

## ETSI approach to Technology Research and Some initial thoughts on 6G

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19/10/2023



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ETSI Work on R&I



ETSI Technology Radar



ETSI Research Enablers



Where are we with 6G?



What is / is not 6G?

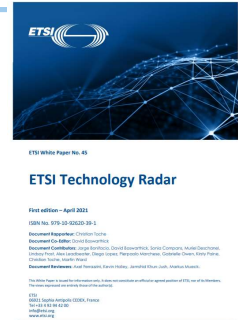


6G Challenges

# ETSI Approach to Research and Innovation

ETSI encourages a constant flow of research and innovation output into our standards work.

- 1
  - **ETSI Board RISE group:** Strong links between Researchers, Innovators & Standardization expertise in ETSI:
    - Working with EU platforms (such as Horizon Europe, SNS JU, 6G-IA, NetworkEurope)
    - Working with national / EU / global research platforms & projects (e.g. HEXA-X / Next G Alliance /one6G / IOWN)
    - Outreach to universities and research labs worldwide
- 2
  - **ETSI Board TREND group:** Examines Future Technology Trends:
    - Produces the ETSI Technology Radar (ETR)
- 3
  - **ETSI NET (New Technology) Team:** responsible for:
    - Building the tools and enablers for R&I into Standards
    - Tracking Future Technology Evolutions & outreach
    - Enable the creation of new technical groups, areas of work in ETSI



# ETSI Technology Radar – 2021 Edition

- ETSI Technology Radar (ETR) tracks the major technology trends that are just on/over the horizon (approx. 0 → 7 years). *Identifies potential for new standards work in ETSI.*
- ETR was first published in April 2021 and originally contained **10** broad Tech-Trends



ETSI White Paper No. 45

## ETSI Technology Radar

First edition – April 2021

ISBN No. 979-10-92620-39-1

Document Rapporteur: Christian Toche

Document Co-Editor: David Rowcroft

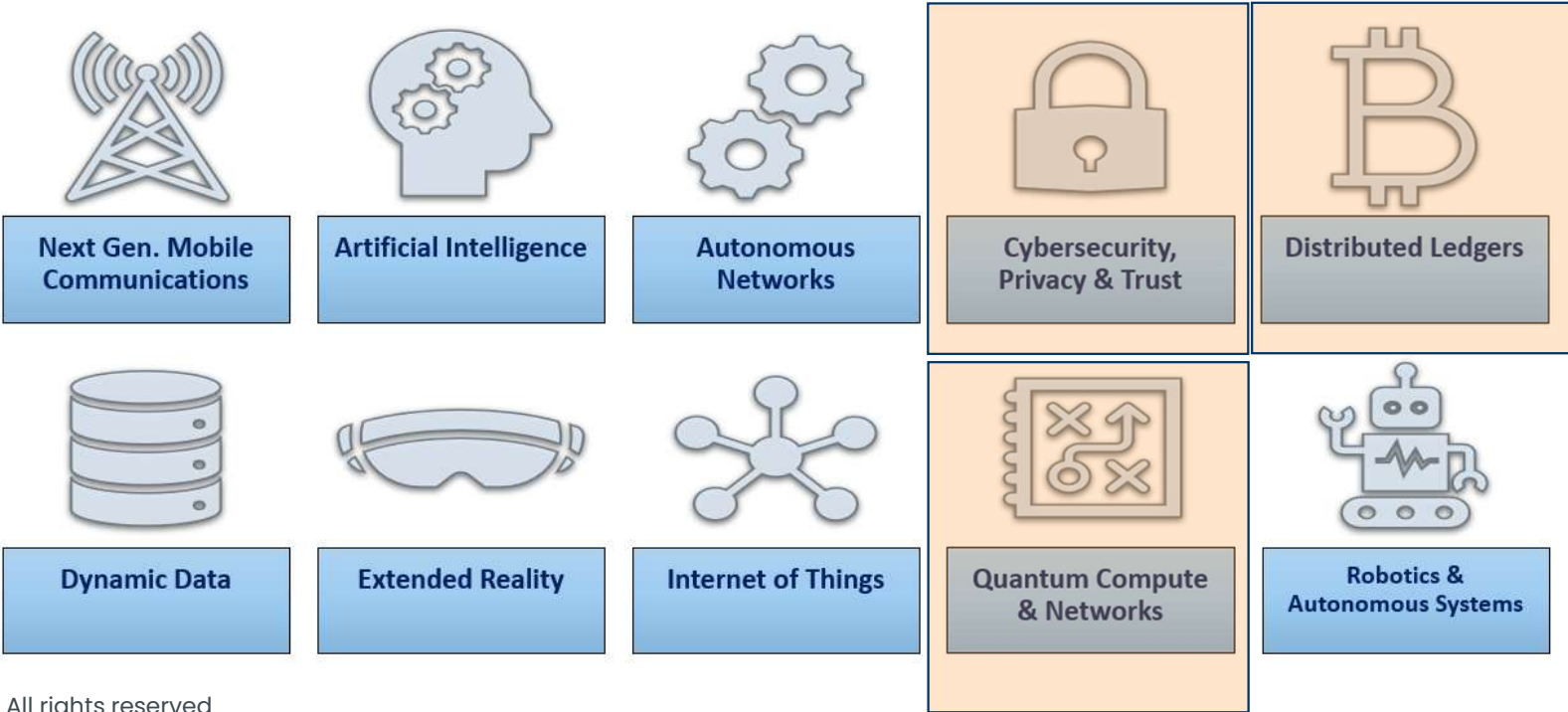
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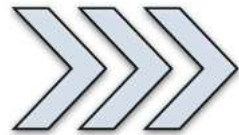
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Initial ETR TRENDS [2021]



