

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

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

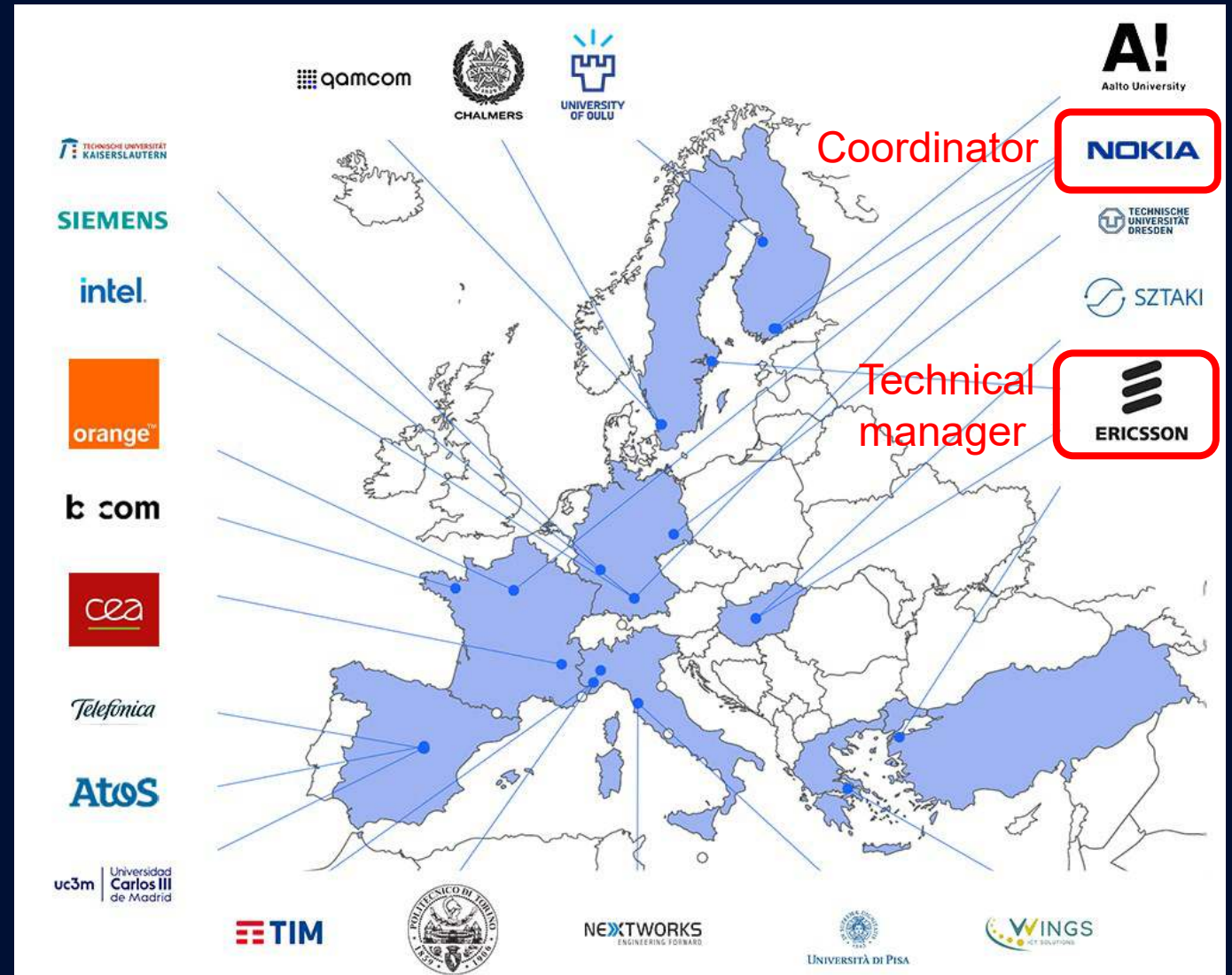
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[Nokia Strategy & Technology  
Hexa-X WP1 Lead]  
22<sup>nd</sup> February 2023



