

15th New Business Strategy
Seminar for the Beyond 5G Era

Latest Trends of Use cases for 6G in Hexa-X

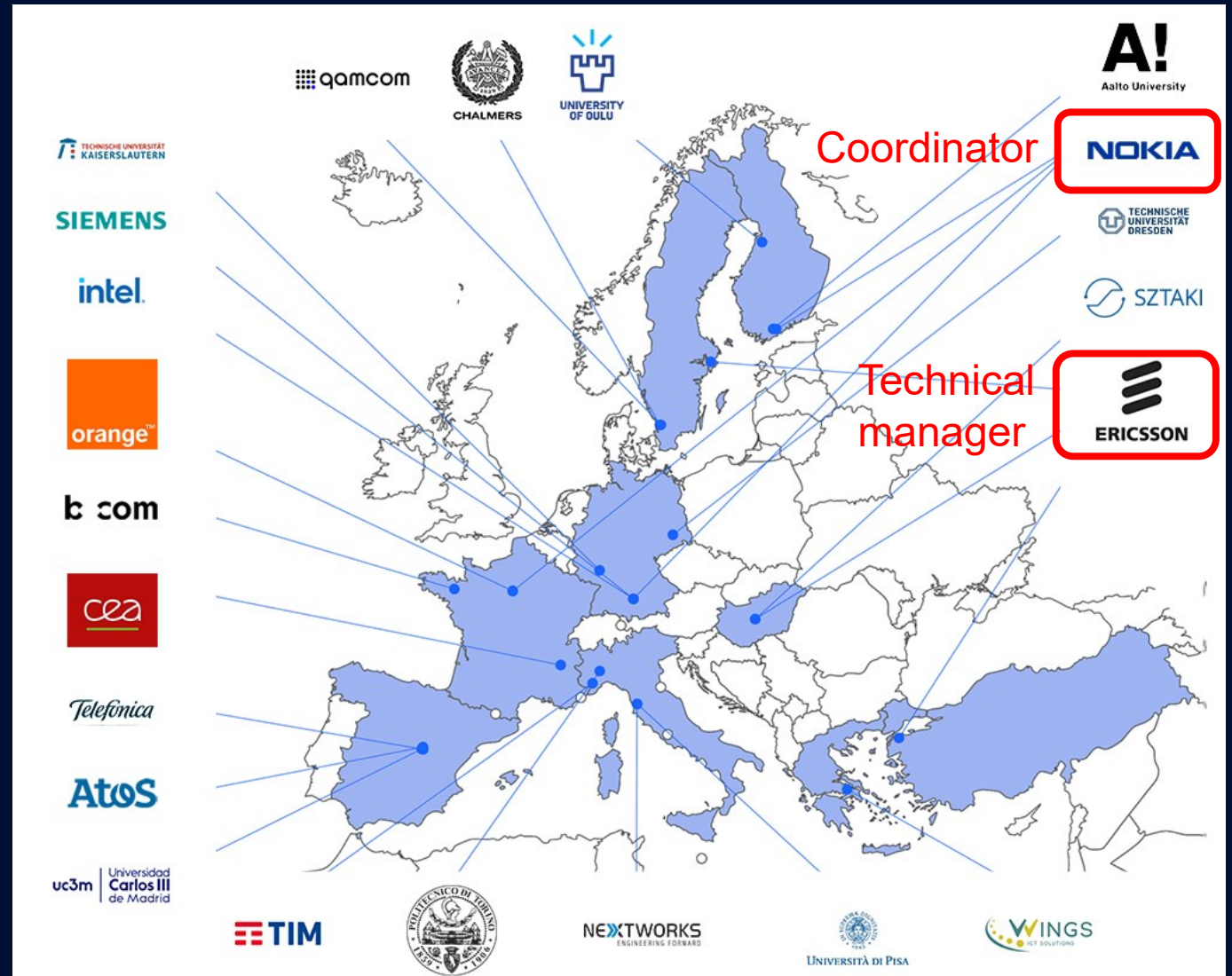
Bahare M. Khorsandi
[Nokia Strategy & Technology
Hexa-X WP1 Lead]
22nd February 2023



Hexa-X overview



- Hexa-X is the European flagship research initiative to develop the foundation and contribute to industry consensus leading to 6G
- Funded through EU H2020 ICT-52
- 25 partners
 - Network vendors
 - Operators
 - Industry
 - Academia
 - SMEs



