

Why 6G?

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Who of you has a

5G Smartphone?

Who of you can tell

whether you are on a

4G or 5G network?



So why should we care about

6G at all?

Why 6G? – Possible Reasons



It's a law of nature



Only even generations succeed

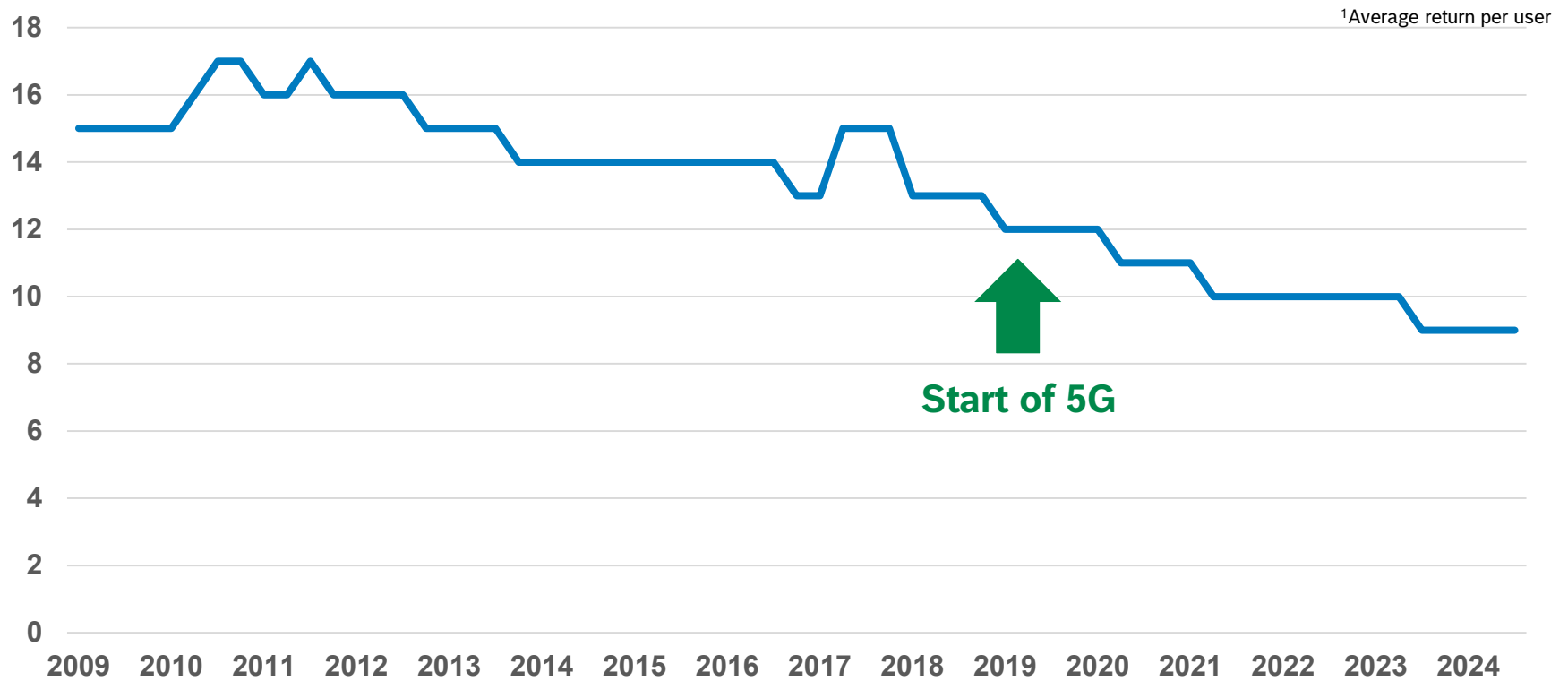


