

The background of the slide is a deep blue space scene. At the bottom, the curved horizon of the Earth is visible, with a bright blue and white glow from the sun or moon just above it. The Earth's surface is dotted with numerous small, yellowish-white lights, representing city lights at night. The rest of the background is a dark, starry space filled with many small, distant stars.

**NOKIA**

# Smart Technologies for a Smarter World

Powered by Nokia

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October 24<sup>th</sup>, 2018

# Table of Contents

The background of the slide is a photograph of a modern industrial factory. It features several large, red robotic arms (likely KUKA) mounted on production lines. The environment is clean, with white walls and metal railings. The lighting is bright, typical of an industrial setting.

Megatrends and Industry 4.0

Use Cases

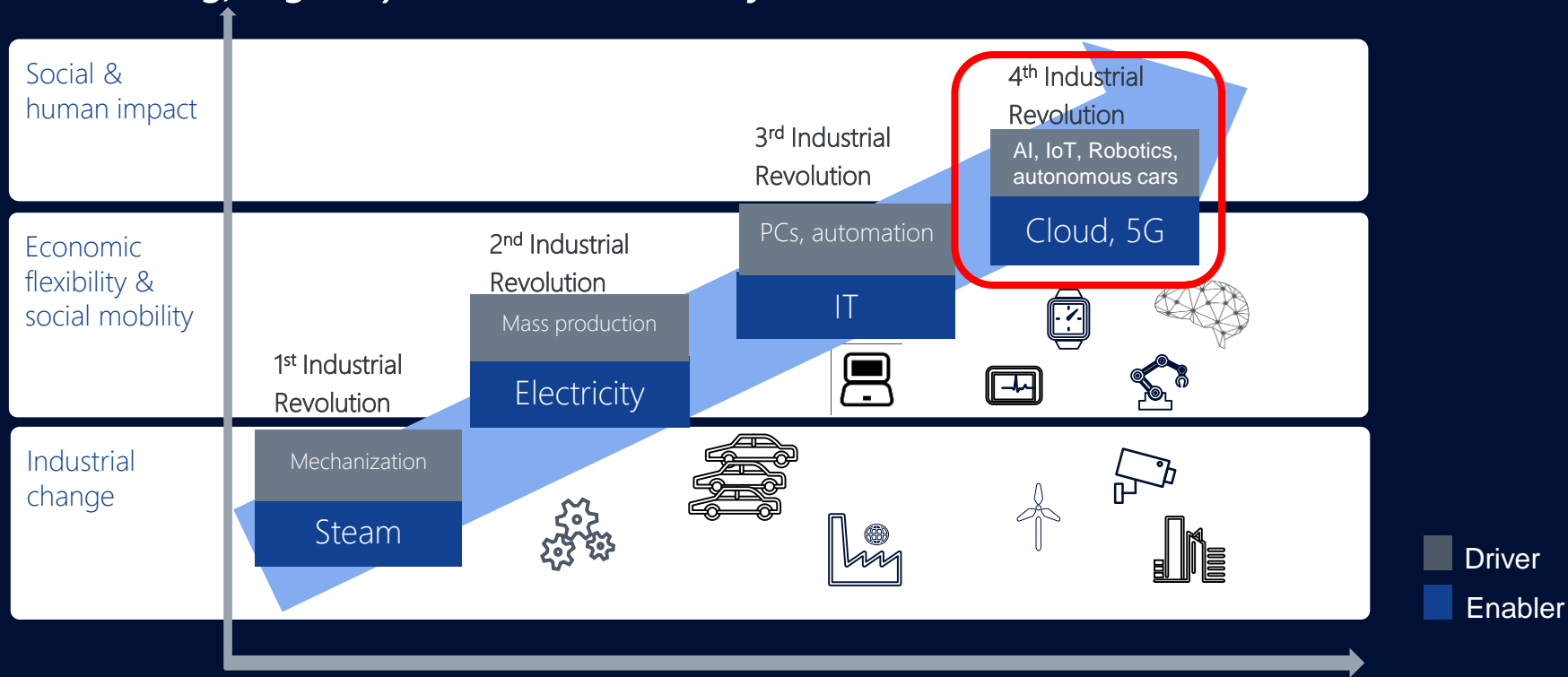
Enabling Technologies

Opportunities

**Nokia's Factory in Oulu as  
featured in Forbes "where  
robots manage robots"**

# 4th Industrial Revolution

*Fast moving, digitally connected and software driven*



# Megatrends are changing the world, and the ways we connect with it



## Network, compute & storage

Broadband everywhere, 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



## Social & trust economics

Sharing economy and digital currencies making trust and security essential



## Digitalization & ecosystems

Digitalization of services, operations, network and supply chain



# Use Cases



# Amazon's Alexa-enabled microwave

Amazon hopes to inspire creation of more voice-enabled household devices



Price: \$60

Connects to Alexa and becomes "The Microwave"

"Alexa, set the microwave to defrost 250 grams of peas."

