



**NETWORLD
EUROPE**

6G – 5G EVOLUTION

Rui L. Aguiar

Steering Board Chair

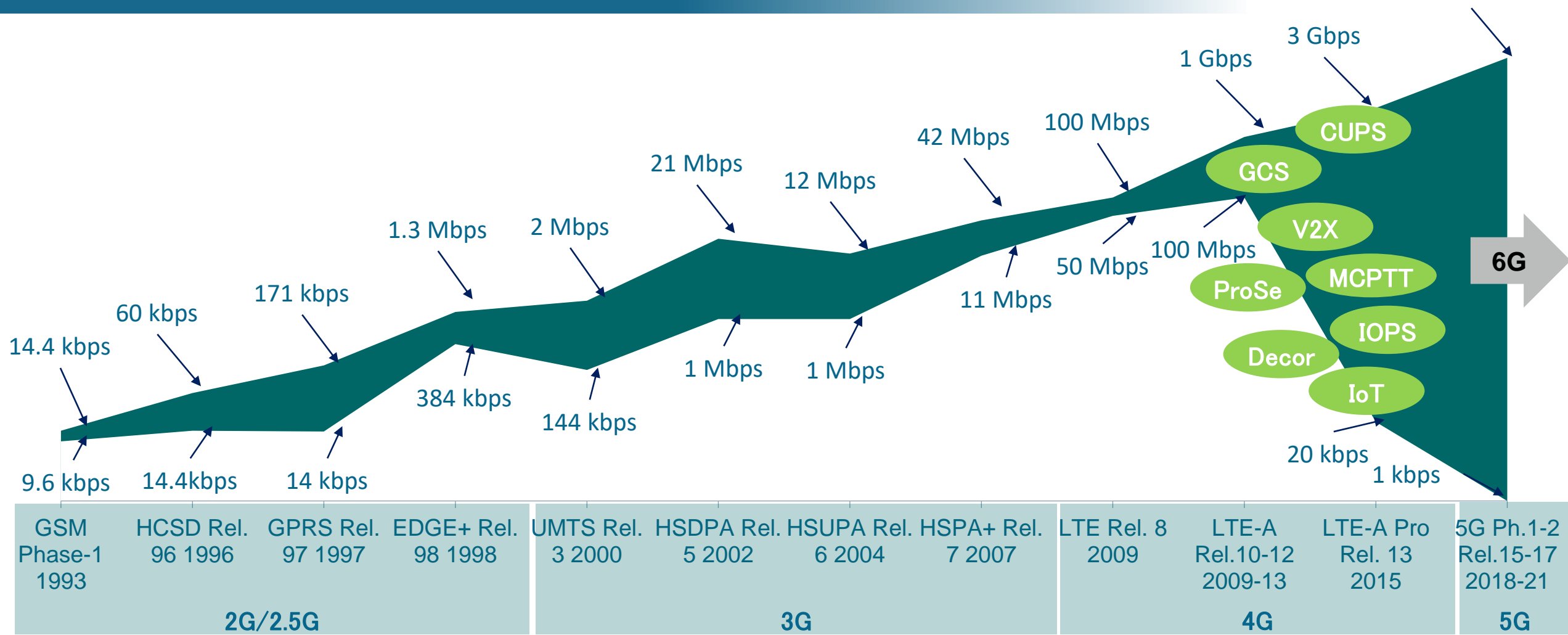
* Strategic Research and Innovation Agenda

- There is no “6G” at this moment
- There are several visions of “6G”, that are being pursued worldwide
- There is a large set of (funding) initiatives currently ongoing in Europe which aim to steer 6G research into the foreground of academia and industry
- This covers not only the EC programmes, but many national programmes as well

It is a good time to consider **security in advanced ICT technologies!**



EVOLUTION FROM 2G TO 5G



CUPS: Control & User Plane Separation

Decor: Dedicated core network

V2X: Vehicle to everything

GCS: Group Comm. Service

IOPS: Isolated E-UTRAN for Public Safety

IoT: Internet Of Things

MCPTT: Mission Critical Push to Talk for LTE

ProSe: Proximity based Services

THE XG DISCUSSION IS WRONG.