# ETSI Technology Radar – Updated 2023 Edition

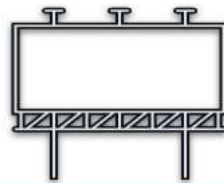
- ETSI Technology Radar (ETR) is in the process of being updated by BOARD\_TREND
- Revision of the ETR planned for publication DECEMBER 2023, with **11 additional** Technology Trends



Photonics



THz  
Communications



Reconfigurable  
Intelligent Surfaces



Optical Wireless  
Communications



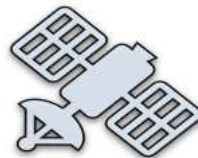
Intelligent  
Distributed EDGE



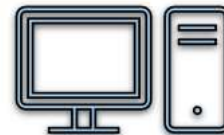
Sustainability



Integrated Sensing  
&  
Communications



Non-Terrestrial  
Networks



High Performance  
Computing



Wireless Area &  
Private Radio  
Networks



Future  
User Interfaces

New ETR TRENDS  
[2023]

# ETSI Support to Projects and Researchers



General Advice  
and Education  
about  
Standardization



Letter of  
Support to  
Projects



ETSI presence  
on Advisory  
Committee



Mapping of  
research to ETSI  
working groups

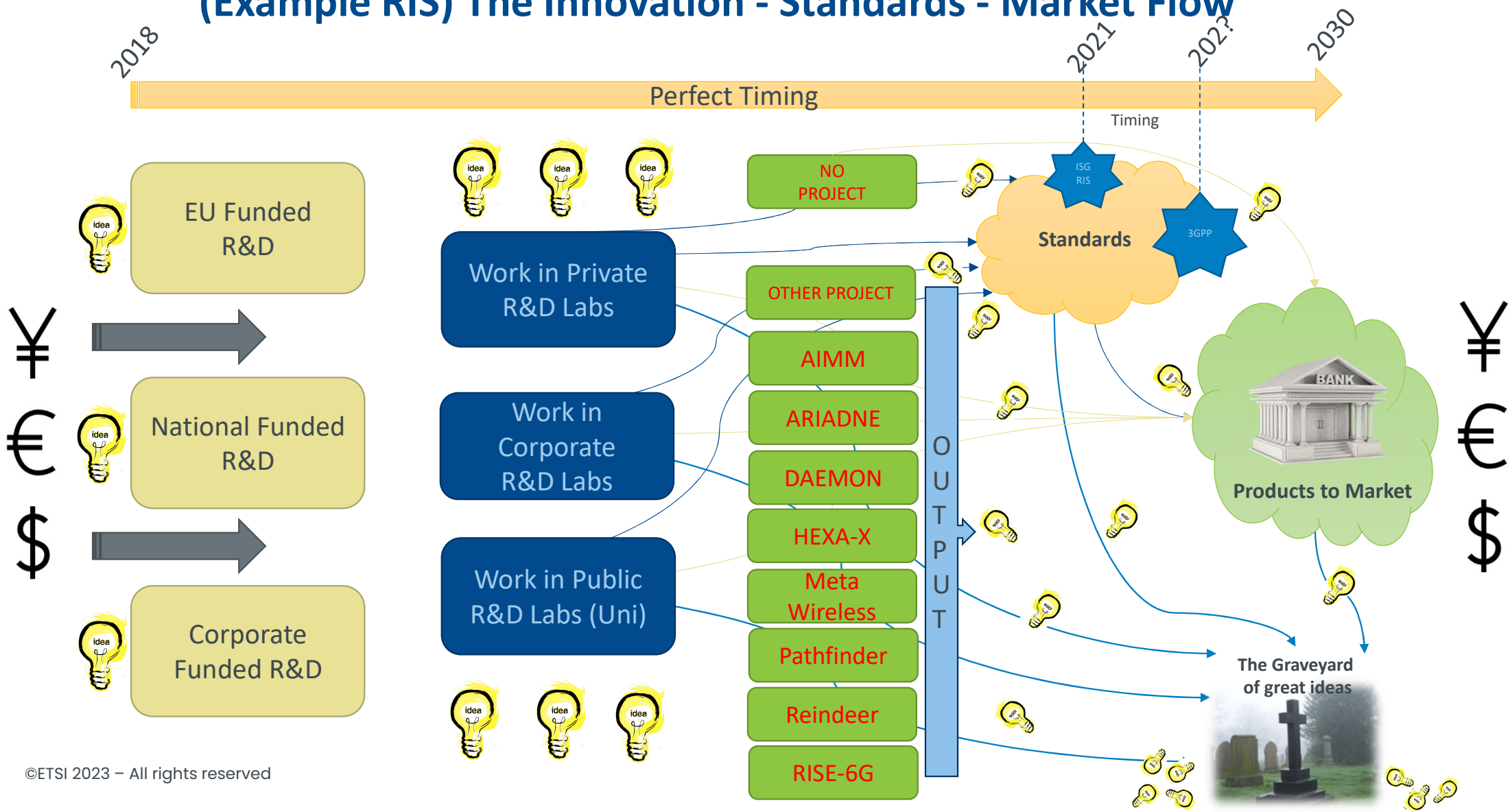


**CAT-ALYSTS**

Between  
research  
projects &  
standards  
groups

**We are here to help. Contact [research@etsi.org](mailto:research@etsi.org)**

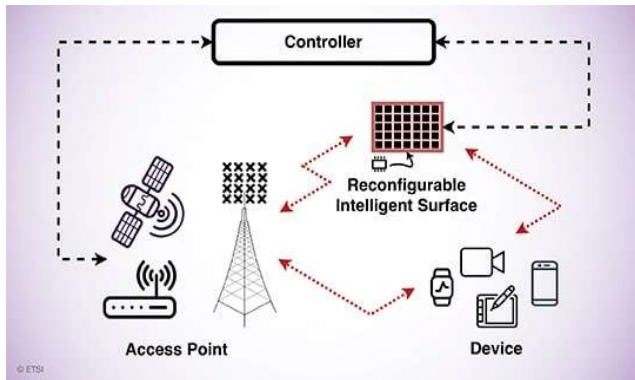
# (Example RIS) The Innovation - Standards - Market Flow



# Recent pre-standards Groups for B5G / 6G



## ISG RIS (Sept. 2021)

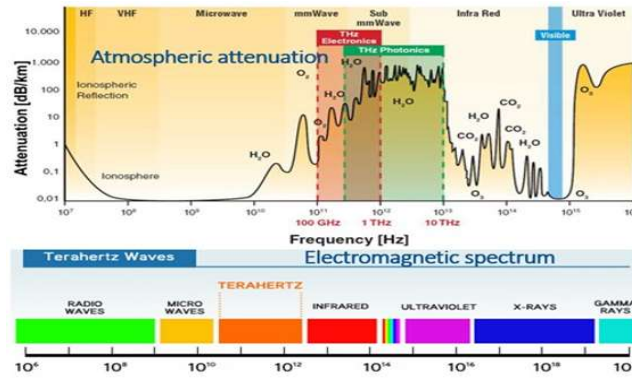


### ETSI ISG RIS Mission:

Provide an opportunity for ETSI members to collect their pre-standards research efforts on RIS technology across various EU/UK collaborative projects, extended with relevant global initiatives, towards paving the way for future standardization of the RIS tech.