# 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



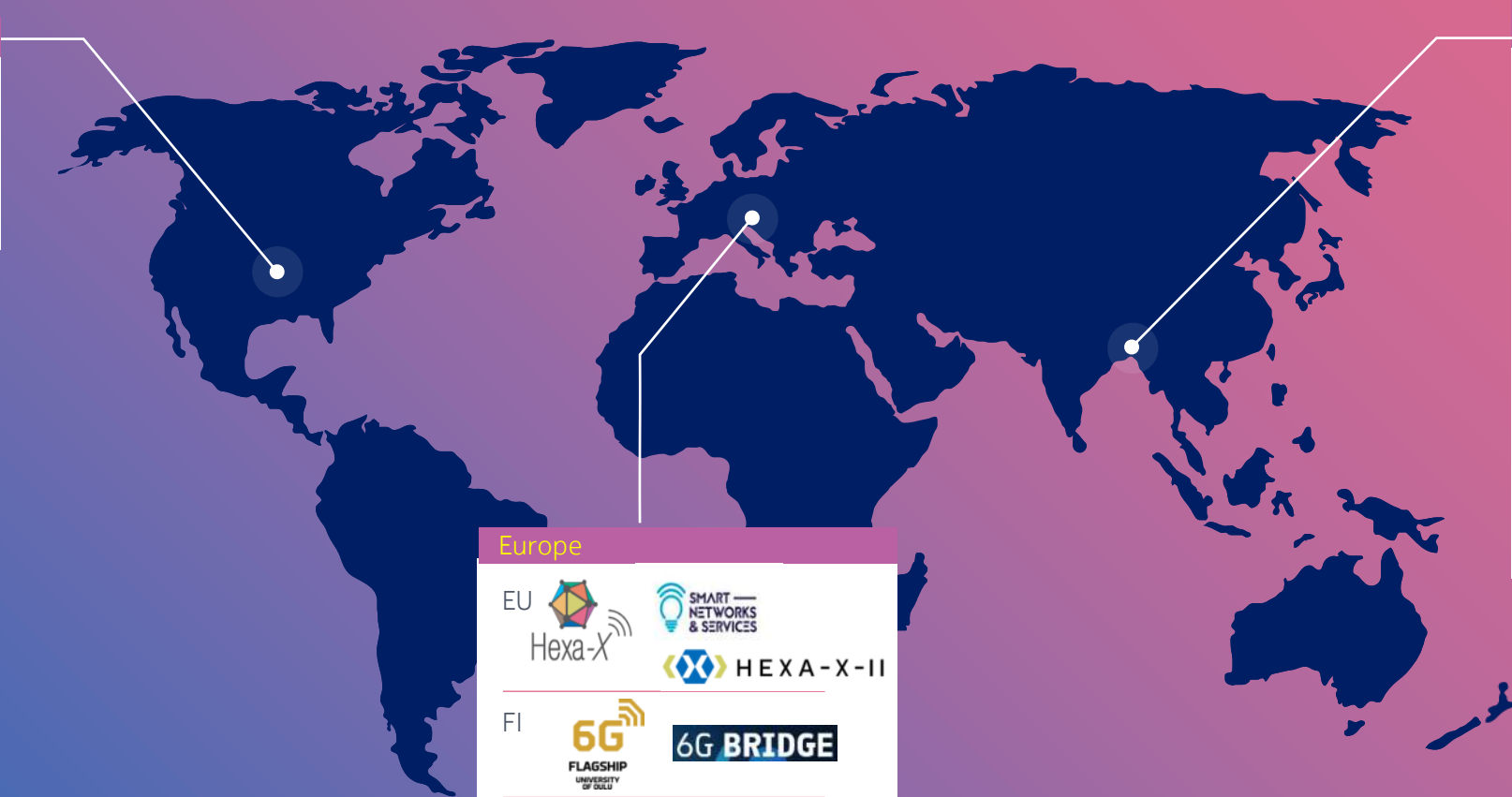
# Mapping Hexa-X on the 6G Ecosystem



North America

NEXTG ALLIANCE

NST RINGS



Europe

EU SMART NETWORKS & SERVICES  
Hexa-X HEXA-X-II

FI 6G FLAGSHIP UNIVERSITY OF OULU 6G BRIDGE

DE 6G-ANNA 6G Platform Germany

Asia

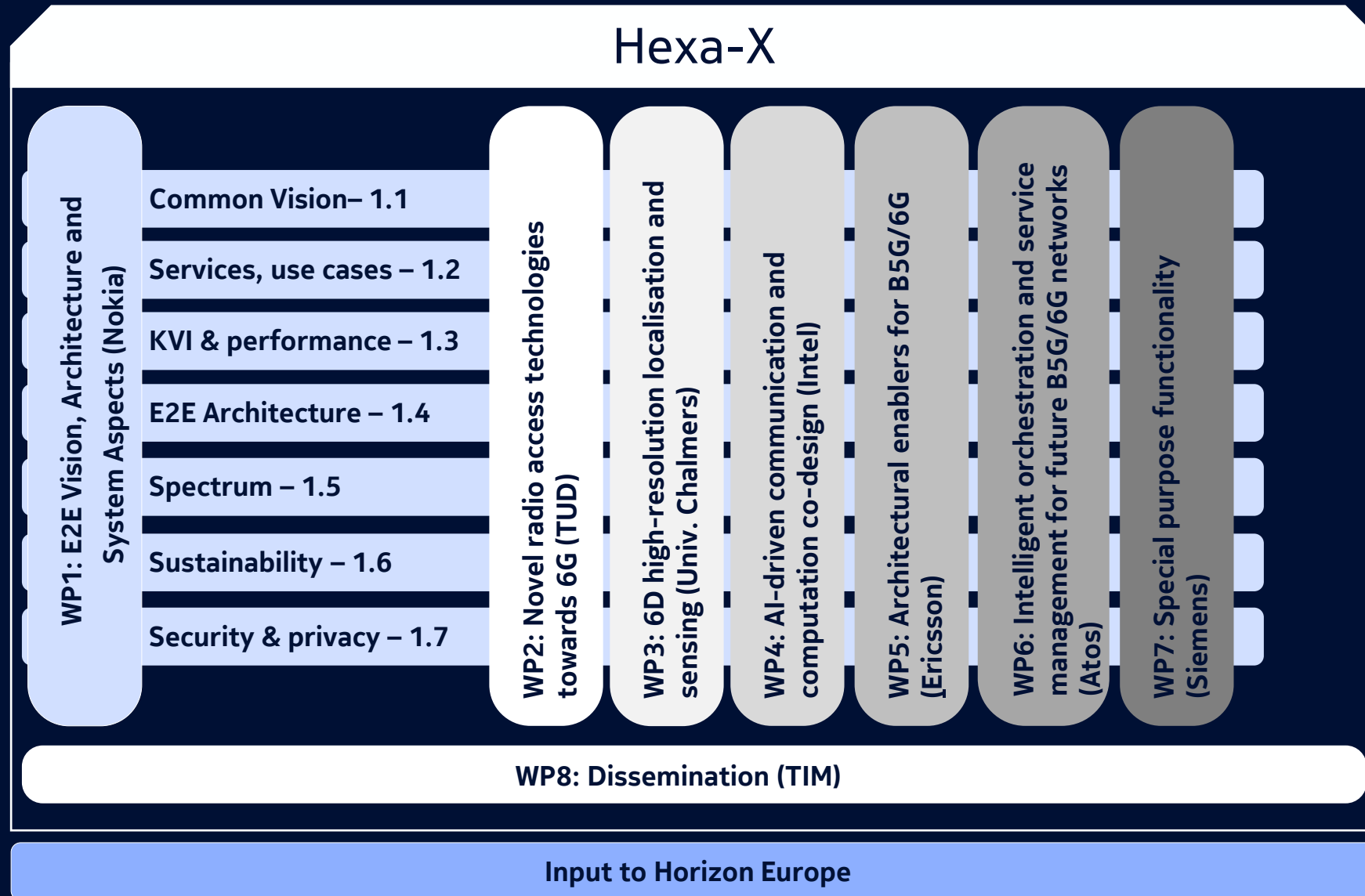
CN MIT  
 中华人民共和国科学技术部  
Ministry of Science and Technology of the People's Republic of China  
 未来移动通信论坛  
FUTURE MOBILE COMMUNICATION FORUM

KR Ministry of Science and ICT  
 5G Forum

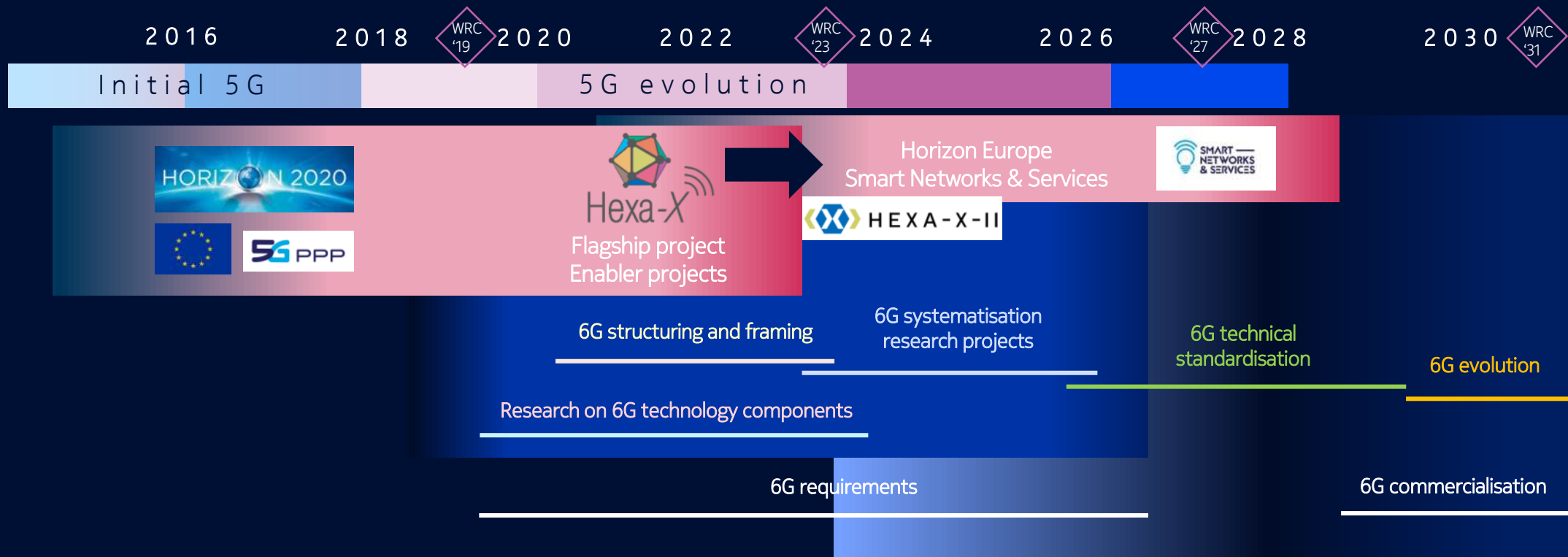
JP MIC  
Ministry of Internal Affairs and Communications  
 IOWN  
GLOBAL FORUM

IN tsds

# Project set-up



















# Timeline





# Dissemination

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

 A Flagship for 6G V	 A Flagship for Expe - inclu	 A Flagship for Toward U	 A Flagship for Gaps, servi	 A Flagship for Gap a for	 A Flagship for A comp	 A Flagship for Initial r ul	 A Flagship for Locali	 A Flagship for Initial	 A Flagship for Int	 A Flagship for Targets	 Hexa-X A Flagship for Design orc	 A Flagship for RSG:G vision and int phy	 A Flagship for RSG:G AI-dri computatio	 A Flagship for RSG:G connecti D Initial mode local	 Hexa-X SS PPP Call: H2020-ICT-2020-2 Project reference: 101015956 Project Name: A Flagship for RSG:G vision and intelligent fabric of technology enablers connecting human, physical, and digital worlds Hexa-X Deliverable D5.2 Analysis of 6G architectural enablers' applicability and initial technological solutions Date of delivery: 31/10/2022 Start date of project: 01/01/2021 Version: 1.0 Duration: 30 months
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- Different tasks/WPs are contributing to various conferences and journals
- <https://hexa-x.eu/deliverables>

# Current Trends

## Societal trends



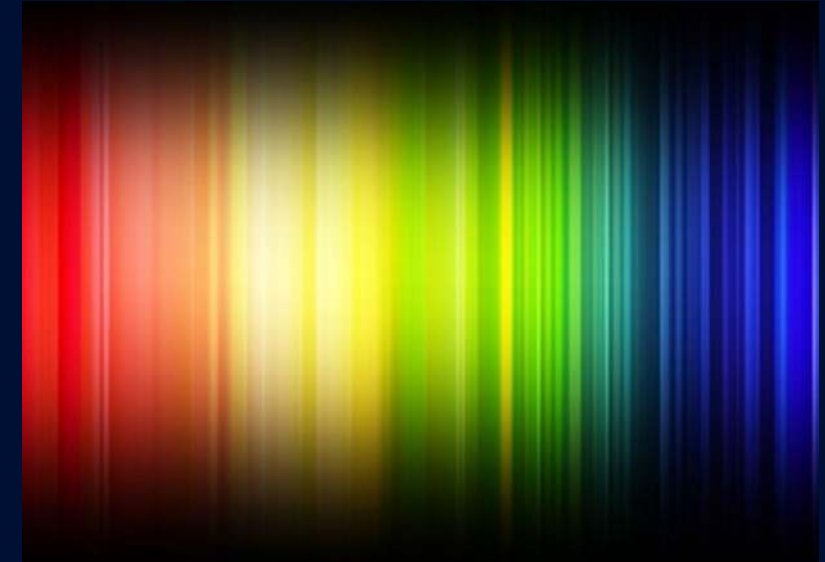
- “a better and more sustainable future for all”
- Trustworthiness
- Global digital inclusion