The rational for xG discussions is not really technical

Generations enable novel markets
 Generations give a target, (scope, time & capabilities)
 Generations ~ 10 years

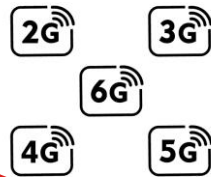
Generations frame innovation

Generations enable R&D Funding

Generations key to cellphone sales

MOTIVATION

MOBILE GENERATIONS



3GPP works in Releases (not Generations)

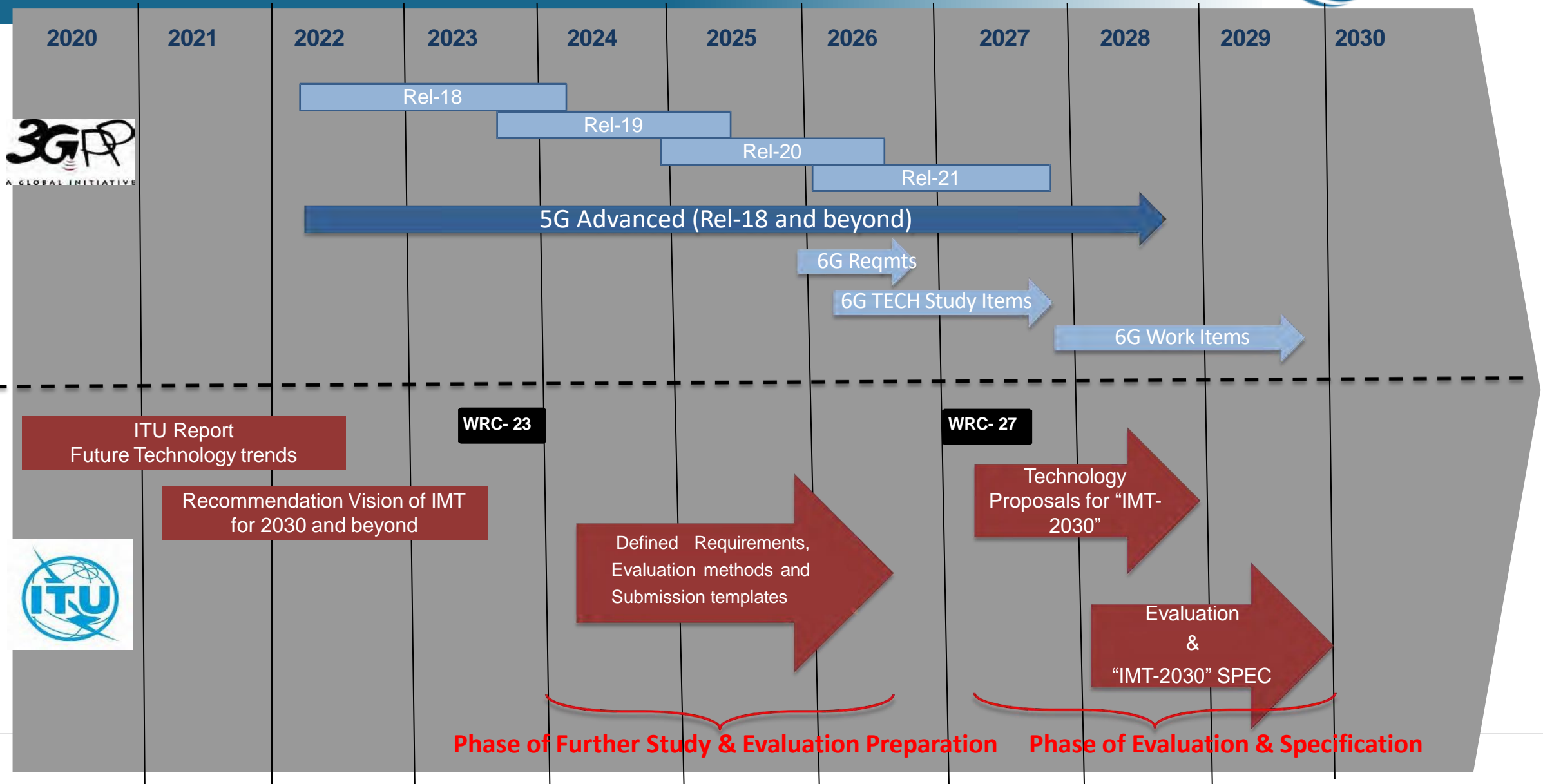
3GPP Releases = 18 months

TECHNICAL VIEW

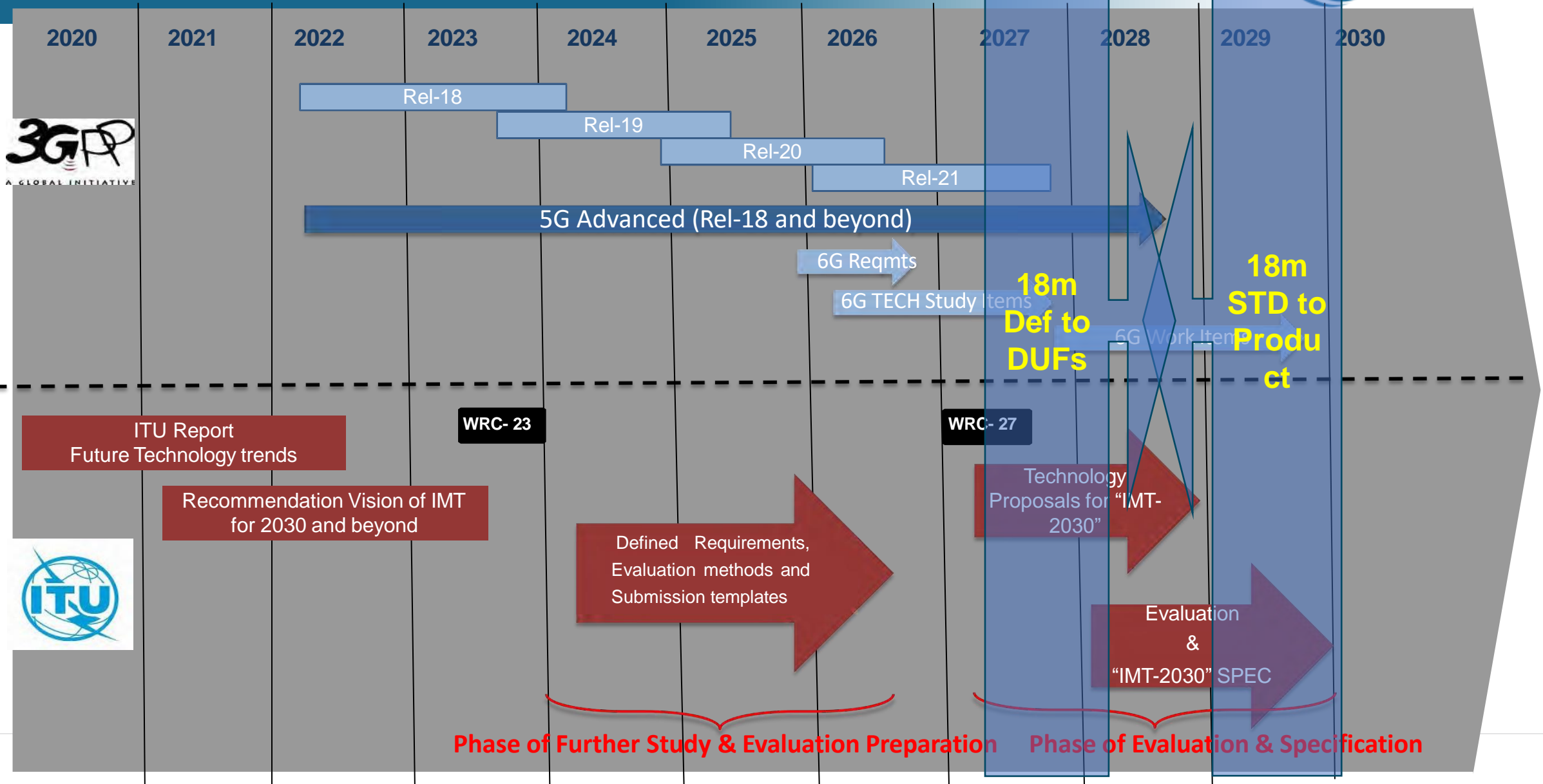


We increasingly talk about "mid-points", 4.5G, 5.5G

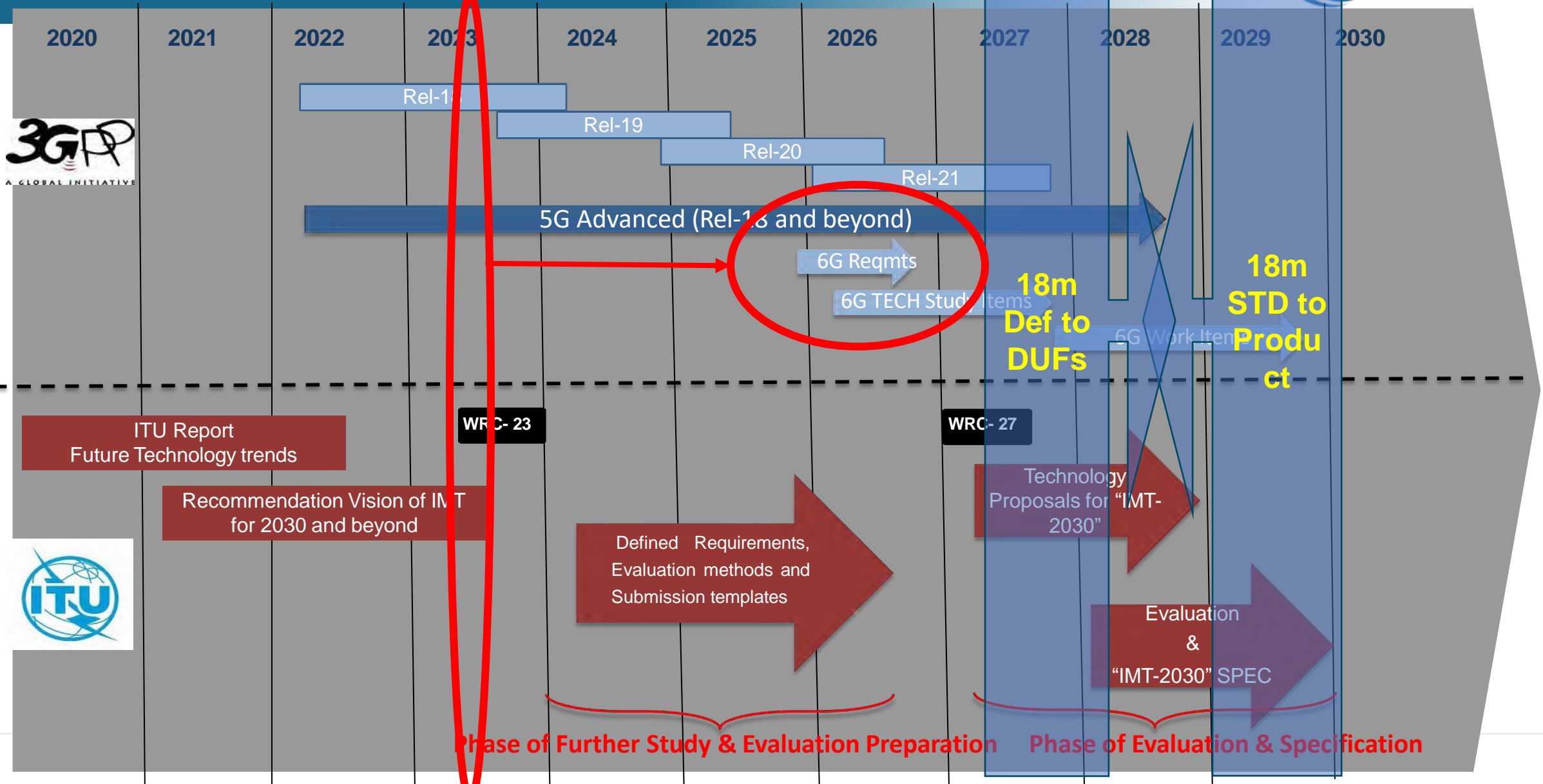
STANDARDIZATION PLANS



STANDARDIZATION PLANS



STANDARDIZATION PLANS (EXPECT CHANGES...)



PEOPLE TODAY TALKING ABOUT 6G AS A REALITY