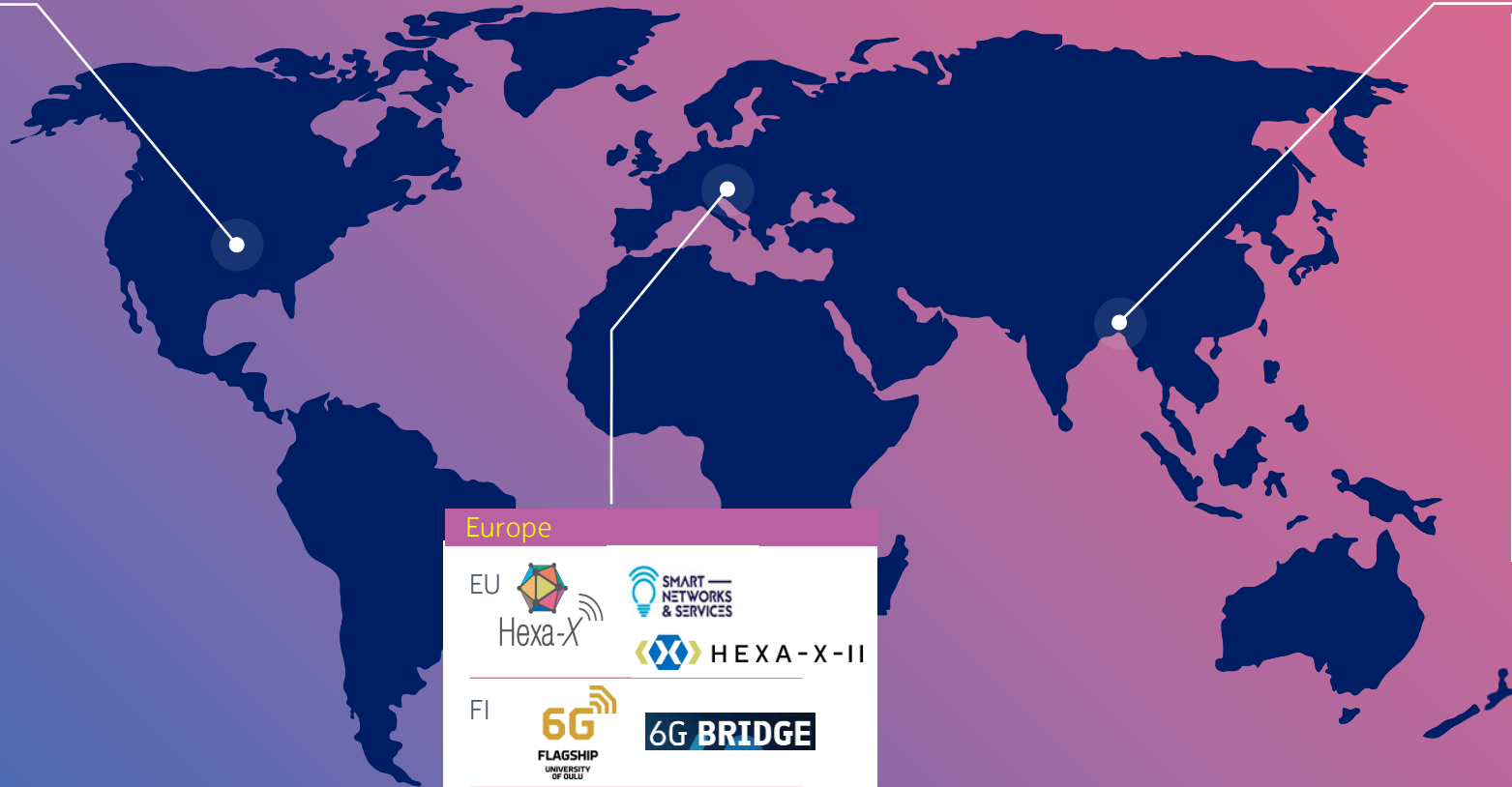
Mapping Hexa-X on the 6G Ecosystem



North America

NEXT G ALLIANCE

NSF RINGS



Europe

EU SMART NETWORKS & SERVICES
Hexa-X

FI 6G BRIDGE

DE 6G Platform Germany

Asia

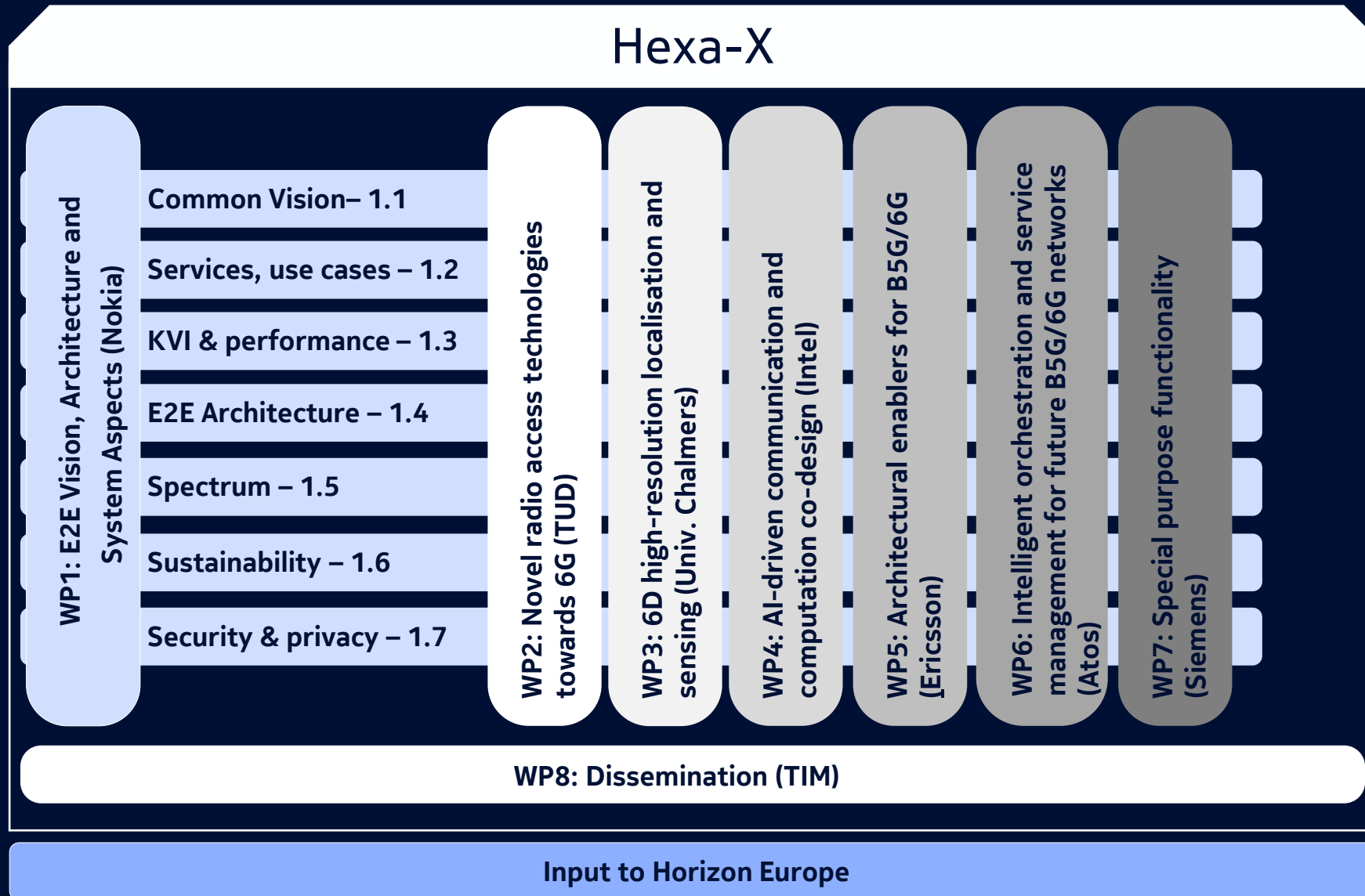
CN MIT
 中华人民共和国科学技术部
Ministry of Science and Technology of the People's Republic of China
 未来移动通信论坛
FUTURE MOBILE COMMUNICATION FORUM

KR Ministry of Science and ICT
 5G Forum

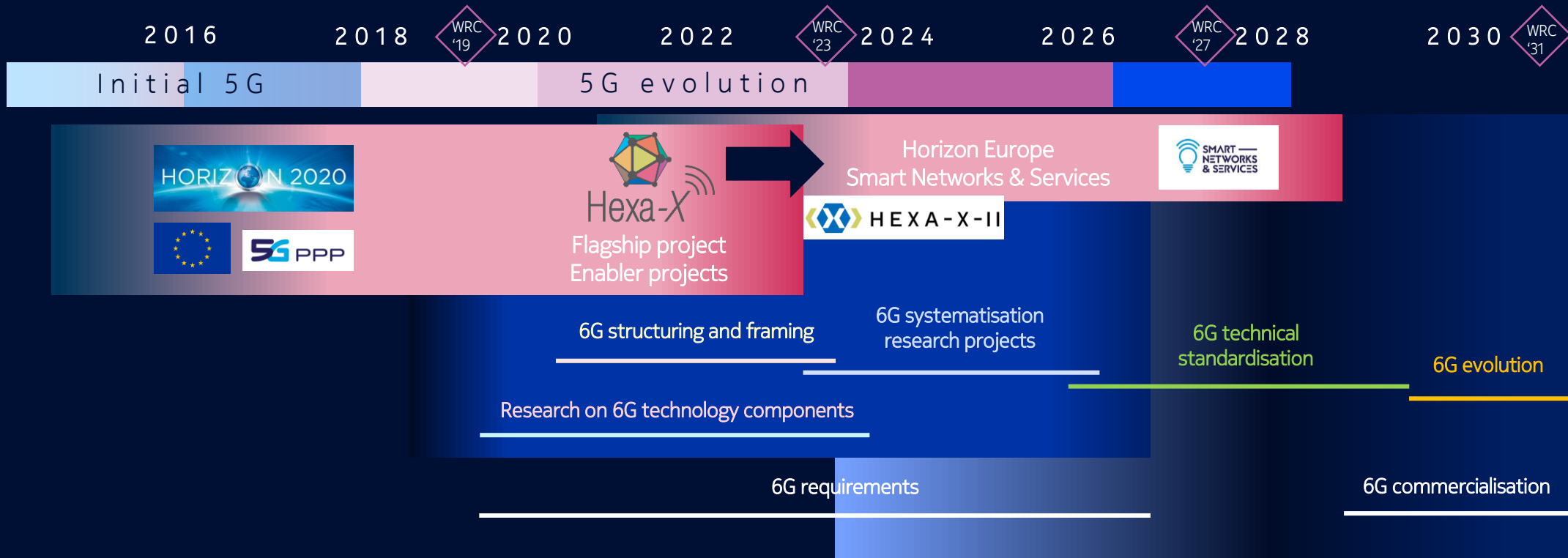
JP MIC
Ministry of Internal Affairs and Communications
 IOWN
GLOBAL FORUM

IN tsdsI

Project set-up



Timeline



Dissemination



- 16 technical deliverables published
- 9 upcoming technical deliverables to be published during next half-year

Deliverable Title	Description	Date of delivery	Start date of project
6G V	A flagship for		
Exp	A flagship for		
Toward U	A flagship for		
Gaps, service	A flagship for		
Gap a for	A flagship for		
A comp	A flagship for		
Initial r ul	A flagship for B		
Locali	A flagship for B		
Initial	A flagship for		
Int	A flagship for B		
Targets	A flagship for B		
Design orc	A flagship for B		
Deliv Special-pur interm	A flagship for BSG/IG vision and int phy	30/04/2022	01/01/2021
AI-dri computation	A flagship for BSG/IG		
Initial mod local	A flagship for BSG/IG connecti		
Deliverable D5.2 Analysis of 6G architectural enablers' applicability and initial technological solutions	Call: H2020-ICT-2020-2 Project reference: 101015956 Project Name: A flagship for BSG/IG vision and intelligent fabric of technology enablers connecting human, physical, and digital worlds Hexa-X	31/10/2022	01/01/2021

- Different tasks/WPs are contributing to various conferences and journals
- <https://hexa-x.eu/deliverables>

Societal trends



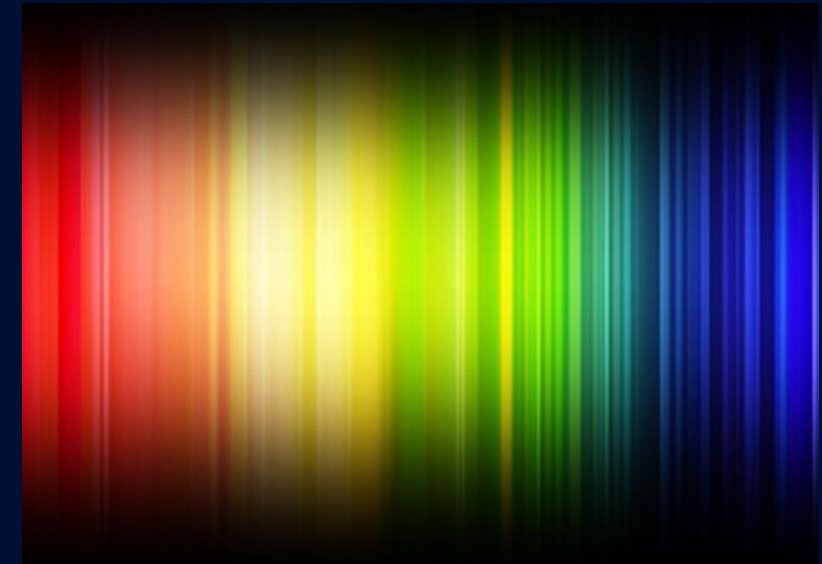
- “a better and more sustainable future for all”
- Trustworthiness
- Global digital inclusion

Economic trends



- Positive impact of ICT on economical growth
- New application, new function, new business model

