Smart Networks and Services Joint Undertaking

What to expect from 6G

Erzsébet Fitori, Executive Director

BCO Network Web Series

On-line event, 26th March 2024

Our session today

1. SNS JU Mission and Roadmap
2. 6G Vision and key features
3. Insights based on Our Work Program

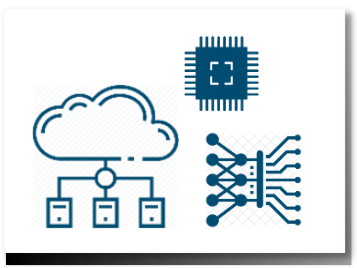
The **world is changing** towards an **hyperconnected future**

Geopolitical Context

+

Everywhere
Connectivity/Compute

+



Automation
(Cloud/Edge Continuum)

+

Open Innovation Ecosystems

+

Green economy & Sustainability

+

New Sectors
(human-machine interfaces)

Key Challenges

1

Global Standard
With strict
Cybersecurity and privacy protection

2

Universal Coverage
Hyperconnectivity and Ubiquitous Computing

3

AI-driven models
Orchestration of heterogeneous network and sensors

4

Open Innovation Ecosystems
to share upside and reduce financial risks

5

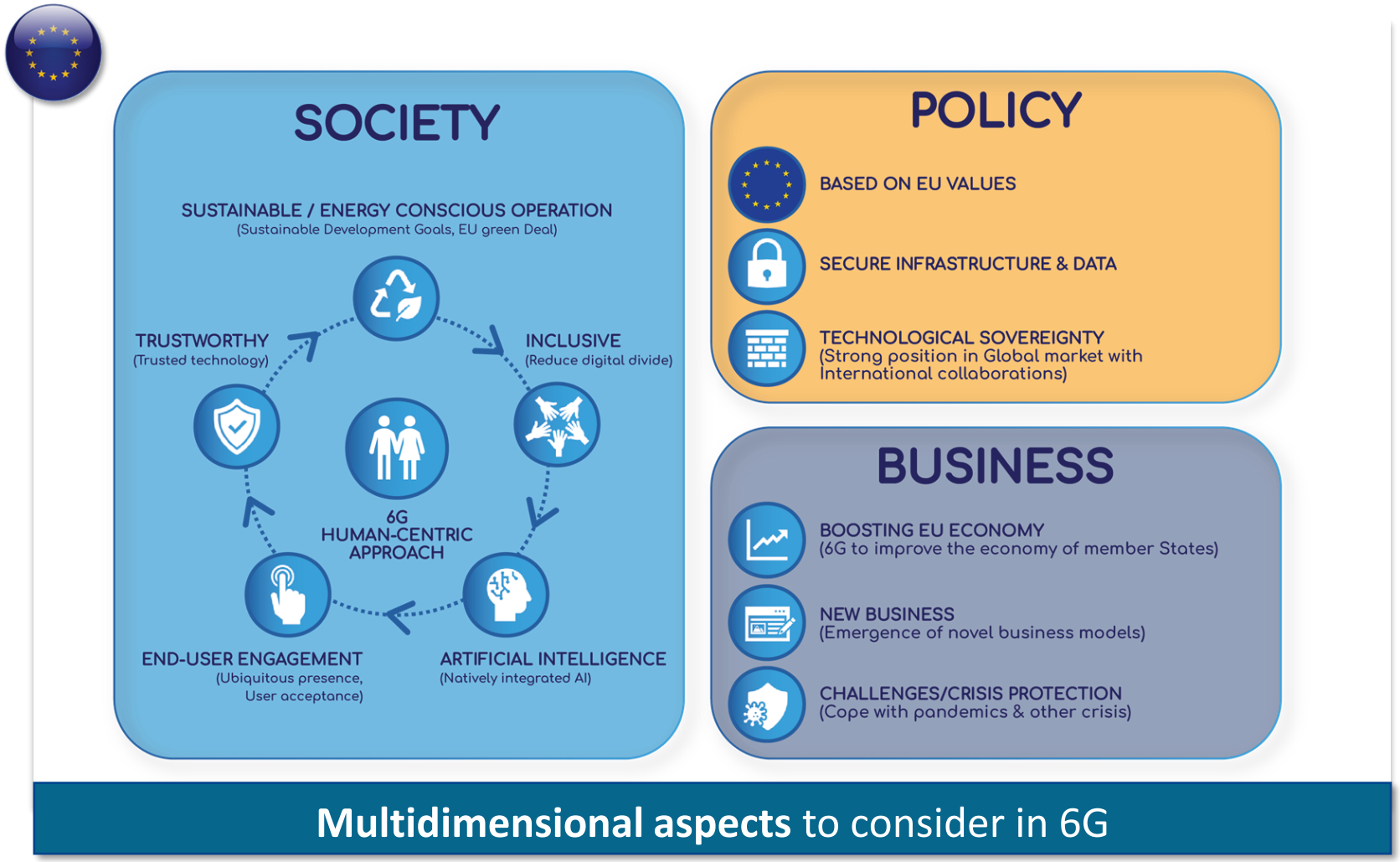
Sustainability
From environmental societal and business perspective

6

New vertical applications and services
reach tipping point

6G will serve as a unifying force joining a Global Ecosystem of Interconnected Platforms