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030



18m
TD to
produ
ct

ITU Report
Future Technology trends

Recommendation Vis
for 2030 and be



EC

& Specification

WHY ARE WE
HAVING THIS 6G
DISCUSSION?

- Telecom technology has a long design cycle
 - You do not do a Ctrl-Alt-Del to a base station or a core network to solve problems
- Investment costs cross the whole value chain, leading to a long design cycle
 - New mobile infrastructure is large (~1000M€ for a country)
- Understanding the most **stable and resilient solution** is not the same than running the P.O.C. in the lab (or in the demonstrator...)
- Mobile systems are increasingly a strategic aspect on countries/economies development
- Pressures on the Unesco SDG impose cross-technology pressures hard to handle



INITIATIVES ACROSS EUROPE UNION



Country	Major Lines	Funding
Germany	3 main lines: research hubs (4), 6G platform, 6G industry projects	~700M€, @2022
Finland	Long-term research: wireless, devices, computing, services	250M€ @2025
Netherlands	Topics identified: economic growth, dutch innovation, knowledge building.	315M€
Spain	(part only) Direct subvention to existing EU 5G, developing Spanish ecosystem with EU seeds	92+3M€ public (only direct)
France	4 main lines: 5G+ use cases, 5G sovereignty, R&D, education	480M€ public, @2022 up to 735M€ public, @2025
Austria	main lines: 2 programmes (ICT/production of the future), excellent centers, and research	~500M€
SNS JU	4 main lines: B5G, 6G, experimental platforms, vertical engagement	900M€ public, (@2027) 900M€ private

