

6G-ANNA



Sustainable and Secure Architecture & System Design

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EUCNC 6G Summit
The 6G series workshop by Hexa-X-II
June 3rd, 2024

6G-Access, Network of Networks, Automation & Simplification (6G-ANNA)



6G ANNA - Ambitions



- **Strengthen and push** German and European industry
- **Enable** dissemination by industry
- **Drive** global pre-standardization activities from a German and European perspective
- **Strengthen and push** German and European technology sovereignty
- **Support** interaction with other national and international activities



Consortium

7 industry partners
8 Small Medium Enterprises
3 research institutes*
16 universities*
3 associated industry partners
*(*incl. leads of all 6G research hubs)*

Selected 6G-ANNA use cases and their requirements



Mobile XR

- Offer high-quality digital experience
- Wide area coverage & capacity with low / bounded delay
- Functional offloading to cloud

Vehicular Mobility

- In-vehicle URLLC
- Inter-vehicle communication
- Functional offloading (e.g. compute) to cloud

Collaborating CPS

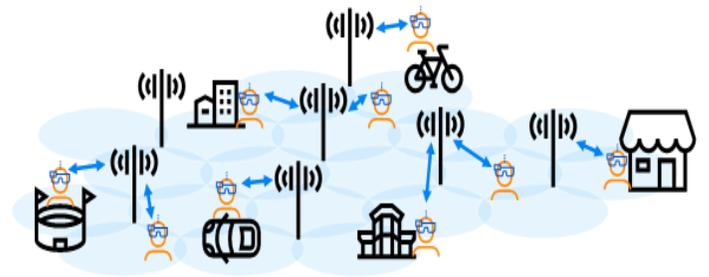
- Cyber-physical systems (CPS) with high functional density
- High degree of autonomy requires high reliability and low delay

Public safety

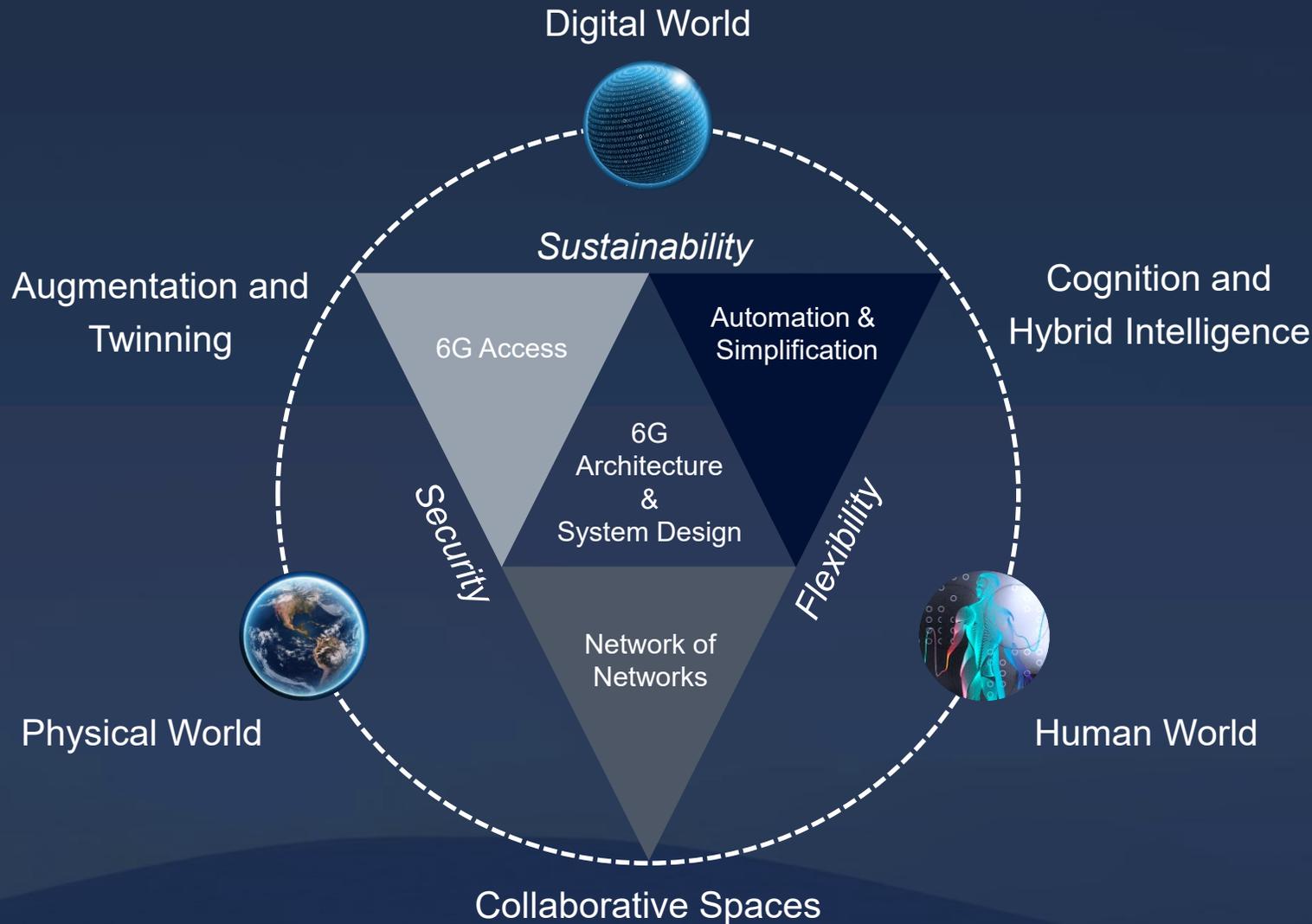
- Extreme KPIs required for Mission Critical Services
- Failsafe, autonomous operation needed in disaster / emergency