Societal, policy and business **drivers of 6G** at EU Level



Multidimensional aspects to consider in 6G

SNS JU : The European pathway to 6G

Smart Networks and Services Joint Undertaking (SNS JU) is **EU's 6G Research and Innovation Programme**

Smart Networks and Services Joint Undertaking

JU Members

- **Representation of Private & Public Sector (50/50)**
- Governing Board: Strategic orientation and roadmap
- Long term commitment (planning and implementation)

Total Funding
1.8 Billion €
2022-27

States Representatives Group

2024

- **Synergies with national investments and 6G R&I plans ,** through a coordinated approach.
- Consultation and Strategic Guidance.
- Strategic coordination of EU piloting and deployment initiatives

Stakeholders Group

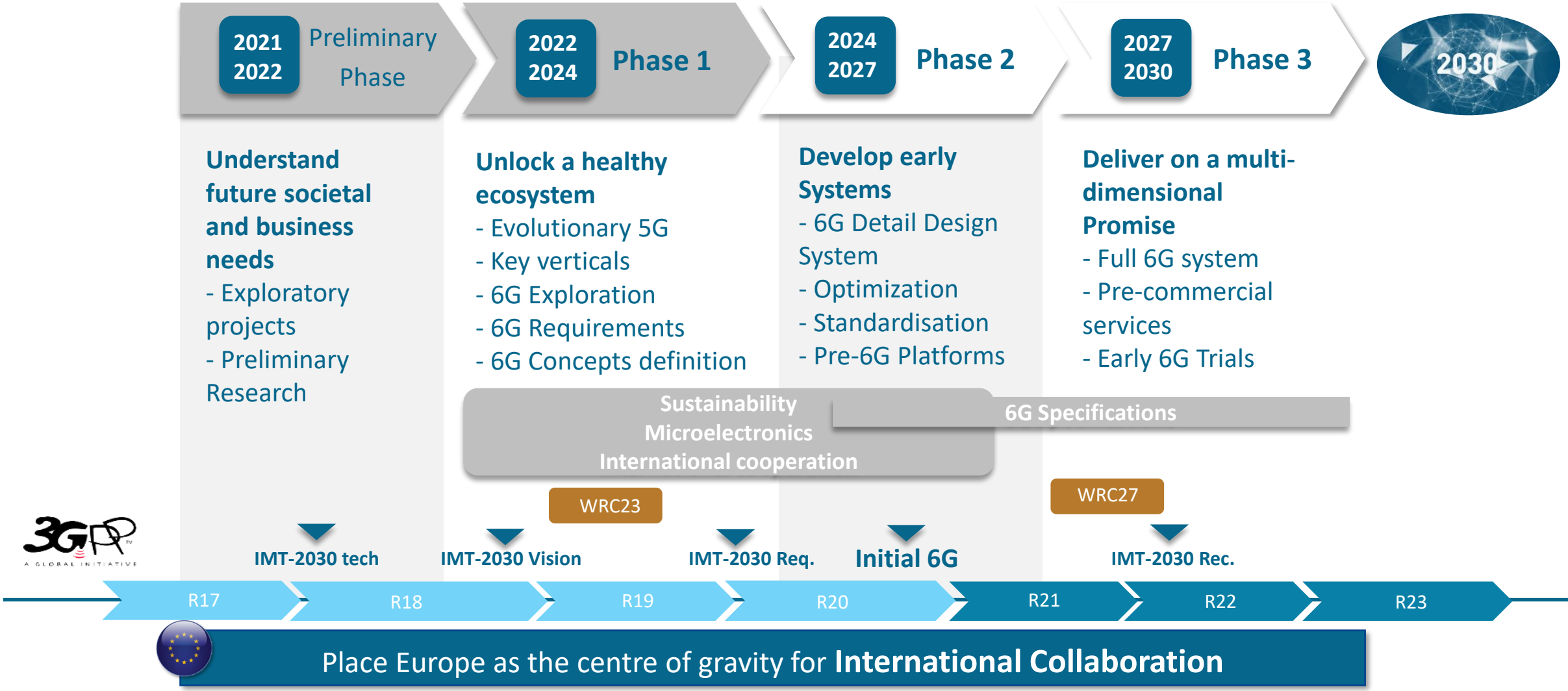
- **Synergies with other partnerships and associations**
- Advisory body