44 members, 4 participants  
 3 x deliverables published  
 3 x deliverables being drafted

## ISG THz (Sept. 2022)

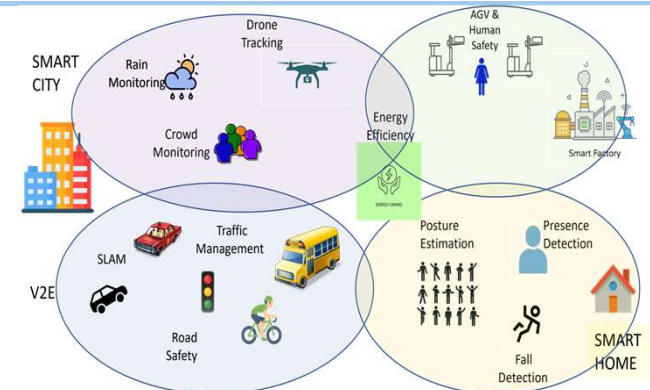


### ETSI ISG THz Mission:

**Mission:** Establish technical foundations for THz (100 GHz -> 10 THz). Place for ETSI members (*and non-members*) to progress their pre-standardization activities resulting from EU/National research efforts in the domain of THz technologies.

45 members, 2 participants  
 4 x deliverables being drafted

## ISG ISAC (Oct. 2023)

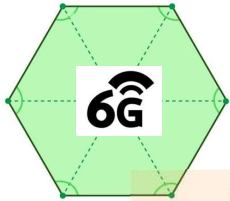


### ETSI ISG ISAC Mission:

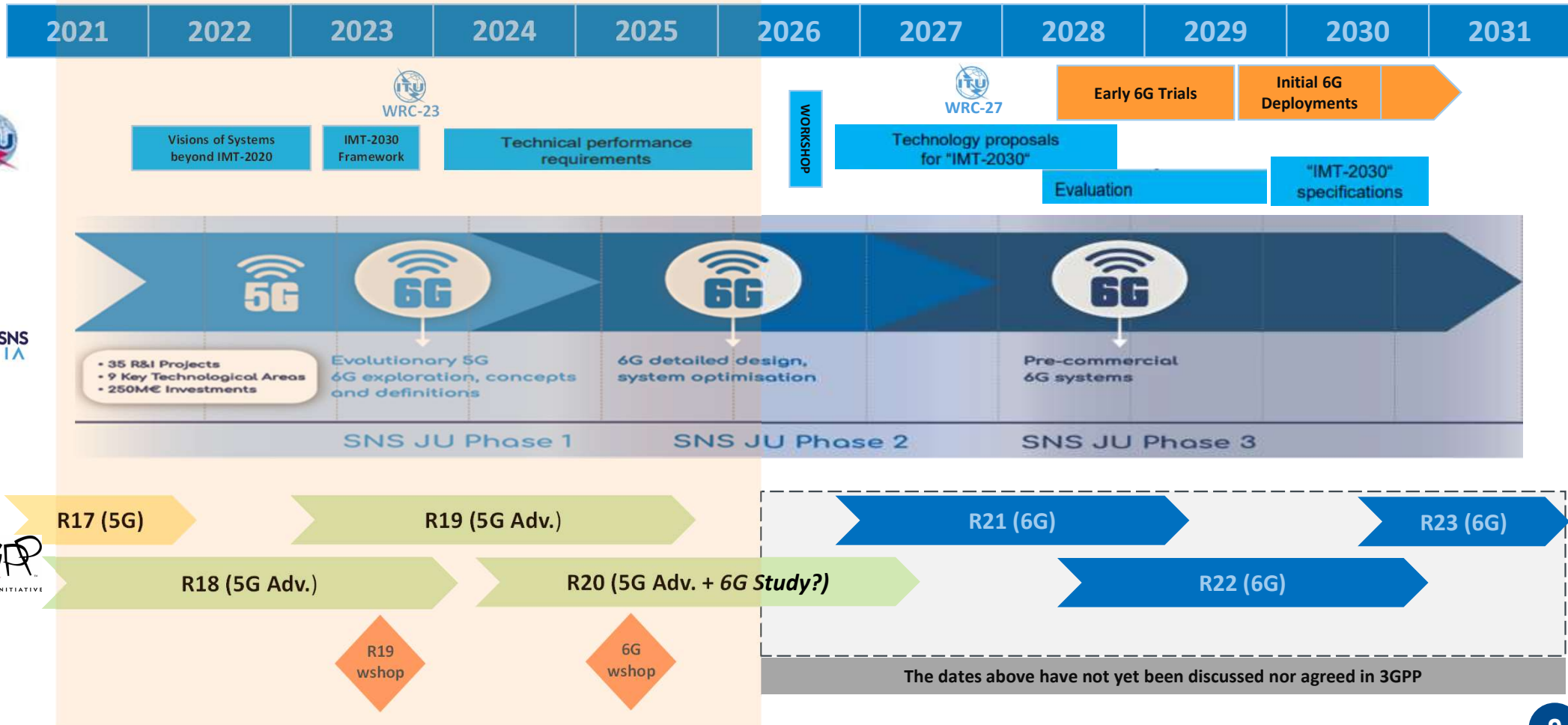
Provide an opportunity for ETSI members to coordinate their pre-standards 6G research efforts on **integrated sensing and communication** technology across various European/National funded collaborative projects, extended with relevant global initiatives.