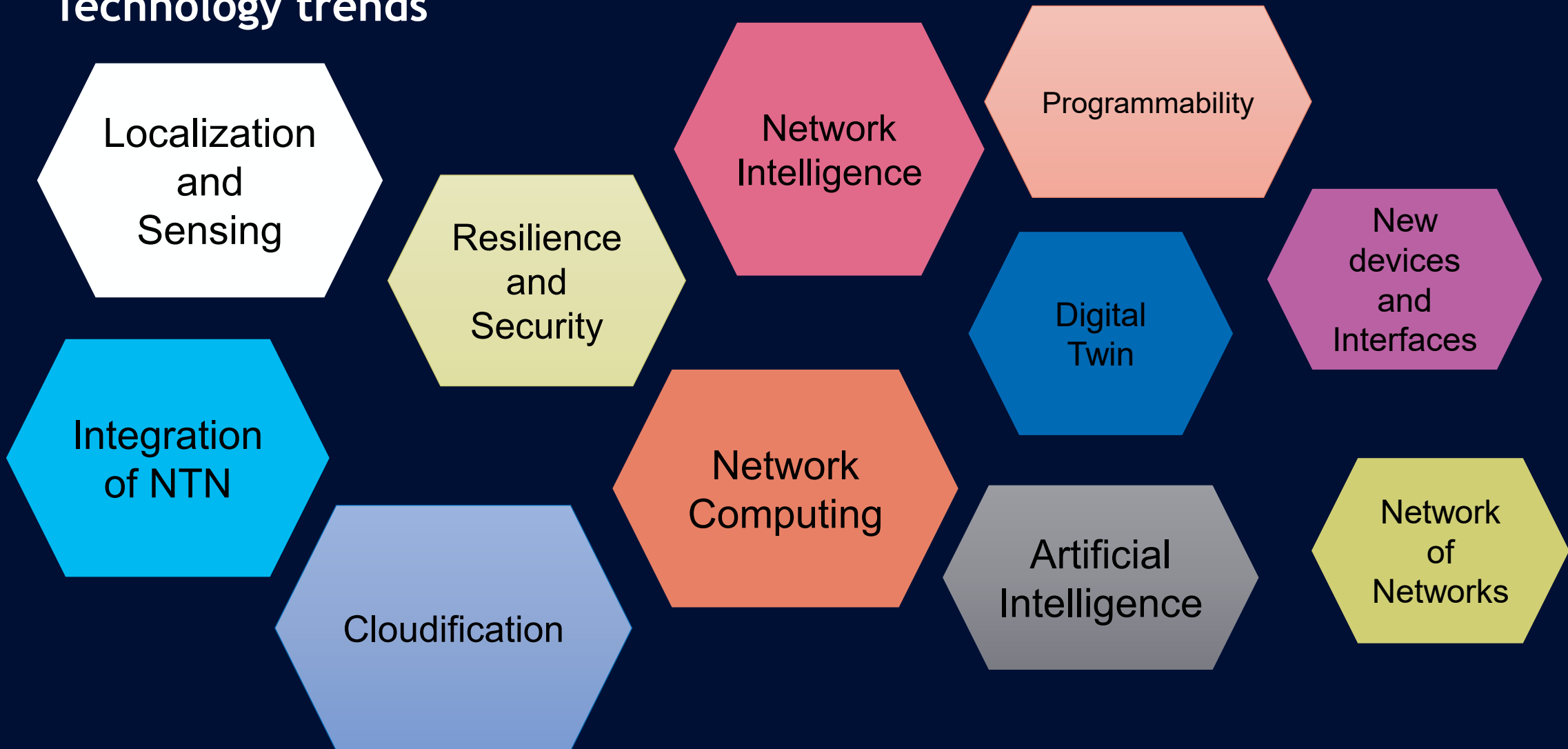
Regulatory trends



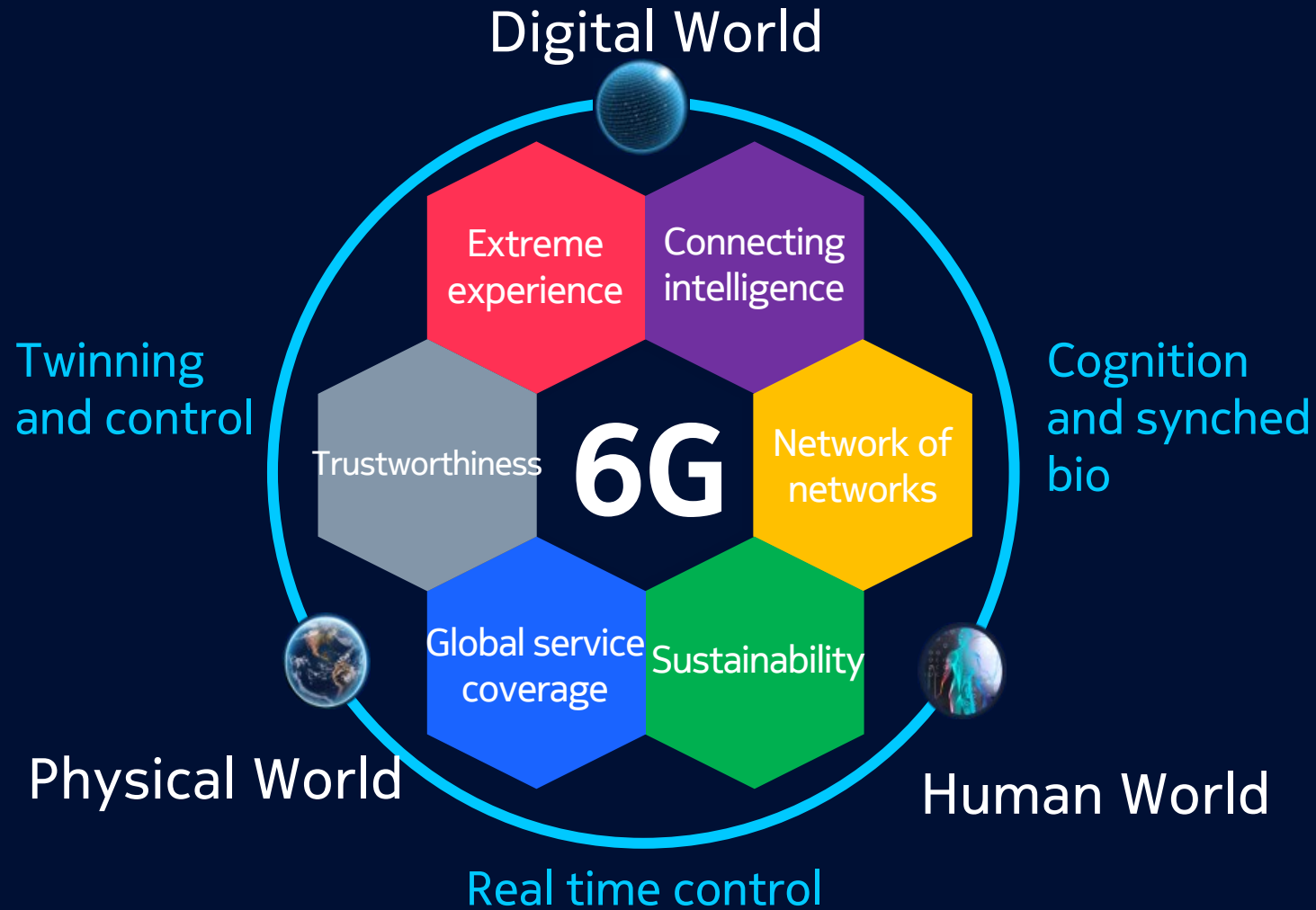
- Spectrum management is at the heart of future networks.
- Ethical aspects - Data privacy