Network digital twins

- Virtual representation of network based on up-to-date data collected from various sources
- Synchronization at required level



6G-ANNA “storyline” and key design principles



Seamless integration of human, physical and digital work

Key design principles:

- Sustainable / energy efficient
- Flexible
- Secure & privacy-preserving
- Reduced complexity
- Programmable & API native
- AI-native

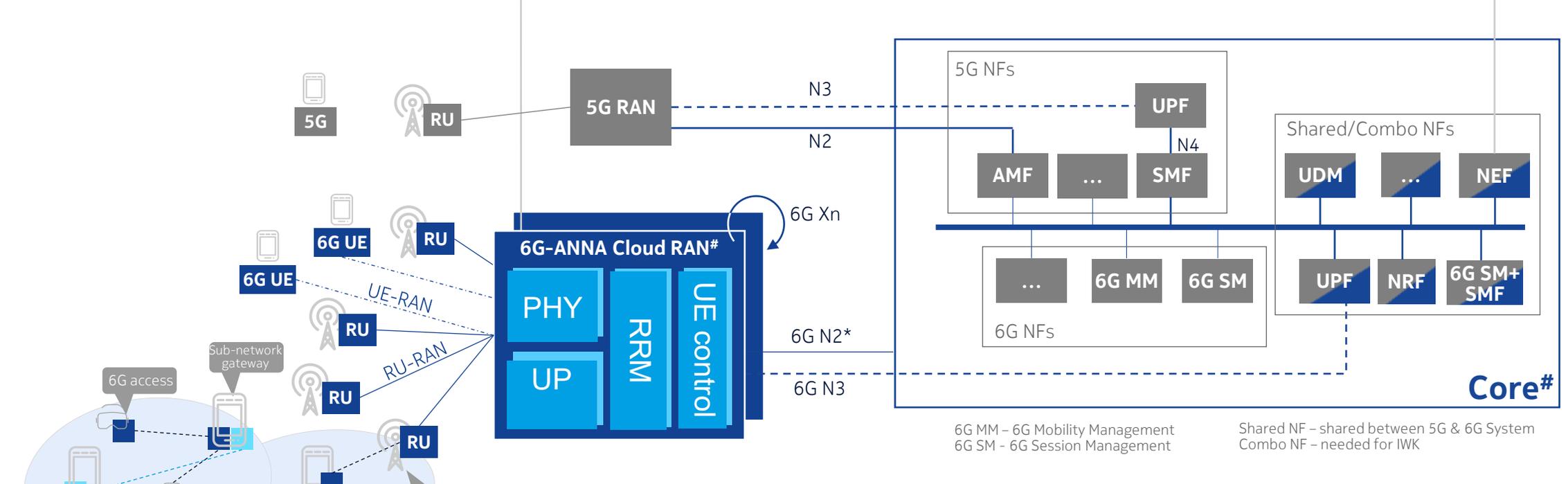
6G functional architecture

3GPP centric view



Value-adding network platform

Network APIs



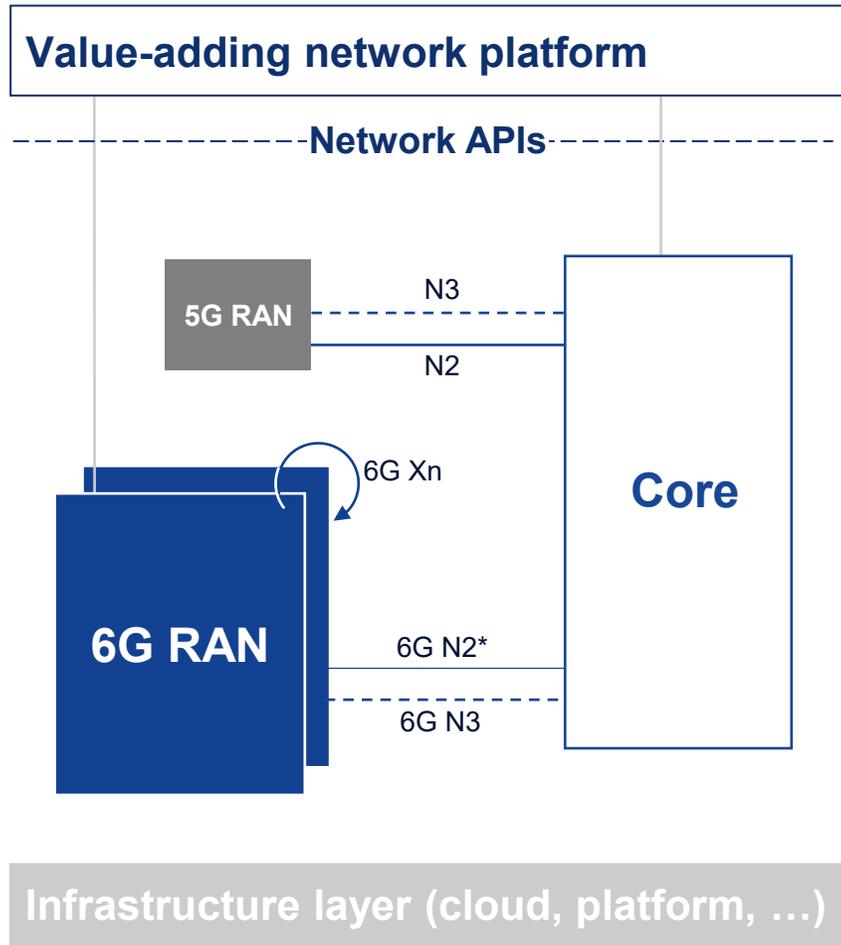
6G MM – 6G Mobility Management
 6G SM – 6G Session Management
 Shared NF – shared between 5G & 6G System
 Combo NF – needed for IWK

Infrastructure layer (cloud, platform, ...)

Notes: *) 6G N2 may be realized as Point-to-Point (like 5G N2), as SBI, or as a hybrid option. #) Figure illustrates an exemplary 6G architecture. Research is ongoing.

6G functional architecture

3GPP centric view



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Key recommendations

- Evolve 5G System
 - With critical enhancements for new 6G services
- Single stand-alone architecture
 - Avoid standardizing multiple deployment options
 - Support distributed RAN and cloud RAN
 - AI-native, cloud-native, API-native
- Focus on key standardized interfaces
 - Where multi-vendor choice outweighs the required complexity and effort
- Clear domain / layer separation
 - E.g. abstract any potential implementation options due to cloud/IT infrastructure
- Increased sustainability
 - Maximize energy efficiency at all layers
- Secure by design

Thank You!

6G-ANNA WP1 “Architecture” lead
6G Platform WG7 “Architecture” lead

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Links:

- 6G-ANNA project: <https://6g-anna.de/>
- 6G Platform Germany: <https://www.6g-platform.com/>
- M. Hoffmann *et al.*, "A Secure and Resilient 6G Architecture Vision of the German Flagship Project 6G-ANNA," in *IEEE Access*, vol. 11, pp. 102643-102660, 2023, doi: 10.1109/ACCESS.2023.3313505