Because it is too early for 7G



Never stop a running system

ARPU¹ in € for a Major German Mobile Network Operator



The Big Promise of 6G



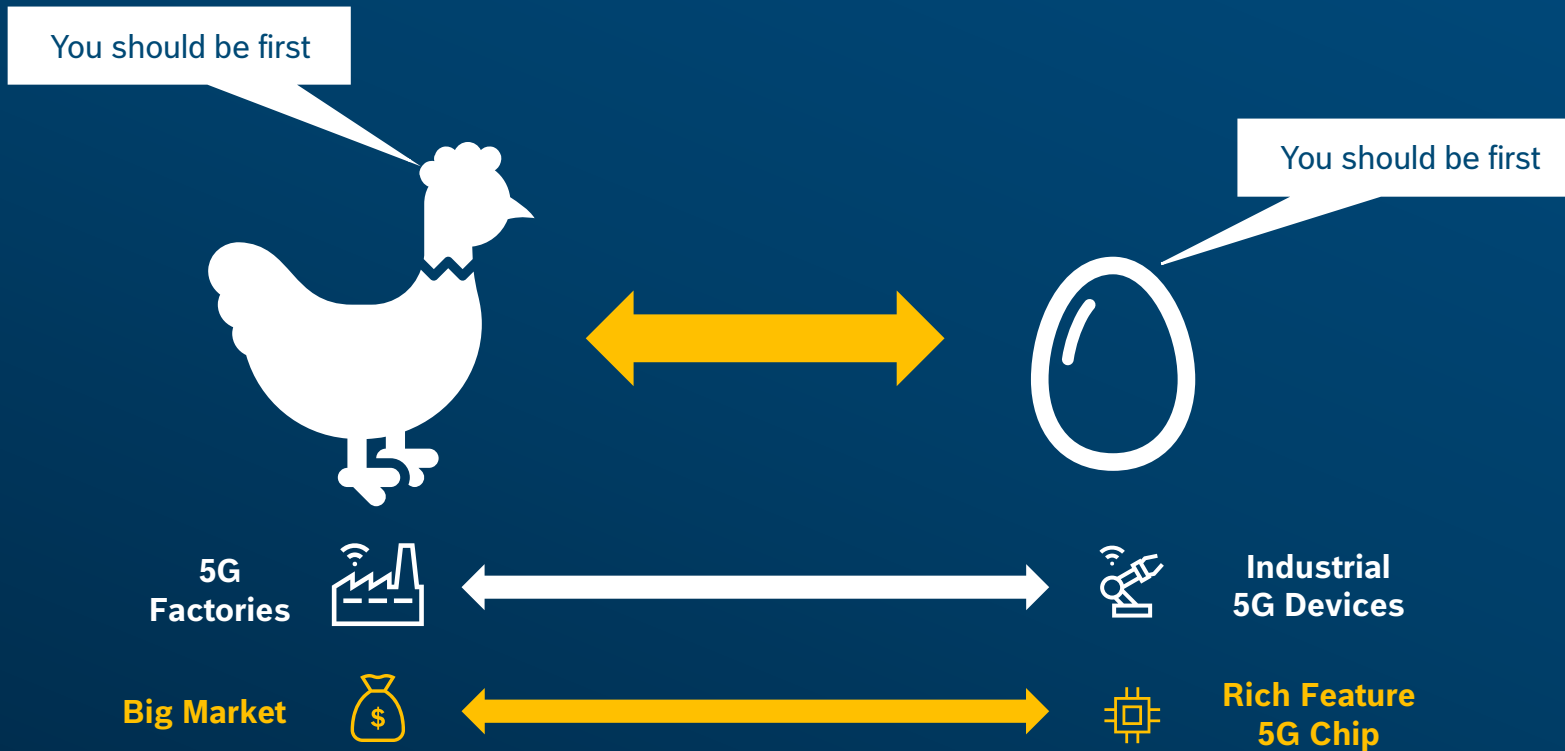
6G

6G driving the **digital transformation** of different vertical industries!



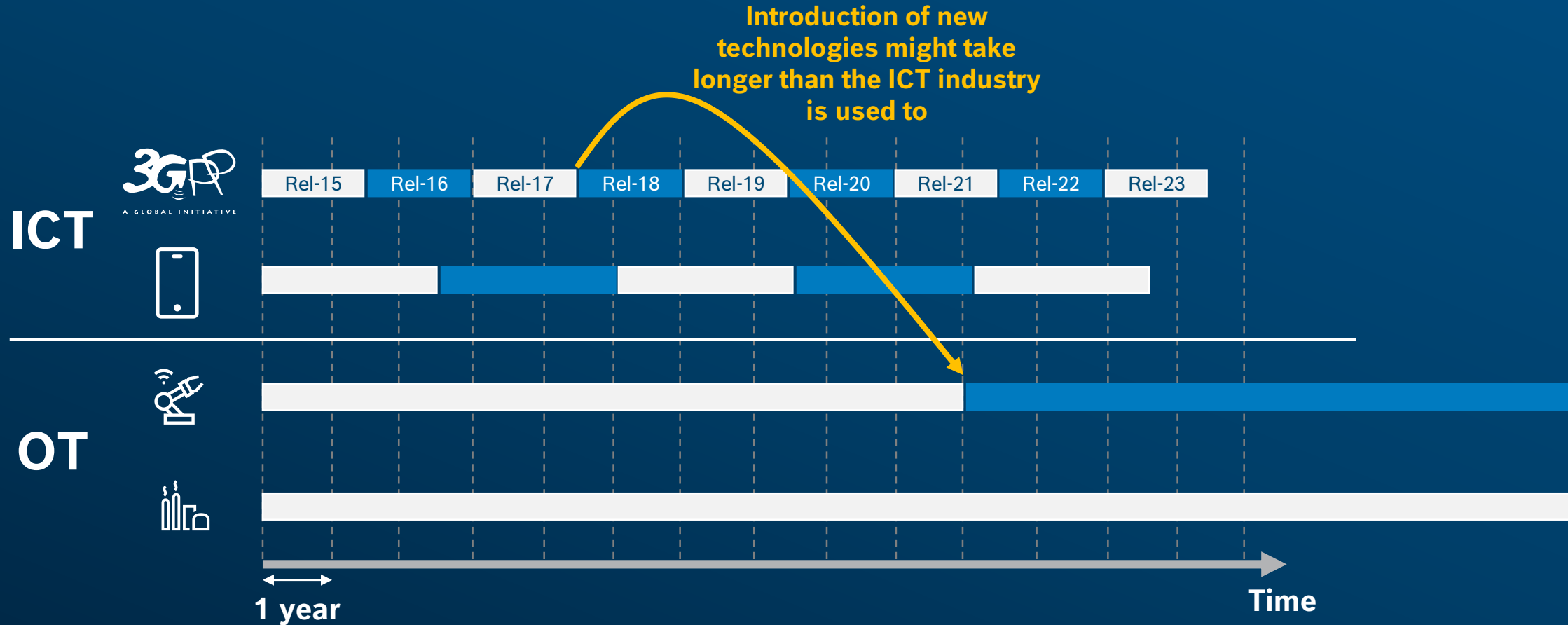
Why 6G?