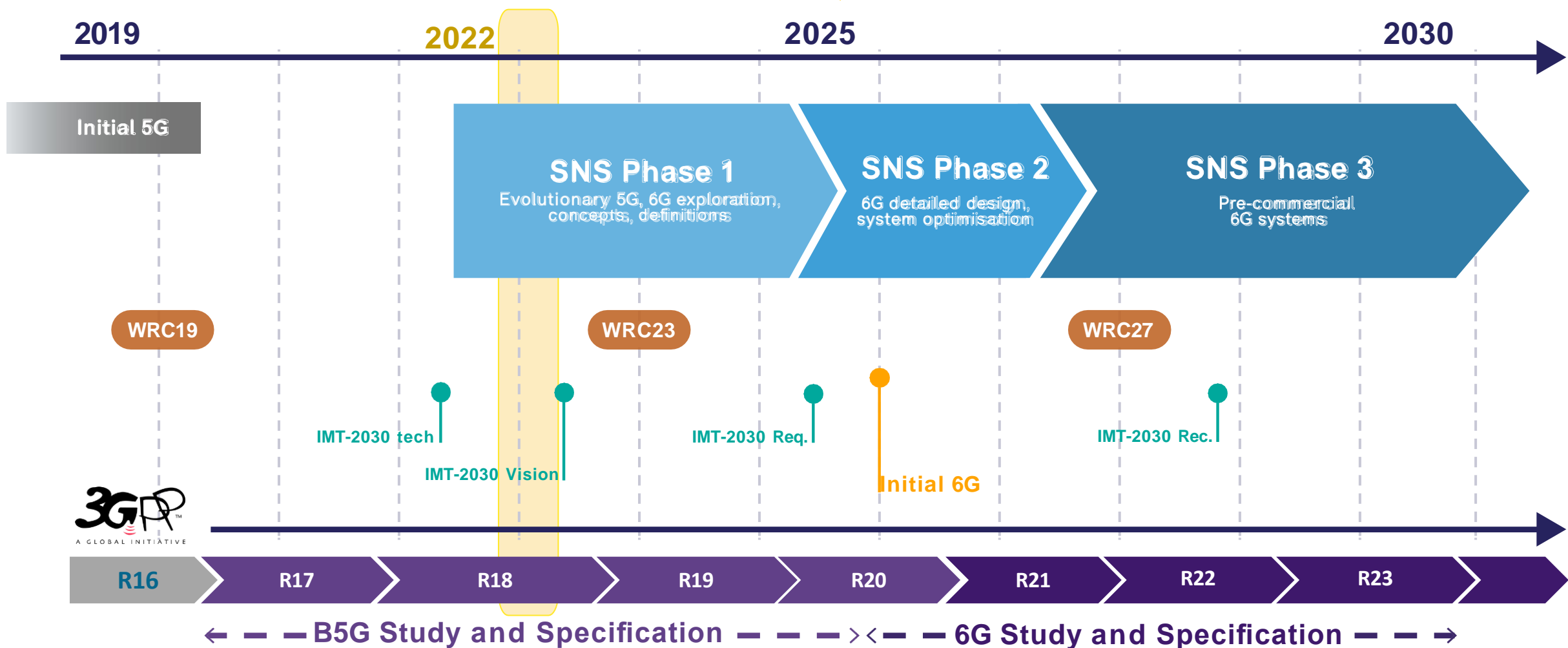


(+Cluster 4 topics)



