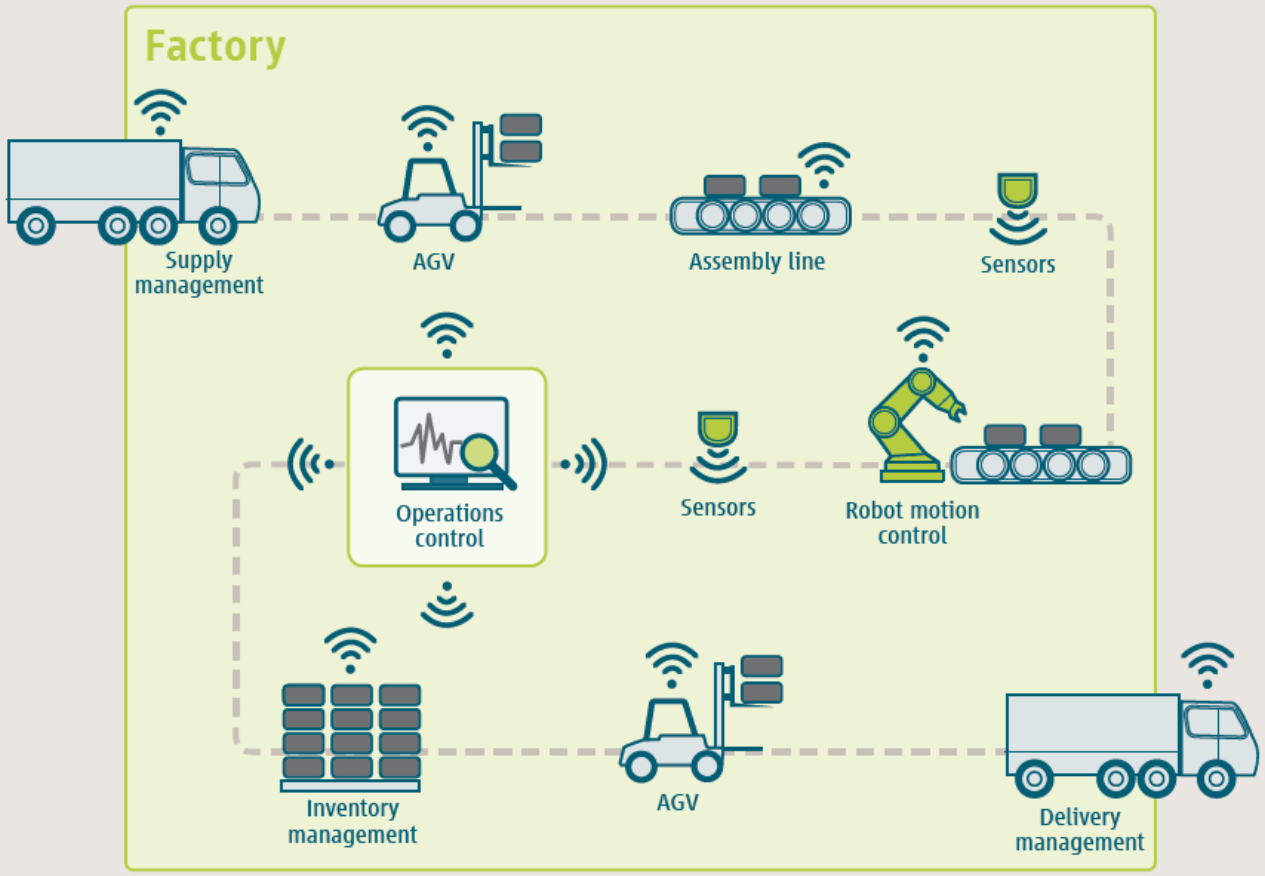


Journey towards 4th Industrial Revolution

Consumers:
- Many smartphones
- Few centralized clouds
- E-commerce and social platforms
- Best effort internet Connectivity

Industry:
- Things Connected
- Multitude of edge clouds
- Augmented intelligence control platforms
- High-performance network