Current Trends

Technology trends



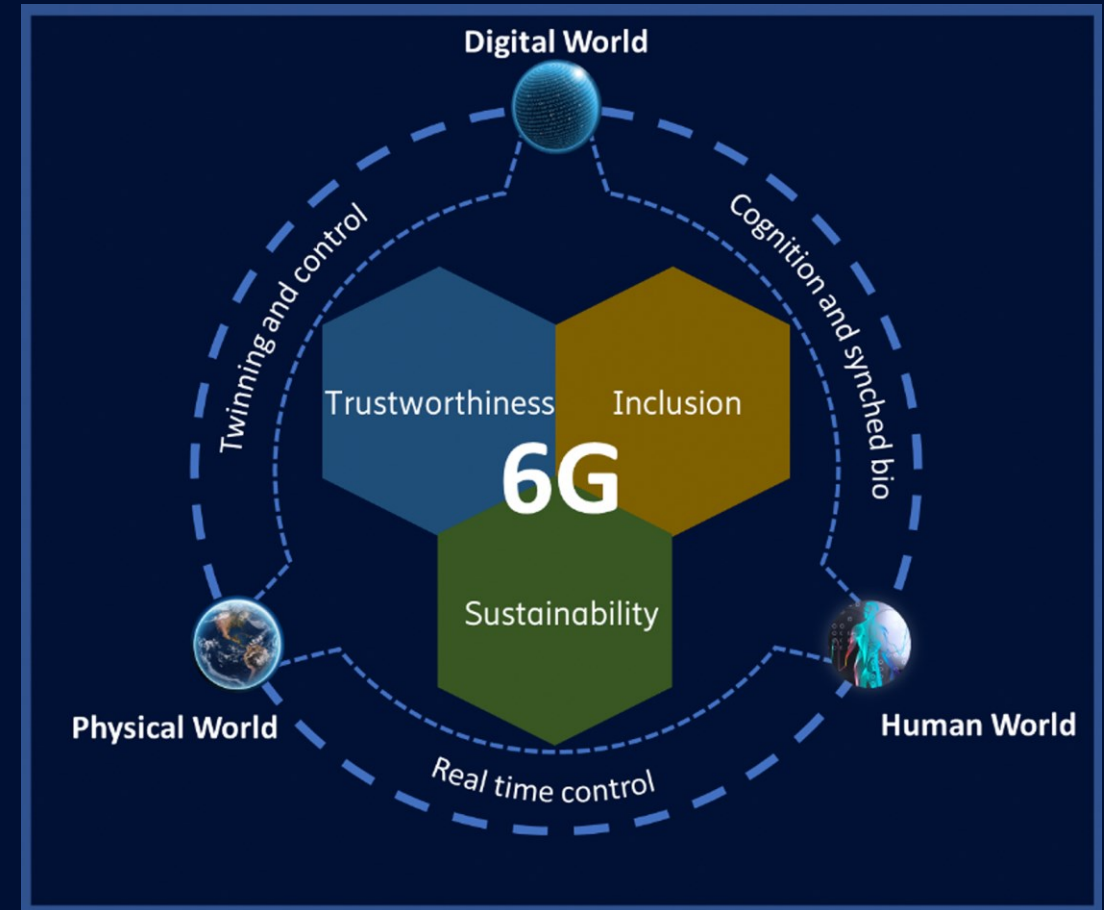
6G Challenges



Hexa-X vision for 6G

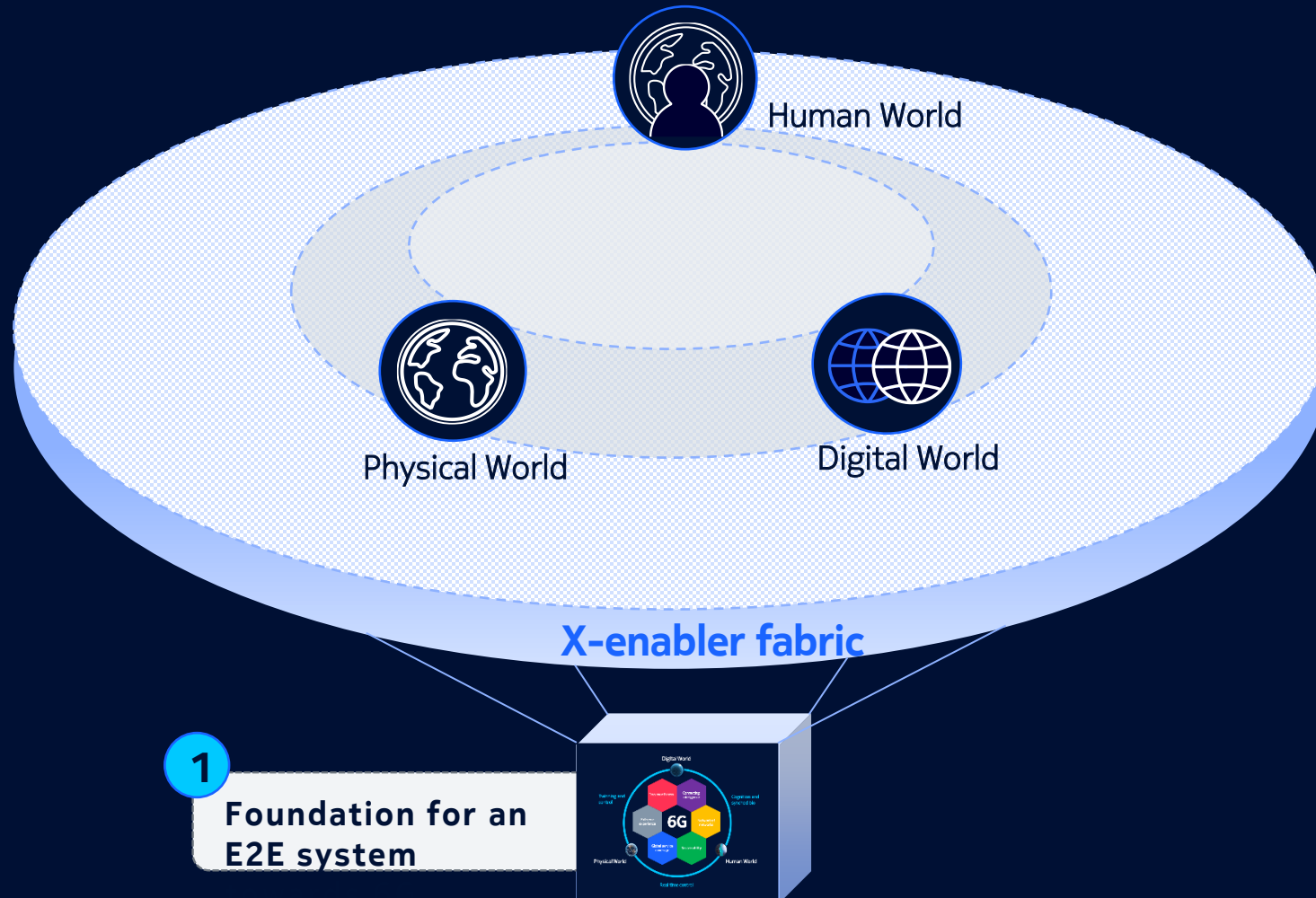


- Connecting the physical, digital, and human worlds:
 - Physical - Digital -> Twinning and control
 - Digital - Human -> Cognition and synched bio
 - Human - Physical -> Real-time control
- Key values:
 - Sustainability
 - Digital Inclusion
 - Trustworthiness



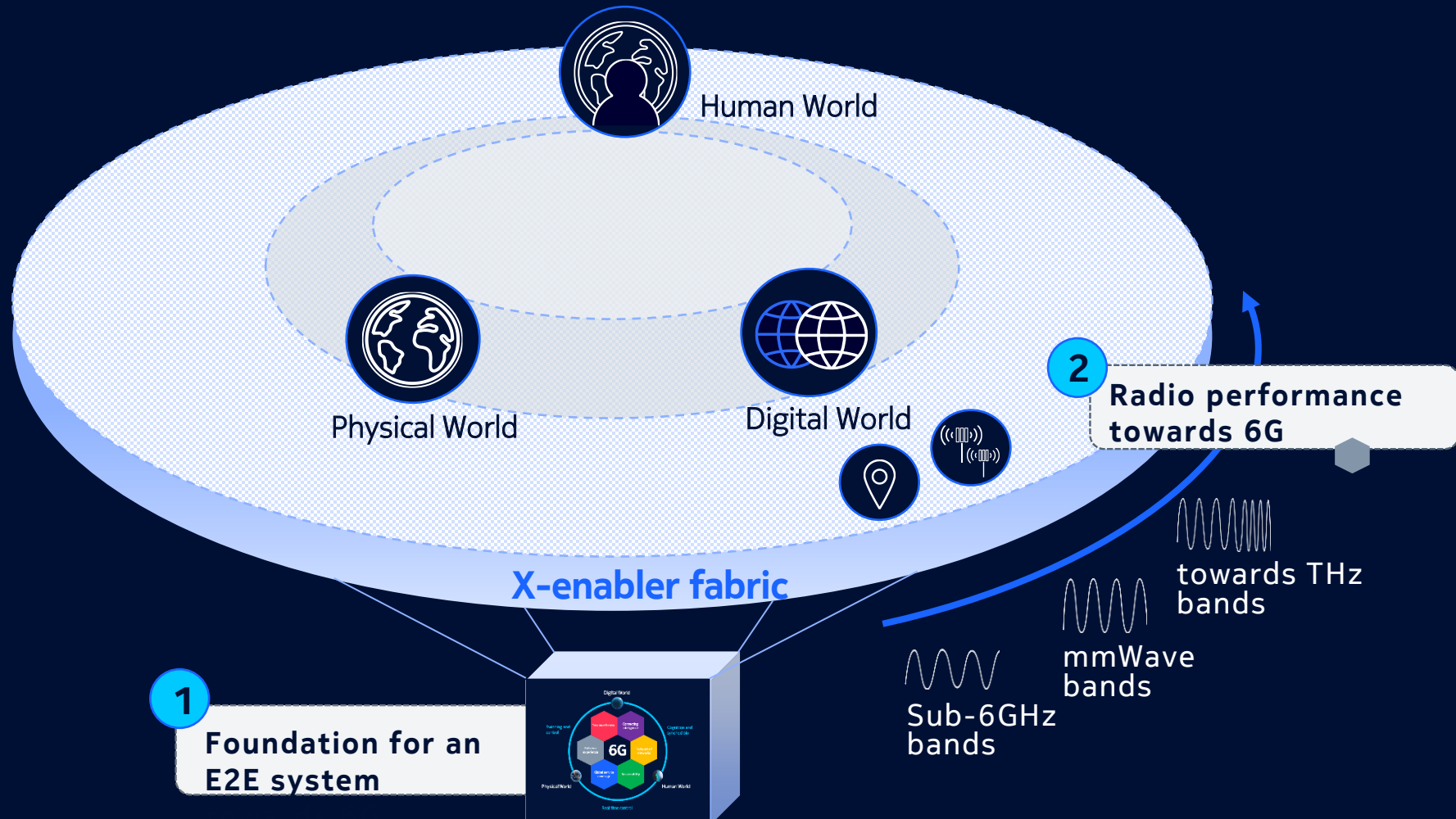
Hexa-X objectives: Foundation for an E2E system towards 6G

Develop the B5G/6G x-enabler fabric and the KVIs for a vision of connecting intelligence, sustainability, trustworthiness, inclusion, and extreme experience