• Call 1 closed 2Q22

• Call 2 closed 2Q23



6G... BOUNDARIES FOR FRAMING THE FUTURE



2G

3G

4G

5G

6G

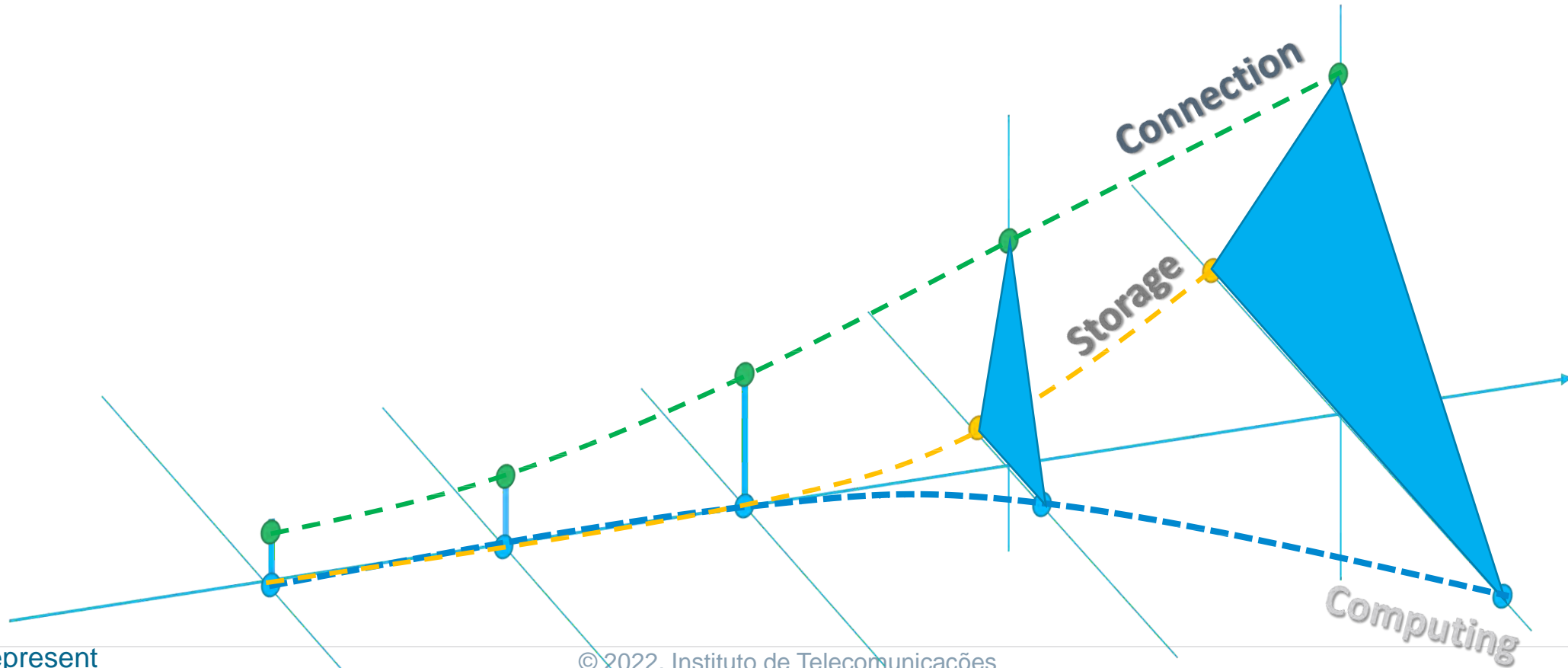
Digital Voice
SMS

Voice + data

Internet (e.g.
IoT, web, etc..)

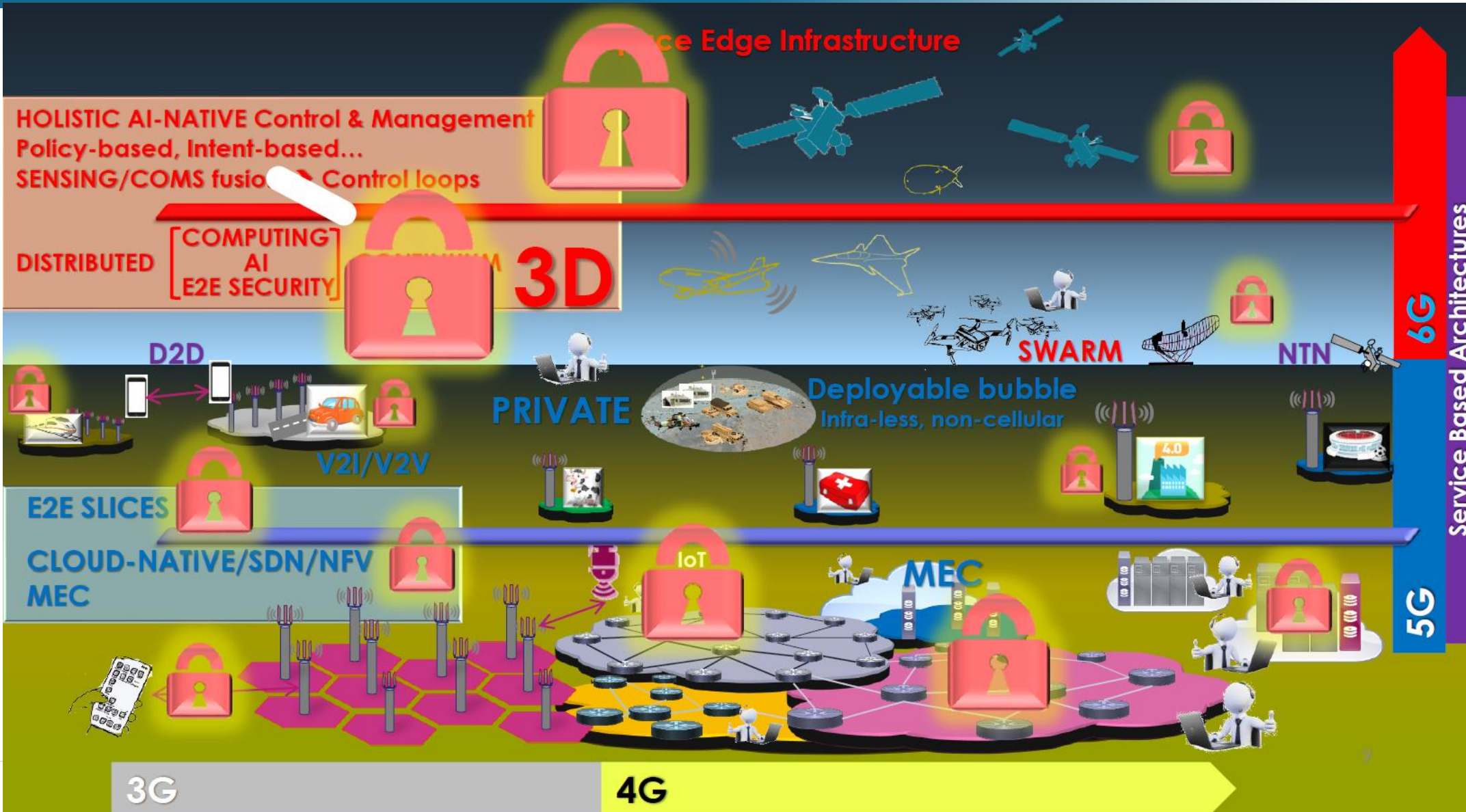
Mobile Broadband
Verticals(?)