## Economic trends



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

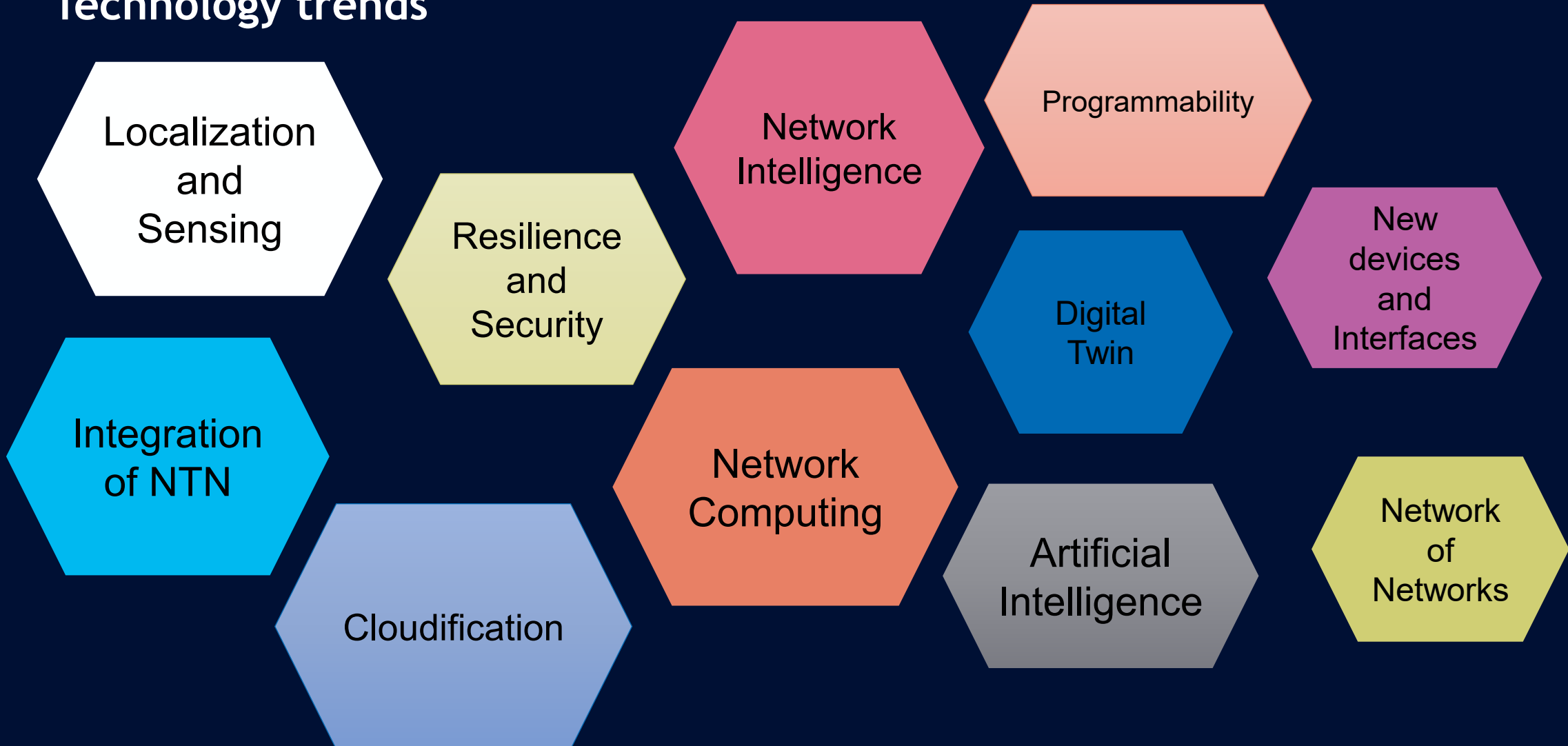
## Regulatory trends



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

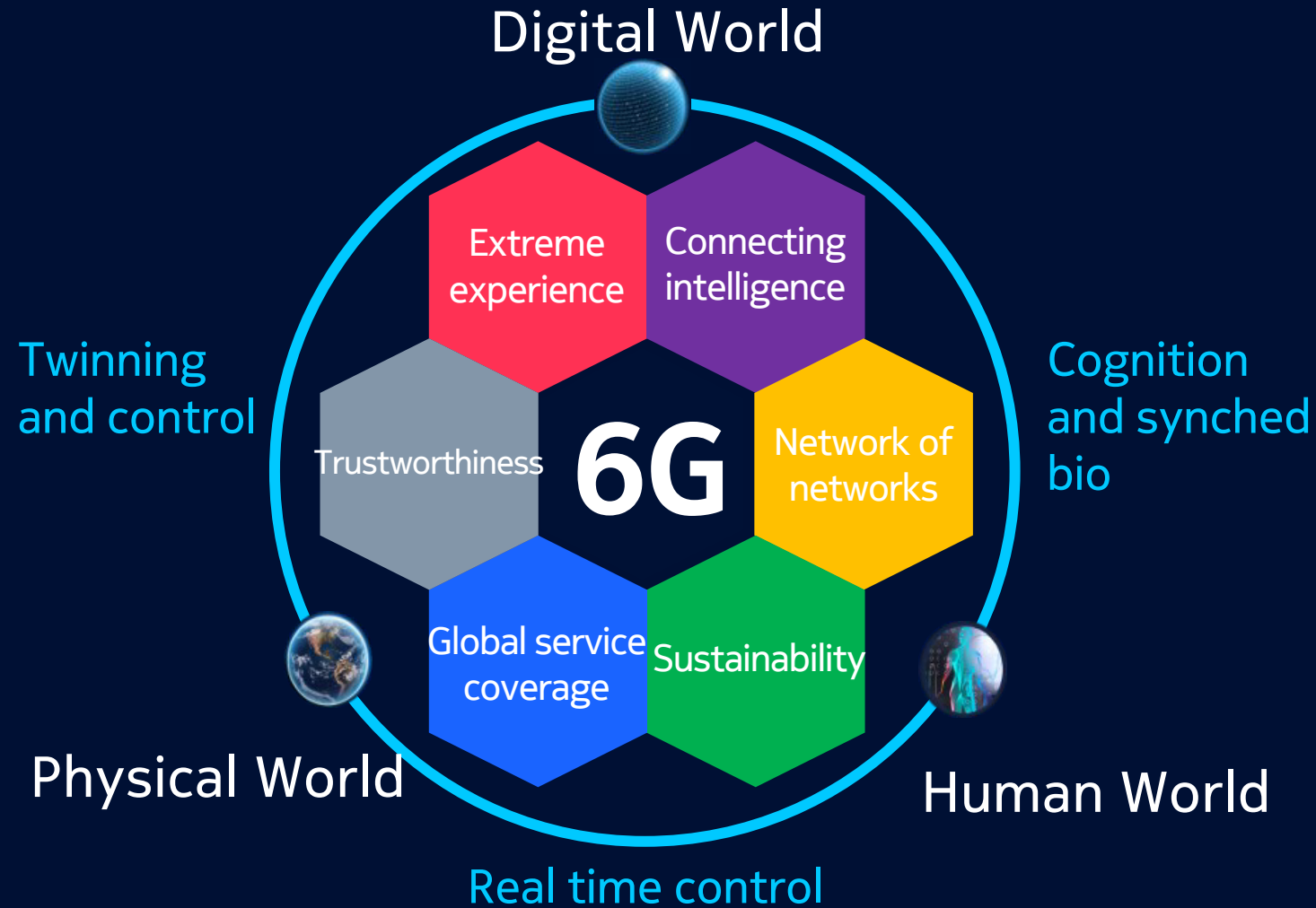
# Current Trends

## Technology trends





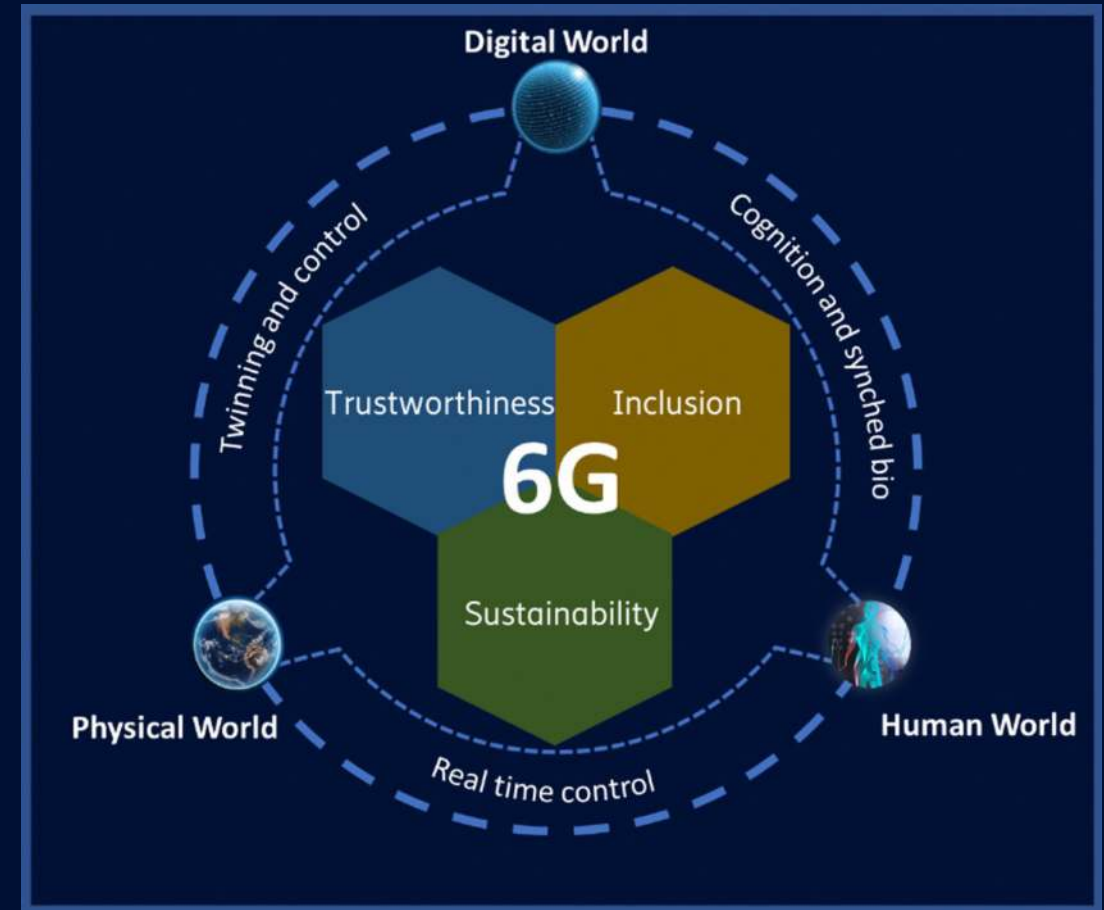
# 6G Challenges



# Hexa-X vision for 6G

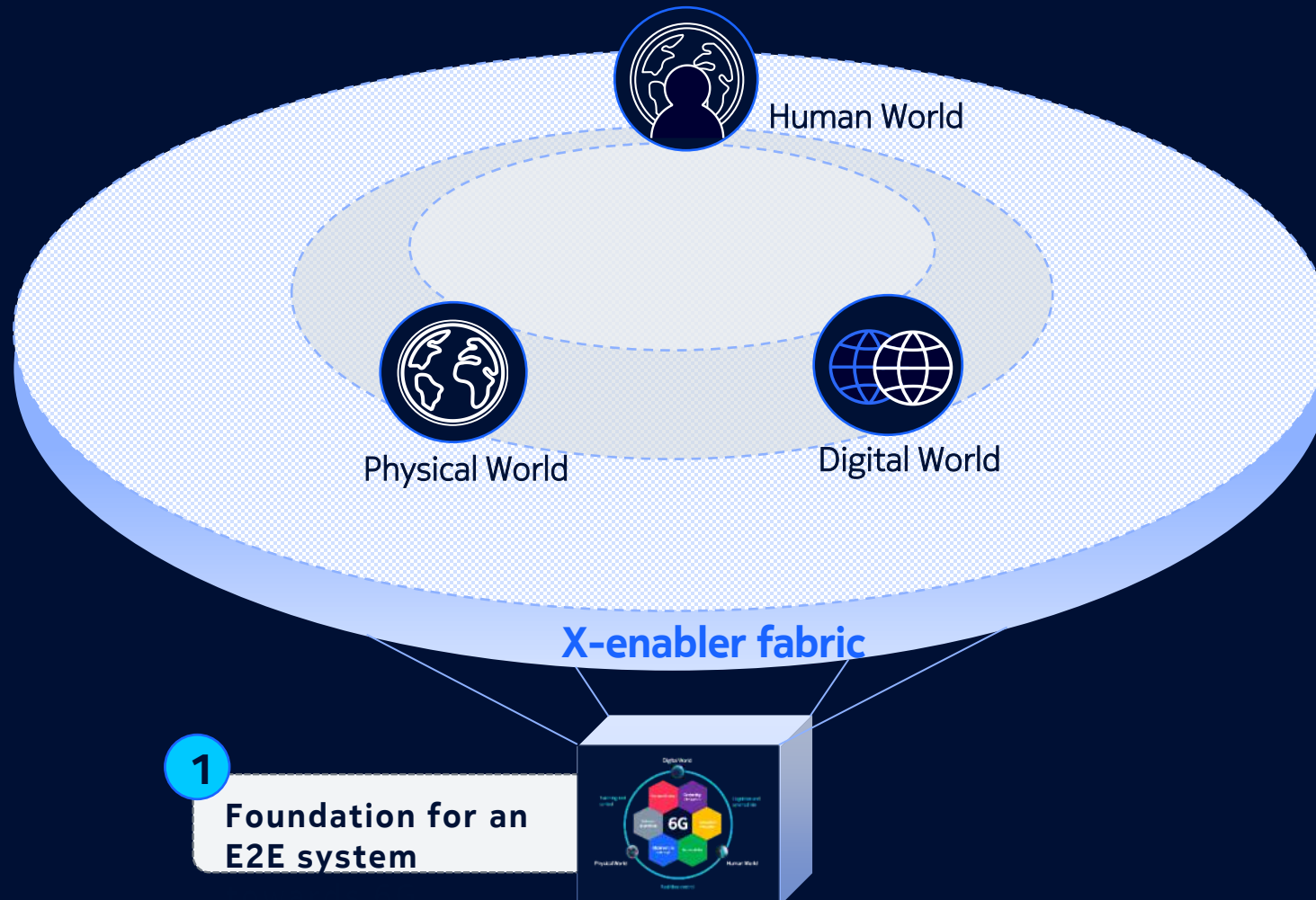


