

# NOKIA

## Envision a 6G future

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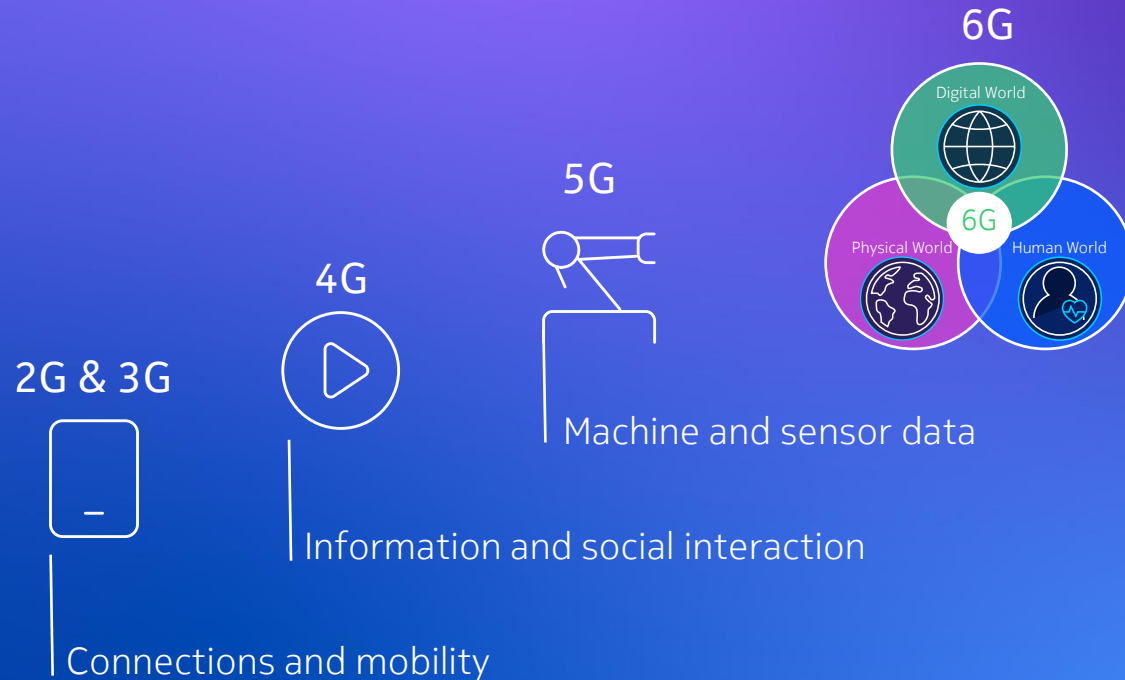
September 29, 2023