International Partnerships

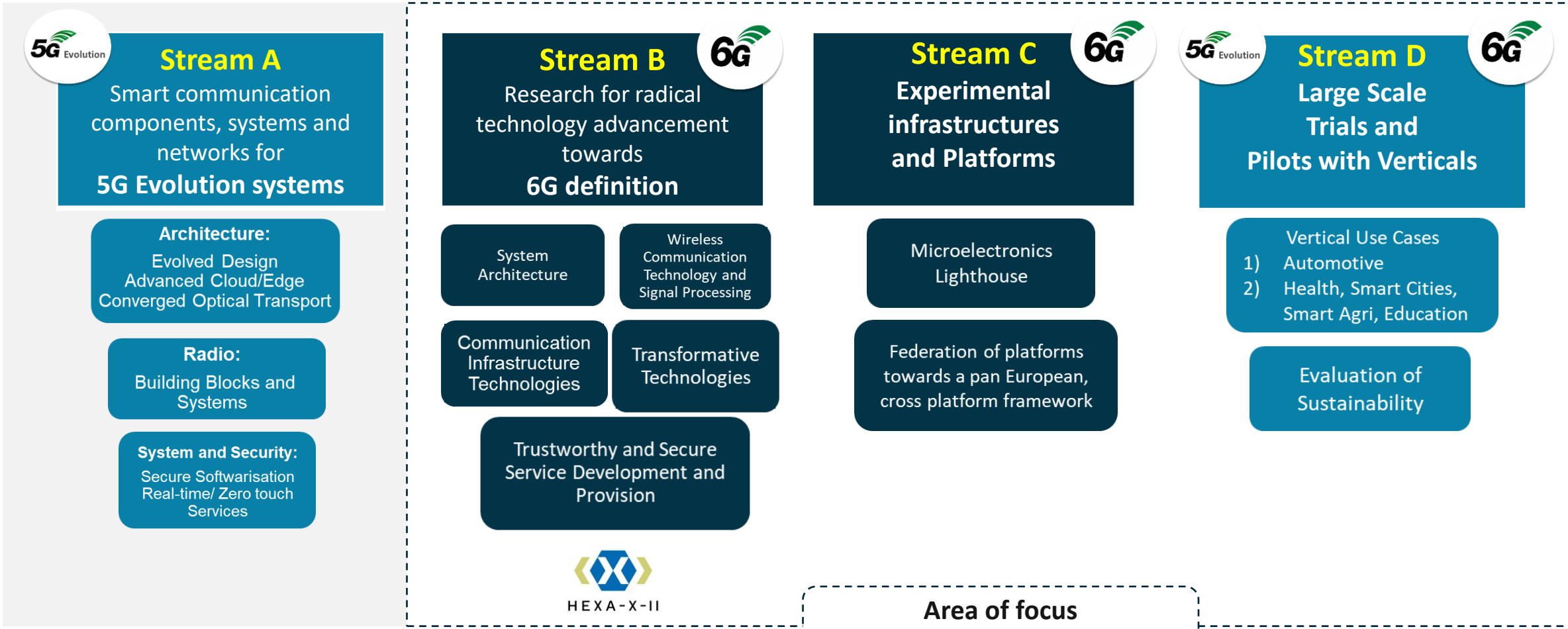
- **Cooperation in mutually relevant domains**
- Associated Countries / multilateral participation
- Long term collaborative cross-roadmaps possible

