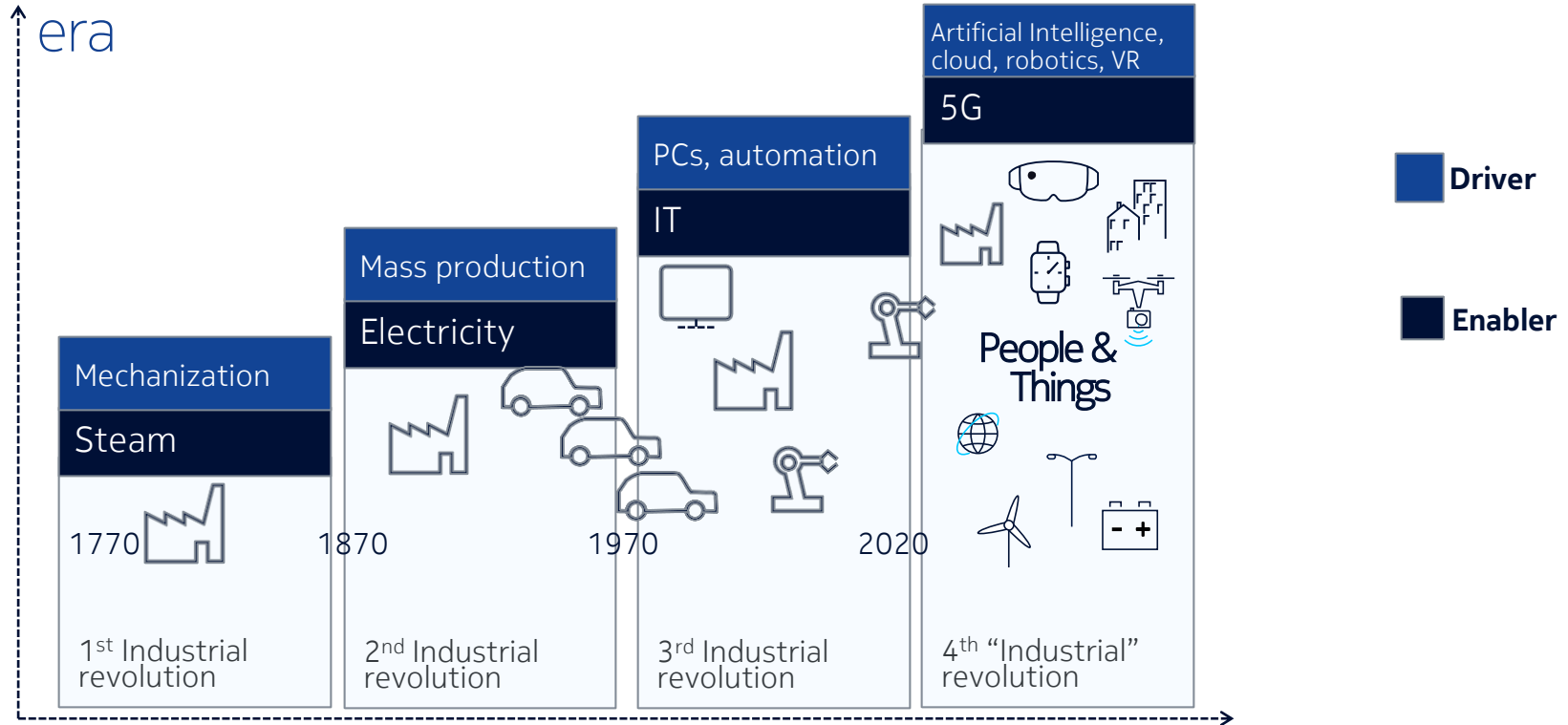# 4th Industrial Revolution: Digitalization, Industry 4.0 and 5G