The Chicken-Egg Challenge of 5G



Why 6G?

The Life Cycle Challenge





The Remaining Disconnect



Why 6G?

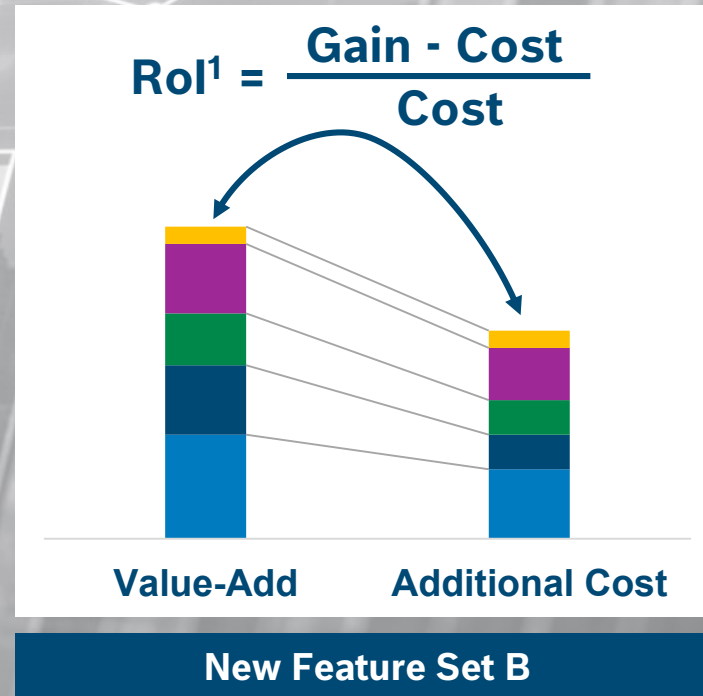
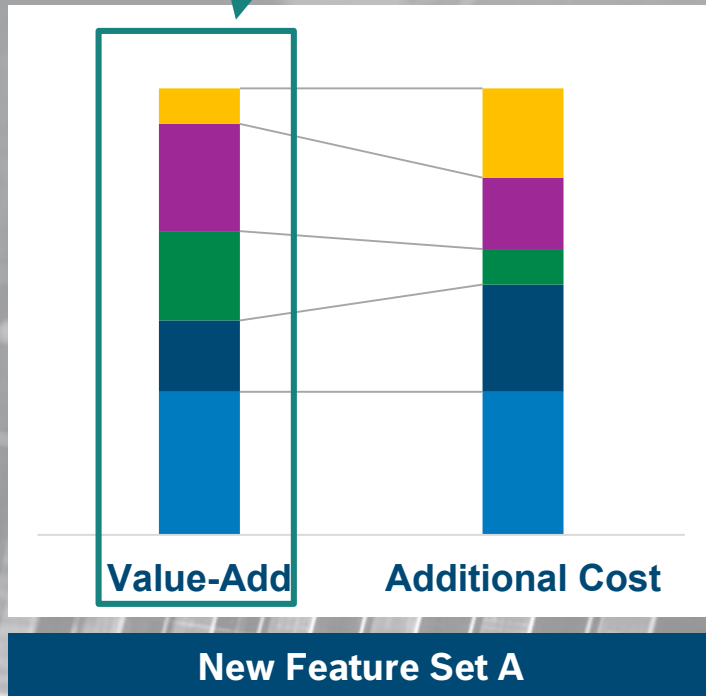
The Remaining Disconnect: Telco World vs. Vertical Industries



Innovation Cycles	Short	Long
R&D Intensity	High	Moderate
Main Innovation Driver	Technology Push	Customer Pull
Level of Standardization	High	Low to Moderate
Market Consolidation	High	Depends
Role of Patents	Offensive	Defensive
Traditional Market Structure	Homogeneous	Highly Heterogeneous