**5G im Gesundheitswesen**

5G4Healthcare & 5G-Netzwerkveranstaltung

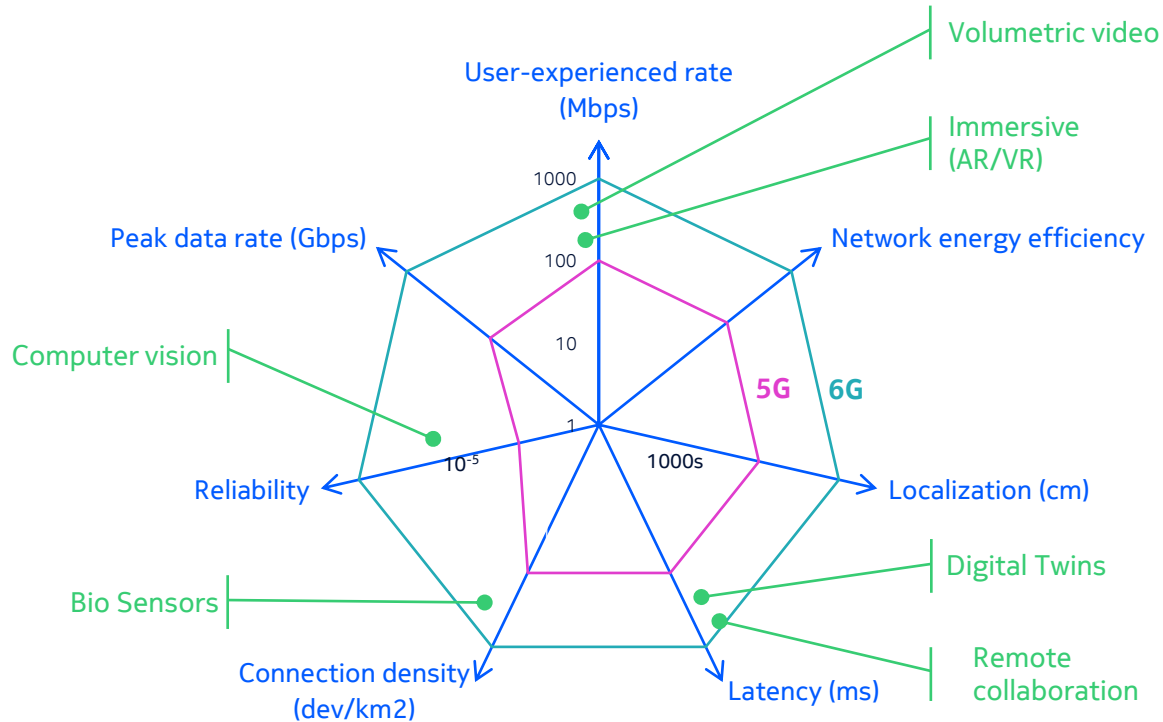


# The digital, physical and human worlds will become closely integrated in the 6G era



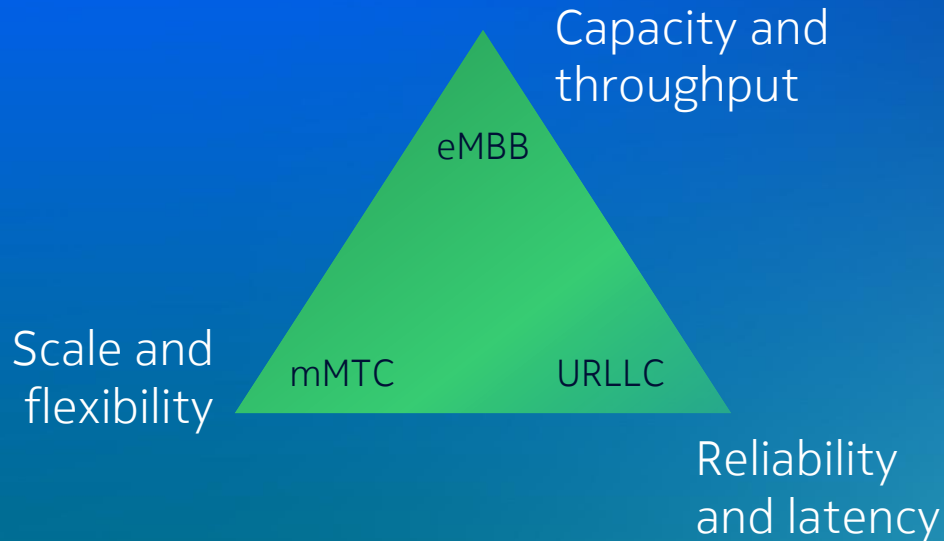
Connect digital, physical and human worlds to augment the potential of human beings