Celedonio von Wuthenau
29 de Mayo de 2018

NOKIA

# Digital Transformation and Industry 4.0

## 4th Industrial Revolution powered by Nokia's vision of the 5G era



**Driver**

**Enabler**

Mechanization

Steam

1770

1st Industrial revolution

Mass production

Electricity

1870

2nd Industrial revolution

PCs, automation

IT

1970

3rd Industrial revolution

Artificial Intelligence, cloud, robotics, VR

5G

People & Things

2020

4th "Industrial" revolution

**NOKIA**

# Megatrends are bringing the programmable world

### Network, compute & storage

Broadband every-where, distributed cloud, near infinite storage

### Internet of Things

Connectivity for a trillion things

### Augmented intelligence

Human assistance and task automation at machine scale

### Human & machine interaction

Virtual and augmented reality, reshaping how we interact with machines
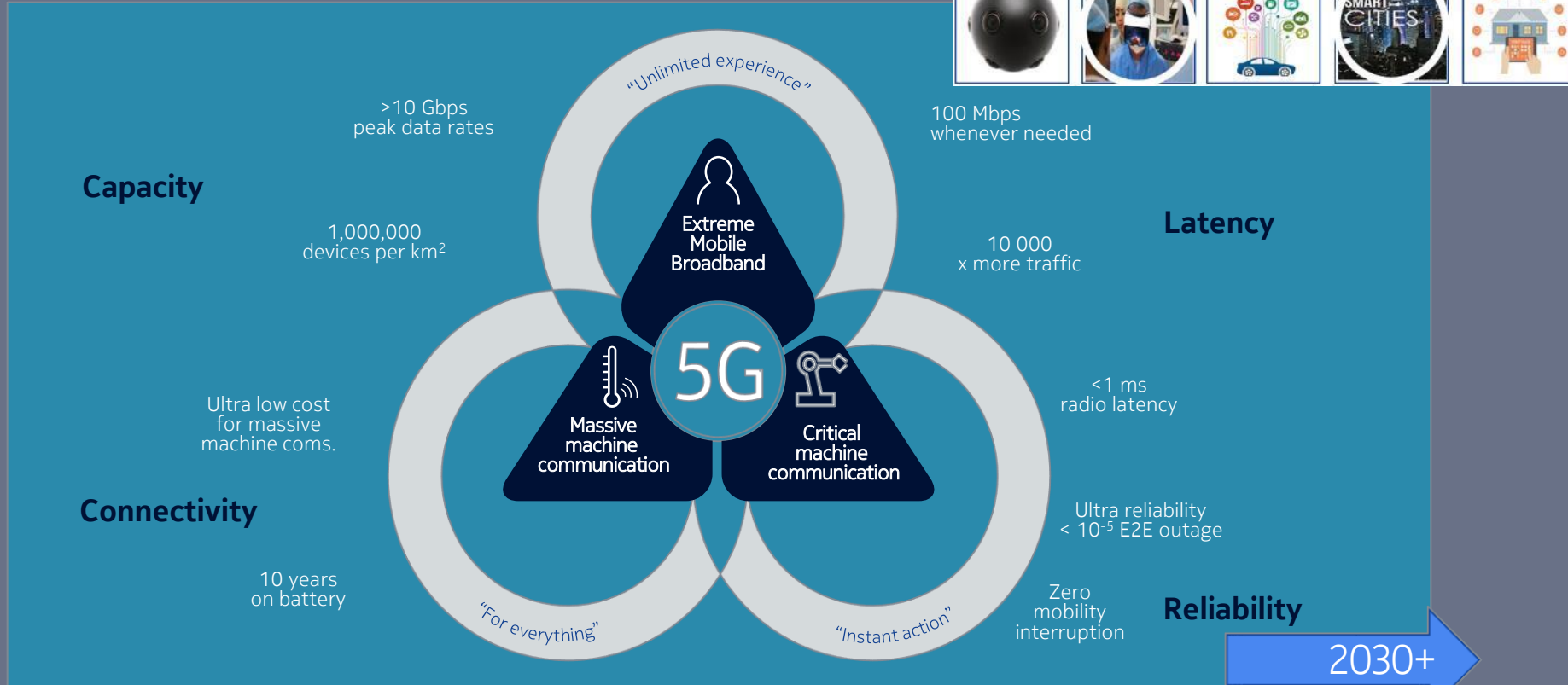
### Social & trust economics

Sharing economy and digital currencies making trust and security essential

### Digitalization & ecosystems

Digitalization of operations expanding into consumer and biology

NOKIA

# 5G is...

**Capacity**

>10 Gbps
peak data rates

1,000,000
devices per km$^2$

Ultra low cost
for massive
machine coms.

**Connectivity**

10 years
on battery

*"Unlimited experience"*

Extreme
Mobile
Broadband

5G

Massive
machine
communication

Critical
machine
communication

*"For everything"*

*"Instant action"*

100 Mbps
whenever needed

**Latency**

10 000
x more traffic

<1 ms
radio latency

Ultra reliability
< 10$^{-5}$ E2E outage

Zero
mobility
interruption

**Reliability**

2030+

**NOKIA**

# 4.5G Pro, 4.9G, and 5G offer new use cases

## Massive Broadband Everywhere

>>1Gbps throughput (50Mbps, cell edge), 10 ms latency

## High-end Augmented (AR) and Virtual Reality (VR)

3-20ms E2E latency

4K 15 Mbps

## Tactile Internet

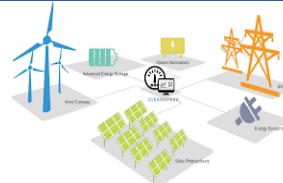~1ms latency with varying data rate requirements

## Industry 4.0

Varying latency, accurate positioning

## Smart Grids

<10ms latency with medium data rates

## Collaborative Robots

Up to 1 ms latency with MEC

1-10 Mbps

NOKIA

# Five sectors enhanced by digital networks will lead the revolution – underpinned by 5G

Universal access to Health, Preventive medicine, lifetime increase

**Health**

Automation, downtimes reduction, increased productivity and virtual collaboration

**Industry 4.0**

Energy efficiency, sensors, analytics and process automation

**Energy**

Traffic management, Ensuring safety

**Transportation**

Digital enterprises, digital homes

**Communications**

## Latin America: digitalization as a catalyst for grow

Advanced manufacturing in countries like Mexico (#7) Brazil, Colombia (#29,#36*). Strong agricultural sectors in Argentina, Brazil. All with key Retail and Enterprise markets

* Global manufacturing index

   Confidential

NOKIA

# In terms of Policies what is required to drive digitalization?

**Digital Foundation, Policies and regulatory framework in place:**

- Digital Leadership
- Digital Literacy
- Cyber-Security
- Data Protection
- E-payment
- Cloud Services

**Verticals to be enabled**

- Agriculture
- Education
- Government
- Healthcare
- Transportation

Indonesia   Singapore   Kenya

Pakistan   Colombia   Finland

Source: Digitalization Scorecard – Nokia for ITU BB Commission 2017

NOKIA

# Key learnings

Designation of a body responsible for digitalization

National strategies

Public funding

Responsible data sharing

Education and awareness

There is no room for complacency in driving digitalization

NOKIA

THANKS

NOKIA