Collaboration and Partnerships is a Strategic priority for the SNS program

Our R&D Program follows a **Phased Approach**



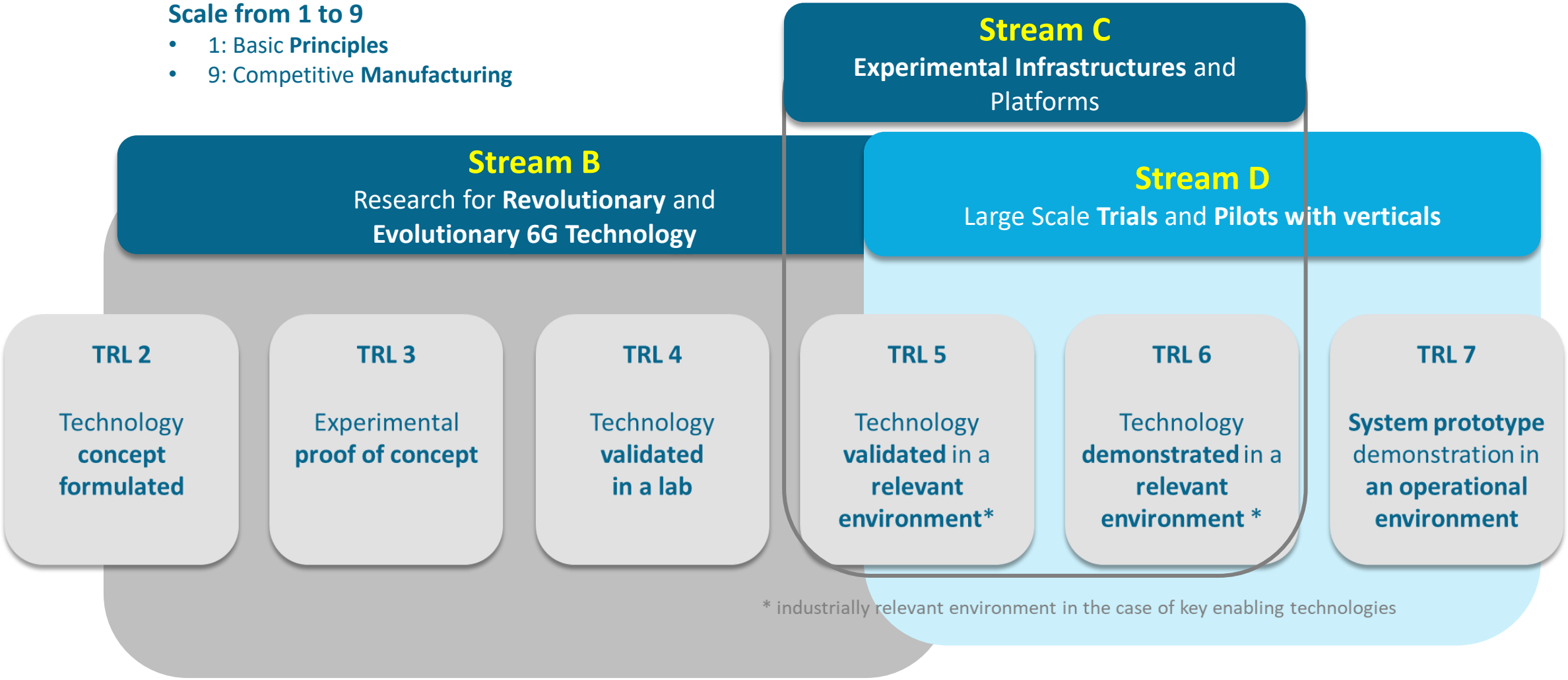
SNS JU **Work Programme Structure**



Technology Readiness Levels (TRL) measure maturity

Scale from 1 to 9

- 1: Basic **Principles**
- 9: Competitive **Manufacturing**



2024 Annual Work **Program Highlights**

129 MM €

What is new?

- Higher TRL
- Focus on 6G Standardisation
- Extended PoCs
- International Collaboration
- Lighthouse Projects
- Artificial Intelligence
- Trials with Verticals

Stream B
Research for radical technology advancement towards **6G definition**

- **B1.** System Architecture
- **B2.** Wireless Tech
- **B3.** Infrastructure & devices
- **B4.** Reliability & Security
- **B5.** Japan
- **B6.** South Korea
- **B7.** Sustainability
- **B8.** Reliable AI

Stream C
Experimental infrastructures and Platforms

- **C.** Microelectronics

Open for Proposals
Until **18 April 24**

Stream D
Large Scale Trials and Pilots with Verticals

- **D.** Large Scale Trials

Other
Synergies and CSA

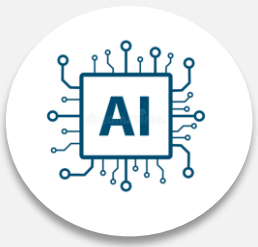
- **CSA.** Operations
- Synergy EU-Rail FRMCS

What will be **'new'** in 6G …

6G will be the key enabler of an **ecosystem of Artificial Intelligence (Physical-Digital)**

Ubiquitous Coverage

Intelligent Sensing



Native AI

Energy Efficiency

Precise Positioning

Interoperability Open Interfaces

+

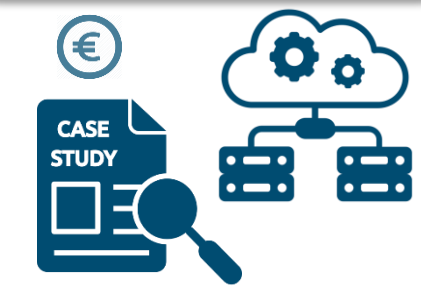
Improvement in **previous Performance-related** communications requirements:

- High Capacity
- Connection Density
- Low-latency

… and what will be **“different”**

6G will require **evaluation of trade-offs**
Performance/Redundancy/Security/Utility/TCO/ Power

Business and Societal



Develop **KVIs that target equitable and inclusive dimensions.** Deployment of 6G infrastructures will require significant resources and careful planning.

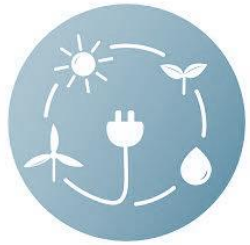
Regulatory and Ethical

Ensure **trustworthiness with new challenges such as ethical use of AI**, future spectrum regulation, data privacy, or IPR protection.

Security and Resilience

Protect against **cyber threats and ensure network resilience.**

Sustainability



Reduce the environmental impact of 6G with innovations in energy-efficient network infrastructure, ambient IoT and power management solutions.

Our **SRIA Vision has** 9 technology **areas of research**

Examples
Non-exhaustive

Smart **Network Infrastructure** (6G capabilities)

Convergence with other adjacent technologies

6G will require significant **technological breakthroughs** to enable its ambitious goals

AI-Driven Architecture

- Programmability and Control
- AI governance
- Deterministic networking

Radio & Signal Processing

- Disaggregated RAN
- 6G RAN modulation
- Beamforming, RIS
- THz bands, VLC
- Harmonized Comms and Sensing

Optical Networks

- Intrinsically secure, green and flexible transport networks.
- Sustainability

Ubiquitous Computing

- Edge-Cloud Integration
- Responsiveness, reduced data flows
- Distributed microservices

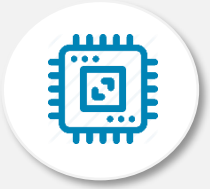
Security

- Network and Services
- Larger attack surface
- Micro-segmentation
- Security as-a-Service

Non-terrestrial Networks

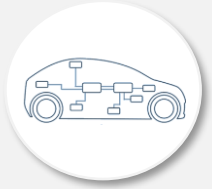
- Integration with TN
- (LEO) networks
- UAM services
- Edge flying nodes

Devices & Components



- **Advanced micro-electronics**
- Efficient Tx/Rx modules
- Optical & hybrid transceivers
- Neural processing units

