SMART NETWORKS AND SERVICES TASK FORCE INTRODUCTORY STATEMENTS

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PROPOSAL TOWARDS THE SPECIFIC PROGRAM

- The proposal is allocated to
  - Horizon Europe
    - cluster “Digital, Industry and Space”
    - area of Intervention “Next Generation Internet” as the center of gravity
    - with some links to other areas such as “Key Digital Technologies” and “Artificial Intelligence” in other Areas of Intervention
  - CEF – Connected Europe Facility, sub-program on 5G deployments at major European transport routes

VISION

- Combination of digitalization, artificial intelligence and ubiquitous communication will change the world we live in
- Support of grand challenges of
  - climate change
  - environmental and resource management
  - Mobility
  - aging population
  - increasing urbanization
  - digital inclusion and industrial competitiveness
- Communication networks and services including IoT are a key enabler by bringing together artificial intelligence, big data, high-performance computing and cybersecurity
- In a world, where everything will be networked seamlessly with nearly infinite bandwidth, we need a flexible, affordable and sustainable communication network that can adapt and evolve
- Smart Networks and Services will be grounded on the idea of ensuring a **human-centric** digitalisation that is directly aligned with the social and ethical values Europe is promoting: **openness, inclusion, security, trust, participation and privacy protection**

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS TOWARDS 2030

Source: United Nations: http://www.un.org/sustainabledevelopment/sustainable-development-goals/.

INDICATIVE TECHNOLOGICAL AREAS RELATED TO EACH SDG

→ Coverage, energy efficiency, delay for some cases (mainly mMTC)

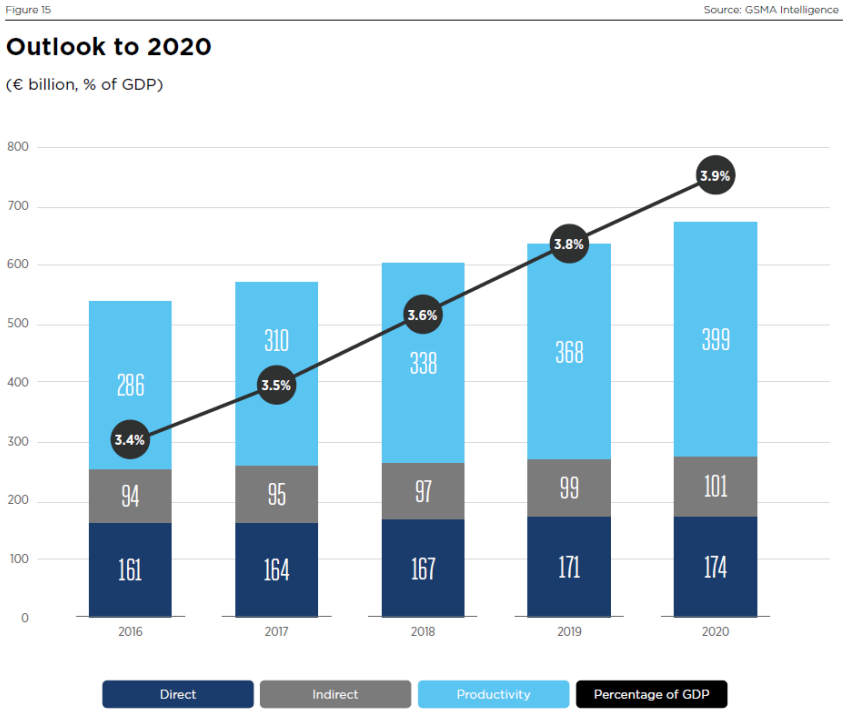
→ Coverage, Throughput, delay, reliability (mainly URLLC)

→ Coverage, Throughput, delay, reliability, energy efficiency (mainly mMTC and URLLC)