- Connecting the physical, digital, and human worlds:
  - Physical - Digital -> Twinning and control
  - Digital - Human -> Cognition and synched bio
  - Human - Physical -> Real-time control
- Key values:
  - Sustainability
  - Digital Inclusion
  - Trustworthiness



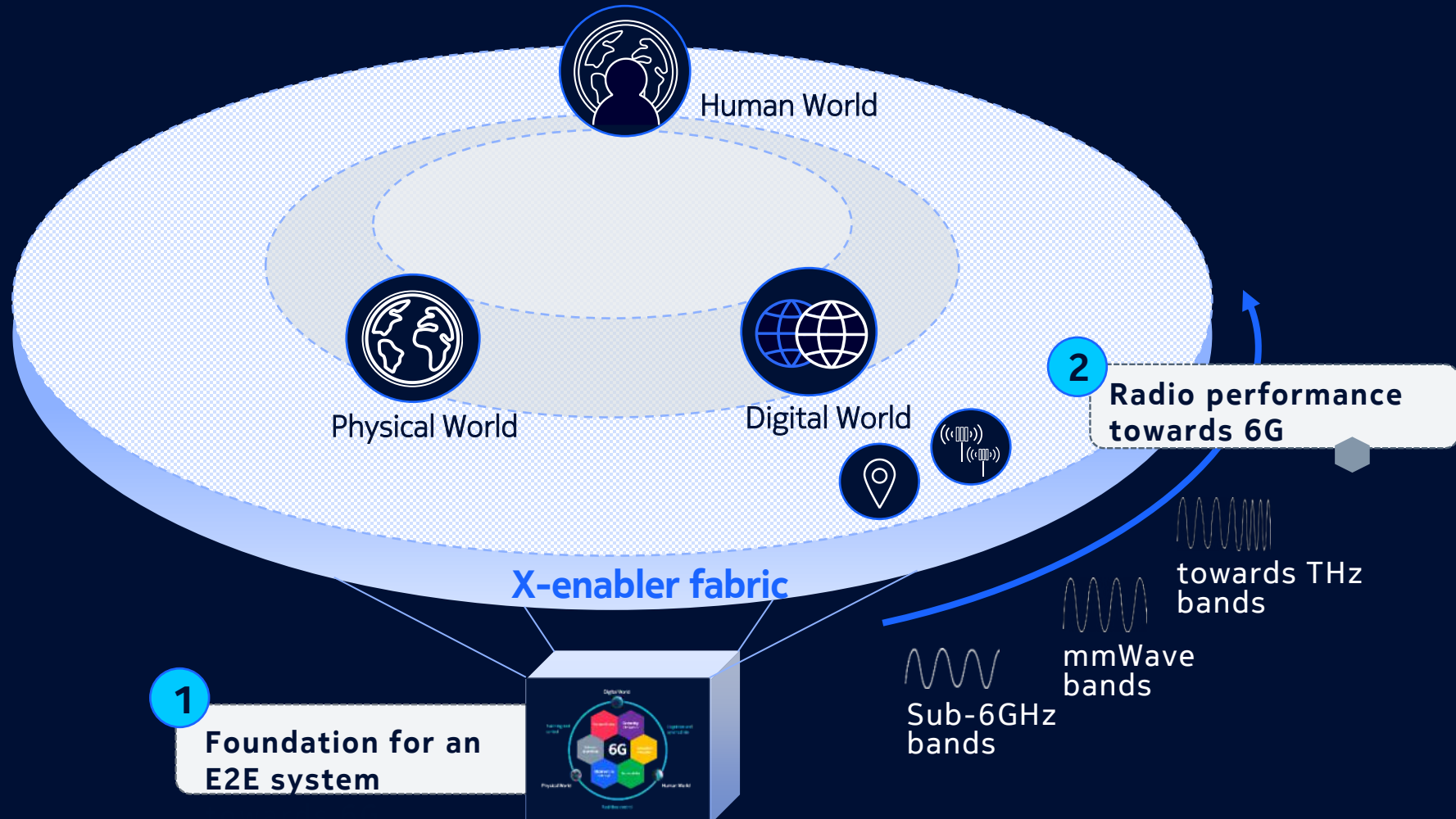
# Hexa-X objectives: Foundation for an E2E system towards 6G