Hexa-X objectives: Radio performance towards 6G

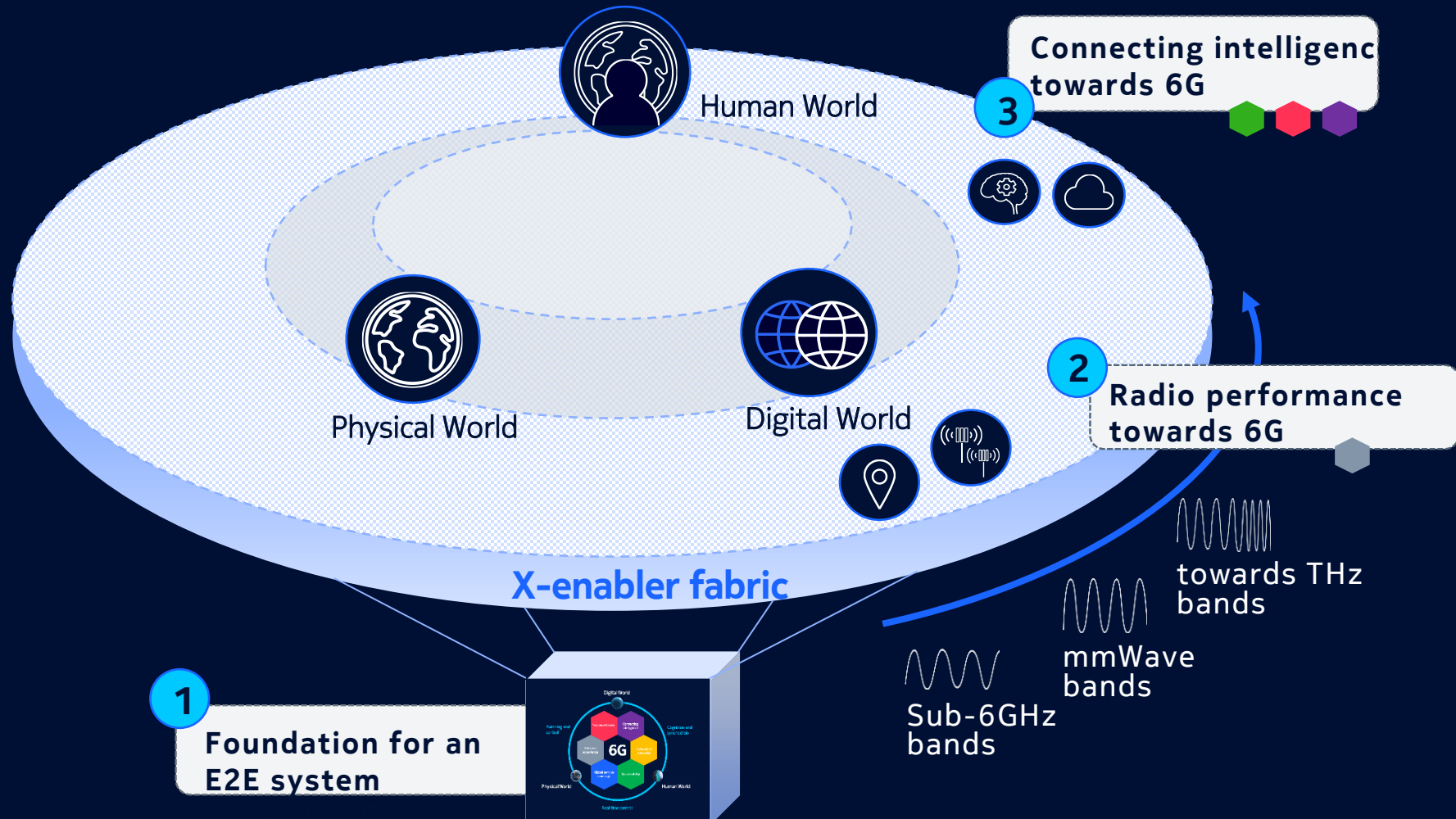
Deliver extreme performance by developing and assessing key radio technology components for the next generation, through higher bands and localisation/sensing



Hexa-X objectives: Connecting intelligence towards 6G



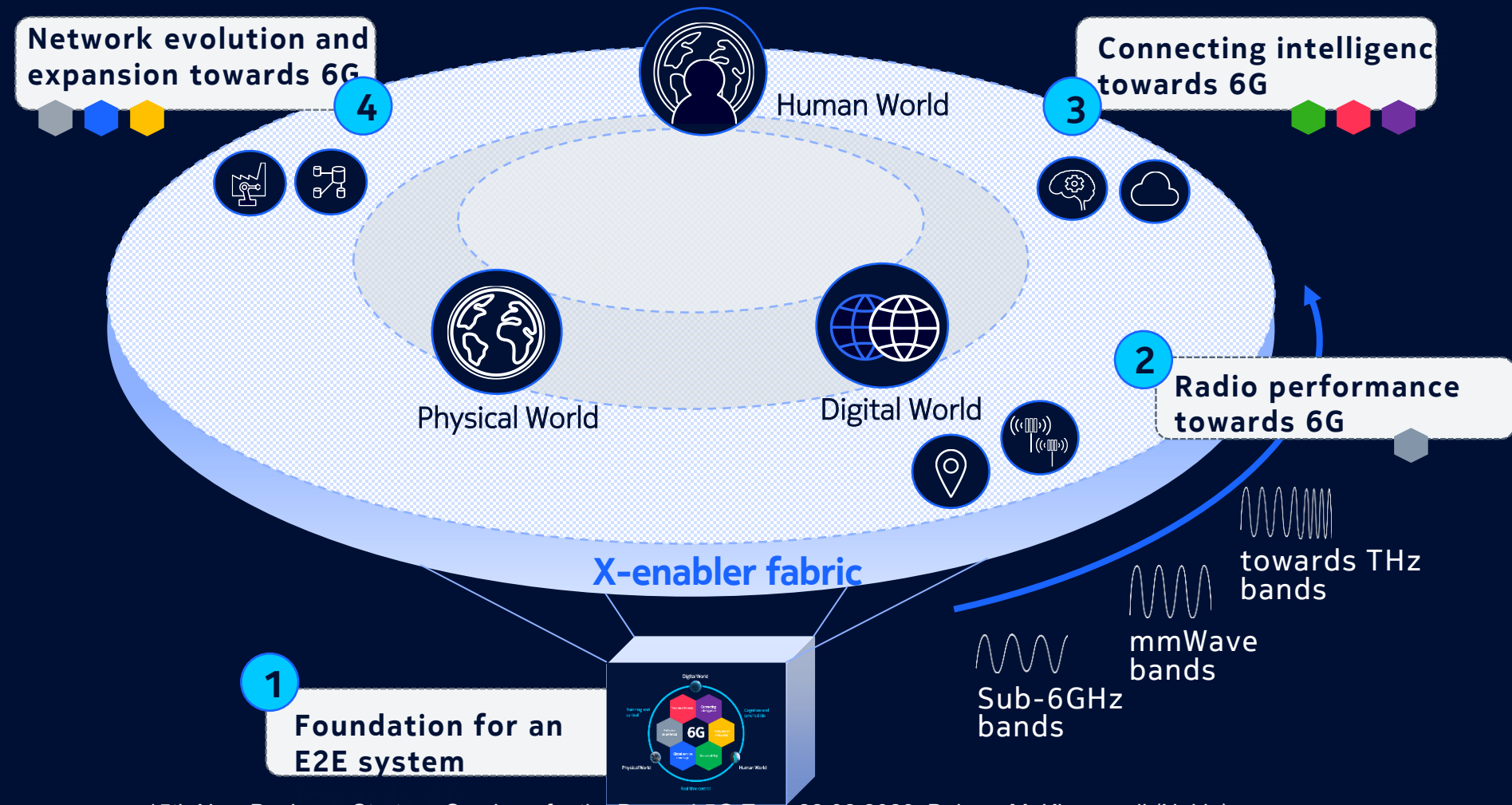
Deliver methodology, algorithms, and architectural requirements for an AI-native network, through AI-driven air interface and AI governance





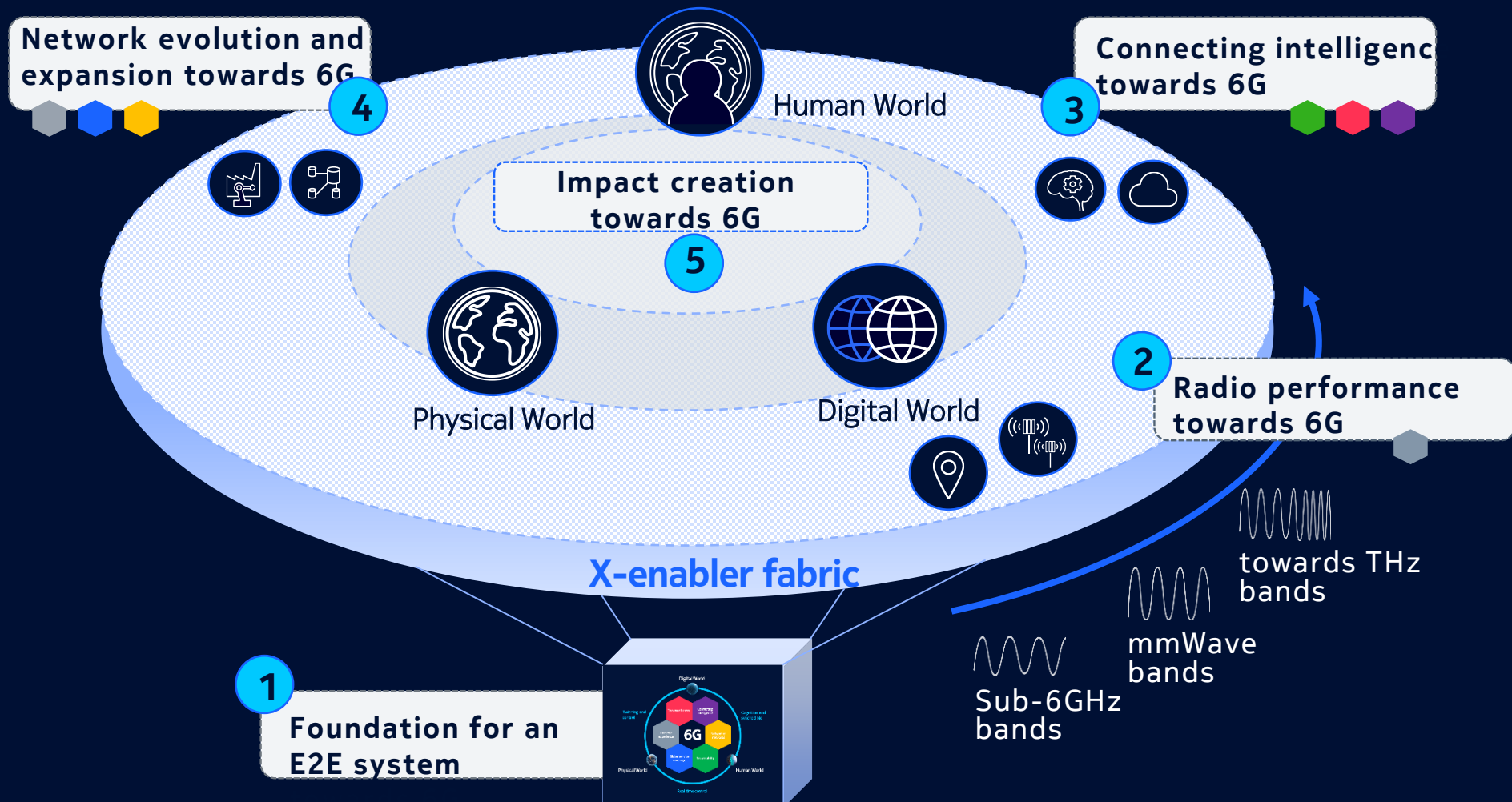
Hexa-X objectives: Network evolution and expansion towards 6G

Deliver enablers for an intelligent network of networks, through network disaggregation and dynamic dependability




Hexa-X objectives: Impact creation towards 6G

Drive a global open discussion on key B5G/6G topics through dissemination, leveraging of outcomes, contributions to standard development.