Industry 4.0 – Controlling physical using digital



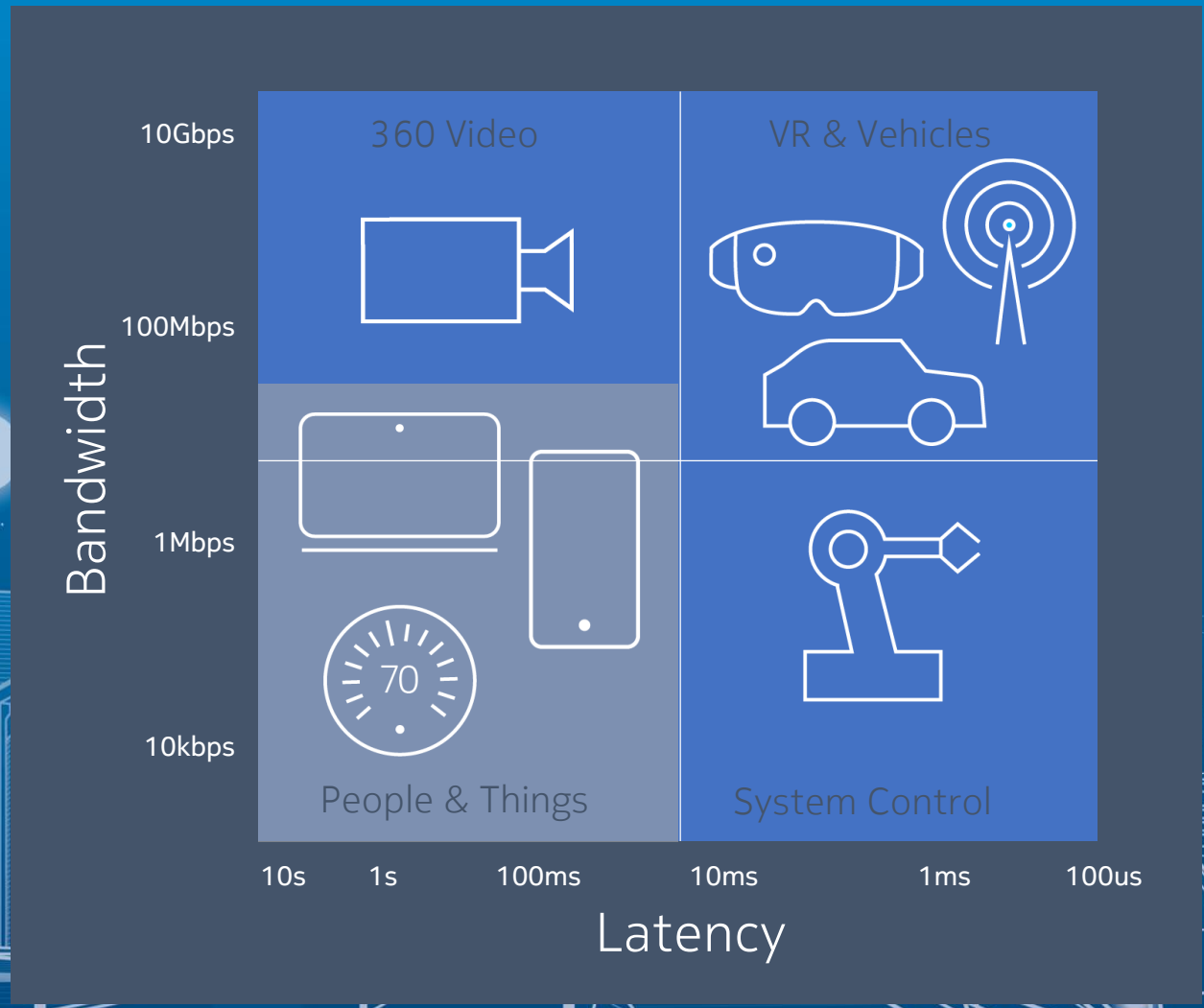
Source: ZVEI

Convert Machines to Mobile Devices:

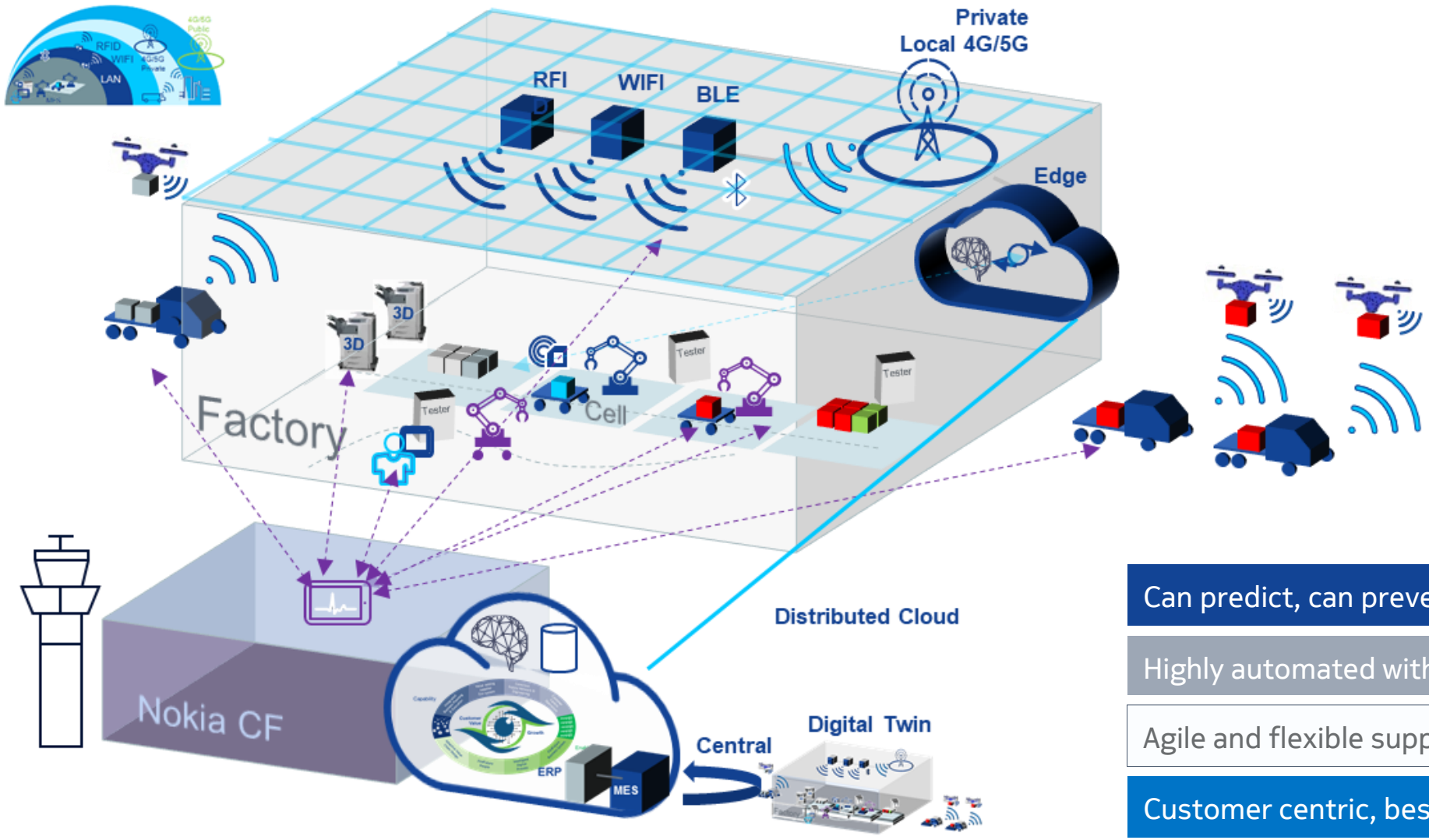
Motion control
Mobile robots
Mobile control panels
Safety functions
Augmenting the physical infrastructure

Service Requirements ?

Evolution to business-critical applications



4th industrial revolution at Nokia – the Conscious Factory vision



Can predict, can prevent and improve by self-learning

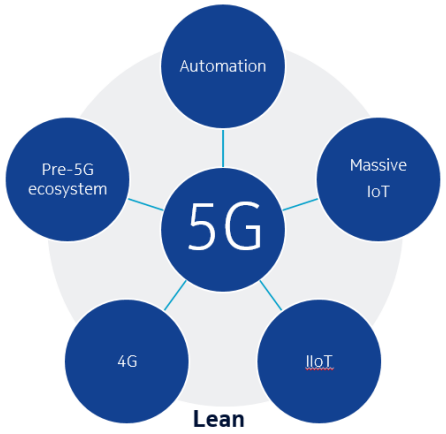
Highly automated with sustainable impact

Agile and flexible supply. Where needed, when needed

Customer centric, best in class in the industry

Wide range of deployed digitalization use cases by Nokia teams since 2014

Circle of our evolution

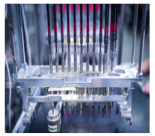


Automation

Manufacturing Automation

Fully automated production line and robotics cells from module manufacturing up to packing of products

Industrial Machine Learning



Specific manufacturing process algorithms for highly complex operations

SW robotics

Digital automation for repetitive office tasks with support of new tools

Specific process knowhow or partnering with System Integrators / Solution providers

IIoT

Factory in a Box

Mobility for manufacturing "factory" towards local and lot size one production cells or machines

Cloud MES

Transformation for multitenant public cloud PLC systems in manufacturing IT landscape

Digital Twin

Big data collection from machines and processes to build foundations for analytics and AI

Manufacturing industry disruption with help of connected machines and new technology

IoT

IoT devices for process control

Control mechanics with IoT devices and applications to manage operations environmental quality

Indoor positioning

Asset / object tracking for indoor operations with precise position data

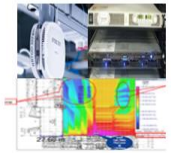
IoT for digital operations

Human interaction with IoT devices and IT systems to take steps for new digital operations

Opening new value of wireless devices use in manufacturing domain

4G

Private LTE



LTE networks for indoor factory networks with edge cloud capabilities. QoS development for factory networks

Mobility

Full indoor accessibility with moving objects and video streaming to support remote collaboration and assist operations