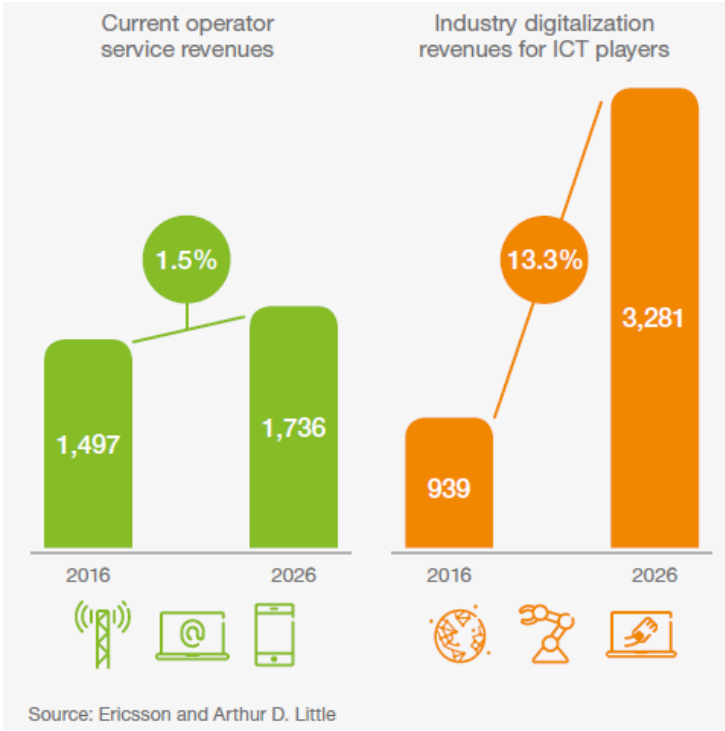
→ Capacity and throughput (mainly xMBB)

Security and Energy efficiency are present in all SDGs

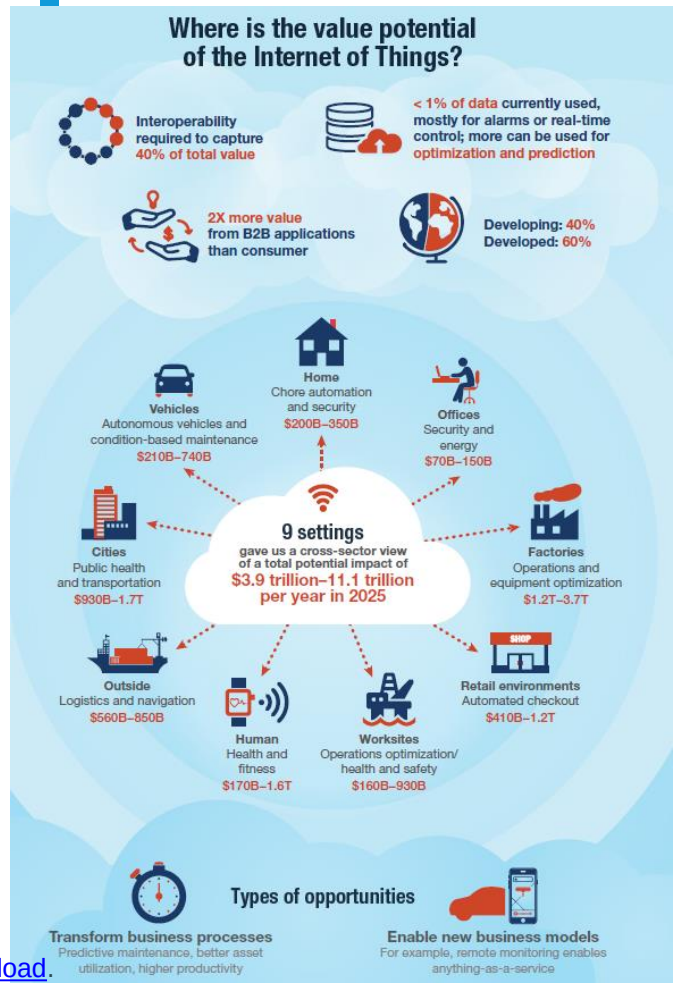
ICT MARKET SIZE
TERRESTRIAL MOBILE AND VERTICAL MARKETS



Total (direct, indirect and productivity) contribution to GDP (€ billion, % 2016 GDP)



Revenue forecast (CAGR 2016 – 2026, US-$ billion)



Where is the value potential of the Internet of Things?

Source: GSMA The Mobile economy report 2017, https://www.gsmaintelligence.com/research/?file=89a59299ac2f37508b252124726a1139&download.