UN Sustainable Development goals

8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION

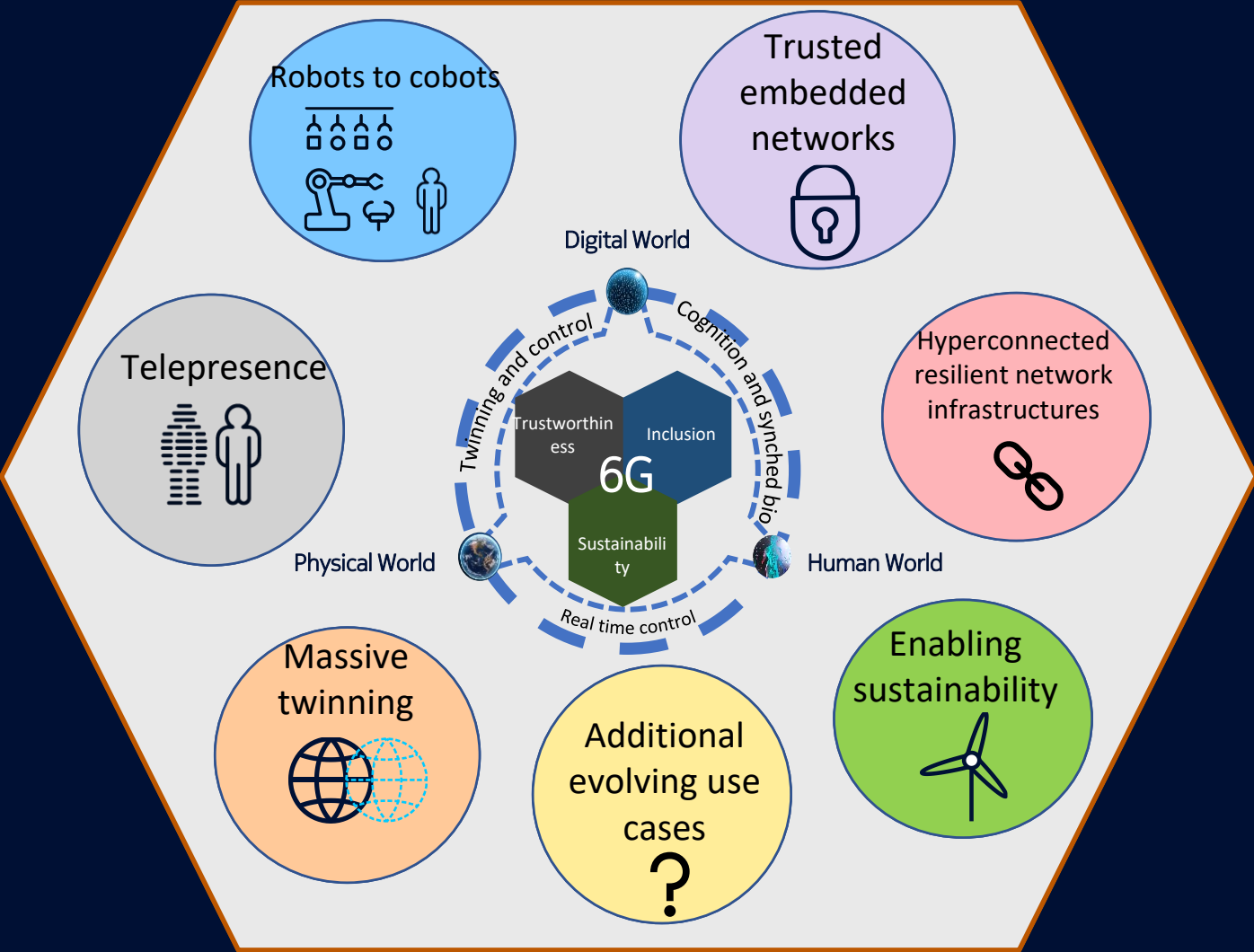


13 CLIMATE ACTION

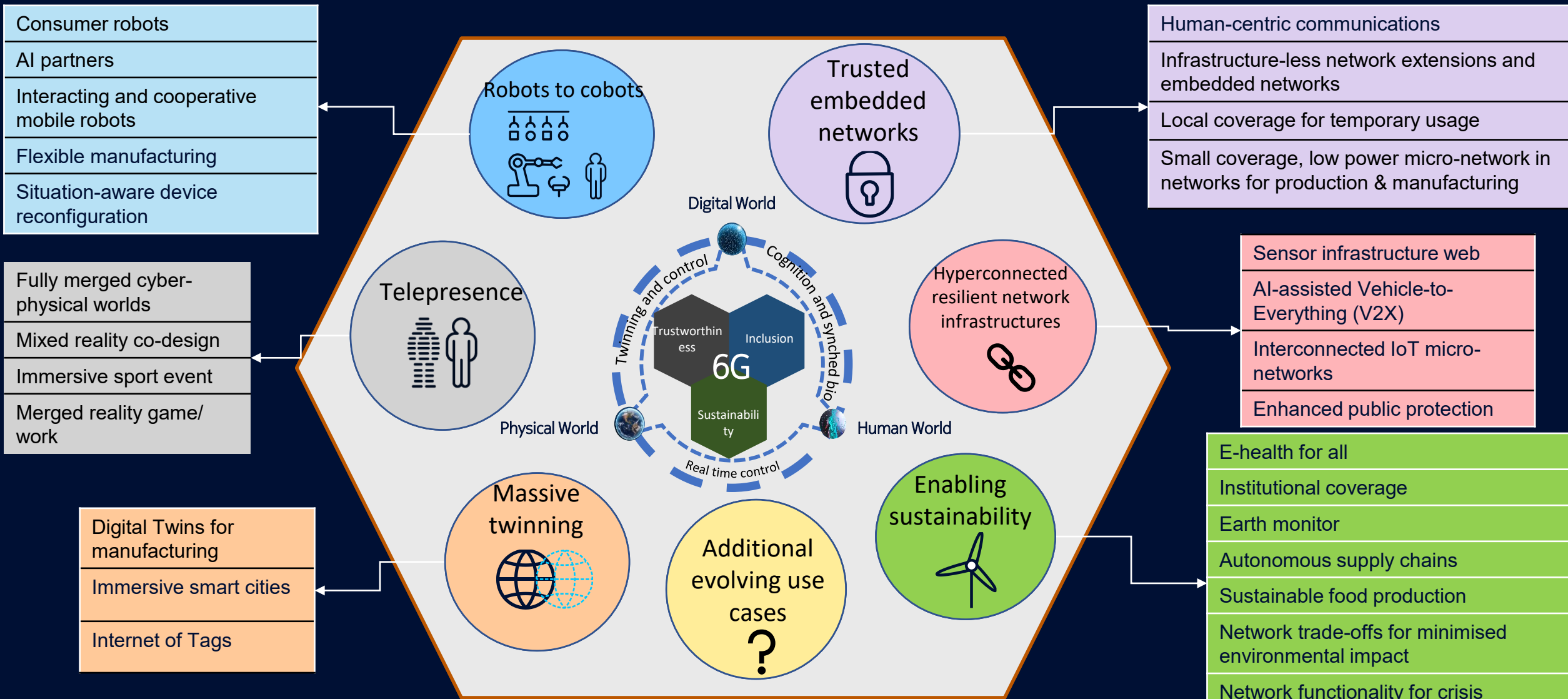


Services and Use cases

- 8** DECENT WORK AND ECONOMIC GROWTH
- 9** INDUSTRY, INNOVATION AND INFRASTRUCTURE
- 11** SUSTAINABLE CITIES AND COMMUNITIES
- 12** RESPONSIBLE CONSUMPTION AND PRODUCTION
- 13** CLIMATE ACTION



