MOVE AMERICA
MODELS • TECHNOLOGY • SUSTAINABILITY

ICT OULU

Next generation's wireless networks as enablers for connected machines

Jussi Leponiemi, Key Account Director, ICT, **BusinessOulu**

Personal profile & ICTOulu

Jussi Leponiemi

- Business Development focus, PhD in Management & Org. int business
- Develop the regional network of high- and deep-tech companies (tech focuses: Wireless networks & data transmission, AI, Edge AI, IMSE, Robotics, RFIC design, autonomous systems,…) and link it with global value chains
- Collaborate with the local and international R&D resources - Tackle the complex challenges with the best resources

ICTOulu

- BusinessOulu branch
- www.ictoulu.fi - Platform to collaborate with Oulu-based high-tech stakeholders
- Share information on locally initiated R&D-activities and connect with potential & motivated global partners
- RadioPark initiative
- Generate innovations to solve shared complex technological challenges and to enable win-win business development

6G Flagship - Oulu

6G FLAGSHIP UNIVERSITY OF OULU

More than wireless.

- Dedicated University of Oulu's research unit – No. 1 in the world
- 4 interconnected research areas - aim is scientific breakthroughs:
  - Wireless Connectivity
  - Devices and Circuit Technology
  - Distributed Intelligence
  - Human-centric Wireless Services
- Primary goals: finalizing 5G standard, develop tech components required for 6G systems, accelerate digitization of society through 5G and 6G

RadioPark initiative

- Plan: A service platform, top level facilities and an intellectual unit for industry willing to develop and test RF-related solutions
- Resources to build total solutions and offer productized services for customer needs
- The company is to be established in winter ‘23/’24 - Recruitment of investors and cluster members now

RadioPark – Service Areas

Effective and Efficient Testing Services for Devices

- Testing facility brokering
- Tester pool management
- Type approvals
- Simulation & remote solutions

Industry vertical integration and solution support

- Health, Industry, Automotive, Energy sectors needs
- Private networks
- O-RAN
- End-to-end solutions

Research and new tech partnering

- 5GA , 6G
- Training and coaching services
- EU and national level funding programs
- Trials and Demos

Product Creation support

- Technology partnering for end-to end solution providing
- International marketing

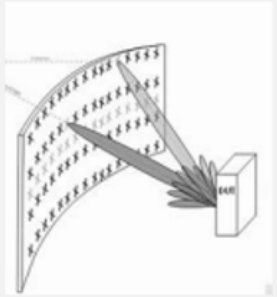
Secure and data critical solutions, data management, AI

Environment for each need

Our environments enables agile development of **components, solutions and systems.**

INDOOR OTA RF TESTING

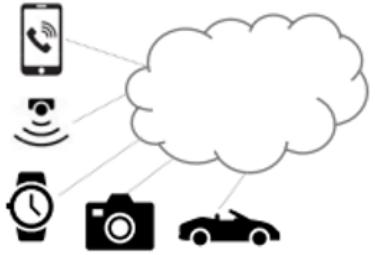
Components:
- RF parts
- Modems
- Antenna solutions



Focus:
- Technology

INTEGRATION (SW&HW)

Solutions:
- Devices
- Applications
- HW&SW



Focus:
- Usability, Energy efficiency
- Complex intelligent systems

OUTDOOR TEST AREA

Systems:
- Real life
- Real time
- Autonomous

Focus:
- Complex intelligent systems
- Field testing in real network

Simulation & Remote Usage (national & international)