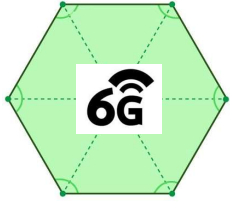
22 Founding members.  
 Kick off meeting **Early Nov 2023**  
 More members welcome to join





# 6G, Window of Opportunity (for pre-standards work)





# 6G, are we there yet?



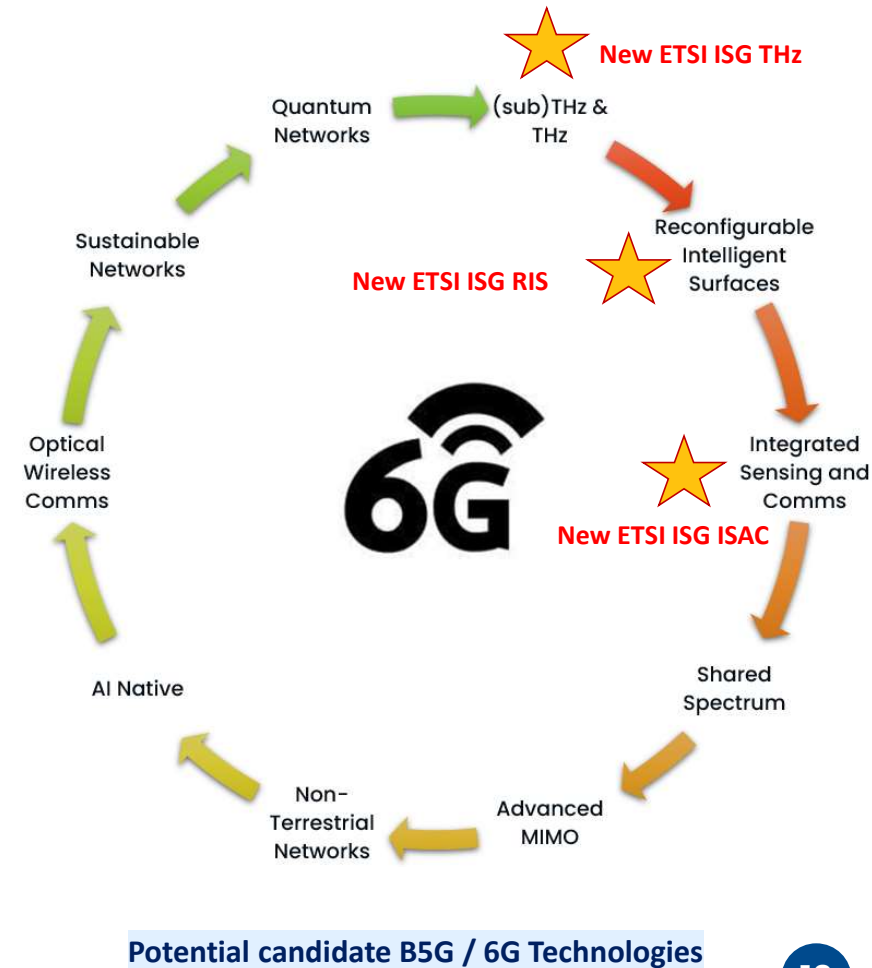
Current assumption is the first 6G services may be deployed in 2030, but of course expectations may change due to market pressures