Simplified interface because functionality held in Alexa

Comes with popcorn subscription – counts times popcorn is made and automatically reorders when about to run out

# All new homes will come with Alexa?

Lennar will pre-install an Amazon Echo and Echo Dot and include a training session



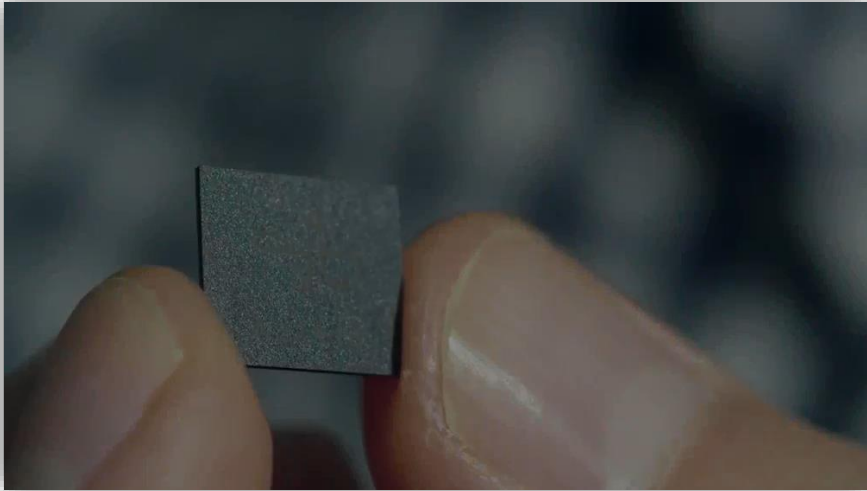
Lennar will also build Amazon Experience Centers in model homes in 15 cities

Hands-on demonstration centers for everything that can be enabled by Alexa in the home



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# Gesture Sensing and Augmented Reality-Driven Workspace



**Radar for fine gesture sensing and interpretation**

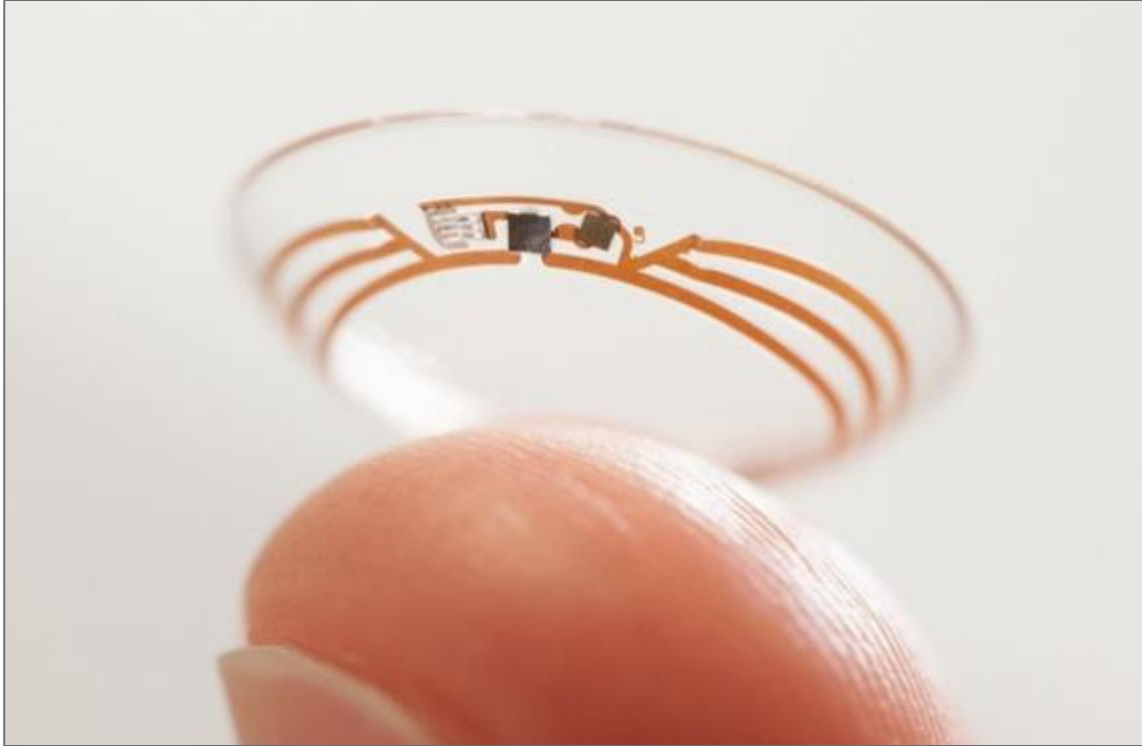


**AR-driven workspace replaces laptops with virtual screens**



# Smart Contact Lenses for the visually impaired

RaayonNova USA



RaayonNova's smart contact lenses have an display directly over the cornea that can help the visually impaired by, for example, magnifying street signs

"We believe that AR and VR applications in the long run will replace smartphones. Our solution is to project visual information directly into the retina of the eye in an enriching and enabling fashion."