Ericsson: The 5G Business Potential. 2017, https://www.ericsson.com/assets/local/news-and-events/events/2017/mwcs-2017/topic-3_ericsson_5g_business_potential.pdf.

McKinsey & Company: The Internet of Things: Mapping the value beyond the hype. McKinsey Global Institute, June 2015. https://www.mckinsey.de/files/unlocking_the_potential_of_the_internet_of_things_full_report.pdf.

SWOT ANALYSIS

Strengths

- Large footprint of 4G/5G coverage and penetration
- Investment grade regulation (EECC)
- Two out of three of major telecommunication communication systems vendors
- Wide manufacturing industry
- Vertical industry ready for adoption
- Privacy regulation (GDPR) now a worldwide benchmark
- High awareness of network security issues
- Strong research ecosystem in industry, R&D centres and universities
- Highly skilled personal in ICT (incl. wireless, network, AI, IoT, etc.) and many vertical sectors
- In some EU countries strong start-up scene
- Research programmes for cooperation among different stakeholders
- 3 world-wide satellite operators are based in Europe

Weaknesses

- Regulation not oriented to data economy (ePrivacy Directive still limits network operators in processing data) compared to US and Asia
- Fragmented European market and regulatory environment
- Lack of strong European Cloud providers
- Lack of highly reliable, secure, intelligent, flexible and open multi-service Internet
- Lack of a platform industry in Europe
- Weak European industry in the communication and computing micro- and nanoelectronics industry (components)
- No European mass market devices industry
- Weak European IT industry
- Access to venture capital more difficult than in other regions (e.g. the issue of scaling-up in Europe)
- Lack of investment in newest technology
- Slow and delayed deployment of newest technology compared to other regions
- Less skilled personnel in computer science and software technology
- Lack of investment friendly environment of digital single market

Opportunities

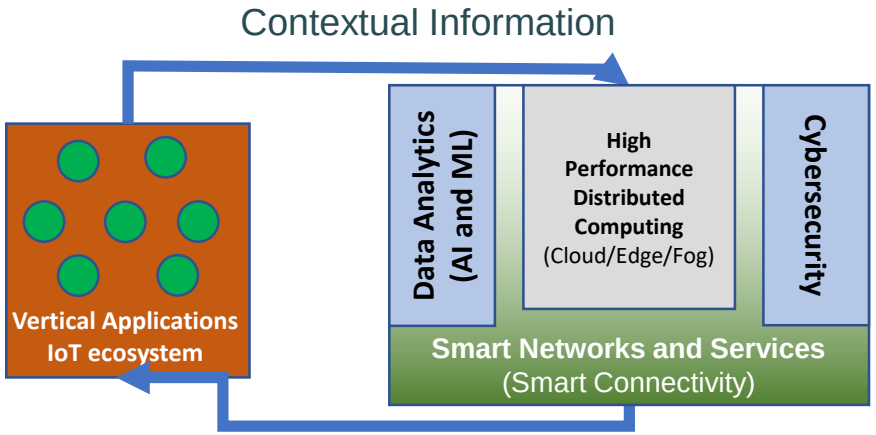
- Smart connectivity and network services supporting all types of applications, enabling innovation in advance application services
- Strong SNS driven enablement for digital transformation of industry/verticals and public sectors
- Create a data driven economy for automation of industry by distributed computing
- Push and strengthen the data driven economy in the EU with EU data (over 500 Million population under coverage), reap full benefit of AI/ML on EU data
- Boost data driven public policies (e.g. Data for Smart Mobility and SDGs), consolidate Verticals digital transformation
- Build-up a new micro- and nanoelectronics industry for communication and computing components
- Establishment of a devices industry for IoT and vertical sectors by supporting e.g. ECSEL and/or the proposed Key Digital Technologies Partnership
- Base new systems on European values and ethical principles to improve security and user-controlled privacy, which is becoming attractive also for other regions
- A strong European drive for advanced use of smart network and communication solutions for the mitigation of climate change and other societal challenges (e.g. aging population, urbanisation, etc.)
- EU will provide a coherent and comprehensive policy framework on digital autonomy that can deliver critical value to the Union's economic standing by ensuring an ethic and secured Smart Networks and Services environment including security in exploiting protected data and IPRs.
- Providing fog, edge and core cloud processing under European data security law and secure communication networks providing end-to-end security for applications
- 5G and beyond can prove to be a testing ground for EU industrial policy. There should be an initiative to further boost EU connectivity, accelerate the adoption and diffusion of digital technologies among Europe's traditional industries. The deployment of 5G would in particular gain from more coordination at EU level
- Investment friendly environment as an opportunity
- Full implementation of digital single market