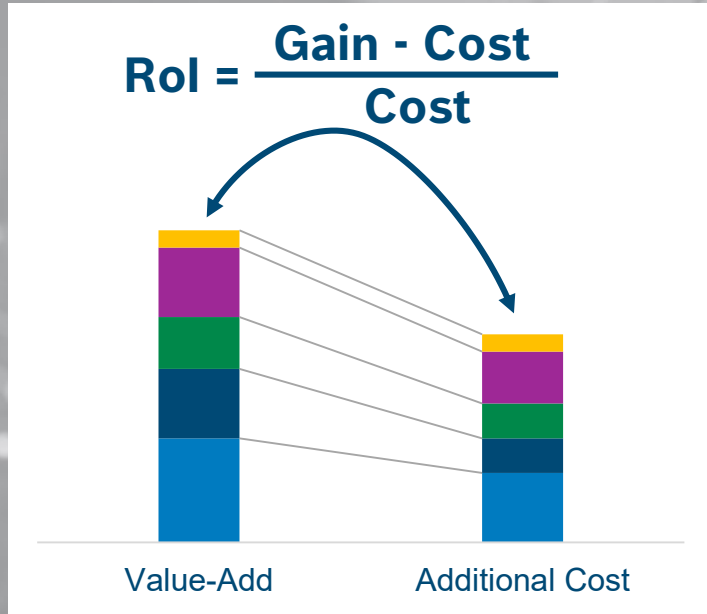
The Most Important KPI for 6G

We tend to focus only on this



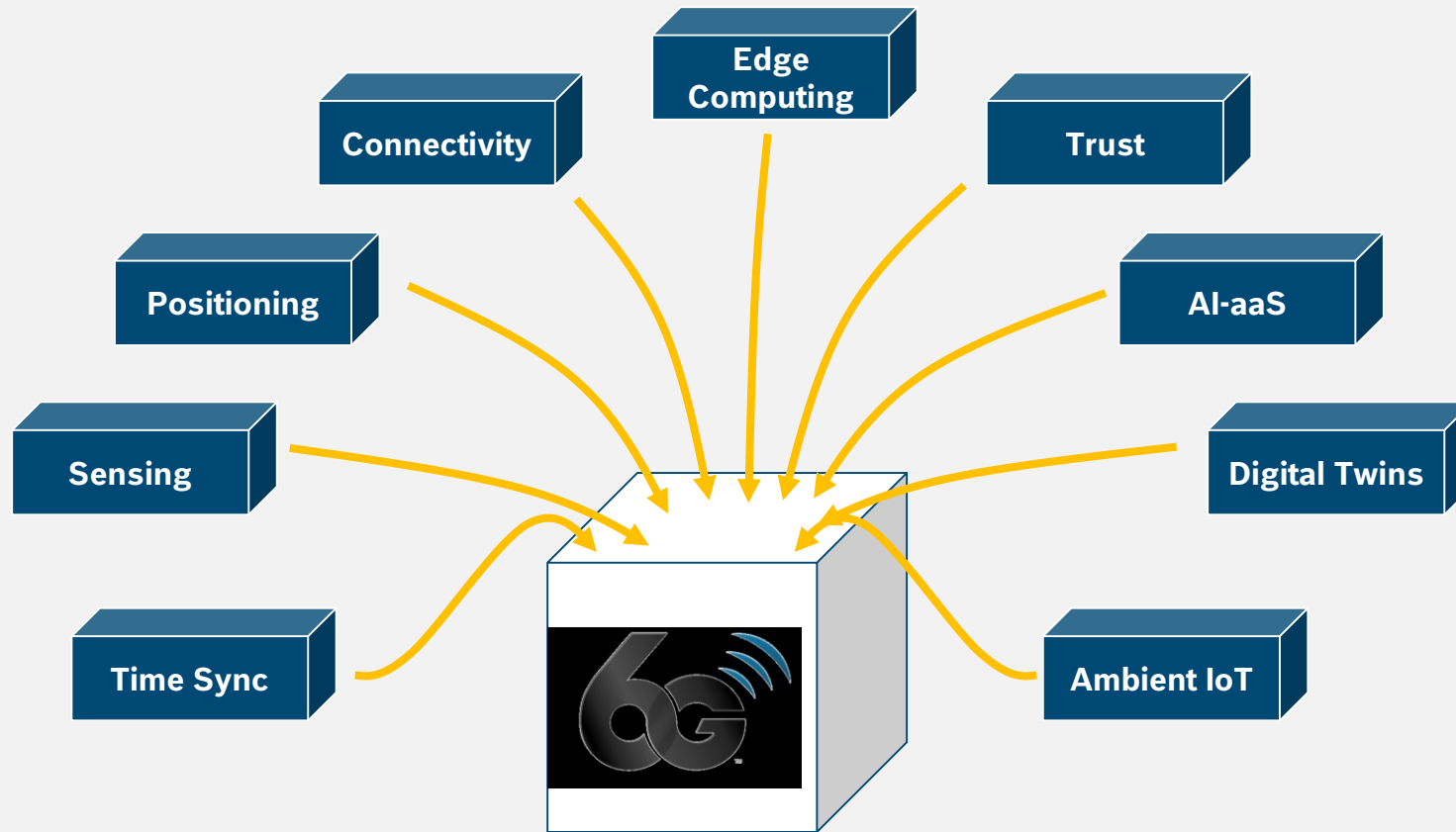
¹Return-on-invest

Key Rol Requirements



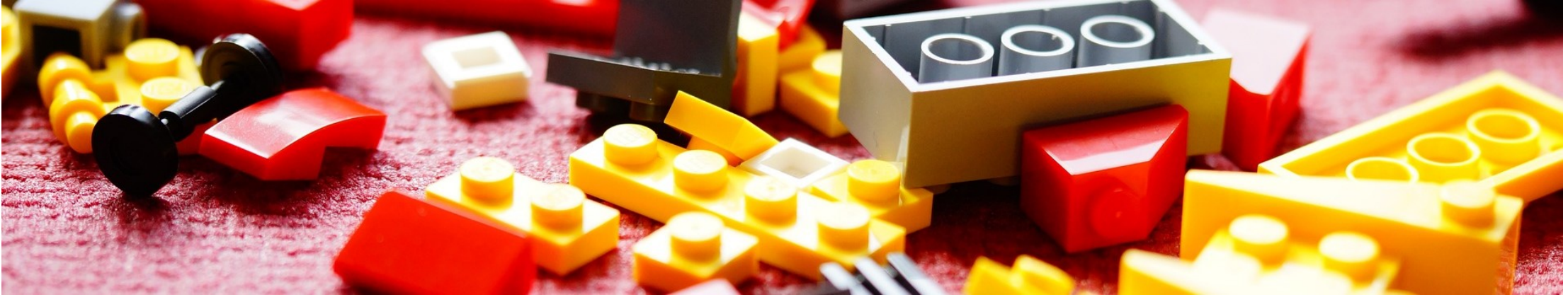
Why 6G?

6G as a Convergent Platform



Why 6G?

Benefits of 6G as a Convergent Platform



1 Economies of Scale

High re-use factor and avoiding individual over-the-top solutions for high cost efficiency.