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



# Hexa-X objectives: Radio performance towards 6G

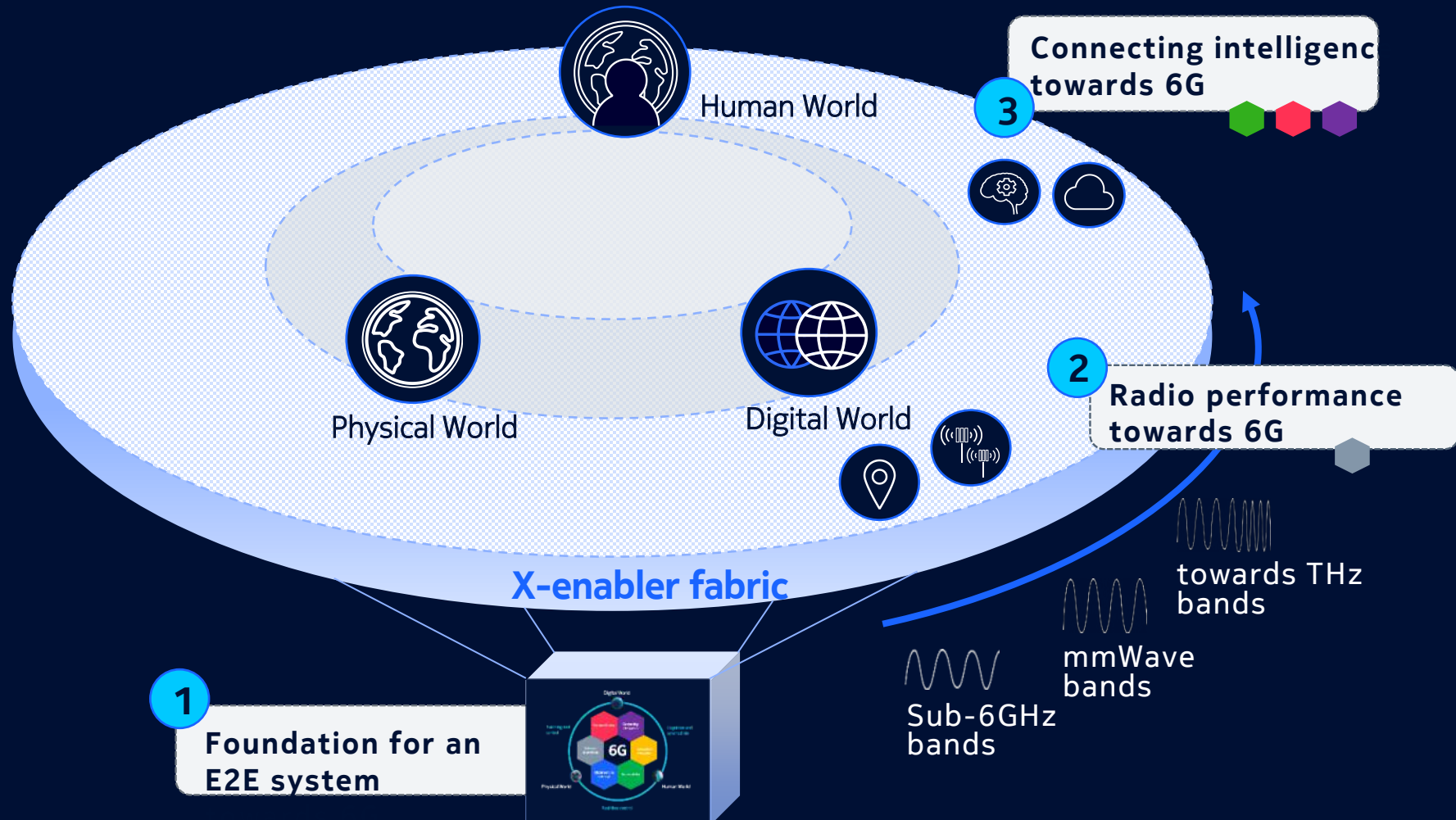
Deliver extreme performance by developing and assessing key radio technology components for the next generation, through higher bands and localisation/sensing



# 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

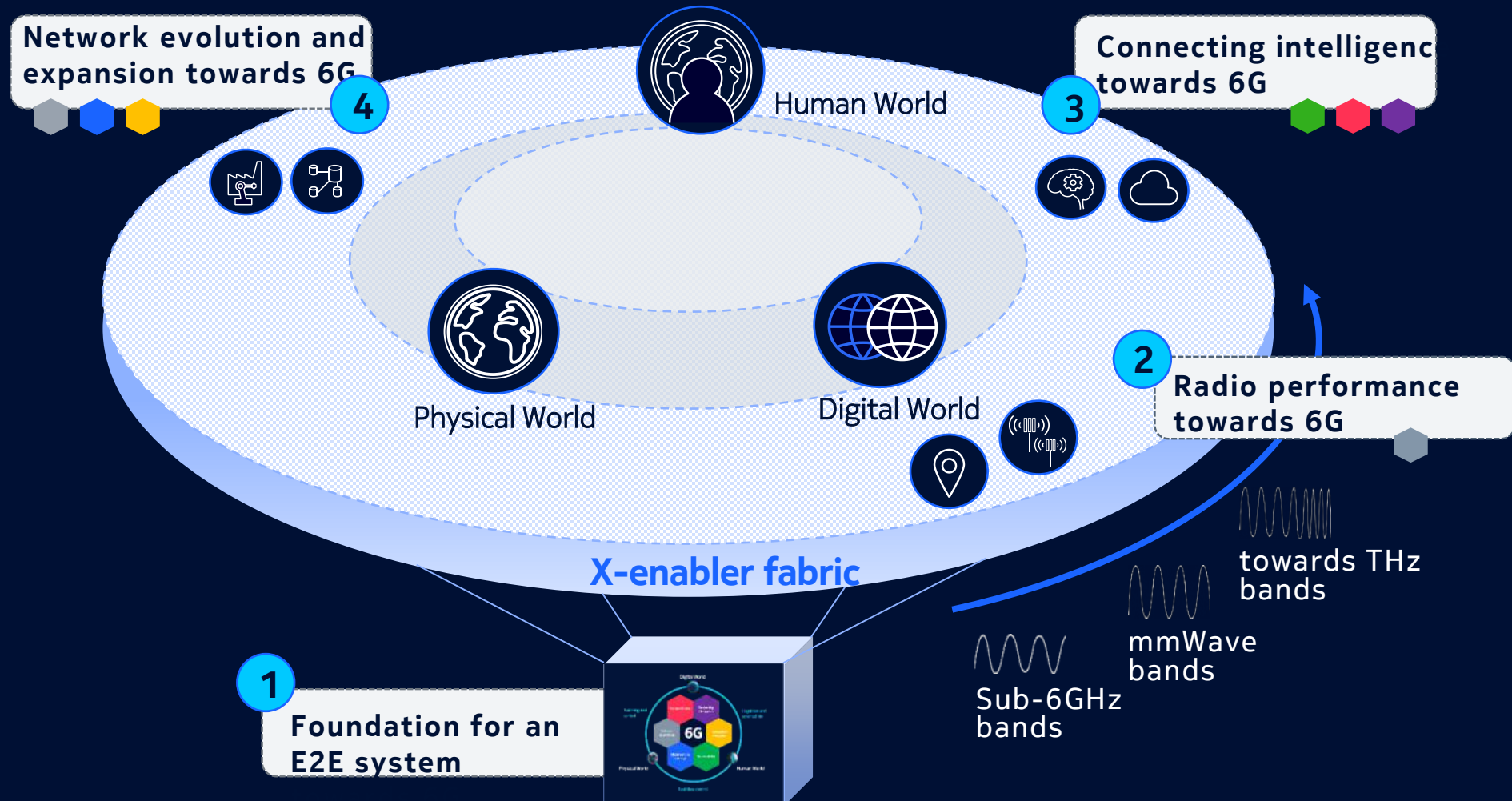




# Hexa-X objectives: Network evolution and expansion towards 6G

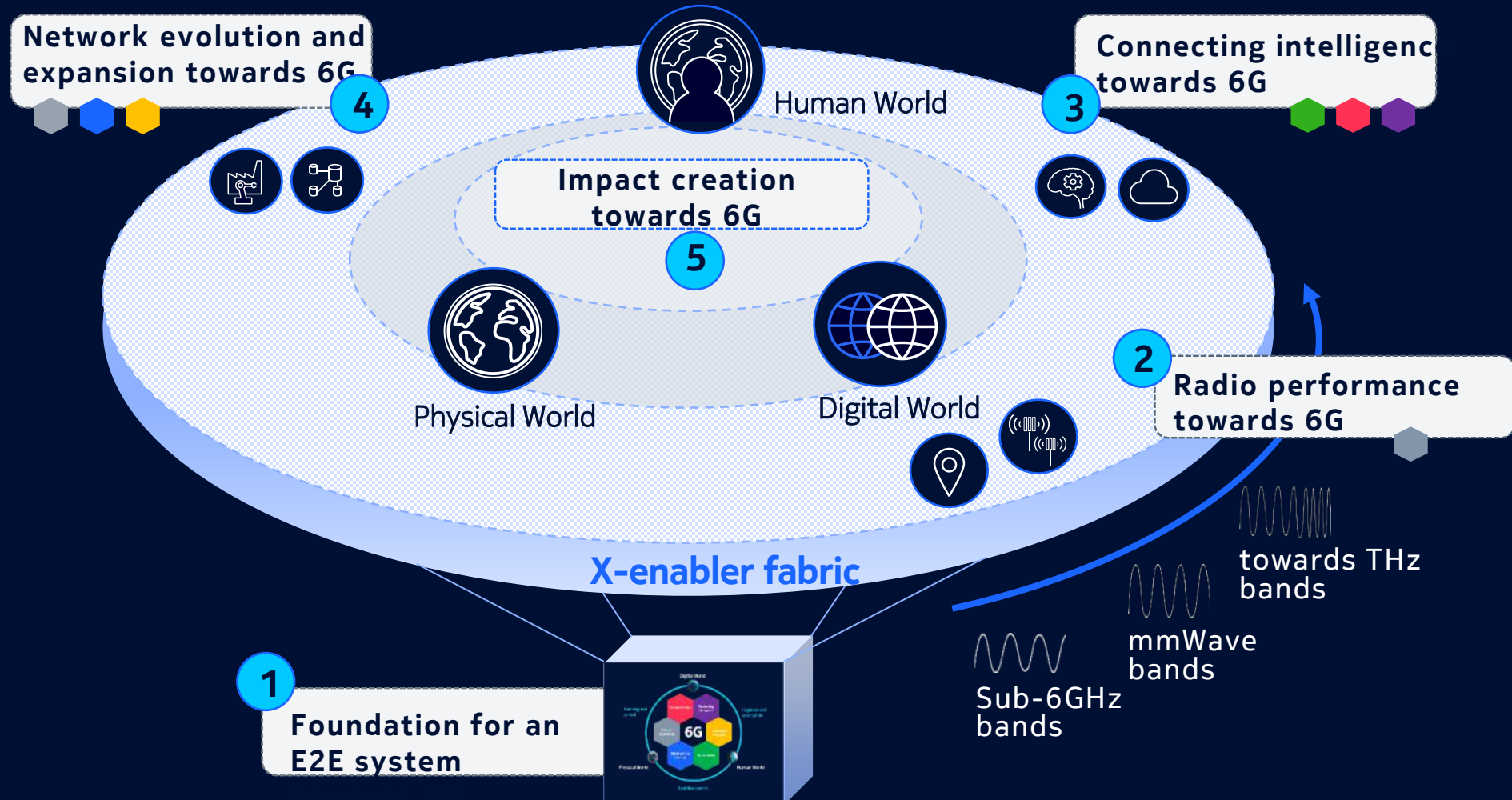


Deliver enablers for an intelligent network of networks, through network disaggregation and dynamic dependability