Threats *

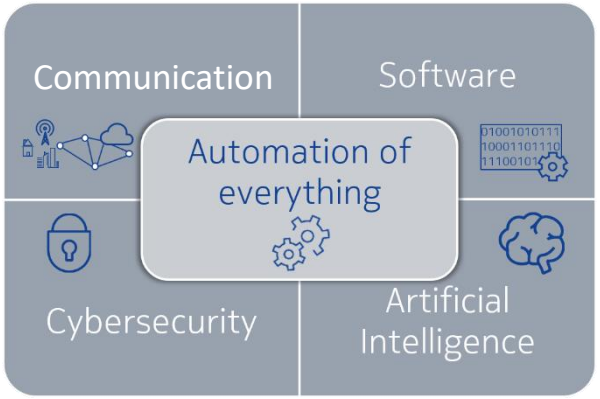
- EU unable to keep pace with US and Asia economies which will be largely AI driven in the next decade (now largely data driven)
- Benefits of EU data leveraged outside EU by non-European players. Verticals and SMEs may lose competitiveness
- Single stakeholder platform industry from outside of Europe dominate markets and business models
- Access to latest micro- and nano-electronics components to EU players, may be in danger in future due to changing political environment
- Not enough personal available with skills in computer science, AI, machine learning and software technology
- The industrial value chains increasingly rely on digital infrastructure that are susceptible to be hacked or sabotaged. The EU's high reliance on foreign imports and technology can expose it to supply chain disruptions penetrating its critical infrastructure.
- Foreign direct investment is a means for foreign players to have access to sensitive European technologies and business secrets or gaining influence over critical infrastructure. The rollout of 5G is a stark example where neither foreign investment screening nor procurement rules apply, as the network components are purchased by private operators. Yet, the impact in terms of cybersecurity and susceptibility to espionage can be considerable.
- Foreign companies (largely) controlling European data networks (because of equipment and/or operation).

(*) Cf. "EU Industrial Policy after Siemens-Alstom. Finding a new balance between openness and protection". European Political Strategy Centre. https://ec.europa.eu/epsc/publications/other-publications/eu-industrial-policy-after-siemens-alstom_en

TECHNOLOGY VISION



Secure communication, Smart and efficient connectivity,
Data analytics (AI/ML) as a service



Key building block of Smart Networks

- Key requirements on Smart Networks and Services
  - Automised network operation allowing self-operating networks
  - Service deployment time reduced by a factor of 10 compared to similar tasks in 2020
  - Full integration of technical operations and business operations
  - Slice creation on the fly with negligible time across the combined cloud, edge and fog infostructure
  - Terabits per second will provide seemingly infinite network capacity and multi-core MEC servers will provide required computing power for future digital applications and services
  - Application to application response time in sub-millisecond range (latency)
  - Networks and services have to be trusted, secure and dependable
  - Personalised and perpetual protection and privacy
  - Trillions of things and systems connected in scalable and cost-efficient way
  - High efficiency in energy and natural resources usage to limit impact on climate change and sustain Earth resources
  - Combination of global reach, ubiquitous availability and optimised local service delivery
  - Spectrum efficiency above 256 bps/Hz
  - Means for geographical and social inclusion to allow basic Internet access at minimum cost
  - Infrastructure solutions for efficient deployment capital expenditures (very low-population density areas)
  - Autonomous networks and systems based on Artificial Intelligence and Machine Learning mechanisms combined with cyber physical security
  - EMF-aware networks

EXTENDED SCOPE

- IoT elements, which are relevant for Smart Networks and Services especially devices for vertical applications
- Clouds for Smart Service provision
- Opportunities for components and devices