2 Complexity Reduction

Integration of different building blocks for reduction of heterogeneity and complexity and thus eventually lower TCO

3 Easy End-to-End Integration

Different building blocks may be easily integrated and orchestrated on an end-to-end basis.

4 Faster Time-to-Market

Easy & fast development & deployment of new use cases & services due to high re-use of existing building blocks

5 New Features & Functionalities

The smart combination of different building blocks may enable completely new functions, e.g., discovery of nearby digital twins.

6 Ubiquitous Availability

Having the same standardized platform readily available all around the world.



Integrated Sensing & Communication



Trust Platform



AI / ML



Ambient IoT / Zero-Energy Devices



Digital Twinning



Non-Terrestrial Networks



General Requirements

Private Networks High Modularity Open Interfaces & APIs Ease of Use Evolutionary



Leading 6G Initiatives



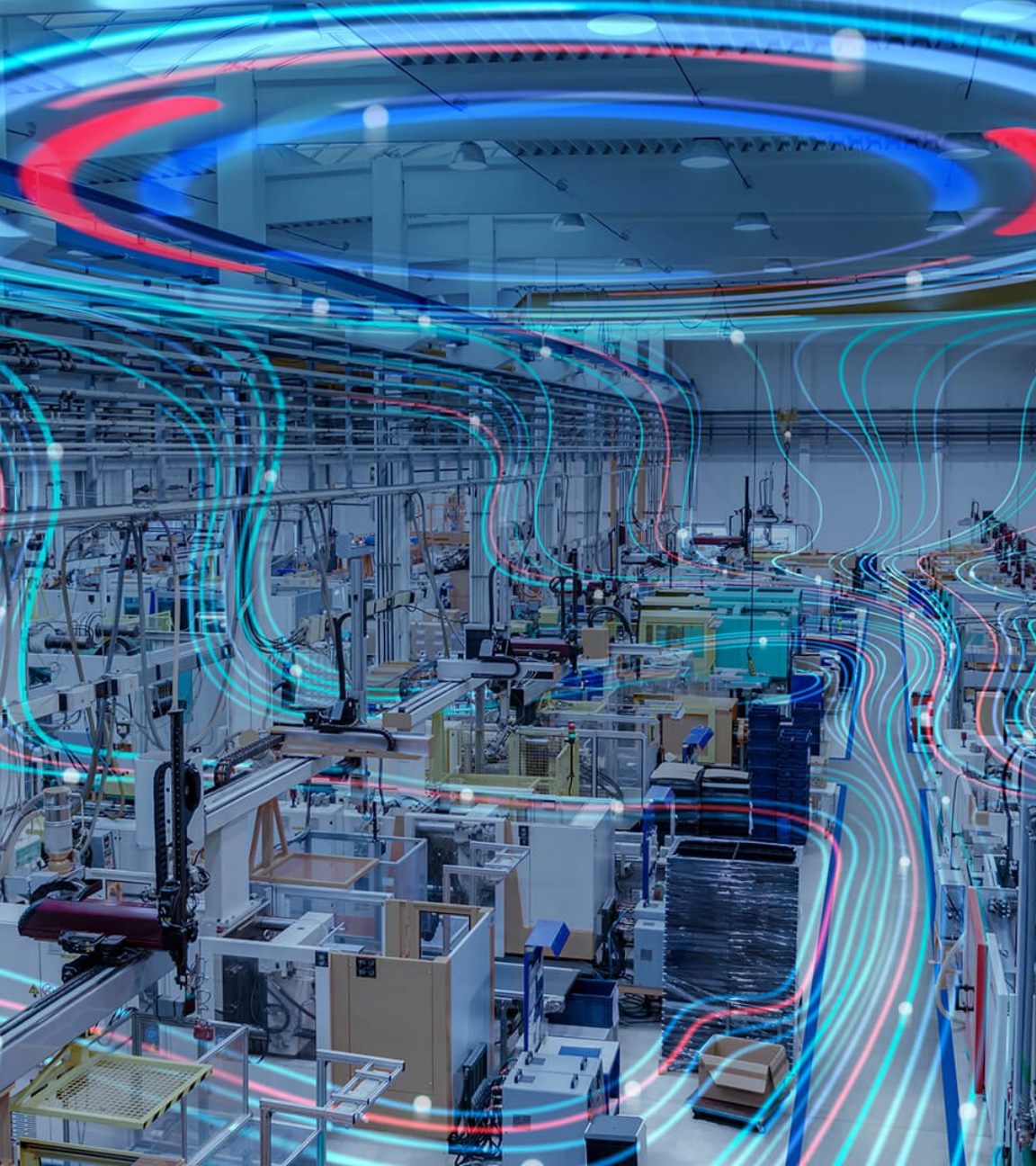
Everybody wants to lead 6G



Yet a single standard is key



Global harmonization needed



Integrated Sensing & Communication

Why 6G?

Possible ISAC Use Cases



Urban Mobility

- Traffic monitoring
- Free parking lot detection
- Vulnerable road user detection
- Automotive radar enhancement
- ...