# Future Scenario: Devices with screens entirely replaced by voice and gesture?

*The end of the smartphone, at least at home and at work*



# BMW Artificial Intelligent assistant

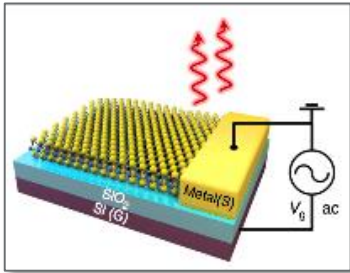
*BMW's own in-car assistant to debut in 2019*

In 23 languages; user specifies assistant name:

- "What's the oil level?"
- "Find gas station on route"
- MS Office and Skype integration – have emails read to you while driving
- "I'm tired," launches Vitality Mode in lighting, music, and temperature – later, AI will self-recognize your tired face



# Molecule-thin transparent displays for information on any surface



Transparent light displays could enable window gaming or information displays integrated with real world – ideal for cars, with glass and power

University of California, Berkeley

NOKIA



# Wearable UV sensor for your fingernail

L'Oreal



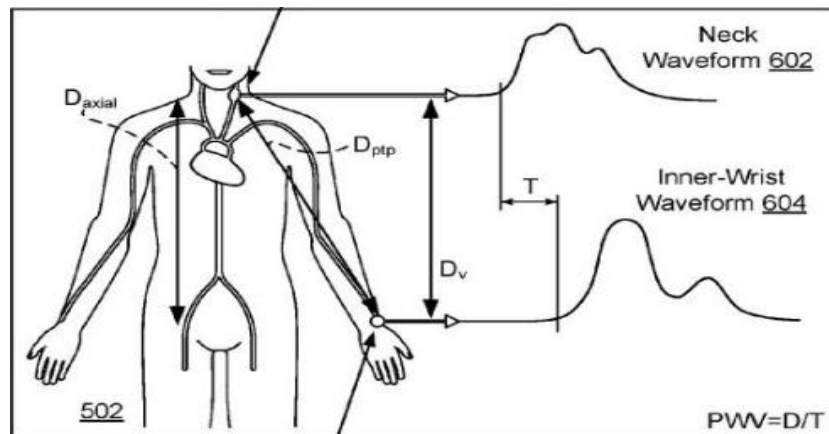
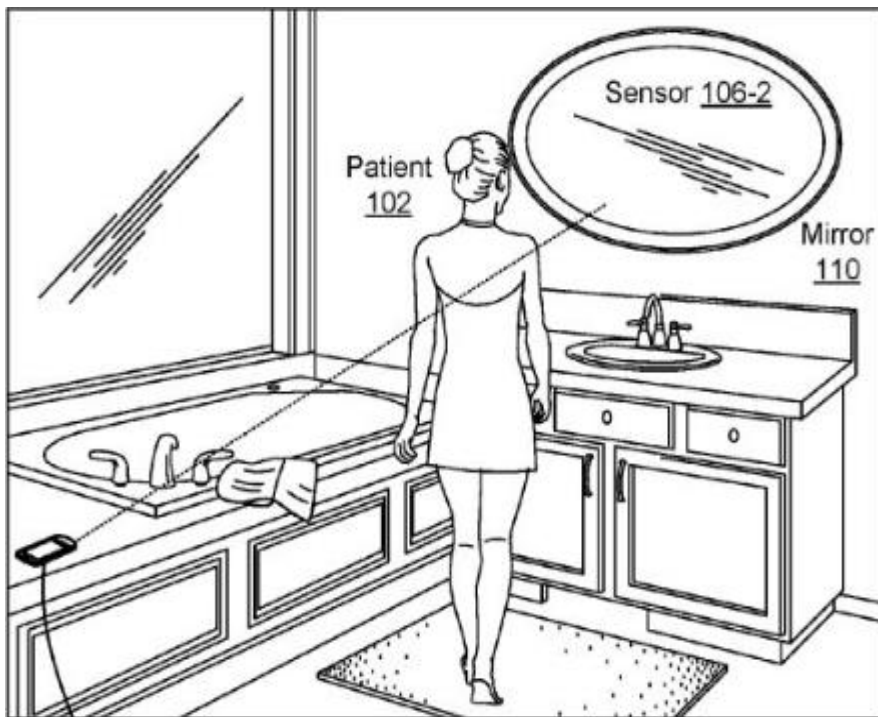
Reusable adhesive nail sensor comes in multiple styles and colors and monitors UV, pollen, humidity, temperature and air quality

2 mm thick, 9 mm long and has no battery

Connects to smartphone via NFC and can give you warning when UV exposure exceeds wise limits

# Google files patent for passive heart health monitoring devices

Patent includes sensors in phones, mirrors, and Google Glass



Passive devices in home bathroom  
“sensing milieu” compare skin color changes in  
different parts of the body to determine blood  
pressure, heart rate – give constant heart health  
feedback for improved outcomes

# Cameras + Analytics are looking for sharks at Australian beaches



Drone-based cameras connected to analytics search for sharks from above and alert swimmers with a loudspeaker when spotted