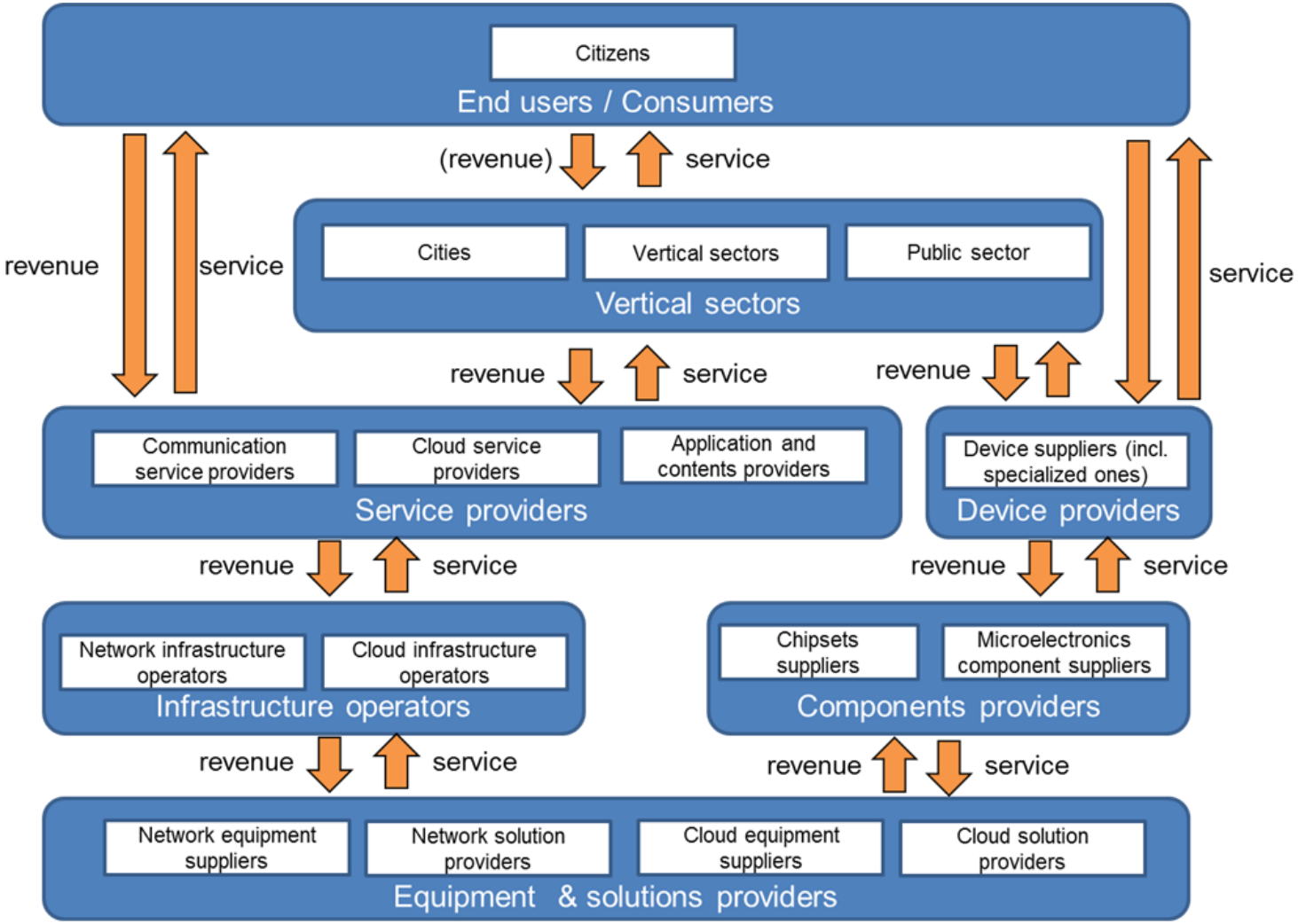
- Cooperation between 5G Infrastructure Association and AIOTI on IoT topics
  - Paper on common areas of interest published on October 1, 2019