# This transformation will require new network capabilities



# Wireless system design principles

Critical dimensions will continue to be important in 6G



## Capacity and throughput



- ▲ 20x traffic growth
- ▲ 100 Gbps peak data rates
- ▲ 1 Gbps where needed

## Reliability and latency



- ▲ 0.1 ms-1ms
- ▲ Seven 9s (99.99999%)
- ▲ Nanosecond synchronization level

## Scale and flexibility

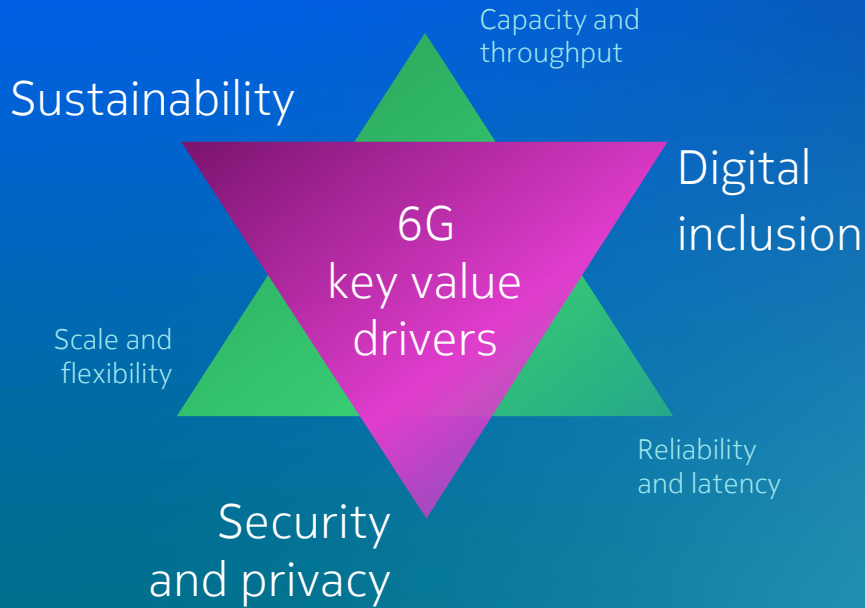


- ▲ Global coverage
- ▲ 10 million devices/Sq Km
- ▲ Platform & services approach

*\* Extreme attributes of performance may apply to specialized sub-networks only and all the requirements may not be achieved simultaneously*

# Wireless system design principles

...but also go beyond



## Sustainability



- ▲ X10 capacity increase with 50% power reduction, compared to 5G

## Digital inclusion



- ▲ Aim to address three key factors: accessibility, affordability and consumability