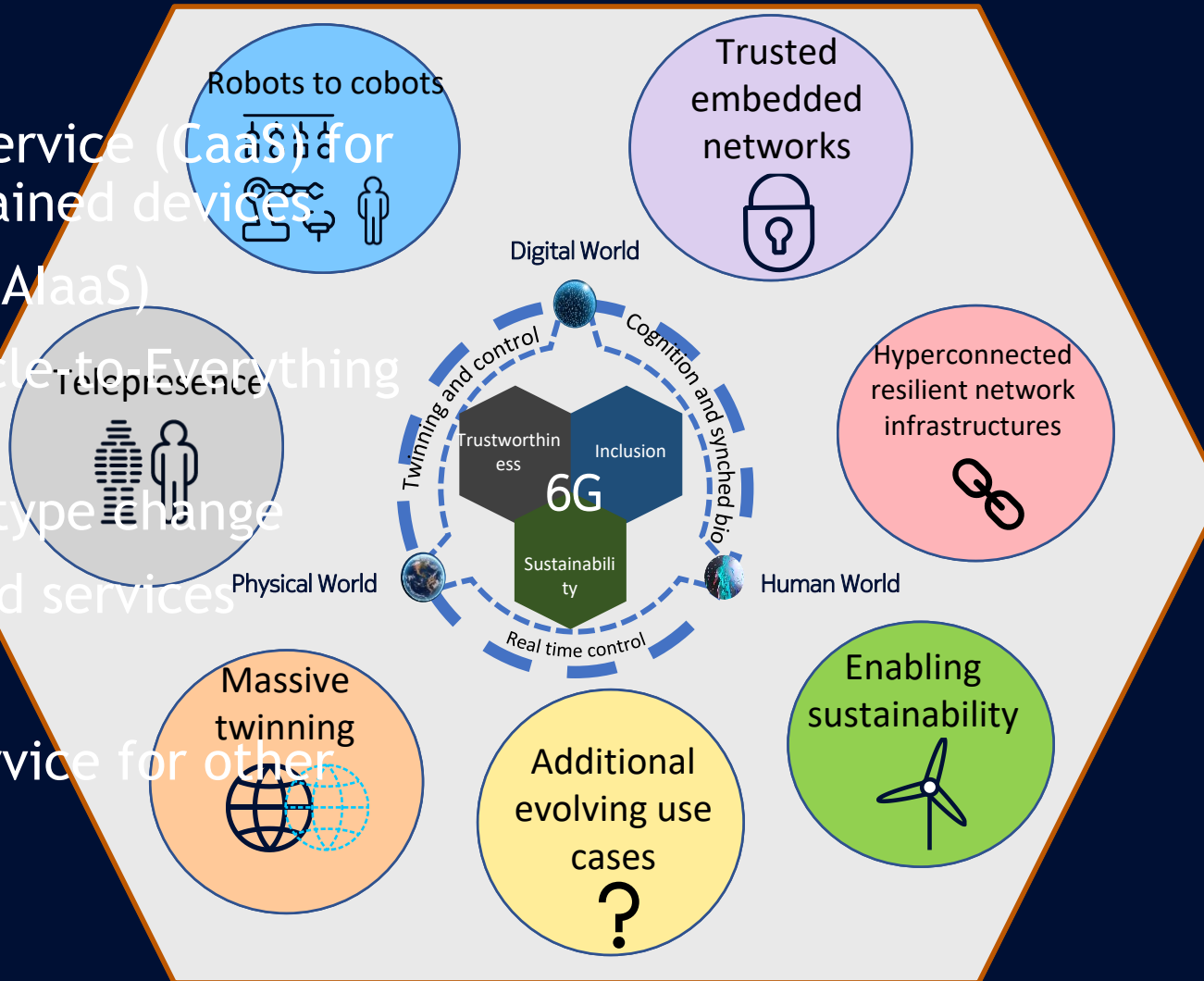
Services and Use cases



Services and Use cases

New services:

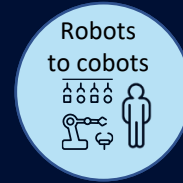
- Compute-as-a-Service (CaaS) for resource-constrained devices
- AI-as-a-Service (AIaaS)
- AI-assisted Vehicle-to-Everything (V2X)
- Flexible device type change
- Energy-optimised services
- Internet-of-Tags
- Security as a service for other networks



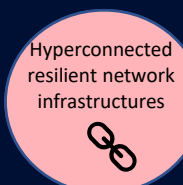
Hexa-X Use Case Families Overview



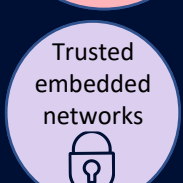
Being present and interacting anytime, anywhere, using all senses
Low latency, high data rate and reliability



Going beyond command-and-control robots
Human to machine and machine to machine communication



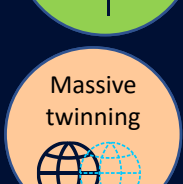
Use cases involving sub-networks, network of networks
Require high level of resilience



Providing local/private communication capability



Using 6G in other sectors than ICT to globally improve sustainability
Addressing some of UN SDGs



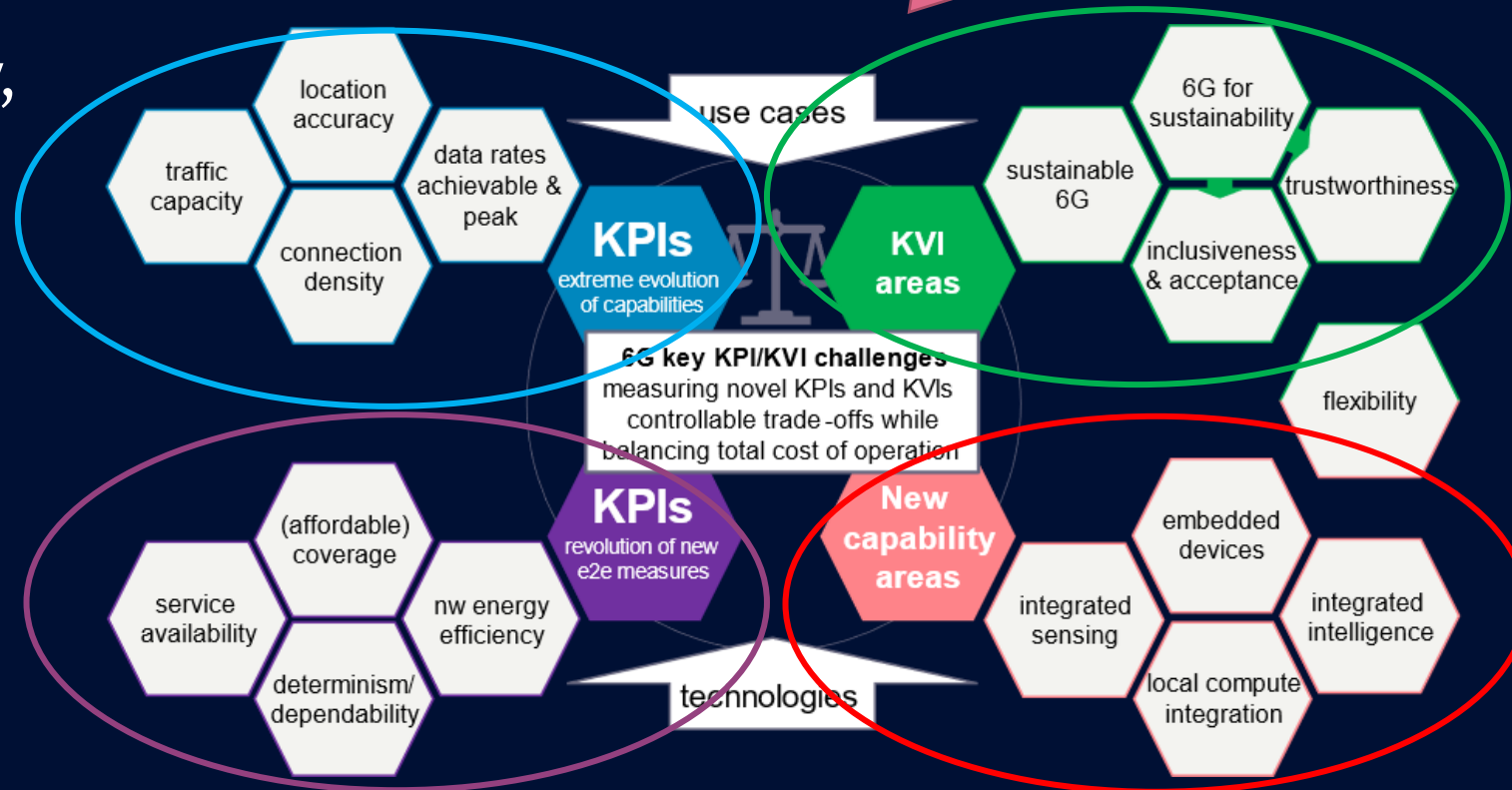
Full digital representation of our environment
Benefit to use in production, manufacturing management of environment, etc.

Key Value Indicators (KVI) and performance goals (KPIs) for Hexa-X system



- Moving toward both performance and value-oriented design paradigm
- “Values” such as sustainability, trustworthiness, and inclusion
- Evaluation criteria:
 - KVIs address UN SDGs
 - KPIs of new capabilities
 - KPIs focusing on E2E measurements
 - Traditional KPIs

D1.2 presented deployment scenarios and corresponding KPIs/KVIs for some use cases. An updated version of KPIs/KVIs presented in D1.3.

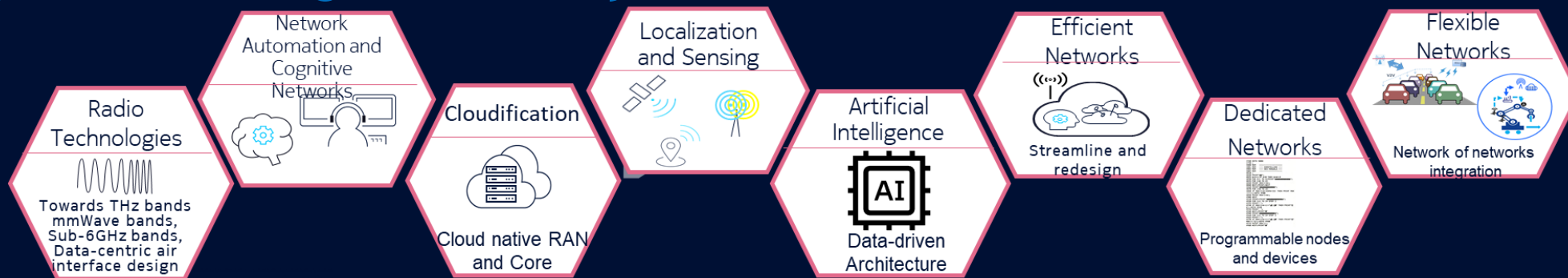


Planned Standardization Activities

• Standardization objectives:

- To pave the way for B5G/6G systemisation and standardization, through industry consensus and interactions with the scientific community.
- To identify the relevant gaps in the ongoing standardization activities and contribute to them.
- Measurable results:
 - Number of standardisation groups addressed, and contributions made.
 - More than (>100) standardisation contributions.
 - Impact on ITU work on 6G requirements, and on roadmap for 6G standardization in 3GPP.

• Project technologies that may lead to standardization:



Planned Standardization Activities



- **Potential targeted standardization bodies / groups:**

- When we started, only ITU-T was studying 6G specific use cases and technologies.
- Our first target was ITU-R IMT Vision of IMT towards 2030 and beyond preparation and its supporting studies, e.g., Future technology trends and IMT feasibility above 100GHz.
- We are now extending our **pre-standardization activities** to ETSI THz ISG, ITU-T sustainability work and O-RAN nGRG.
- Towards 3GPP we contributed topics and solutions related to developed enablers in the area of security, AI/ML, energy efficiency, network management and analytics.