Special purpose (sub)-networks



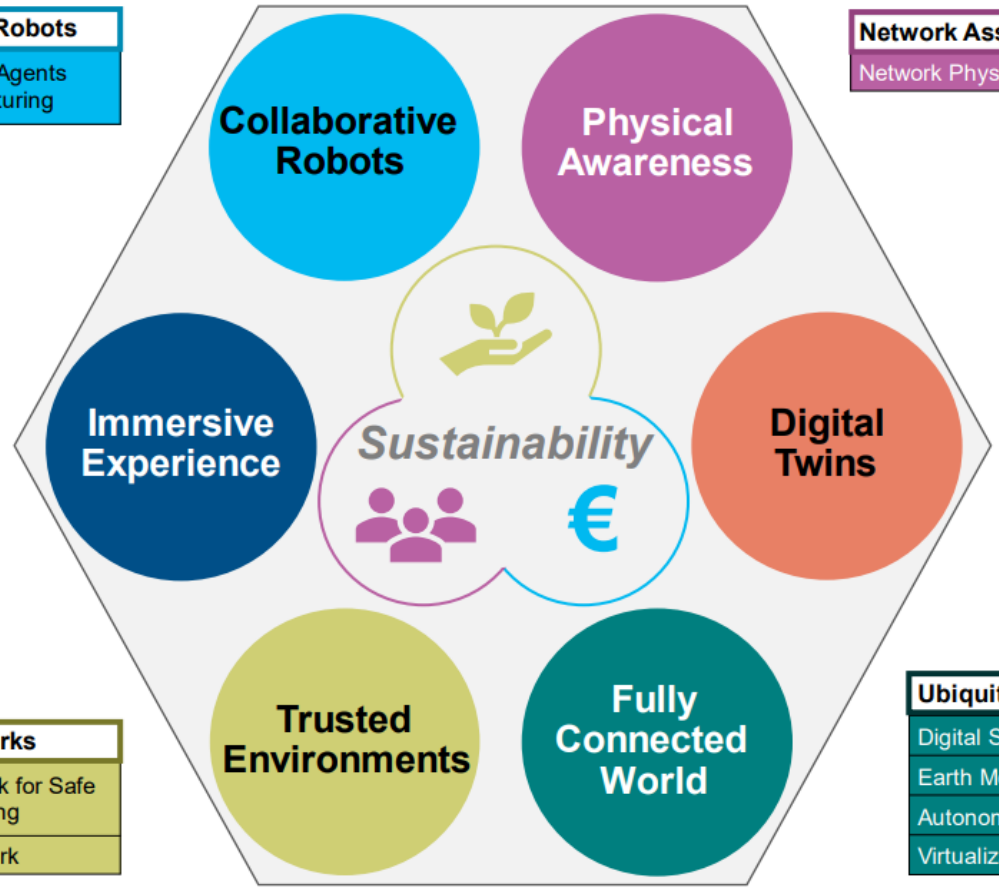
- **Vertical sub-networks** such as in-body, in-robot, in-car networks, etc

Future Emerging Technologies

- May have deep impact in the future
- Do not have a clear industrial path yet

Source: Networld Europe SRIA - https://www.networldeurope.eu/sria-and-whitepapers/

Hexa-X-II Use Case Families



Cooperating Mobile Robots
- Autonomous Embodied Agents Within Flexible Manufacturing

Network Assisted Mobility
- Network Physical Data Exposure

Seamless Immersive Reality
- Immersive Education
- Immersive Gaming
- Live and Interactive Immersive Content Creation

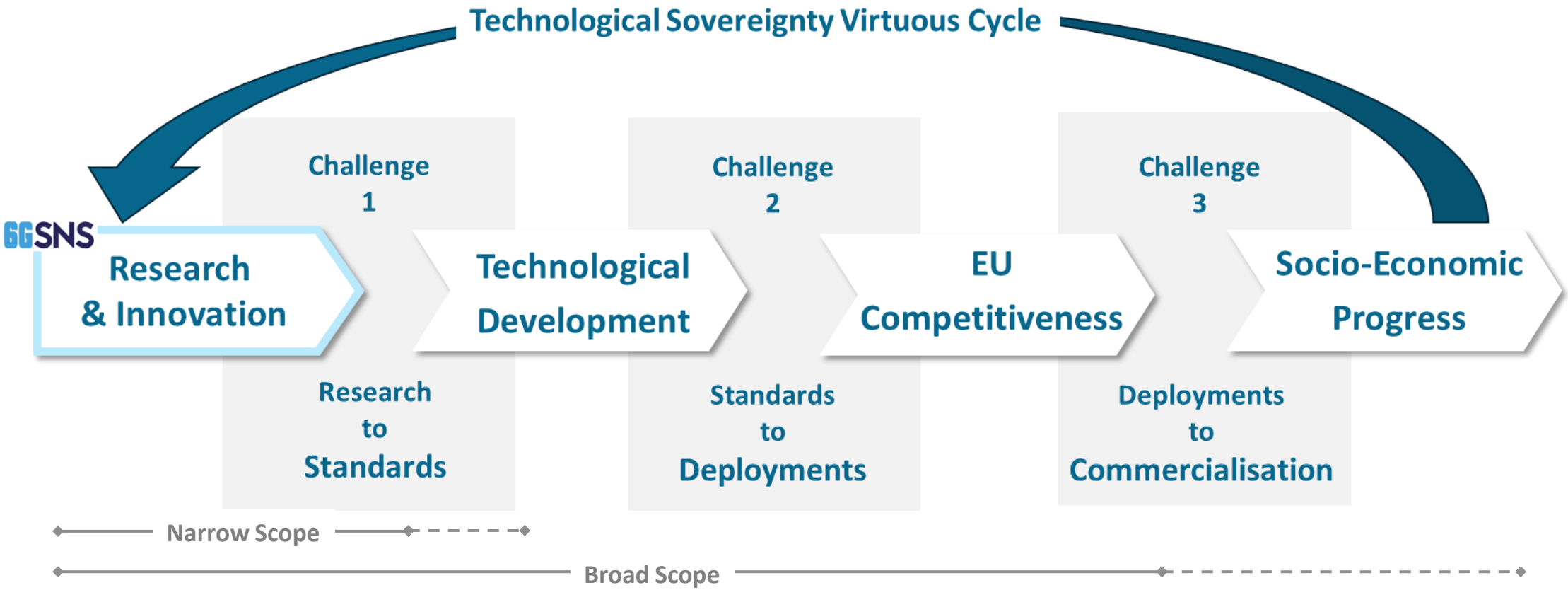
Realtime Digital Twins
- Cloud Continuum
- Smart Maintenance
- Digital Twins (Building Model)