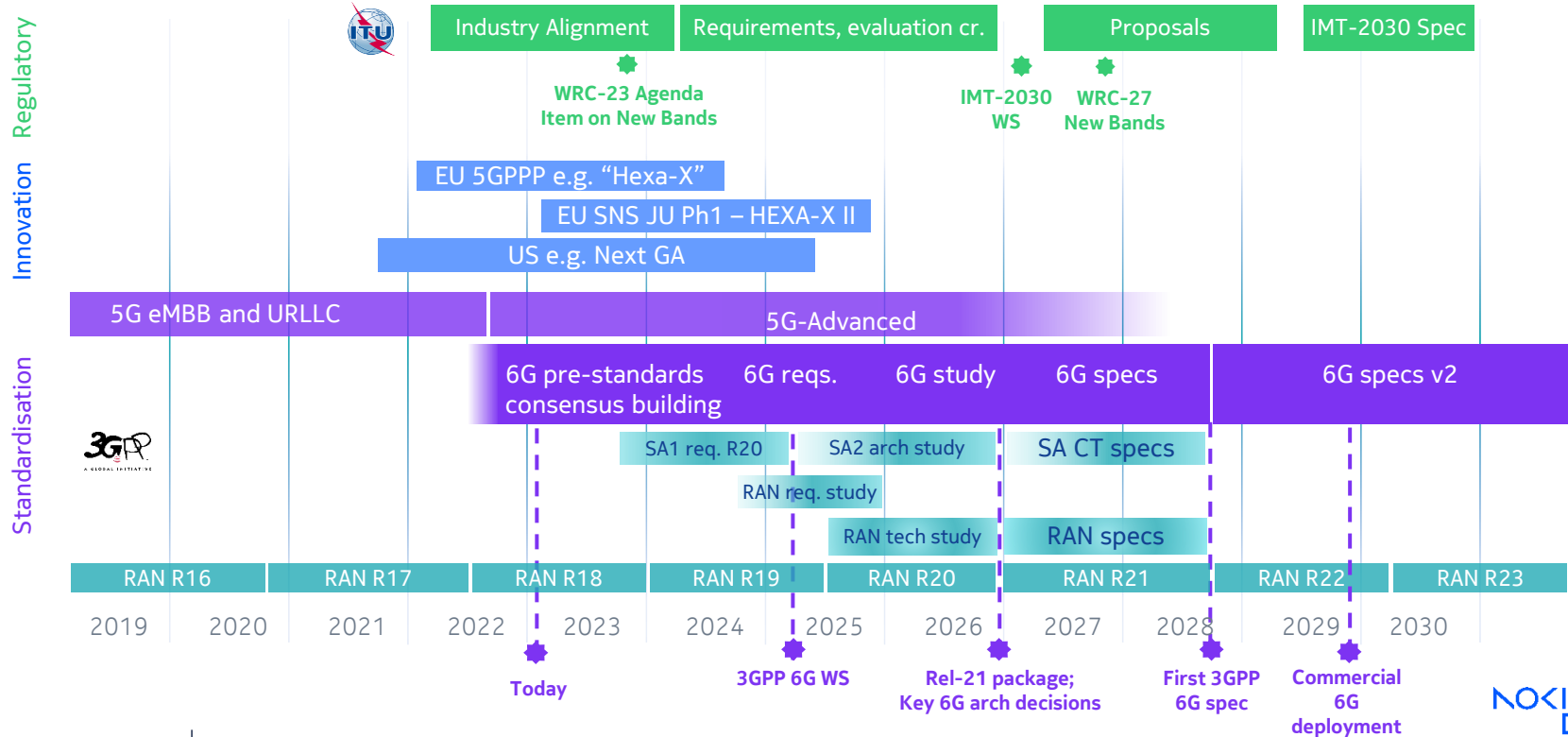
## Security and privacy









- ▲ Increasing security and privacy risks require higher levels of control

# 6G success depends on a global unified approach

Different regulatory, innovation, standardization timelines to be brought in harmony



# While 6G will be evolutionary, the technology required to get there will need to be revolutionary

5G	6G
 <p>High quality video (4K-8K)</p>	 <p>Holographic transmissions</p>
 <p>Object driven digital twinning</p>	 <p>Broad based digital twins with RT synchronous updates (e.g., smart hospital)</p>
 <p>Data communication and control</p>	 <p>Network with a 6th sense Intent based autonomy Zero touch automation</p>
2019	2030

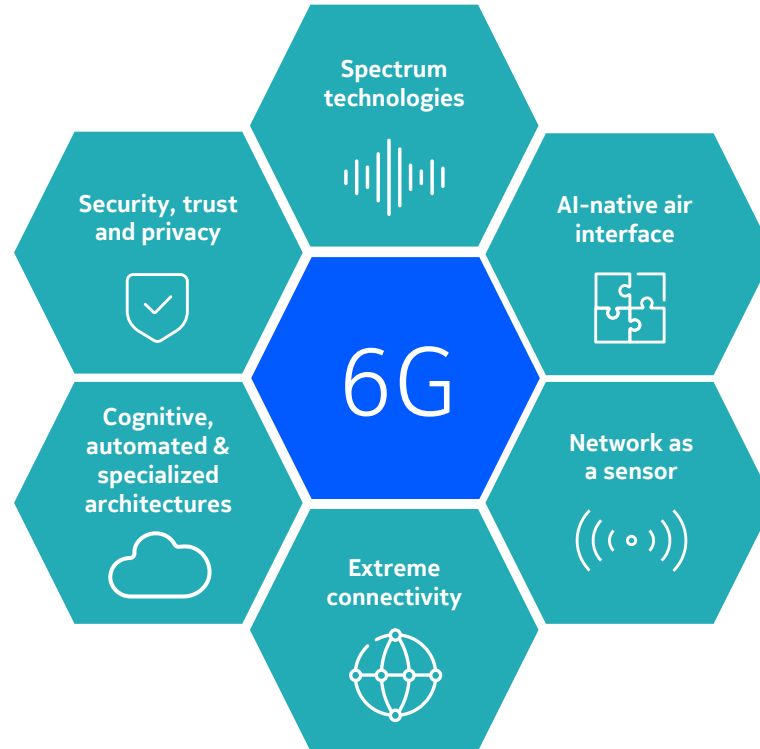
## Technology Drivers



AI and Data  
Ubiquitous compute  
Human Machine Interface  
Sensing and Actuation