6G is currently only at the Research & Vision phase, investigating potential technologies. More formal standards for 6G will follow later

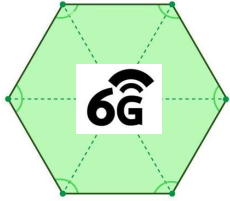
We see many announcements of national, regional, corporate 6G programmes & visions with large investments in global 6G research

6G is expected to begin in 3GPP in Rel-20 (6G initial studies) and Rel-21 (6G service requirements), starting around 2024 -> 2025 \*\*\*

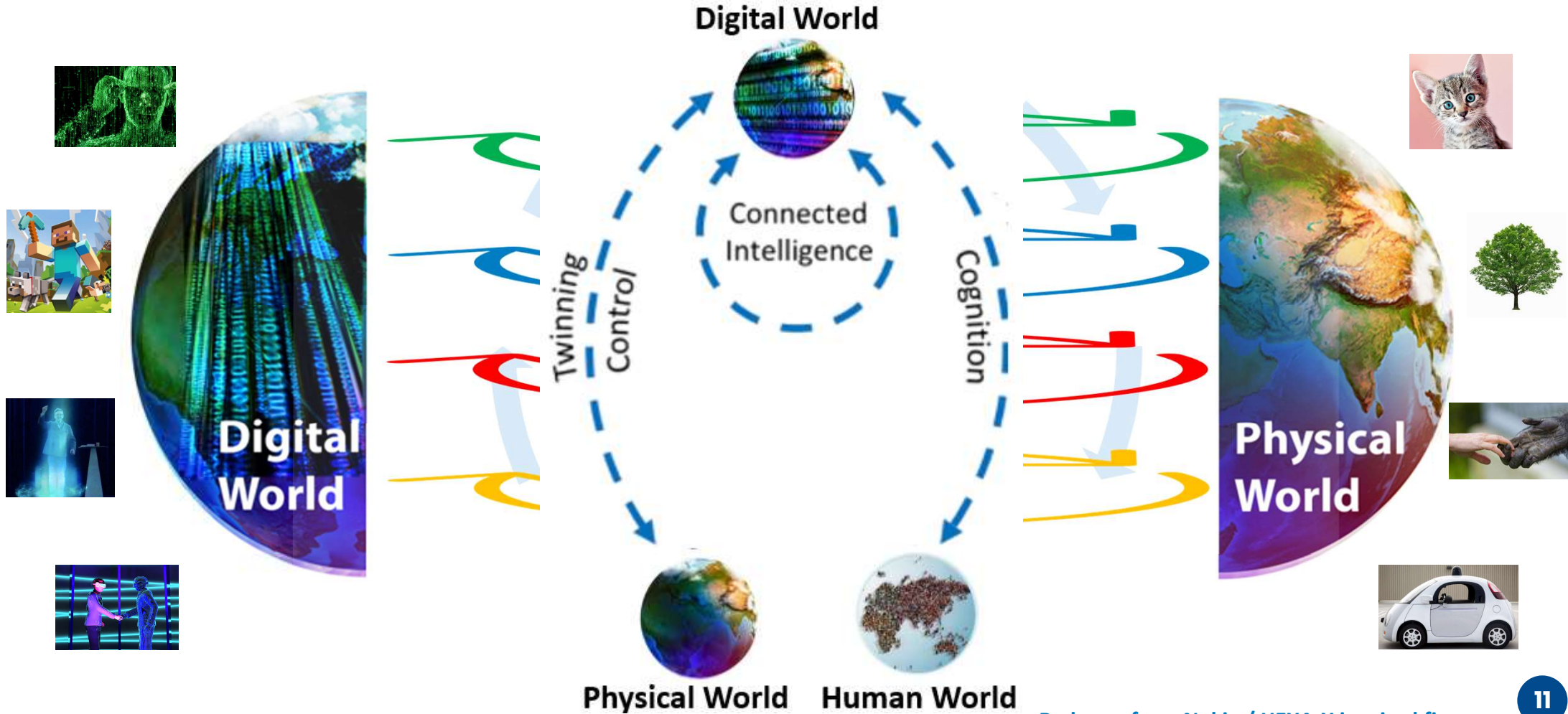
There is no consensus on “what is 6G” – it will be a mixture of gradual technology evolutions from 5G & some revolutionary new concepts