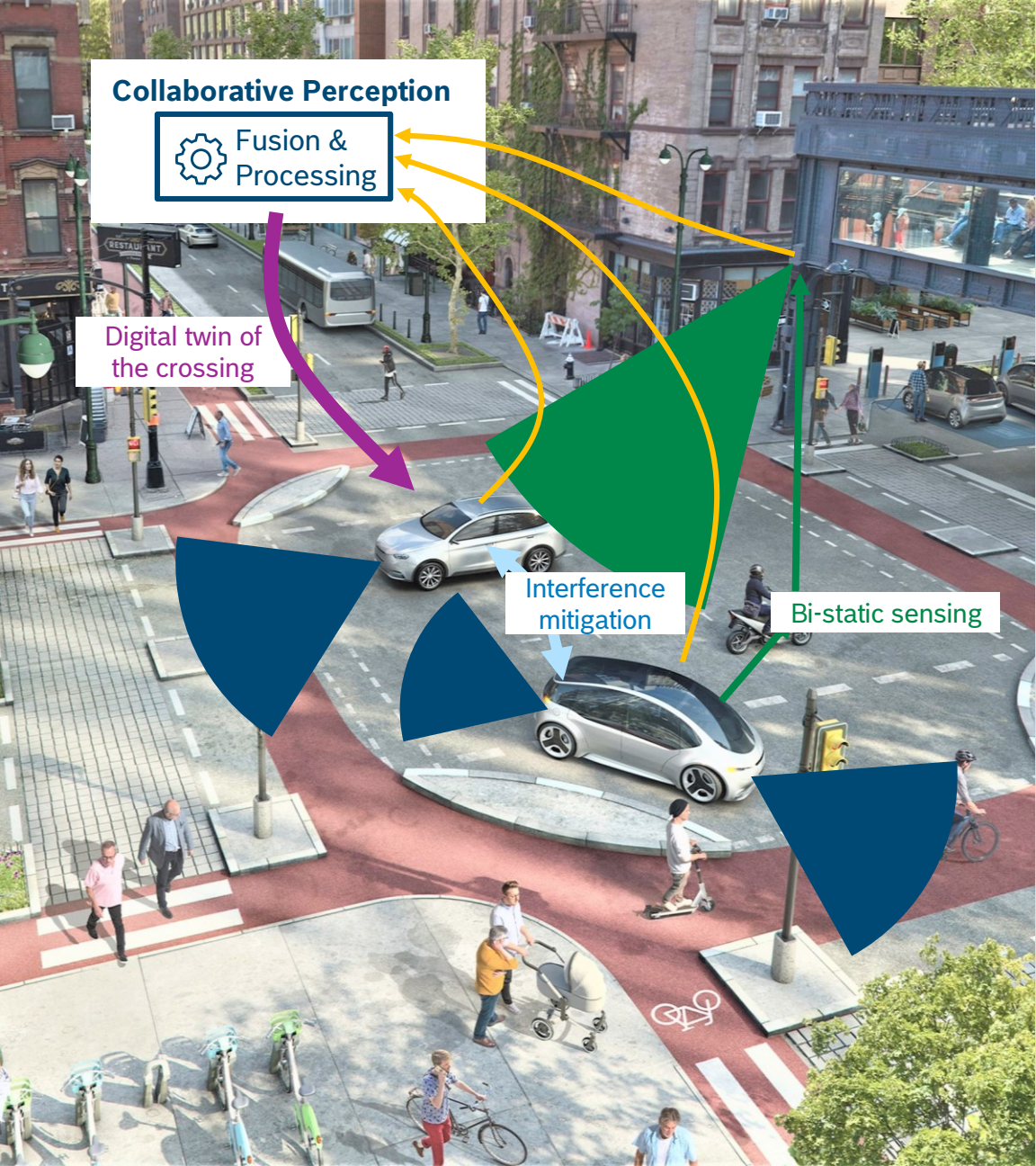
Industry 4.0

- Digital twinning
- Virtual safety zones
- Navigation for AGVs¹
- Gesture recognition
- ...



Smart Buildings

- Presence detection
- Activity detection
- Intrusion detection
- Accident detection
- ...



Collaborative Perception



Fusion &
Processing

Digital twin of
the crossing

Interference
mitigation

Bi-static sensing

Integrated Sensing & Communication

Example: Mobility Scenario



Better Sensing Performance

thanks to cooperation and additional sensors



Better Communication Performance

by exploiting insights about the environment



Higher Resource & Cost Efficiency

thanks to HW integration and spectrum re-use



Replacement of Other Sensors

such as cameras, light fences, etc.



Standardization & End-to-End Integration

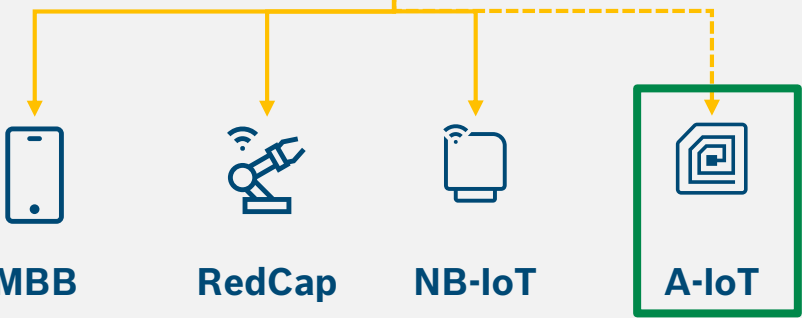
for interoperability & easy mgmt & orchestration



Zero-Energy Devices / Ambient IoT

Why 6G?