Human-Centric Networks
- Industrial Sensors Network for Safe Production & Manufacturing
- Wireless In-Vehicle Network

Ubiquitous Network
- Digital Sobriety and Enhanced Awareness
- Earth Monitor, Sustainable Food Production
- Autonomous Supply Chain
- Virtualization of Device Functionalities

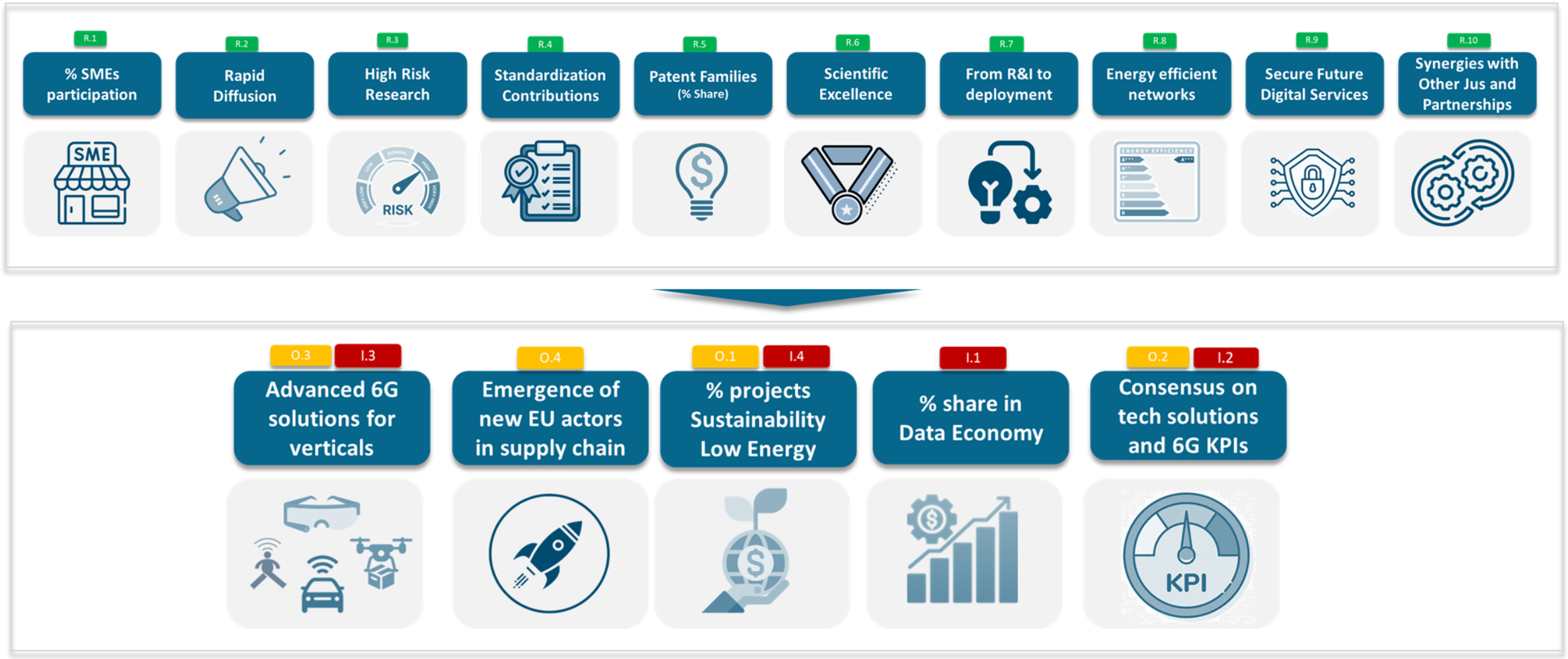
Hexa-X-II Use Cases with **Highlighted** Representative Use Cases