- **Standardization planning and estimated time plan:**

- Bring forward following project results by the end of the project (June 2023):
 - Modelling of physical characteristics of (sub)-THz systems - ETSI -THZ ISG, NGMN
 - Trustworthy AI - ETSI ISG Securing AI (SAI)
 - Orchestration and Management - 3GPP SA5, ETSI ZSM, etc.



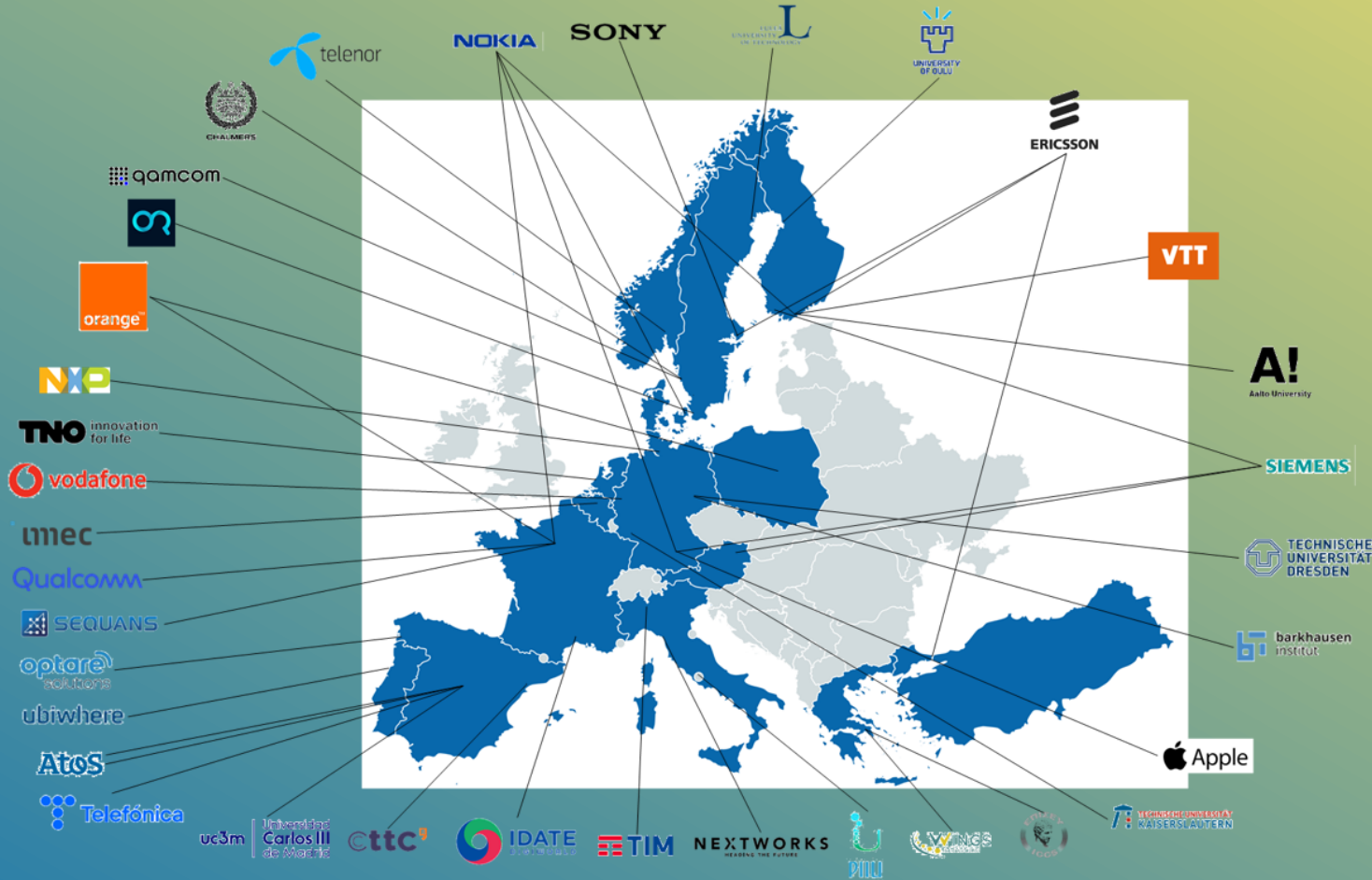


HEXA-X-II

Hexa-X-II overview



- Hexa-X-II is the next European level 6G Flagship
- Focus will be continued development of technology and define the 6G platform and system
- Funded through Horizon Europe SNS-JU
- 44 partners
 - Cover the entire value-stack from hardware to system to platform to applications to service providers and a strong academic presence
- Nokia is overall leader
- Ericsson is technical manager



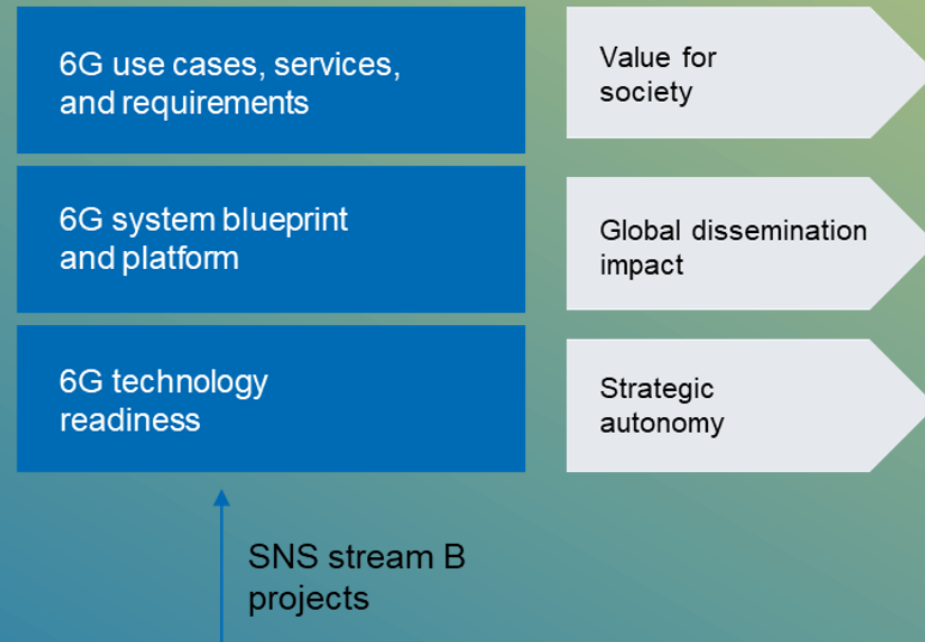


Overall objectives of Hexa-X-II

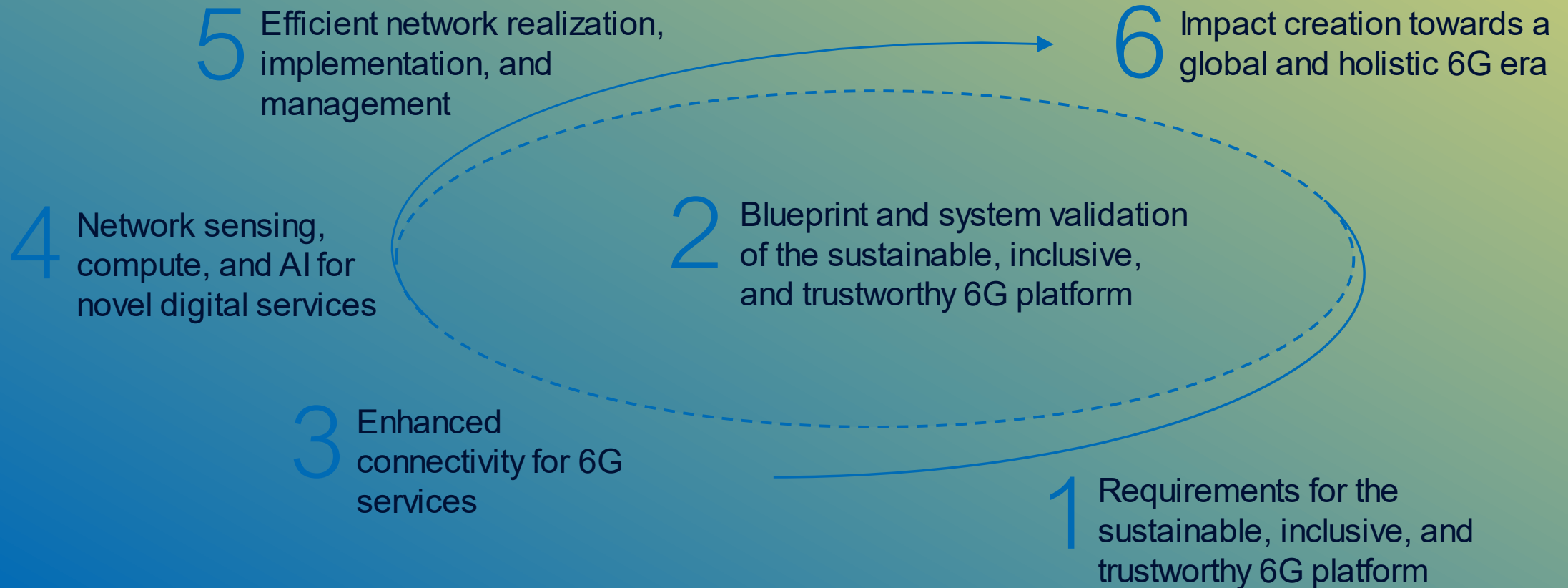
- A holistic flagship towards the 6G platform and system to inspire digital transformation for the world to act together in meeting needs in society and ecosystems with novel 6G services



Hexa-X & Horizon-2020 candidate enablers



Objectives



Thank you!

HEXA-X.EU



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