Data Management, Security, AI

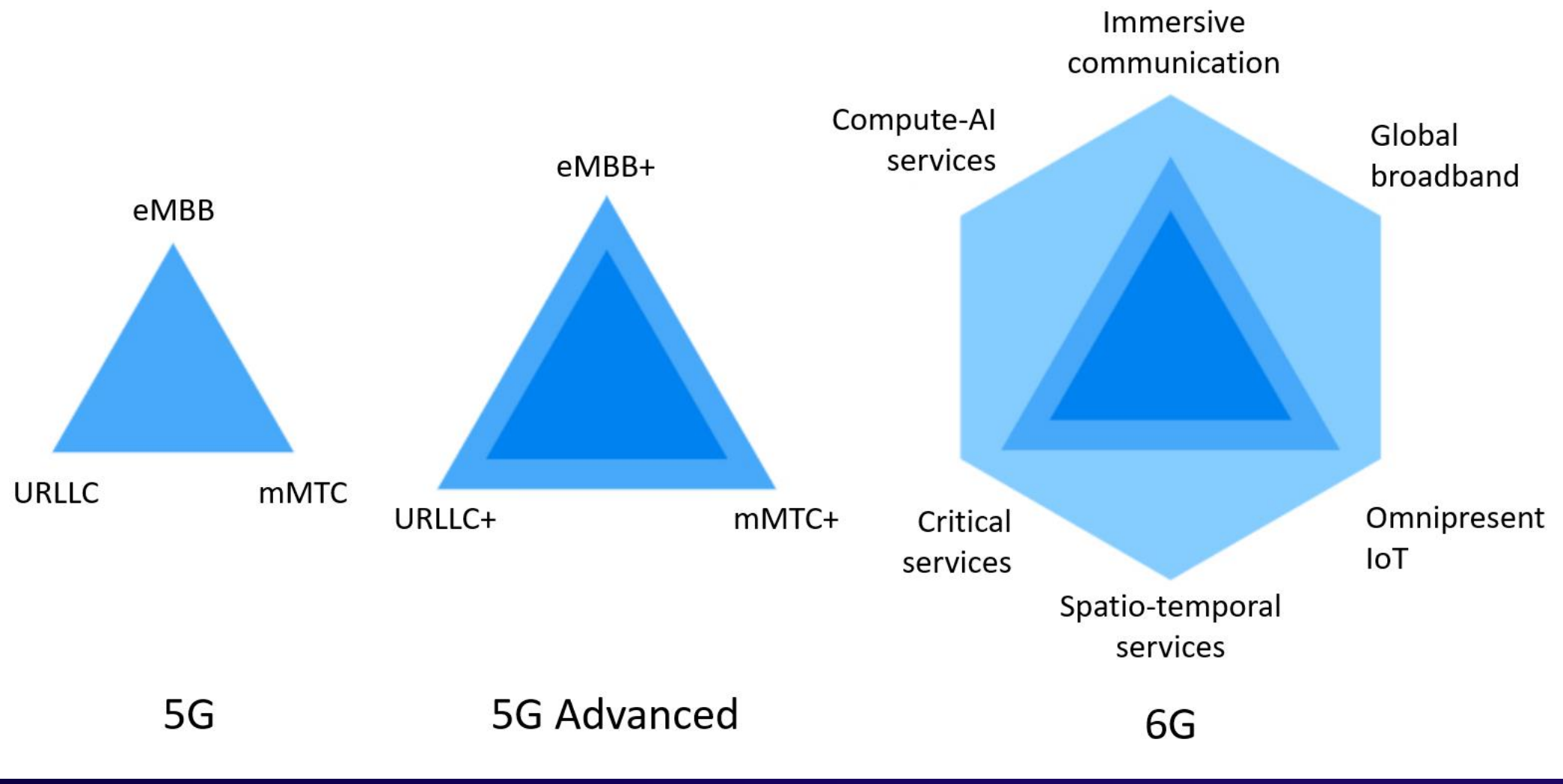
Towards 6G: a revolution

- Drivers from society will shape 6G → data ownership
- 6G – leaving the linear development curve, bring real-time AI enabled features into everything
- Merge communications & new applications (cognition, imaging, sensing)
- Automation and seamless processes (supply and production chain management 2.0)

Towards 6G: a revolution

- Sustainability is vital → novel linkage between 6G and UN SDGs: possibly mutually reinforcing forces
- Higher frequencies → new features & disruptive approaches to private networks - e.g. sensing tools in factories
- Use case: smartphones and certain industrial control devices replaced by AR (see-through lenses, etc.)
- Cyber security is vital