# Dubai Airport's facial recognition tunnel for border control

Opening mid-2018



Designed to replace passport border control process

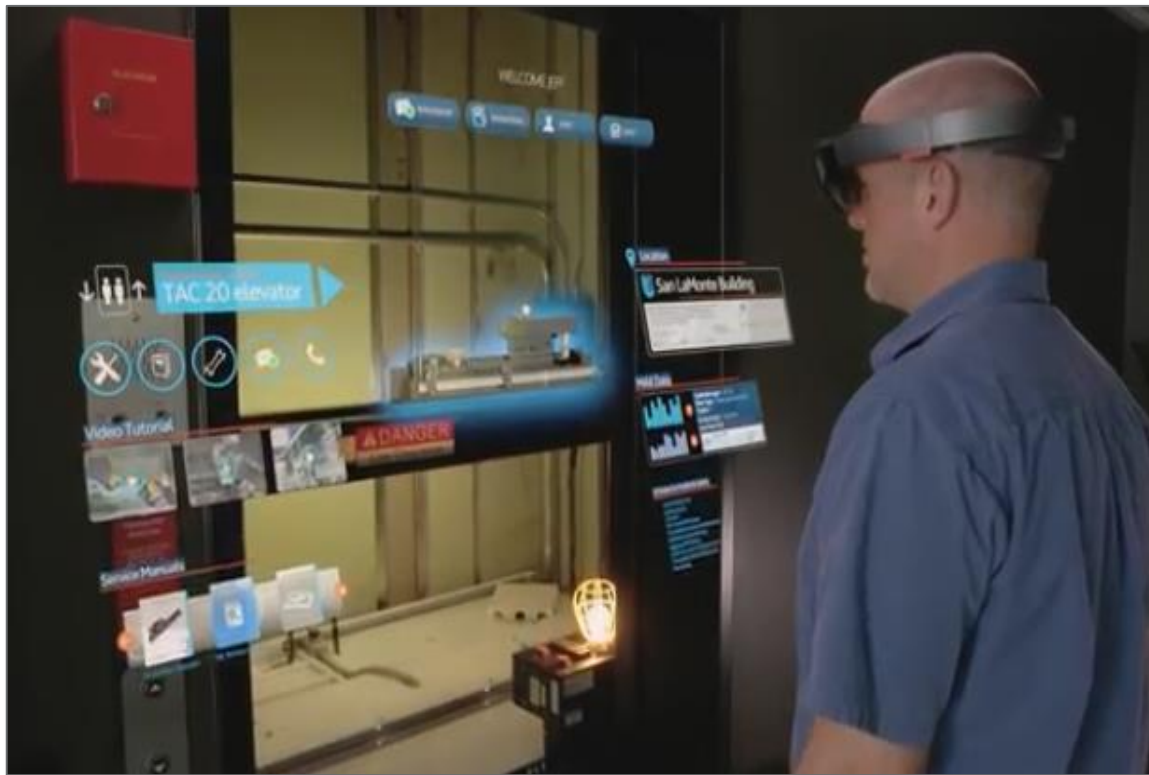
After registration with program, visitors merely walk down the video tunnel

80 separate facial recognition cameras catch different angles of face as person turns head to look at video images on walls



# ThyssenKrupp elevator engineers using AR on field calls

Hands-free access on site to history, manuals, and supervisory viewing



# Enabling Technologies

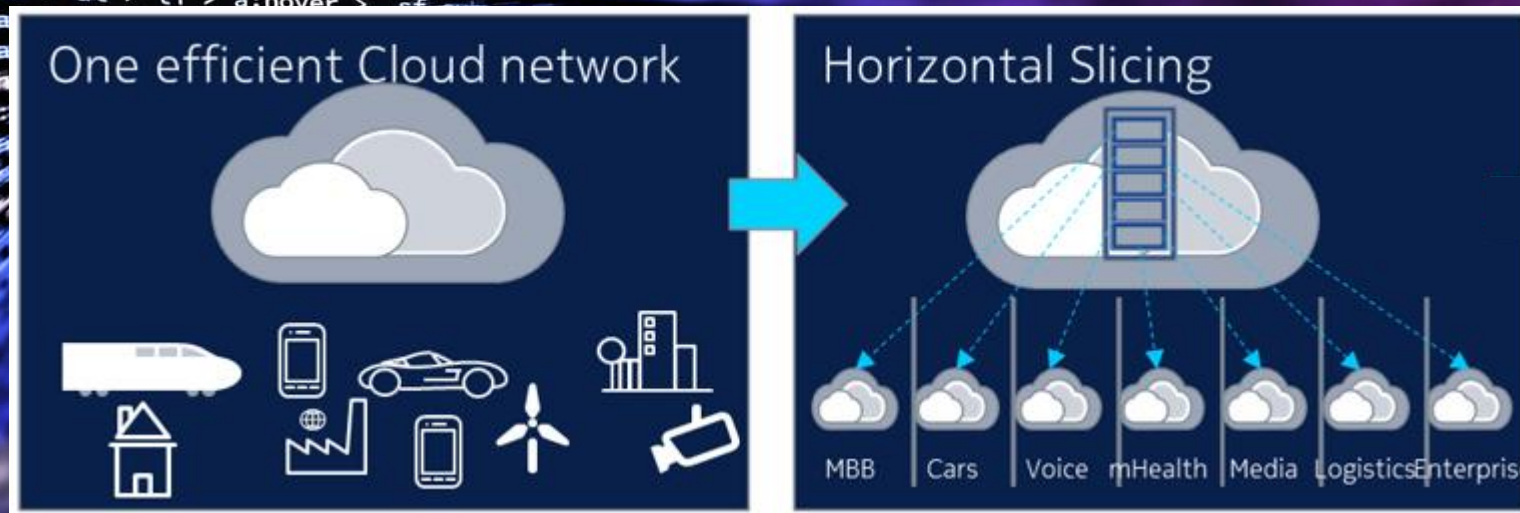


A word cloud of enabling technologies. The words are arranged in a circular pattern, with some words being larger and more prominent than others. The colors of the words are: massive (red), mimo (red), orchestration (black), drone (yellow), networks (yellow), network (yellow), slicing (yellow), Multi-access (green), edge (green), computing (green), blockchain (red), Fog (green), computing (green), everything-as-a-service (red), securization (black), automatization (yellow), cloudification (green), cognitivization (red), 5G (yellow), iot (red), ng-pon (yellow), fiberization (black), Software defined network (green), network function virtualization (yellow), and big data (black).