Adobe Acrobat Document

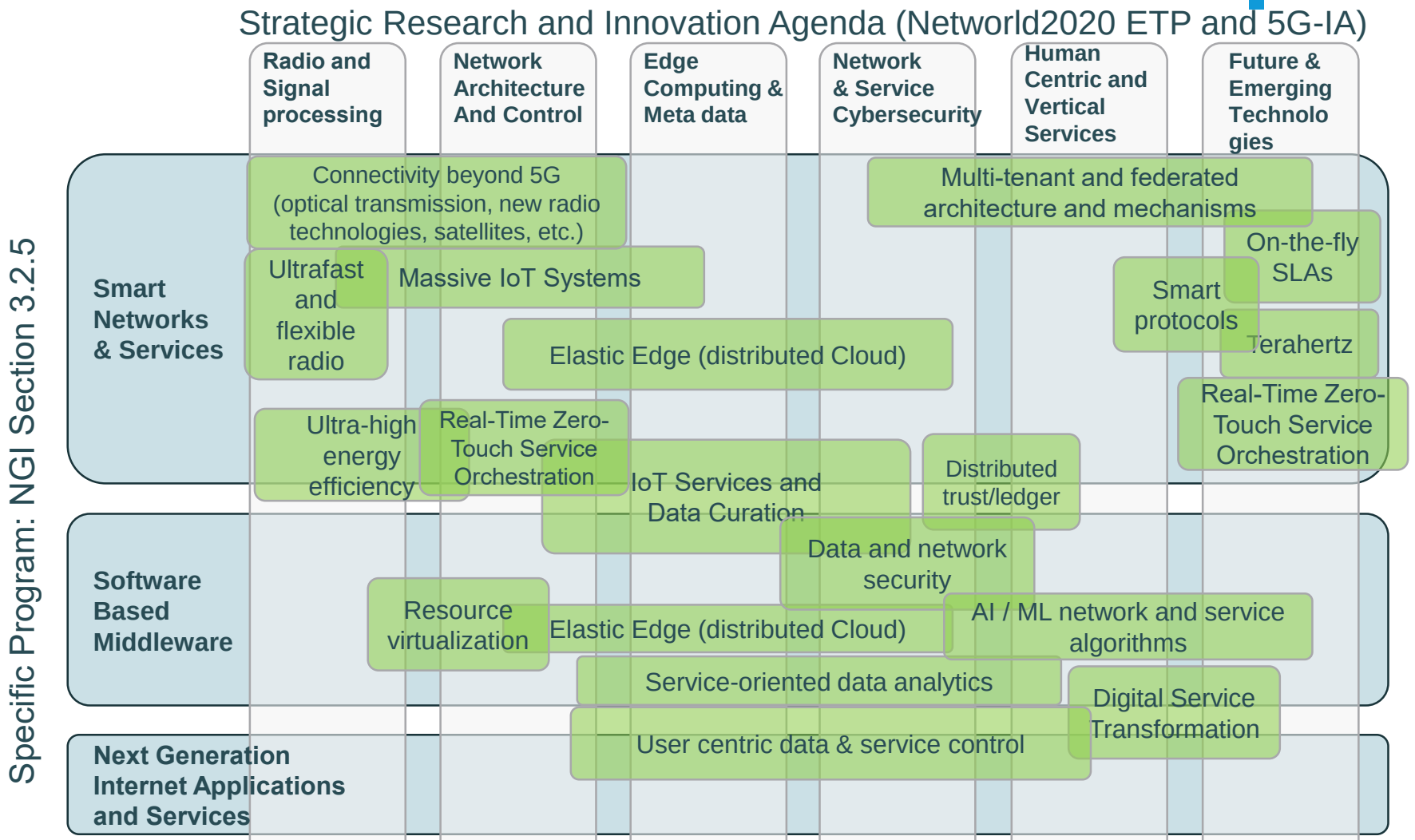
- Cooperation between 5G Infrastructure Association and BDVA / AI on Artificial Intelligence topics

- Overall objective: To improve digital autonomy of Europe by providing an additional European offer