Towards 6G: a revolution



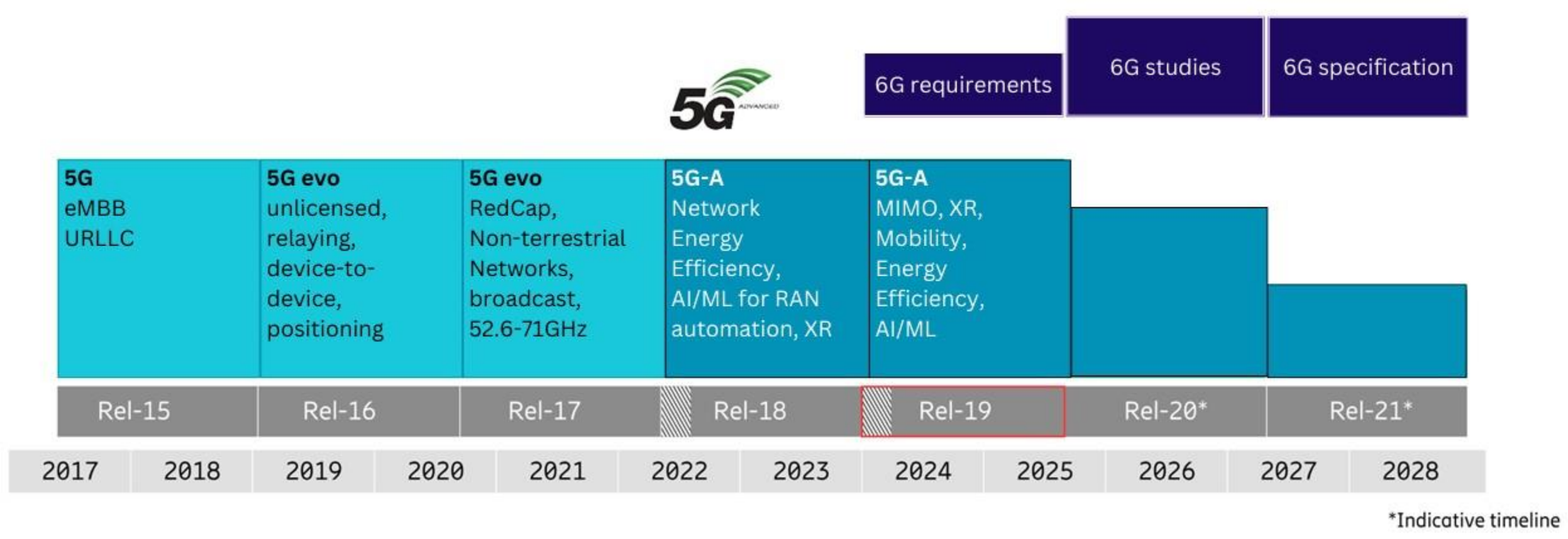
Towards 6G: a revolution

- Enables features not possible with 5G/B5G
- Extremely high-speed communications, merged with sensing, cognition and imaging
- Extremely accurate sensing: health, XR, auto-nav (drones)
- Revolutionizes the way are in interaction with our surroundings
- Integrated ML/AI: 6G systems will be truly intelligent and autonomous