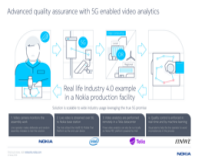
Cloud robotics

Programmable robot tasks transfer over the air for edge based control systems

Starting with todays network technology to explore new opportunities

Pre-5G

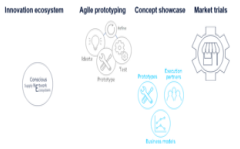
Joint pilots to accelerate change



Video Analytics

Real use case examples by use of 5G as part of manufacturing with steps towards new services

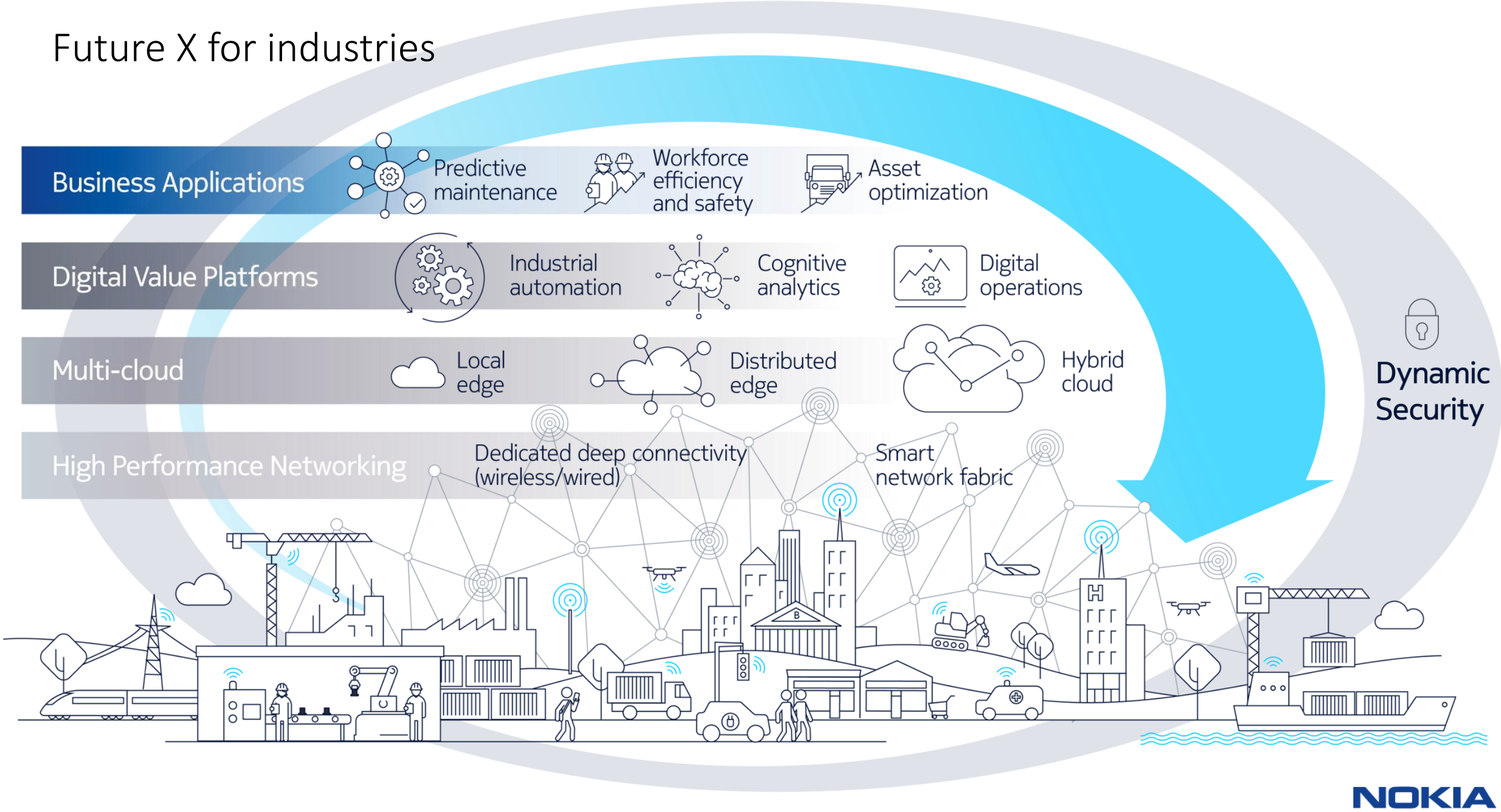
Building 5G eco-system



Ecosystem engagements to pilot pre-5G / 5G solutions in real or digital manufacturing environment

Impacting to change

Future X for industries



NOKIA

Go Allwhere.

Networking solutions for the new age of industry.

nokia.com/networks/go-allwhere

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