VALUE-CHAIN APPROACH AND INVOLVED STAKEHOLDERS

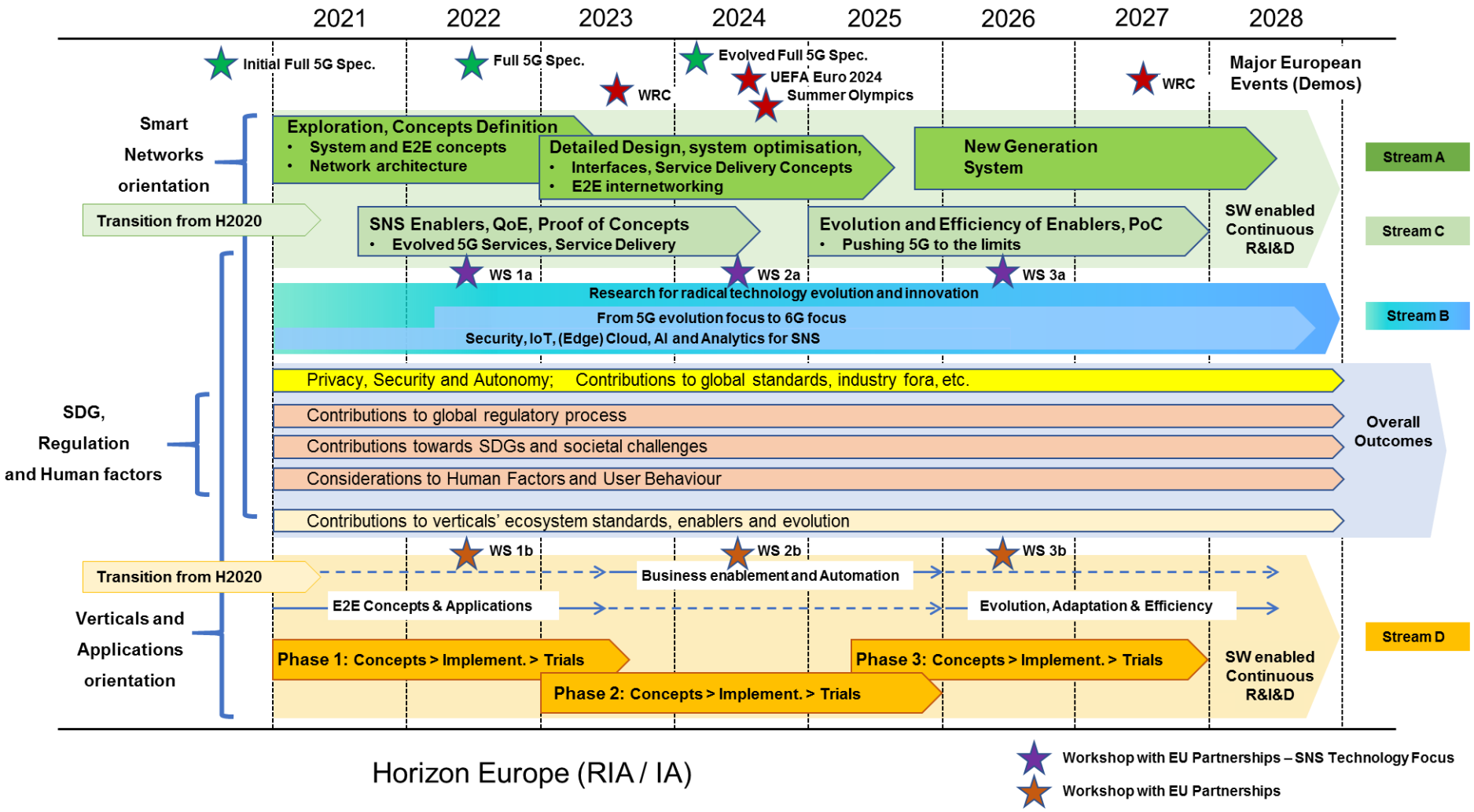


SMART NETWORKS TECHNOLOGY SCOPE DIAGRAM

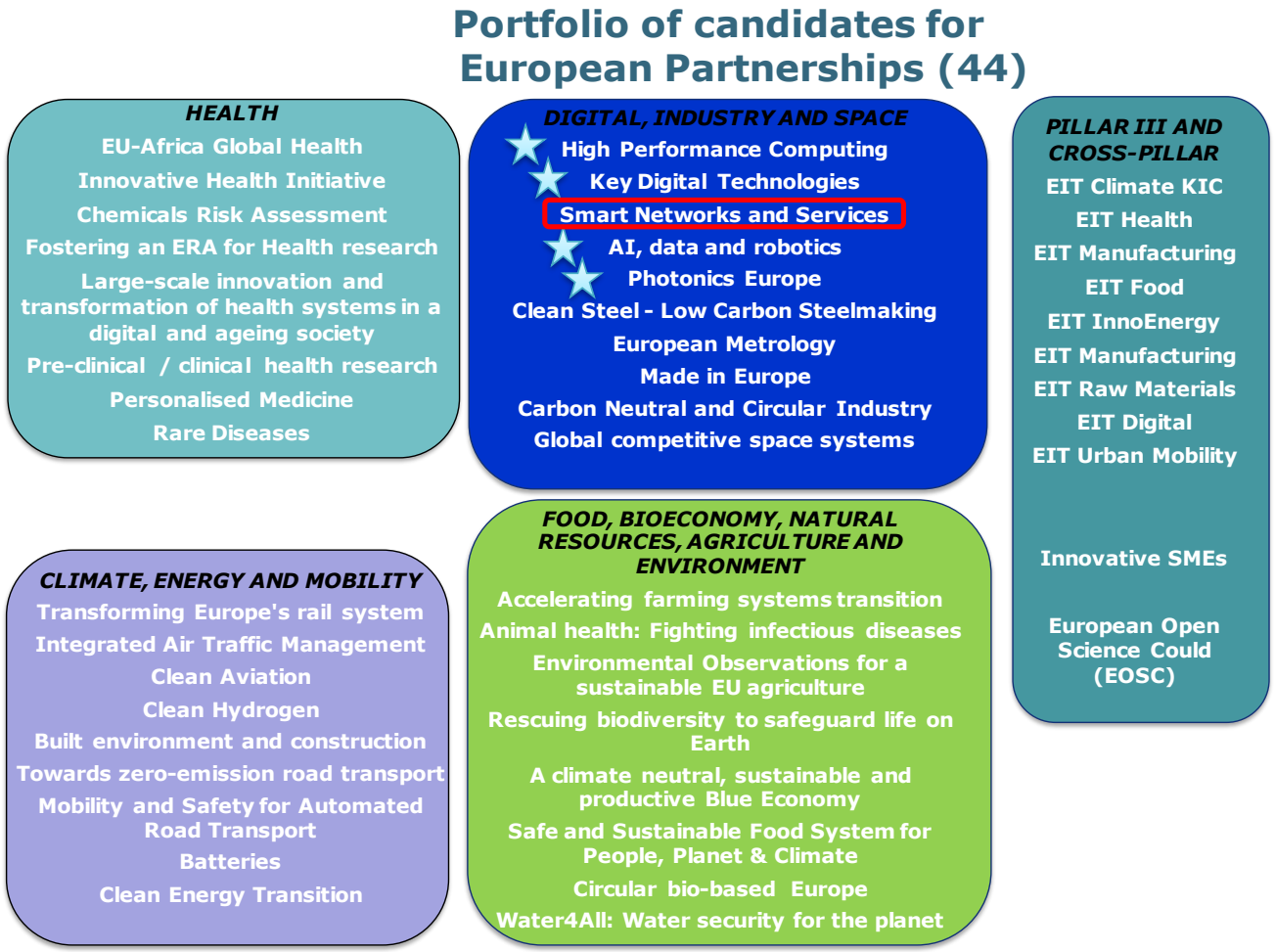


Source: Networld2020 ETP: Strategic Research and Innovation Agenda. 2018, https://www.networld2020.eu/wp-content/uploads/2018/11/networld2020-5gia-sria-version-2.0.pdf.

ROADMAP
MAIN ACTIVITY STREAMS AND PHASES



HORIZON EUROPE TARGETED PARTNERSHIPS AND POTENTIAL RELATED PARTNERSHIPS



Source: EU Commission.

VALUE CHAIN OF HORIZON EUROPE AND CEF (AS WELL AS DIGITAL EUROPE PROGRAMME)