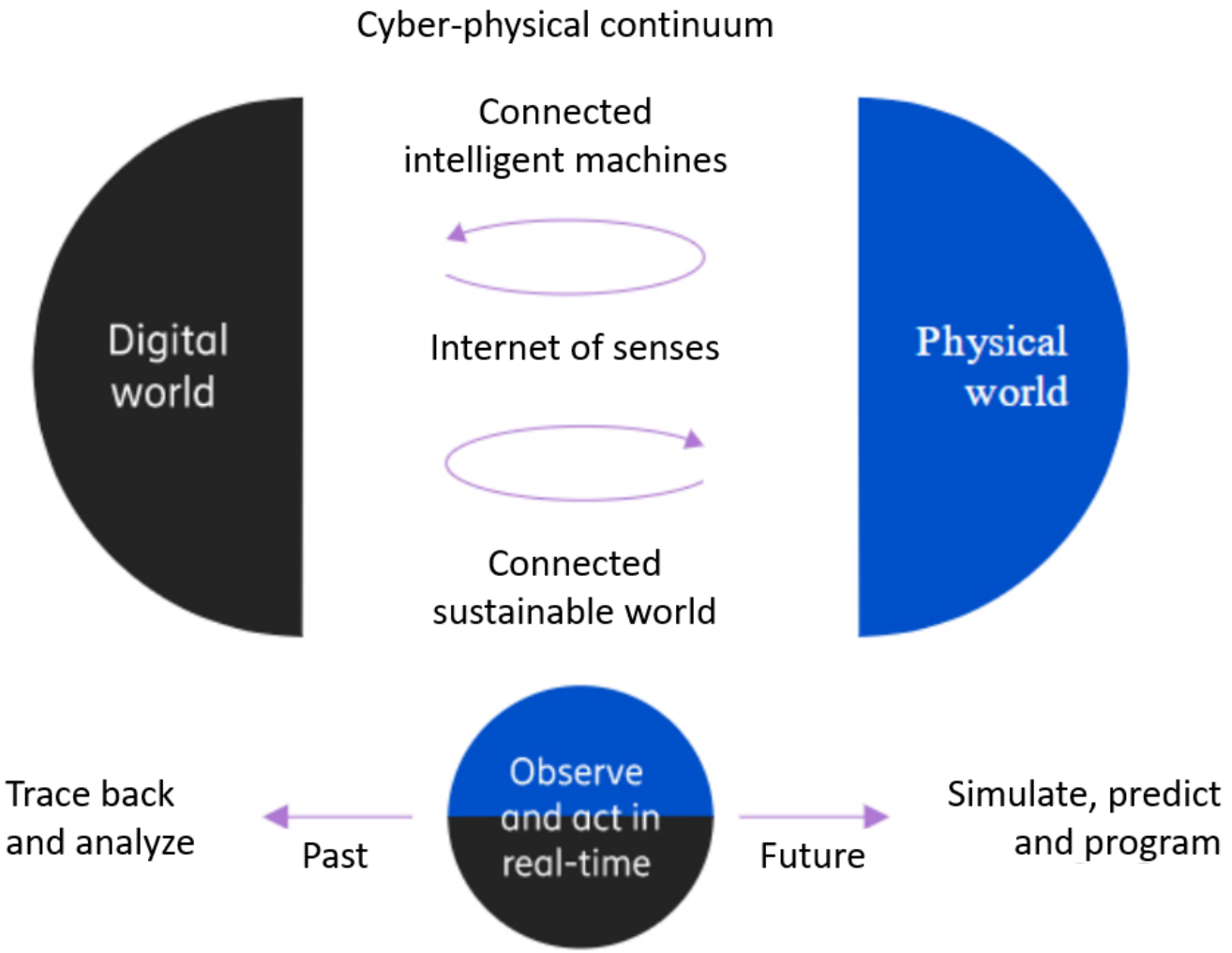
6G in numbers: the goals

- Capacity with peak data rates up to 1~Tbps
- AI managed networks
- Instant real-life unlimited wireless connectivity
- Sub-ms latency
- Sub-cm (~ 6/16”) positioning
- 100% coverage
- Broadband available up to 1000 km/h or 620 mph

5G and 6G development timeline



Connected machines



Connected machines

- Ultra-high performance: wider perspective, enables inconcievable possibilities
- Immersive AR communication, multisensory remote presence and holographic communication
- An online drill maintenance: a new part delivered before old one breaks, the whole system senses maintenance process autonomously

Connected autonomous machines

- Machines with autonomous operations capabilities that reflect the conditions holistically
- Interconnected individual machines deploy the network further, enabling applications for other processes' purposes
- Drones with real-time terrain intelligence & strategies, automated reactions enabling other machines

Connected autonomous machines

- 6G enables high-precision sensors, AI, low latency and high transfer rates
- Mining machines with immersive machine operator interface: underground- & surface communication
- Sensing networks will unchain the coordination from dedicated infrastructures

Call-to-action: industrial partners seeked for collaboration projects

- Many overseas projects needed to tackle the enormous technological challenges and to deliver business outcomes
- We are looking for industrial partners for various roles in the development and deployment of connected machins
- Developer companies – 6G Flagship – RadioPark
- Contact us – let’s develop a win-win project

ICT OULU

www.ictoulu.fi

Contact: jussi.leponiemi@businessoulu.com

OULU BUSINESSOULU