massive mimo orchestration drone networks  
network slicing Multi-access edge computing  
blockchain Fog computing everything-as-a-service  
securization automatization  
cognitivization cloudification  
ng-pon 5G iot  
Software defined network network function virtualization  
big data

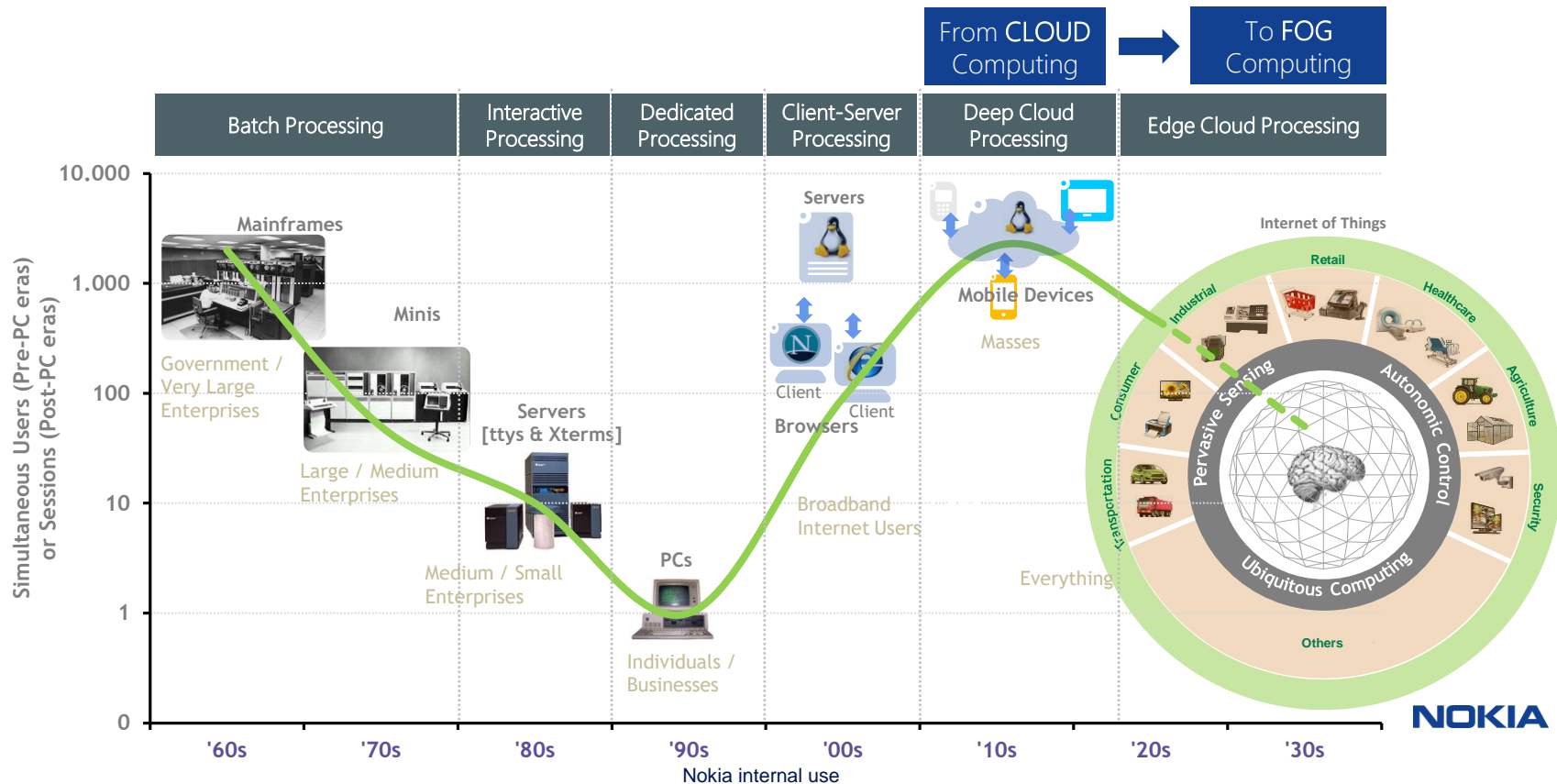
# Network Programmability

## *From Cloudification to Slicing*



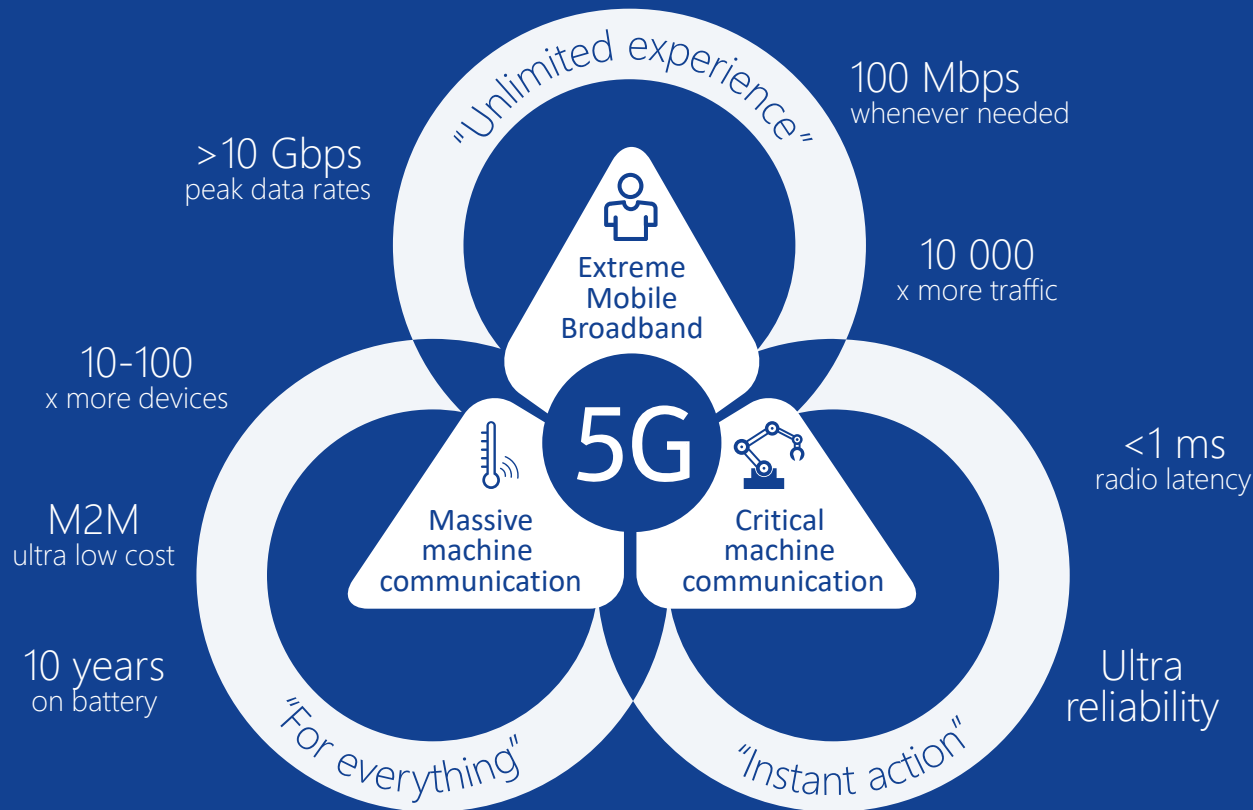