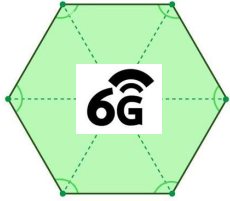
\*\*\* NOTE: BEYOND R19, These are “indicative and estimated” dates only



# Common 6G vision emerging from research



Redrawn from Nokia / HEXA-X inspired figures



# 6G Outline (revisited)

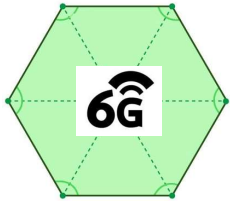


## Recent Call from several Operators (via NGMN)

<https://www.ngmn.org/highlight/ngmn-publishes-6g-position-statement.html>



- 6G mobile **network standards must be globally harmonised**.
- 6G must not inherently trigger a hardware refresh of 5G RAN infrastructure.
- 6G introduction must allow certain scenarios to be realised through software-based feature upgrades of existing network elements.
- 6G must not result in degraded performance for customers connected to 5G networks.
- New features should be able to be deployed as and when required, without compromising existing core connectivity services such as voice.
- 6G must address demonstrable customer needs across mobile, fixed and non-terrestrial networks.
- 6G must ensure interoperability and backward compatibility with 5G.
- 6G must incorporate robust **security measures by design** to protect against **emerging threats and vulnerabilities**.



# 6 Trends in 6G in 6 months\*



\*What has evolved in 6G since Jan 2023?



## 6G Research Projects

- SNS JU Phase 1 projects launched
- Hexa-X -> HEXA-X II
- DSIT launch several 6G FONRC projects in UK
- Other Countries do similar 6G project launches
- Several B5G / 6G Flagships projects publish early findings



## 6G Events

- ETSI RnD Workshop in Sophia Feb 2023
- 6G Symposium in UK April 2023
- EUCnC research event in Sweden June 2023
- See a Multiplication of 6G events worldwide
- Term "6G" is moving up the hype curve



## 6G Standards

- ETSI THz & ISAC begin
- ETSI RIS make first three publications
- 3GPP R19 workshop, what is out may appear in 6G
- IMT-2030 moves from Vision to Framework
- Emergence of O-RAN inside 6G research projects
- Geopolitical rumblings
- Risk of 6G standards fragmentation



## 6G Roadmaps Converge

- General agreement on 2030 target
- 5G-Adv Roadmaps in 3GPP are clarified, 6G to be discussed soon
- The 'window of opportunity' for research into standards is open
- There is no 6G standards race (yet) but it will come



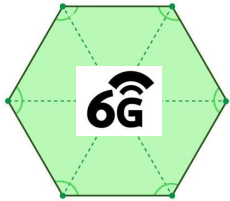
## 6G takes shape

- General agreement that 6G will be an EVOLUTION of 5G
- 6G will need to be SUSTAINABLE
- 6G will include a large NTN element
- 6G will include more AI (AI native)
- 6G Networks will sense & communicate