# Bringing future to life

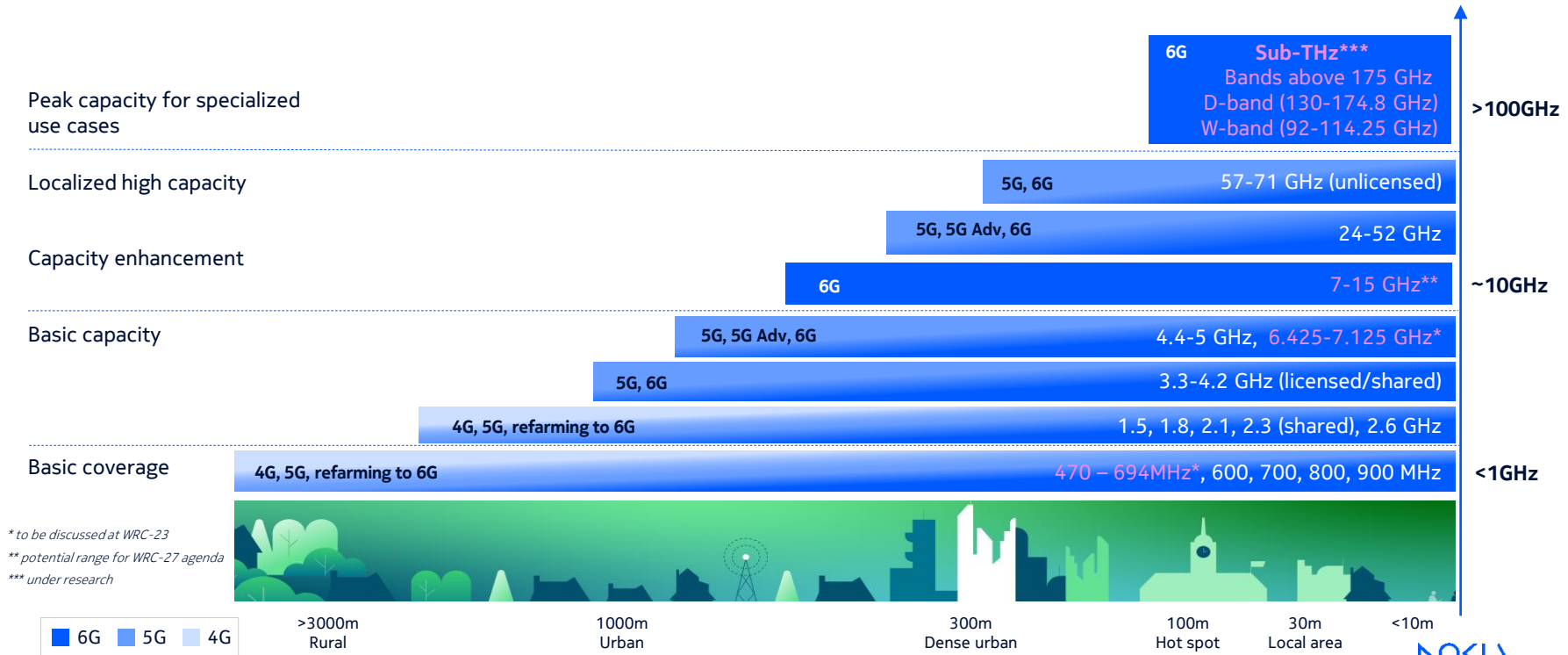
Six key technology areas for the 6G essential infrastructure