Comm +....
Sensing ?Intelligence?



Dotted lines represent temporal rate of evolution

6G... BOUNDARIES FOR FRAMING THE FUTURE



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Emmanuel Dotaro



SRIA
security editor

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3G

4G

5G

6G

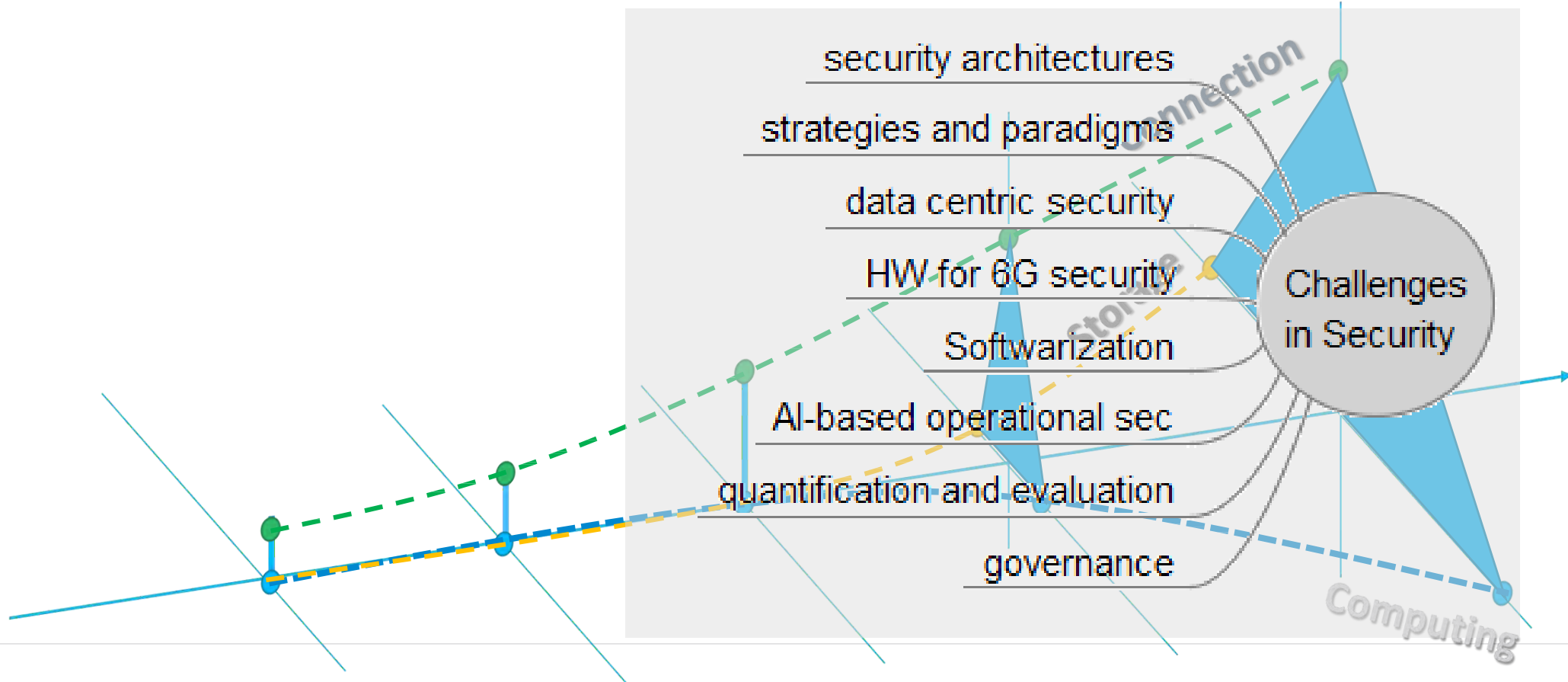
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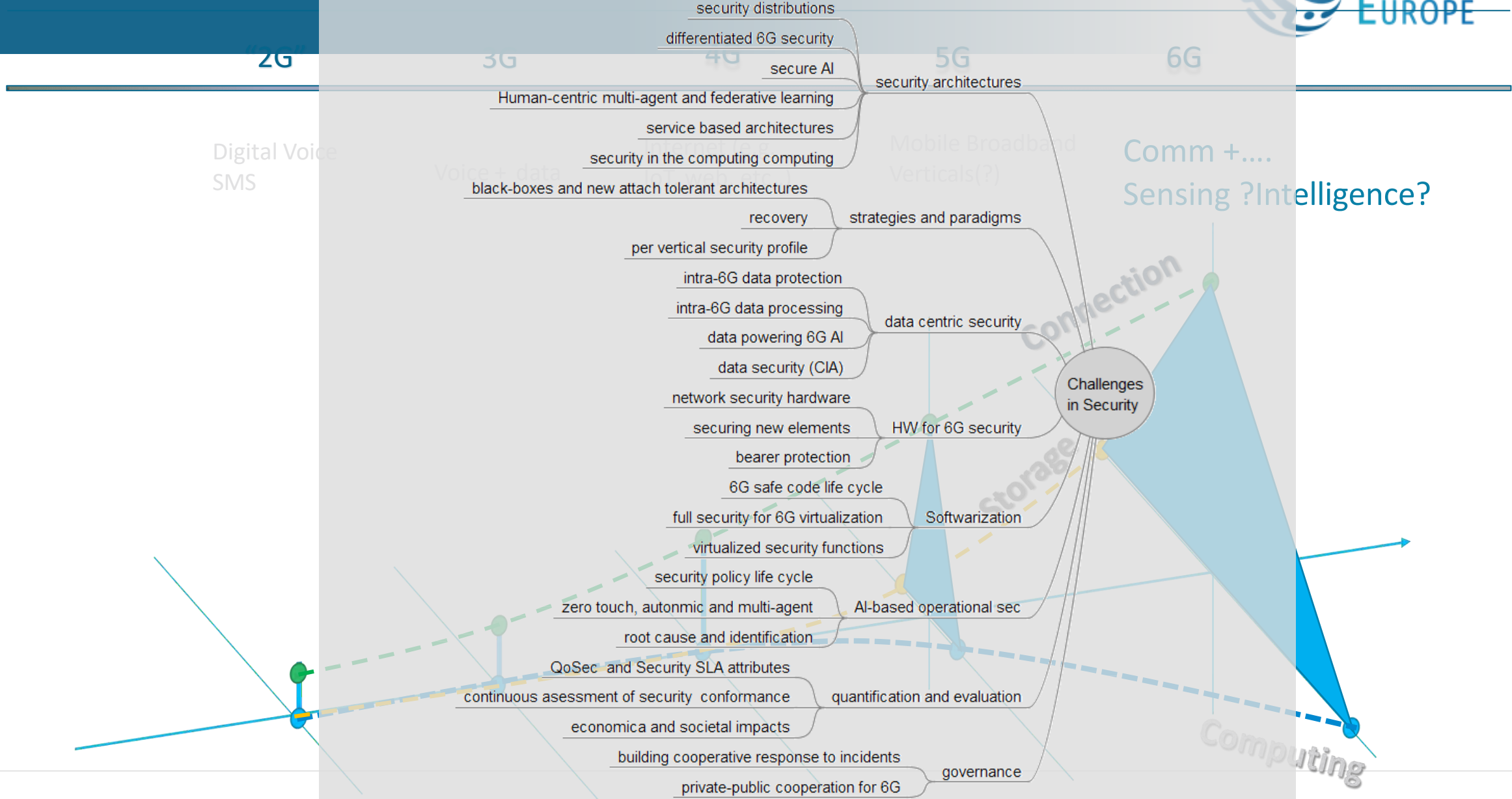
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6G... BOUNDARIES FOR FRAMING THE FUTURE