## 6G thoughts mature

- Operators are not rushing for 6G, 5G is the now network
- 6G needs to evolve and be backwards compatible with 5G
- Full coverage is essential
- Speed is not everything
- 6G may be the last G, the debate is open (again)



# 6G Security Challenges, Securing Complexity

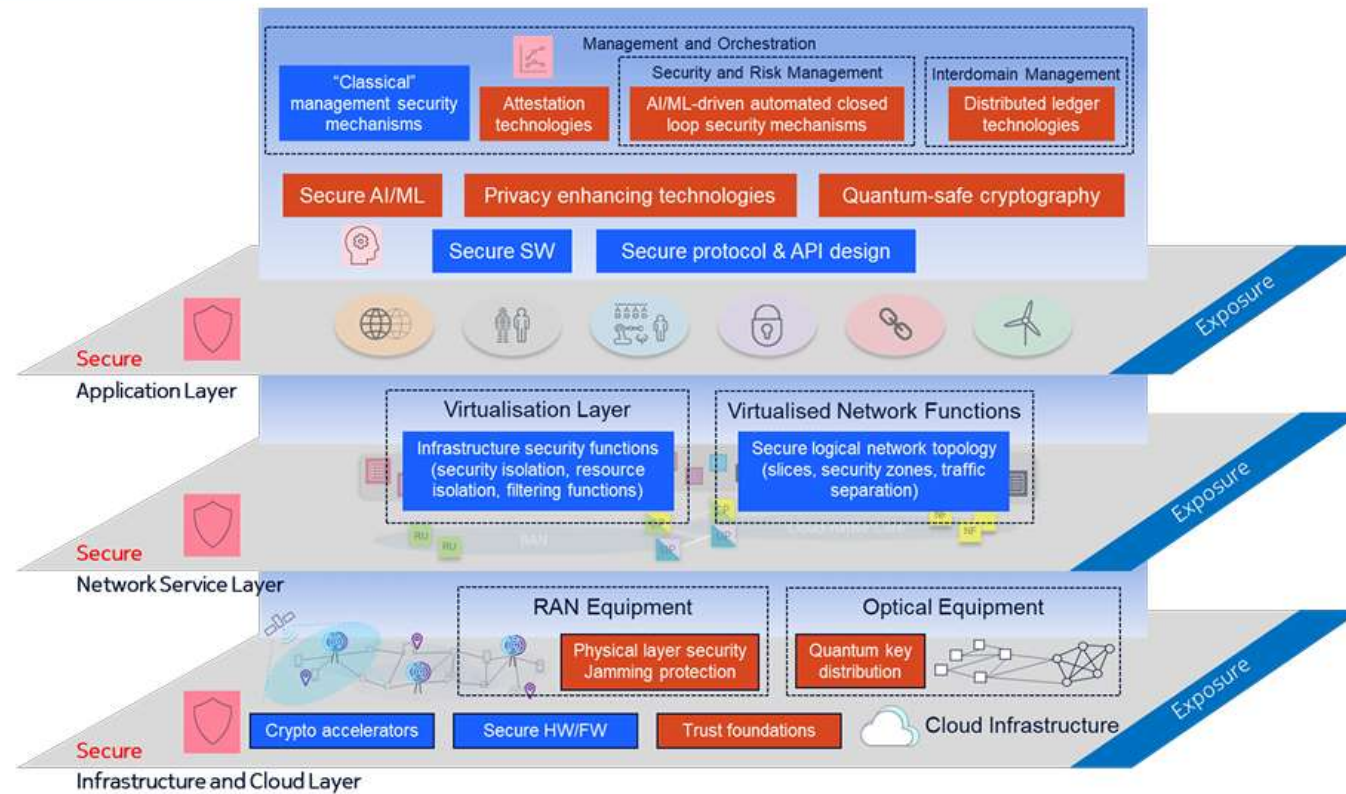


## Hexa-X Security Architecture



6G Security will include:

- Secure AI aspects
- Post Quantum evolution
- Secure multiple Access Networks (Het Net)
- Converged Core
- Management and orchestration issues
- Secure cloud
- Consider Device 2 Device
- And much more ....



<https://hexa-x.eu/wp-content/uploads/2023/07/Hexa-X-D1.4-Final.pdf>



**Thank you for your attention**



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