# Hexa-X objectives: Impact creation towards 6G

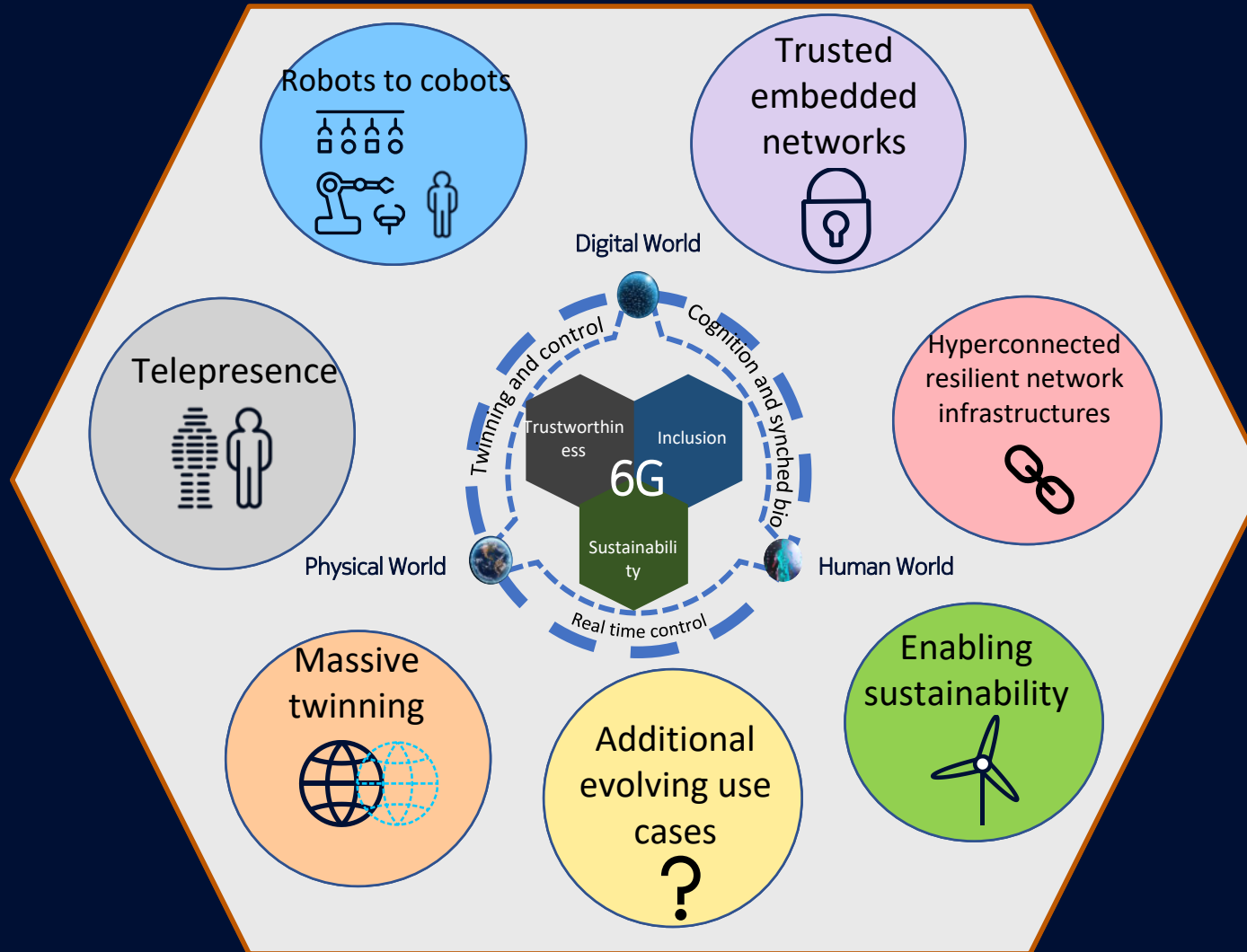
Drive a global open discussion on key B5G/6G topics through dissemination, leveraging of outcomes, contributions to standard development.