# Spectrum for 6G – possible new and re-farmed bands

## Band options for a new generation of wireless technology



\* to be discussed at WRC-23

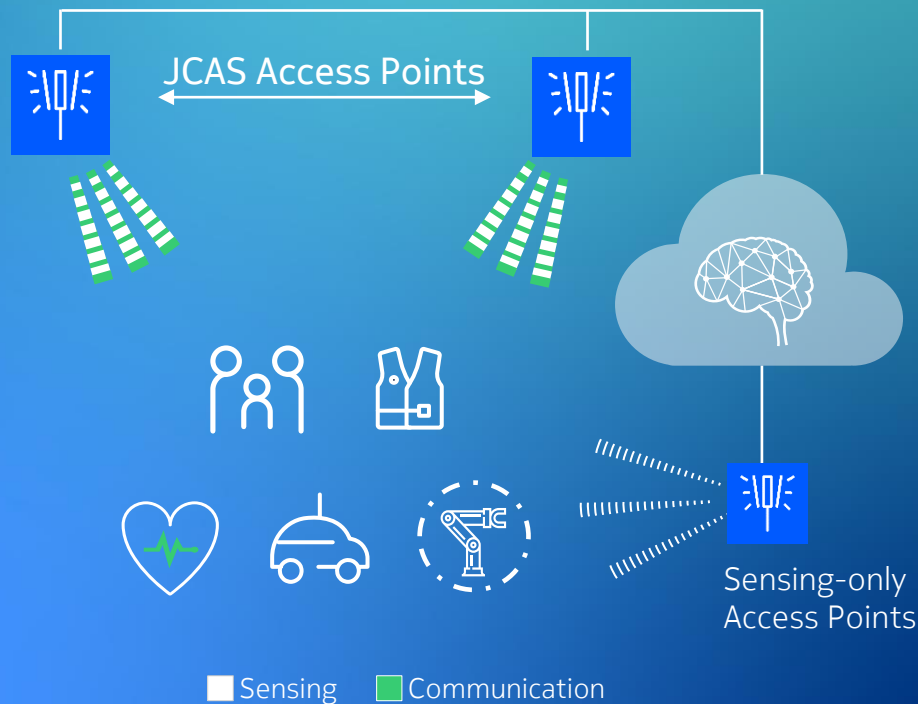
\*\* potential range for WRC-27 agenda

\*\*\* under research

6G 5G 4G

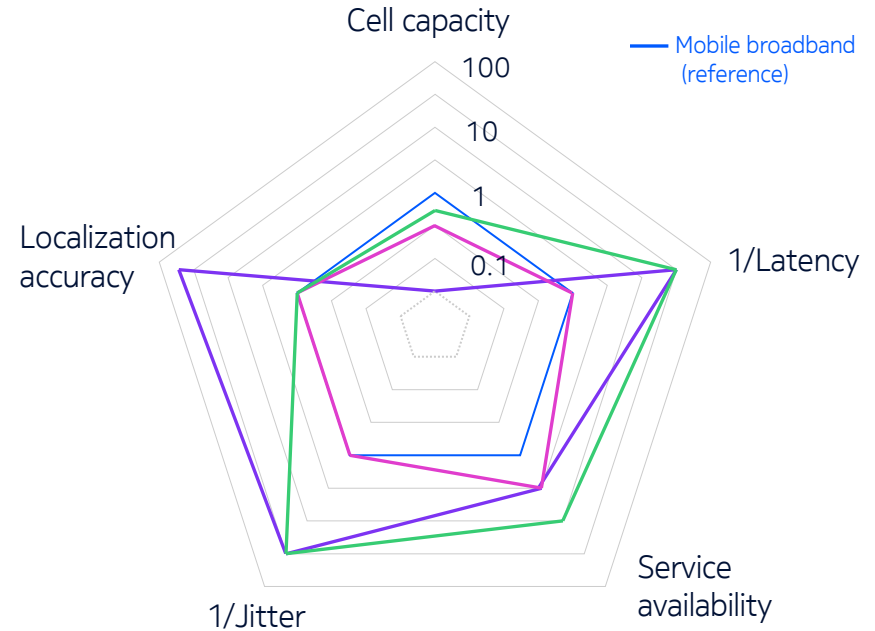
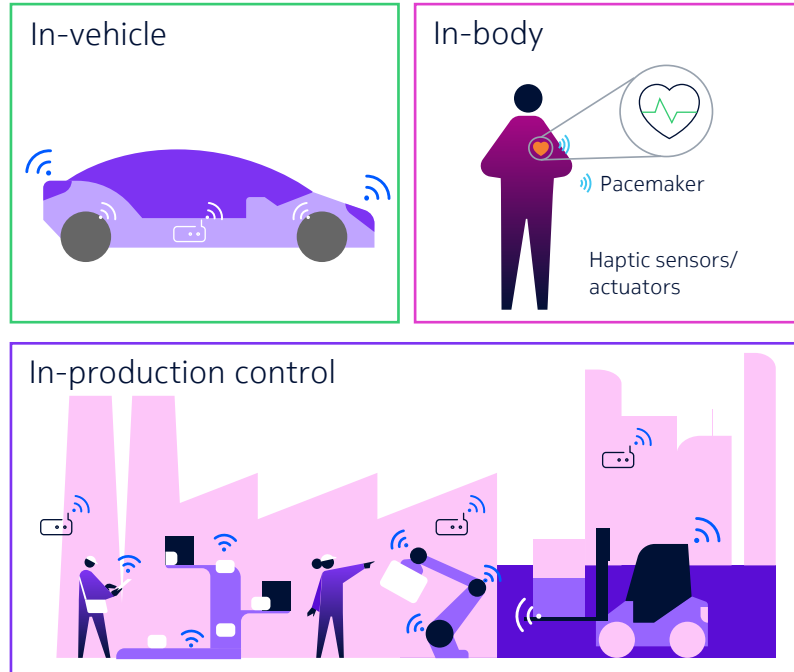
# Network as a sensor

Simultaneous  
communication  
and sensing



# Extreme connectivity

End-point is a critical sub-network with specific requirements



# Creating the future through research collaborations

## Working with academia and research institutions

### Academic partnerships on 6G research



### Brooklyn 6G Summit

Communications Beyond 5G and into the 6G Era



A landmark industry event created by Nokia and the NYU WIRELESS research center to charter the technical future of the wireless industry.

Nokia is a co-creator member of University of Oulu 6G flagship program.



Nokia is a member of 6G@UT, a funded collaboration between industry and University of Texas at Austin.



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