# Intelligence back to the EGDE

*The pendulum is swinging from a centralized model back to a dispersed model*



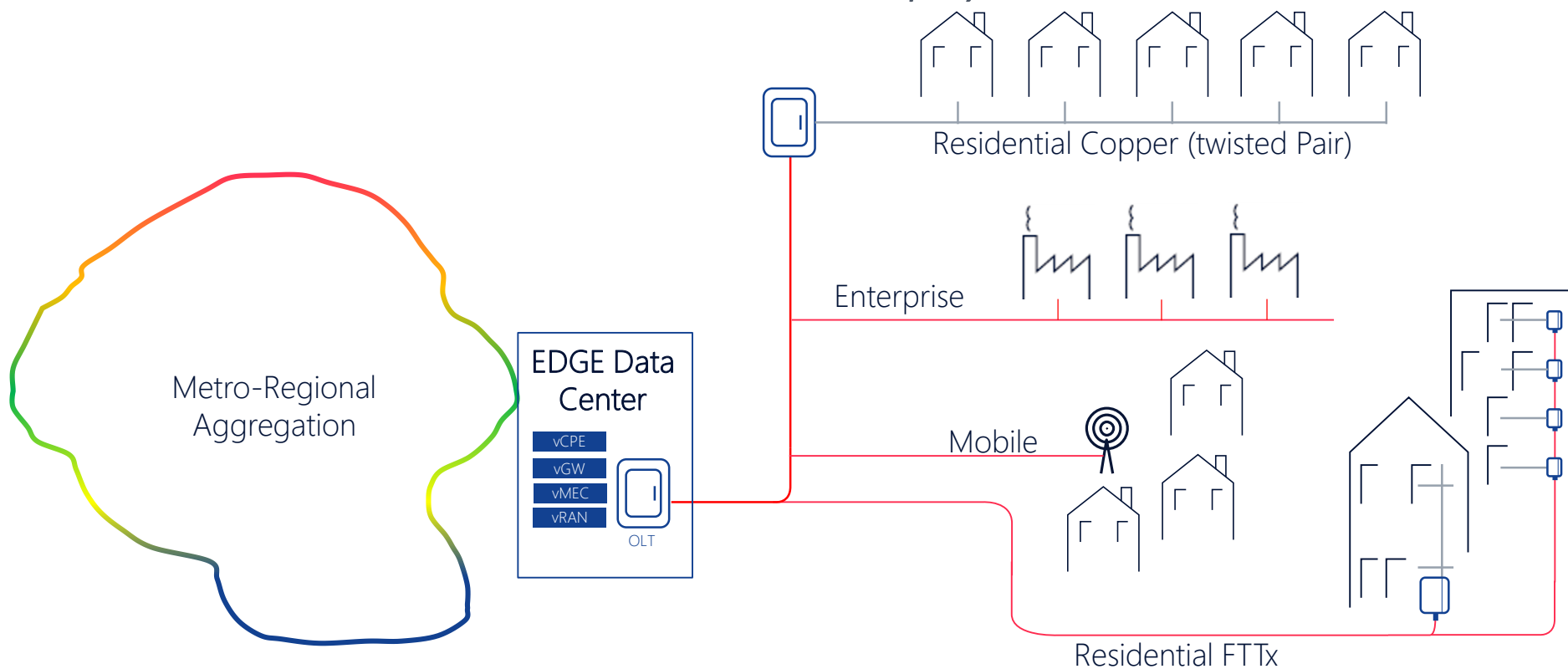


# Market Drivers for 5G - Heterogeneous use cases



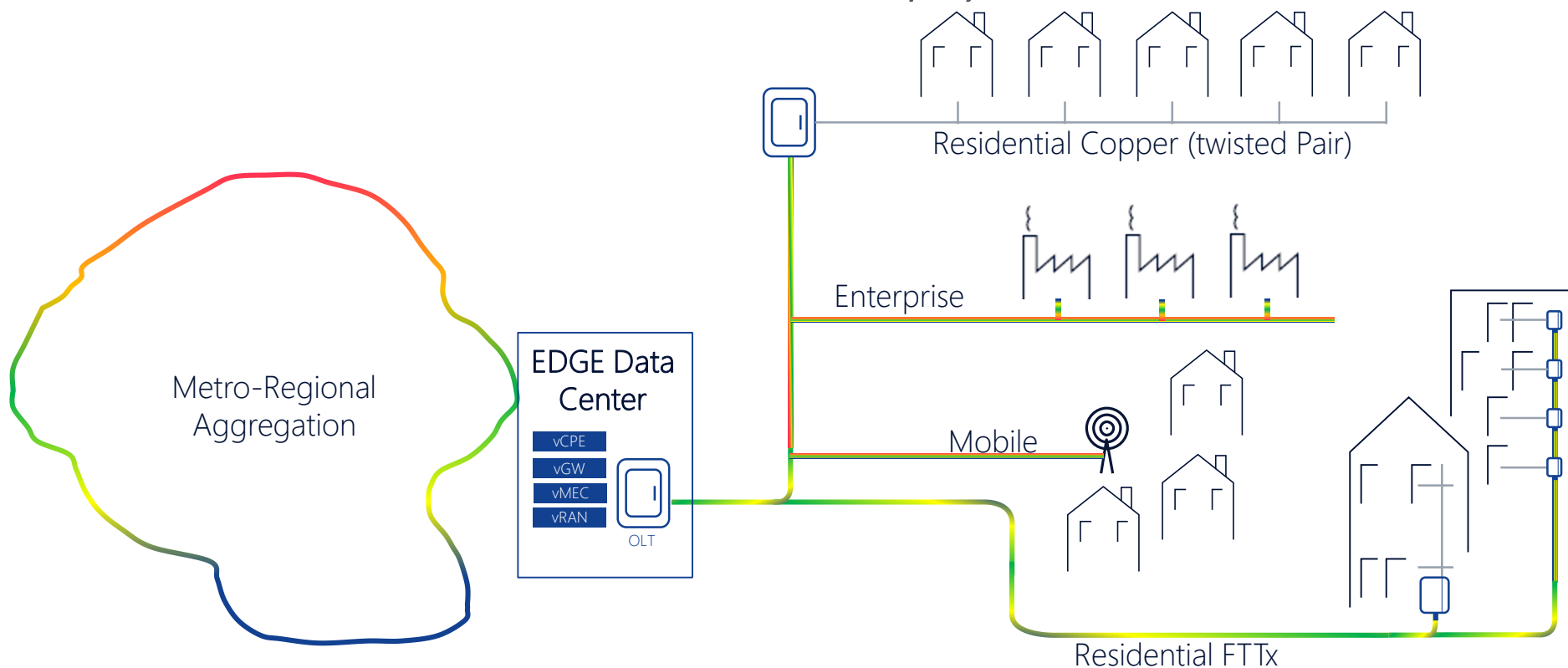
# Fiberization

*Fiber as critical asset to innovative use cases deployment*

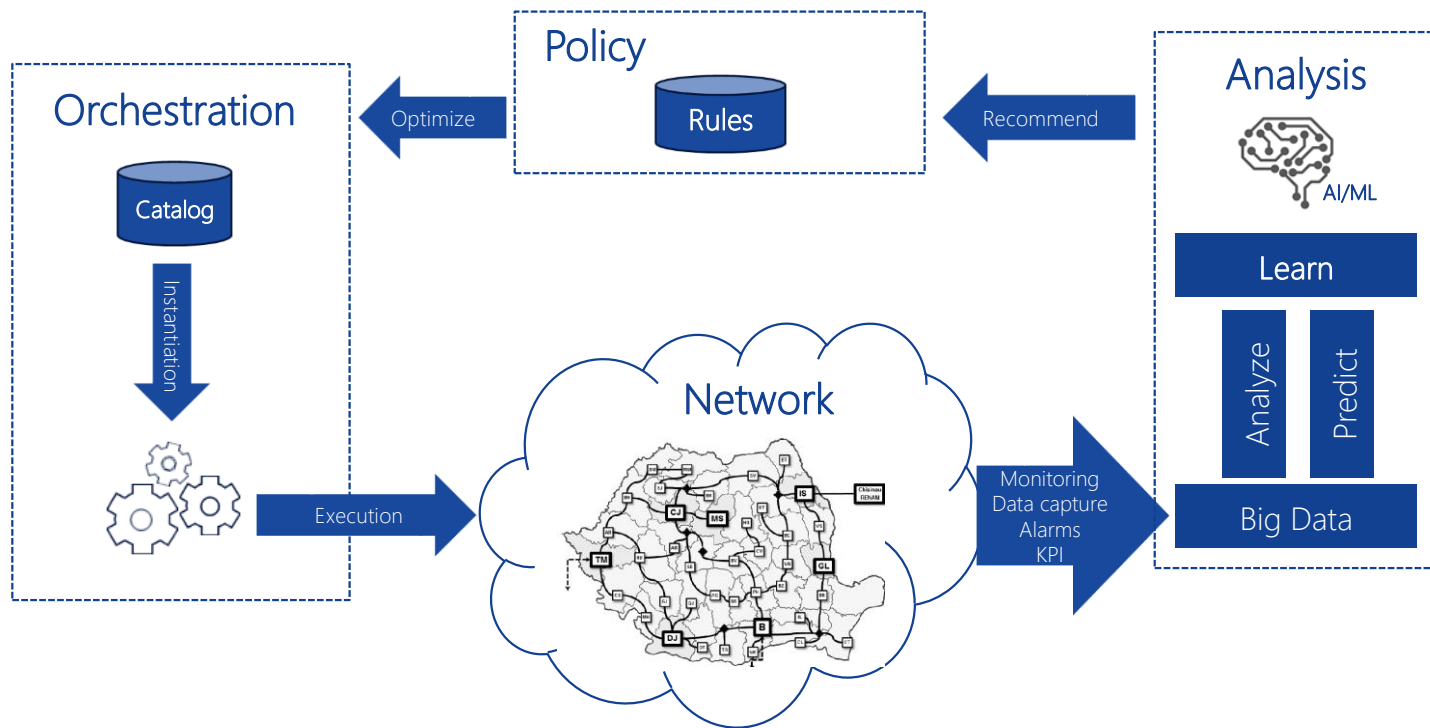


# Fiberization

*Fiber as critical asset to innovative use cases deployment*



# Automation & Analytics





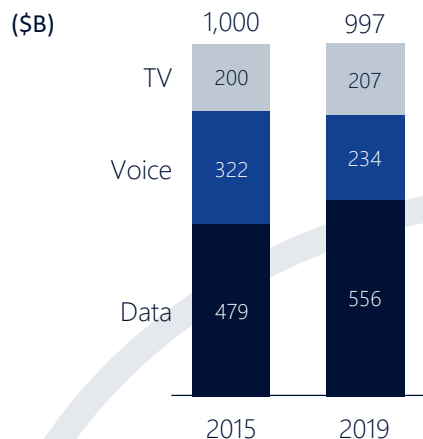