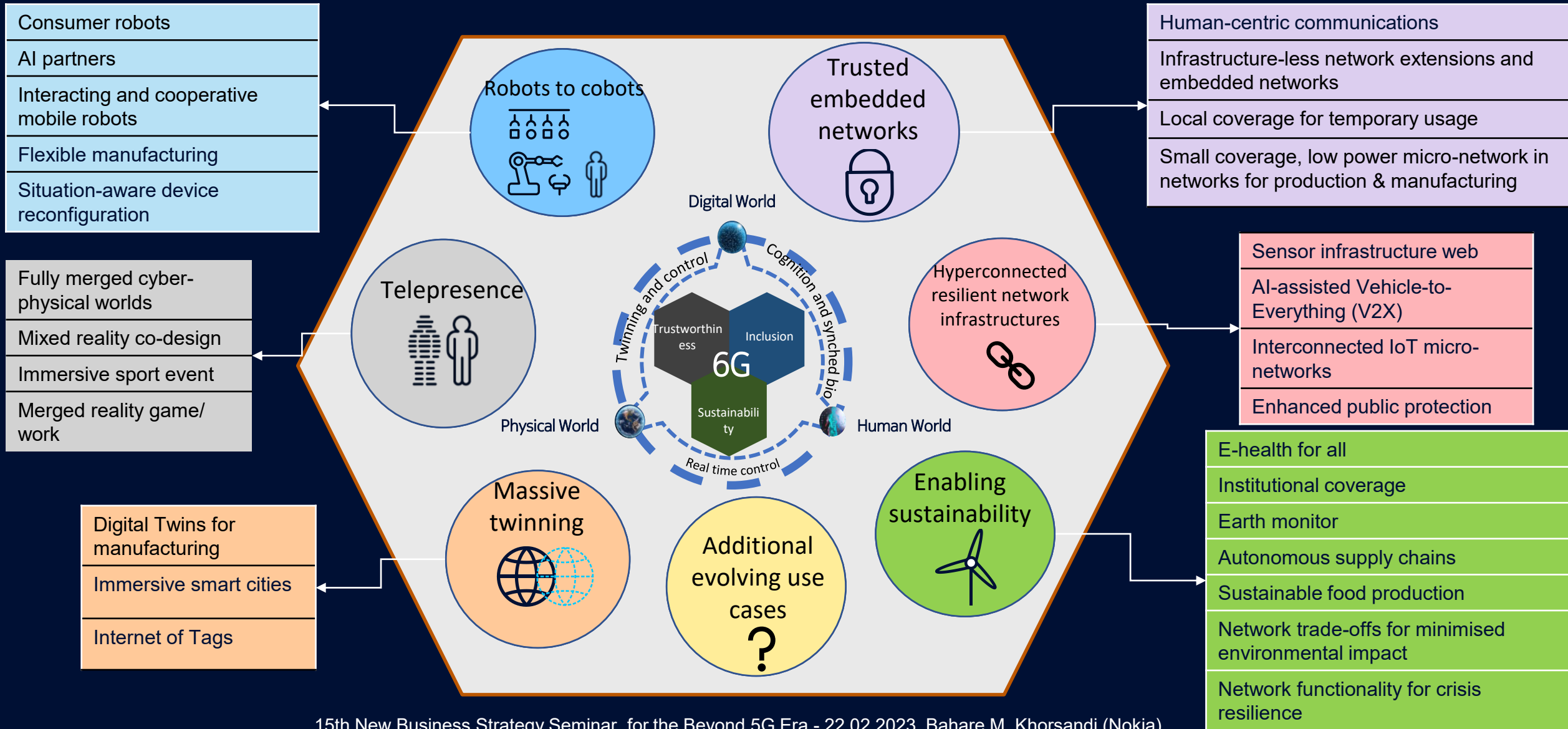
# UN Sustainable Development goals



# Services and Use cases



# Services and Use cases

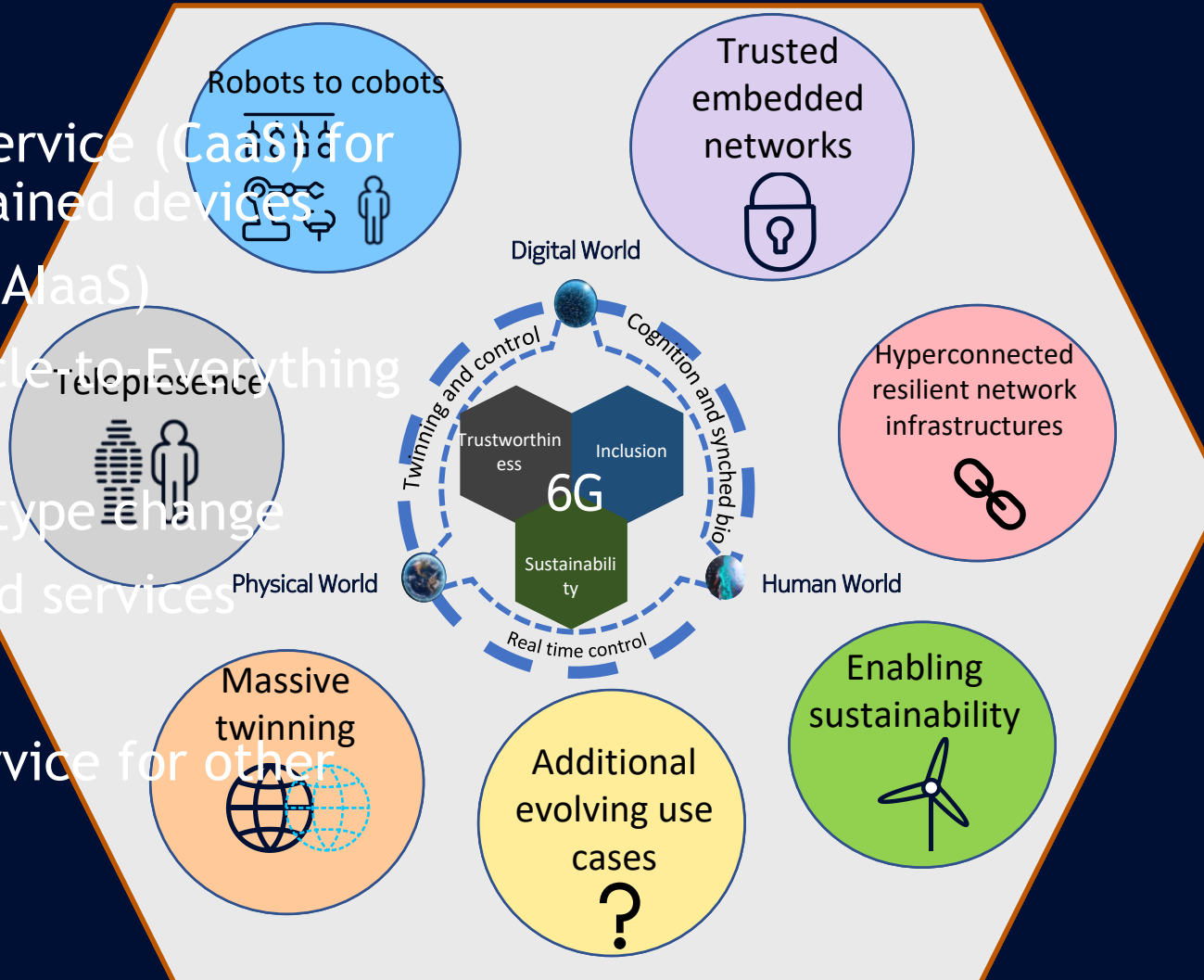




# Services and Use cases

## 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

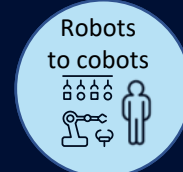


# Hexa-X Use Case Families Overview



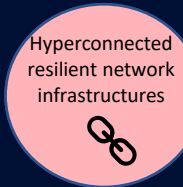
Telepresence

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



Robots  
to cobots

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



Hyperconnected  
resilient network  
infrastructures

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



Trusted  
embedded  
networks

Providing local/private communication capability



Enabling  
sustainability

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



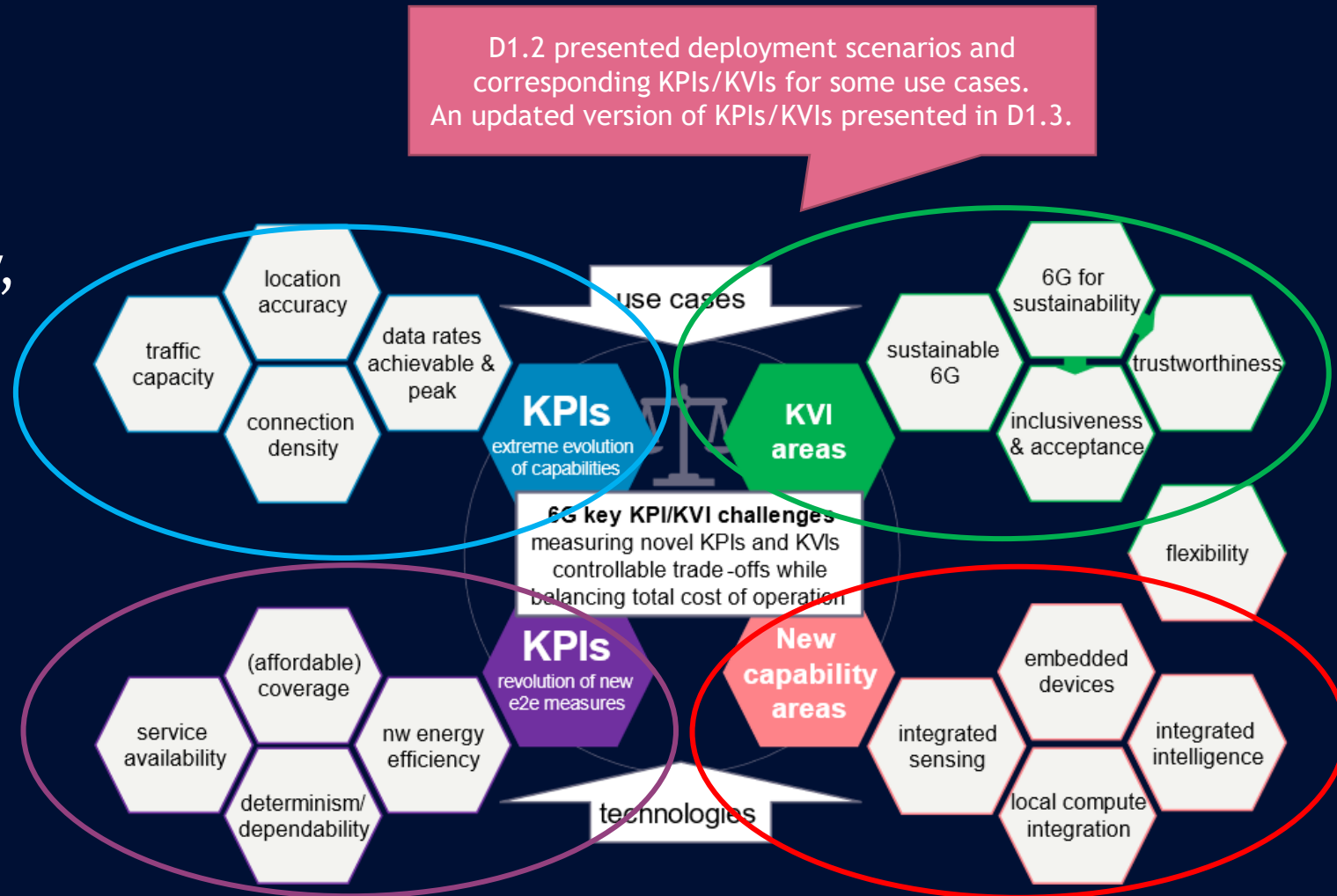
Massive  
twinning

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

# Key Value Indicators (KVs) 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:
  - KVs address UN SDGs
  - KPIs of new capabilities
  - KPIs focusing on E2E measurements
  - Traditional KPIs