Ambient IoT / Zero-Energy Devices – A Missing Piece



	eMBB	RedCap	NB-IoT	A-IoT
Cost	● ○ ○ ○ ○	● ● ○ ○ ○	● ● ● ○ ○	● ● ● ● ●
Performance	● ● ● ● ●	● ● ● ○ ○	● ● ○ ○ ○	● ○ ○ ○ ○

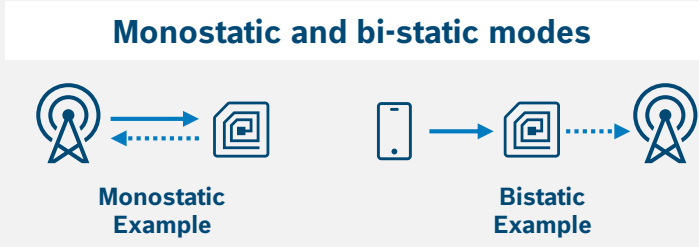
Enabled by backscattering or energy harvesting



Initial study in SA1 in Rel-19
→ TR 22.840

Three types of of A-IoT devices

Passive **Semi-Passive** **Active**



High Potential in Manufacturing

Convergence **Long Range** **Positioning**

A man in tactical gear, including a black turtleneck, vest, and gloves, is holding a handgun. He is standing in a control room filled with numerous computer monitors displaying various data, charts, and images. The room is dimly lit with blue and orange tones.

The Next Big Thing

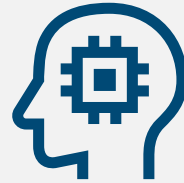
Agentic AI

Why 6G?