**The quest for new  
value:**

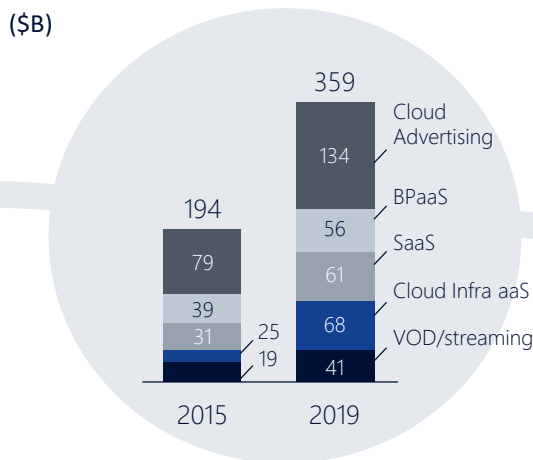
**where are the new  
opportunities?**

# Transformation from CSP to DSP

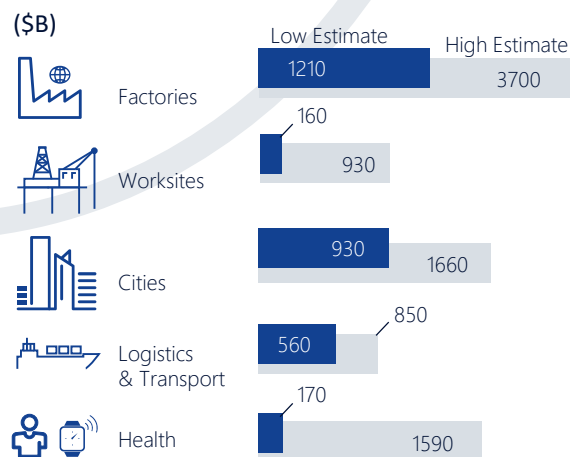
Traditional CSP service revenues are flat



Cloud Services have strong growth, but often intercepted by Web-Scale Companies



New DSP markets offer significant revenue expansion



Source: Bell Labs Consulting analysis, and McKinsey and Co analyses

The background of the slide is a deep blue space scene filled with numerous small white stars. A bright blue arc, representing the horizon of Earth, curves across the lower half of the image. Below this arc, the dark blue and black outlines of continents are visible, with a dense pattern of small yellow and white dots representing city lights. The Nokia logo is centered in the upper half of the image.

**NOKIA**

Thanks

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