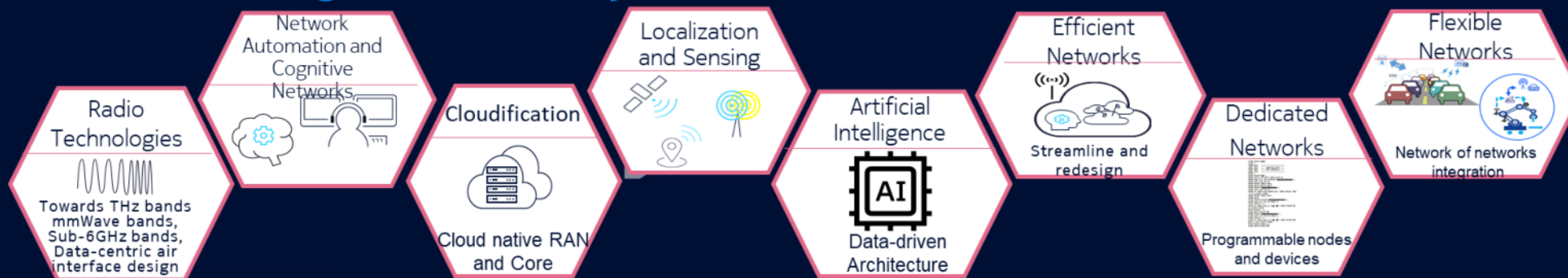


# Planned Standardization Activities

## • 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

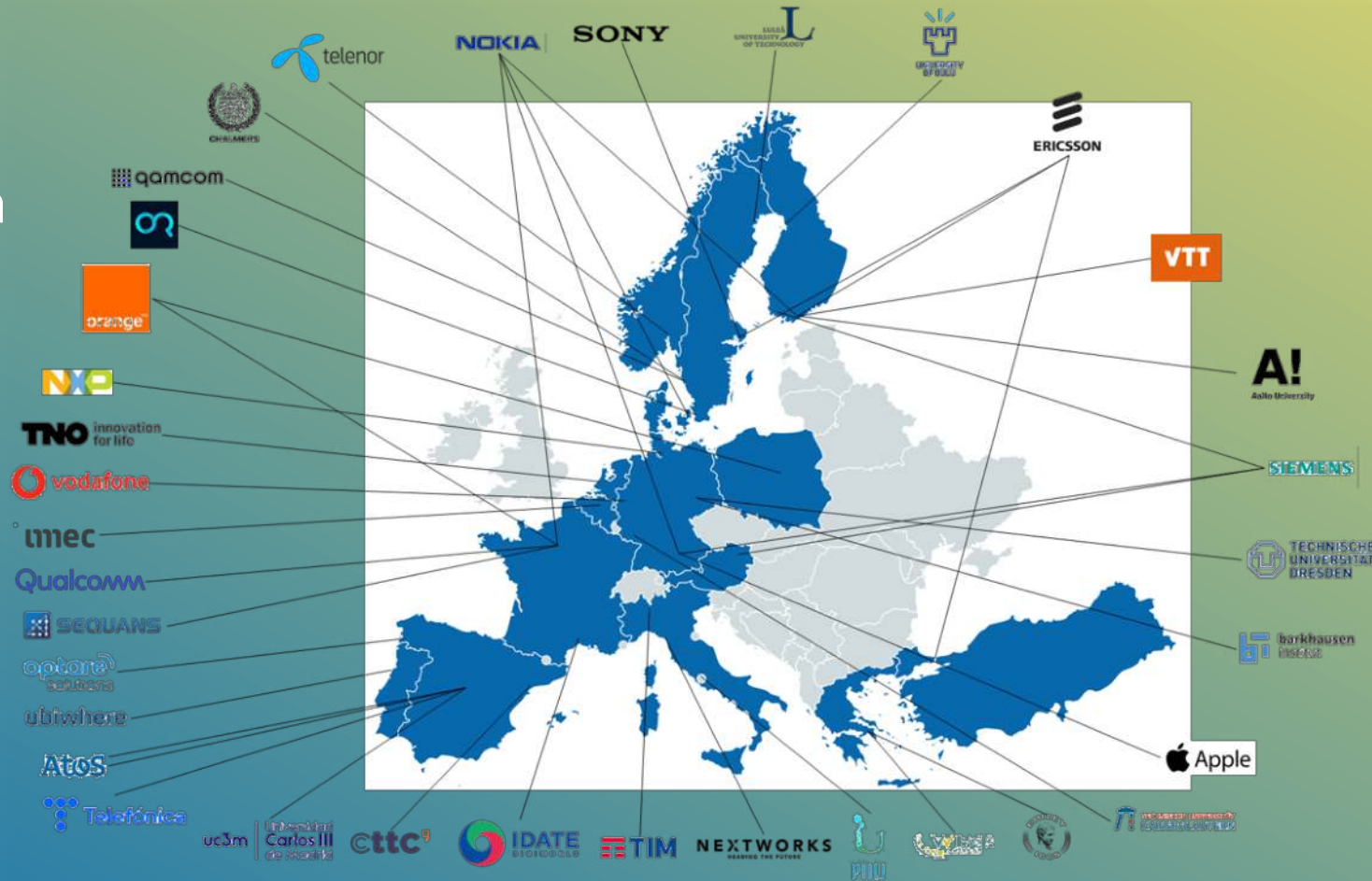
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# Hexa-X-II overview



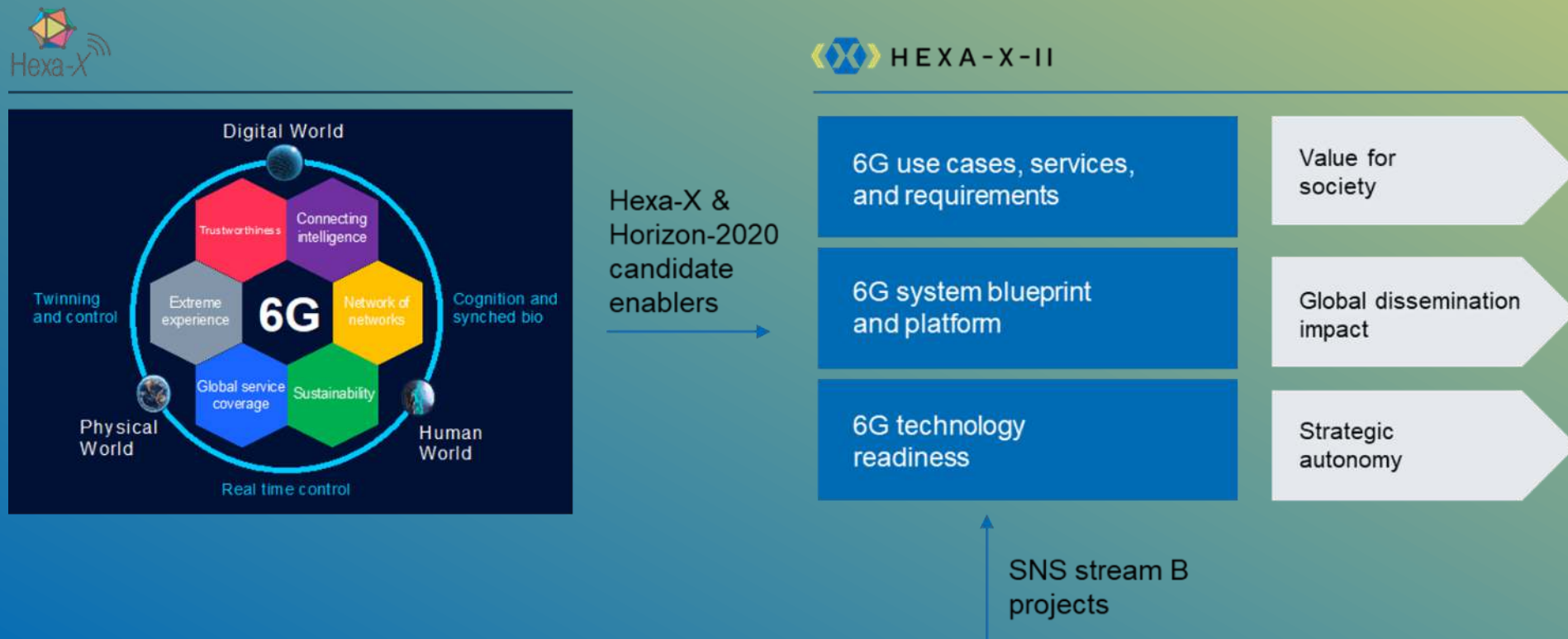
- Hexa-X-II is the next European level 6G Flagship
- Focus will be continued development of technology and define the 6G platform and system
- Funded through Horizon Europe SNS-JU
- 44 partners
  - Cover the entire value-stack from hardware to system to platform to applications to service providers and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



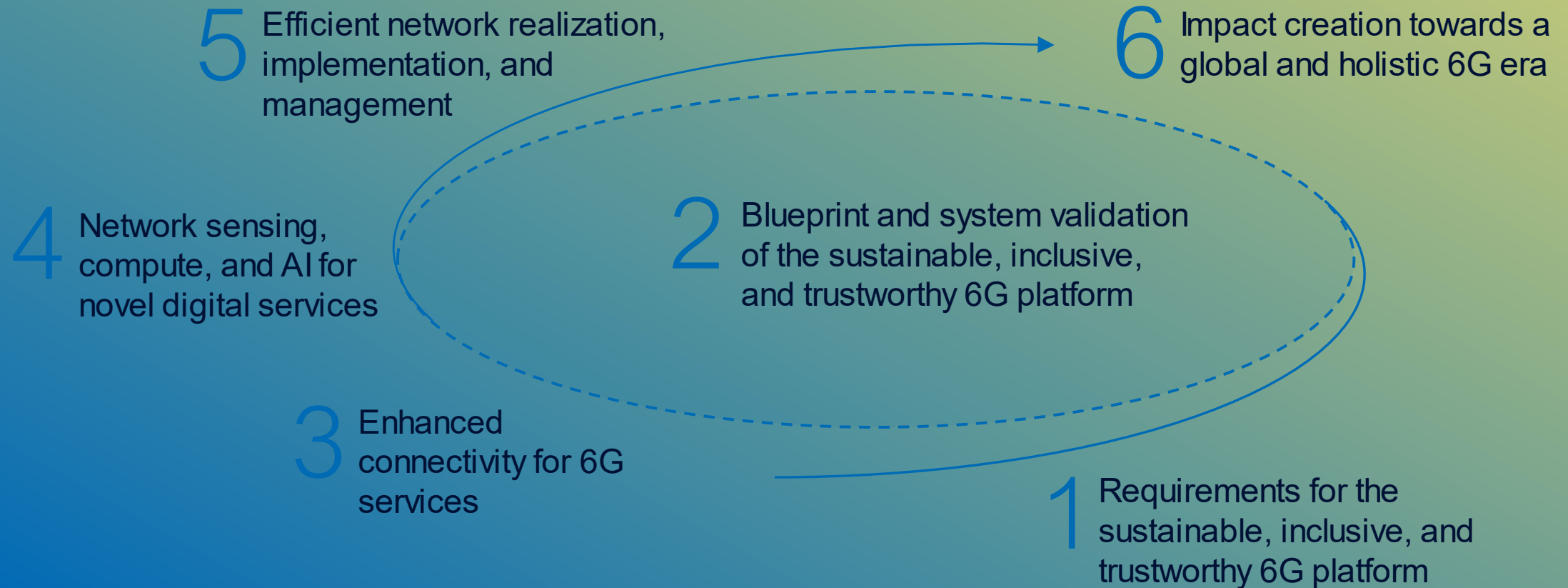
# Overall objectives of Hexa-X-II



- 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



# Objectives



# Thank you!

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HEXA-X.EU



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