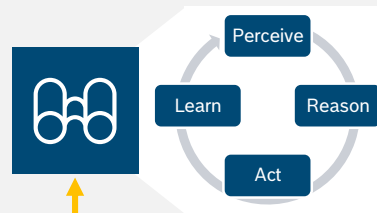
Digital Twins & AI Agents



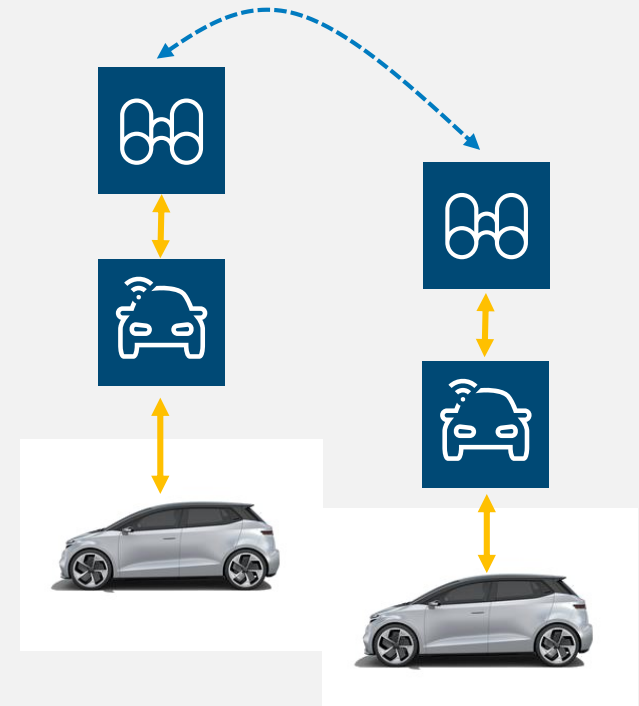
Digital Twin

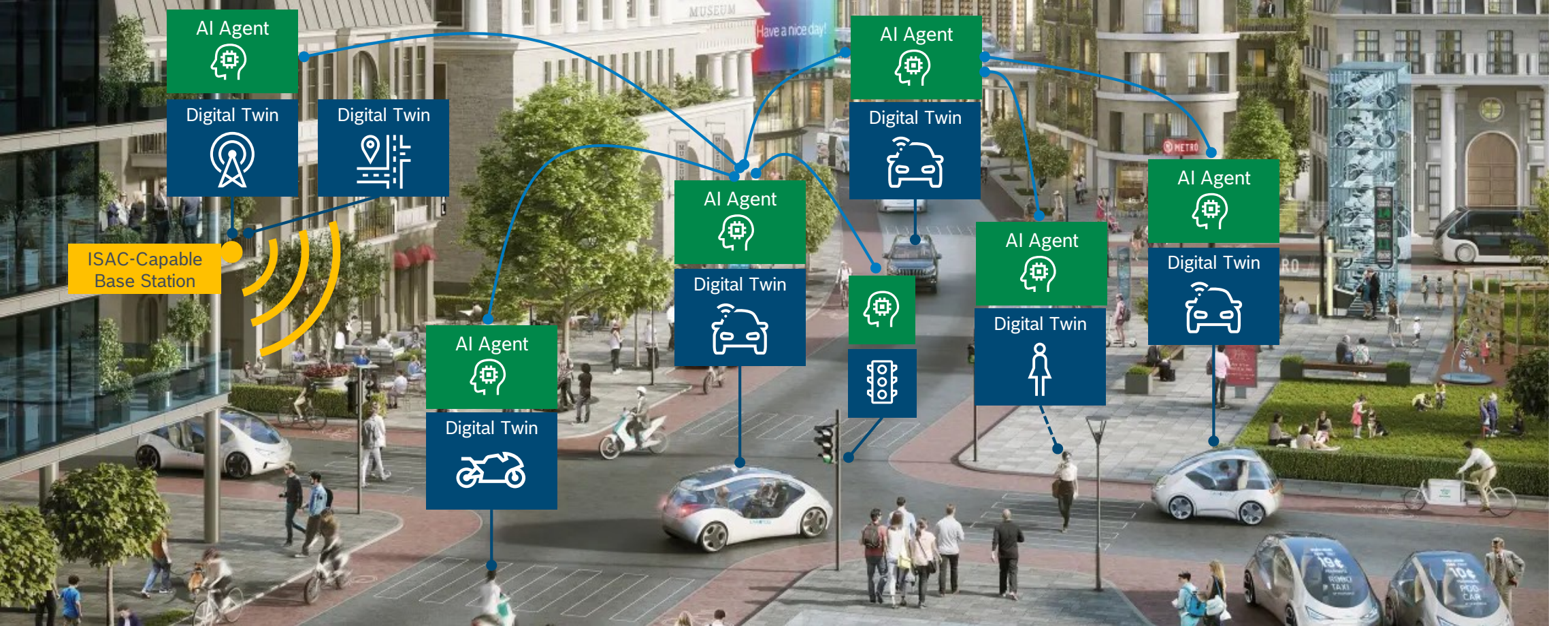


AI Agent



Collaborative Multi-Agent System





Selected Challenges



Massive Twinning



Security, Privacy & Trustworthiness



Real-Time Agentic AI

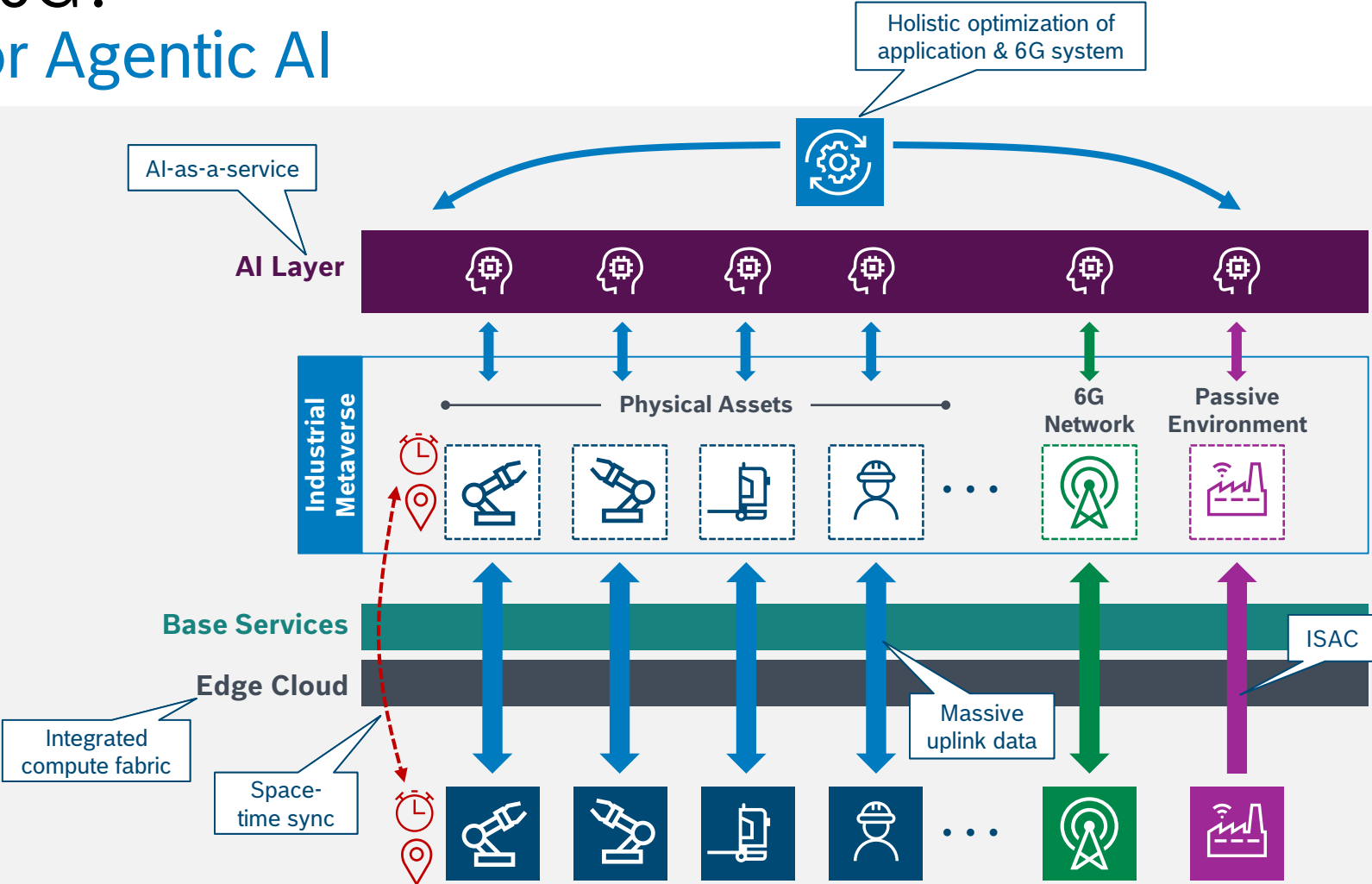


State, Time & Space Sync



Why 6G?

6G for Agentic AI



Why 6G?

Major Challenges Beyond Technology



Regulation

→ Global harmonization? Regulation of ISAC¹? ...



Societal Concerns

→ How to address them in a proactive manner?



Trustworthiness & Accountability

→ How to establish & maintain trust? Who is accountable for what?



Sustainability

→ Sustainable 6G & 6G for better sustainability



Business Case

→ Where is the real business opportunity of 6G?

„We have come to stay!“



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