Our challenge will be to move **from 6G R&I to Impact**



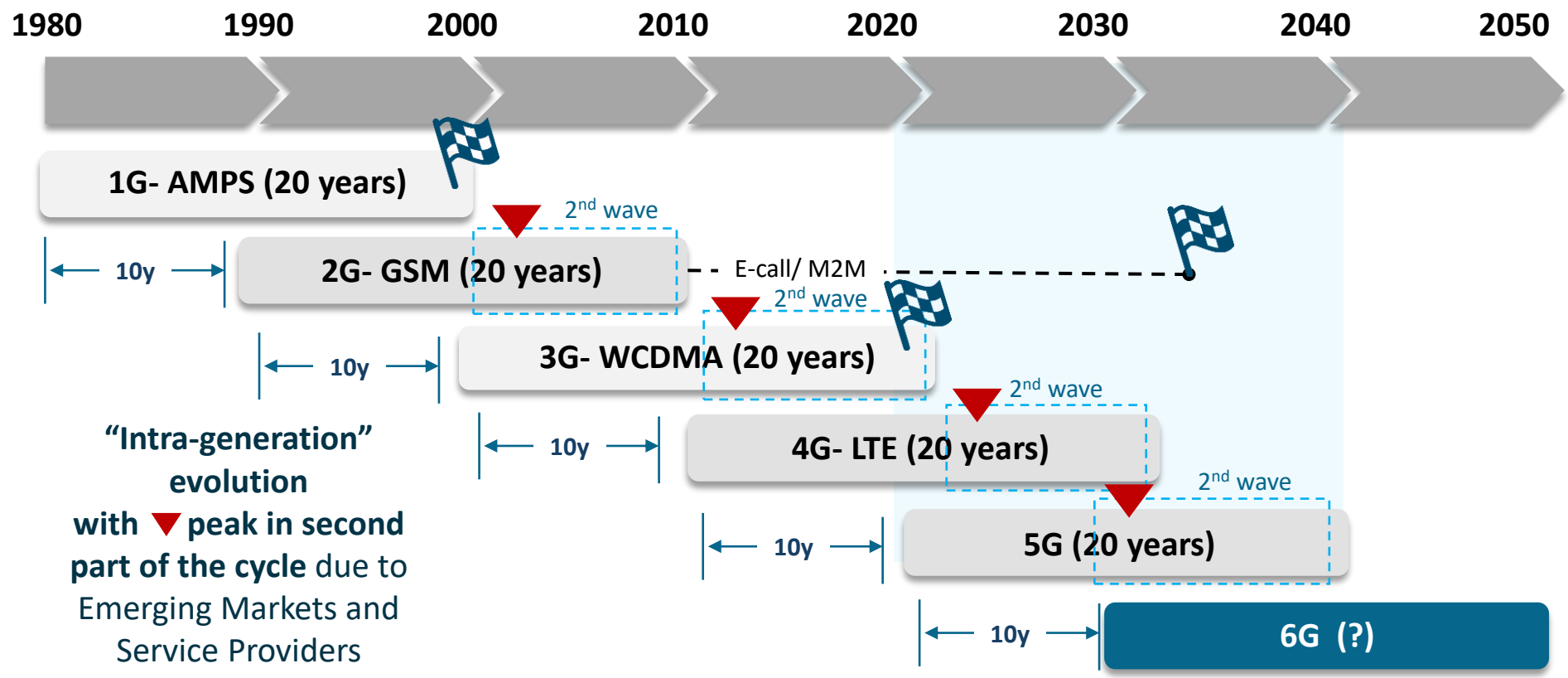
TS: the ability for Europe to **develop, provide, protect, and retain** critical technologies

Our SNS JU **KPIs include impact** dimensions



Inputs | Outcomes | Impact

Previous **Mobile Generations** followed a similar pattern

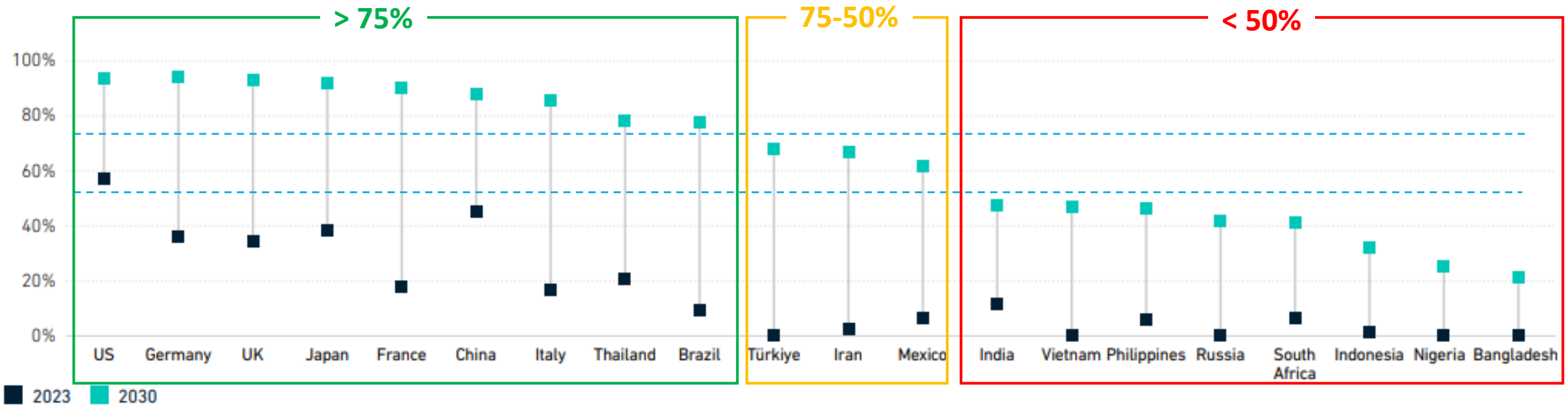


Even generations (in the past) were **more successful** that odd generations

*Source: PWC / IHS iSuppli Mobile and Wireless Communications Service / GSMAi

Degree of 5G Adoption by **2030 <u>may</u> affect 6G forecast**

5G penetration in 2030 as % of Total Connections (Top 20 markets by size)



Source GSMA Intelligence

In Summary …..