- We do not know what 6G will be
- But the technology envelope for 6G research is very wide
- Most probably 6G will incorporate/integrate/orchestrate a multitude of technical domains
 - The merger of telco and ICT is an unstoppable trend
 - No clear idea where the balance will be, in terms of ecosystems
 - The slate is still quite open at this stage for innovation
 - *Designing for 6G means designing for the future society*
 - There are very few topics that are outside the scope of 6G research

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 - *Designing for 6G means designing for the future society*
 - There are very few topics that are outside the scope of 6G research
- There is an ongoing strategic race in all dimensions for the development of key 6G ideas: **security has a major role to play...**
 - **And handle increasing energy efficiency and sustainable constrains...**

<https://www.networldeurope.eu/sria-and-whitepapers/>

- Updated ~2-3 years
- Used by EC community to frame future research funding
 - Influencing industry
 - Influencing governments' agenda
- Process triggered by the Network World Europe Steering Board
 - Launch event in a “Visions for Future Communications Summit”.
 - Early draft build with resource to an Expert group
 - Open consultation to the whole community

<https://www.networldeurope.eu/sria-and-whitepapers/>

- Upo
- Use

The 9th IEEE World Forum on the Internet of Things (IoT)

12–27 October 2023 // Aveiro, Portugal

Aveiro Congress Center

Hybrid: In-Person and Virtual

The Blue Planet: A Marriage of Sea and Space

Sponsored by the IEEE IoT Technical Community



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THANK YOU FOR YOUR ATTENTION

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