We must be prepared for a hyperconnected future that reshapes industries, lifestyles, and economies on a global scale

- Building a **shared vision of 6G** with an agreed roadmap
- Learning from **5G experience**, validating business perspectives early-on
- **Ecosystem view** with end-to-end initiatives (research-standards-industry)
- **Collaboration** via public-private partnerships, and internationally
- **Analysing system trade-offs** to guide decision making

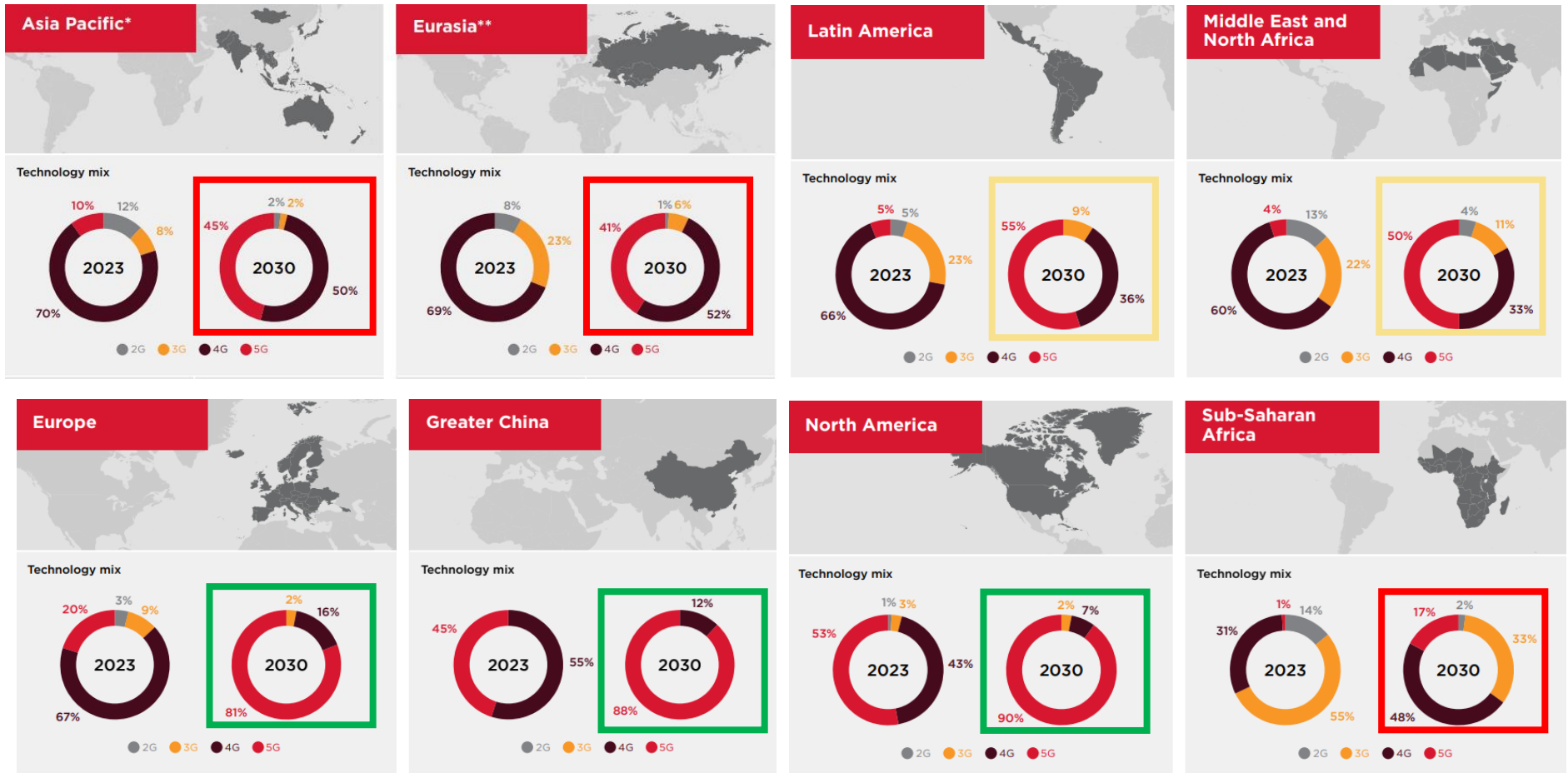
6GSNS

SMART NETWORKS AND SERVICES
JOINT UNDERTAKING

THANK YOU FOR YOUR ATTENTION

Contact us: smart-networks.europa.eu

Degree of 5G Adoption by **2030 <u>may</u> affect 6G** forecast



Source: GSMA intelligence