



SNS WP 2024 Orientations

2nd 6G-IA consultation results

The Voice of European Industry and Research for Next Generation Networks and Services

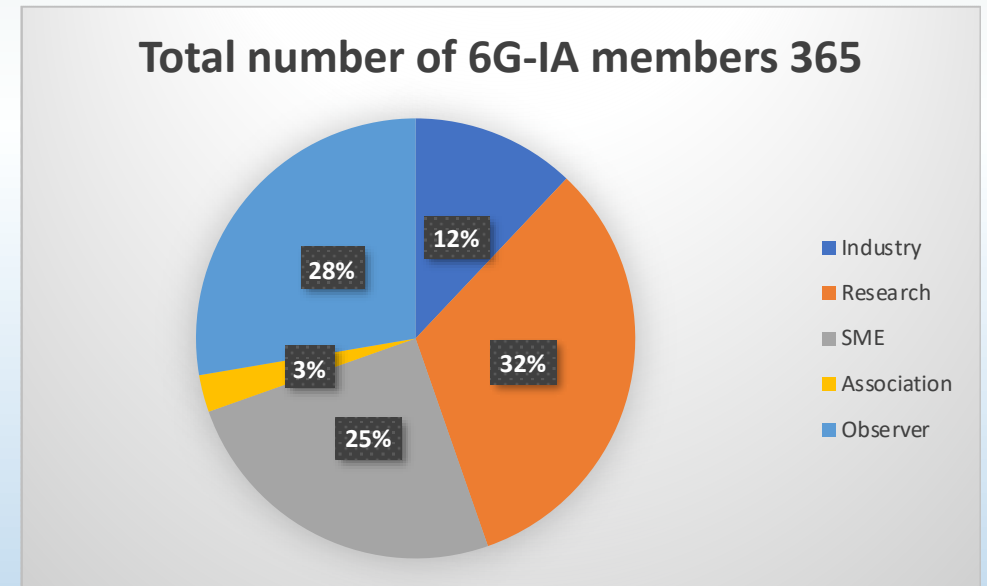
Agenda

Time (CET)	Topic	Speaker
10:00-10:05	Opening	Alex Kaloxylos
10:05-10:15	B-01: Disruptive Technologies for 6G	Rui Aguiar
10:15-10:20	B-02: Wireless Communications and Signal Processing	Carles Anton Haro
10:20-10:25	B-03-01: 6G NTN-TN Unification Integration	Bernard Barani
10:25-10:30	B-03-02: Higher Speed Optical Access Networks and future end-to-end Packet Optical Network Architecture in 6G	Werner Mohr
10:30-10:40	B-04 Reliable Services and Smart Security	Rui Aguiar
10:40-10:45	B-05 Microelectronic – Front-End Module (FEM)	Bernard Barani
10:45 – 10:50	International Collaboration	Didier Bourse
10:50-10:55	C-01: 6G Telco Cloud and Service Provision enablers	Alex Kaloxylos
10:55-11:00	D-01: Stream D – SNS Trials and Pilots (T&Ps) with Verticals	Didier Bourse
11:00-11:10	Further points	Alex Kaloxylos
11:10-11:25	Discussion	Alex Kaloxylos-moderating
11:25-11:30	Closing remarks	Alex Kaloxylos

- The meeting is recorded.
- The video and slides will become available after the webinar
- Please use the chat box for questions during the presentations. We will try to answer all questions live
- During the “Discussion” slot please raise your hands before opening your mic

Contributions to the consultation

- 59 contributions received (16% of all 6G-IA members, 22% of full members)
- 96% of those responded that they have read the draft orientations



Initial gap analysis of retained projects WP 2024 – For information

1. The architectural topics seem to be well covered. Quantum Technologies also addressed on B01-01
2. Cell-free and mMIMO are almost not addressed in the selected projects for the wireless strand. New topics like NOMA introduced, Follow up opportunities in WP2025
3. On Infrastructure and Technology, one promising project on IoT has been selected. Follow up opportunities in WP2025. The other project chosen is relevant to NTN
4. Small traction from the selected projects on post-quantum and QKD and timing-sensitive and responsive software.
5. About the two INCO projects, the commitment to the availability of data sets appears limited
6. The Sustainability lighthouse appears to cover all points
7. For the Reliable AI project, MLOpps and DataOps appear to be the main focus
8. The micro-electronics lighthouse appears to cover all points. In past calls, considerable resources have been allocated for THz. It is evident that THz will not play a role for 6G at least until 2030. How can this research path be evolved?
9. The trials and pilot projects cover the scope. Proponents select the same model as in the past calls (multiple verticals to be addressed). The engagement of key verticals and the potential of the produced solutions to be used in the real world will be further analysed.

More information/analysis when projects will on-board SB/TB – Information to be collected by the CSA projects

Q1: Concerning Strand B01-01 (Disruptive Technologies for 6G), do you agree on the approach of the draft set of Clusters and related Technical Topics

87% YES

(47 Yes, 7 No, 5 no opinion)

“Covered elsewhere, elsewhere”

- Would prefer to have a single topic focusing on Architectural aspects, as in previous years. This can include, as a subtopic, IoT enhancements. "IoT applications" are IMHO out of SNS research scope. **The topic on architectural aspects has been discussed extensively in the previous consultation (i.e., by the time these projects will start, the main 6G architectural principles will be already established in standardization bodies)**
- For B-01-01-02 we propose the addition of aspects of "deterministic networking" to the paragraphs of "Real time serverless computing" and "All optical packet networks". **Deterministic networking has been included in the previous calls of the SNS, however with limited traction.**
- Extend the scope to other disruptive studies than IoT (eg. antennas)? Are low-energy components in the scope? And energy harvesting technologies? Also consider evolutions of ETSI DECT-NR+ standard that meets IMT2020 criteria, to ensure **optical communications) but also in B-01-01 compatibility with IMT-2030 requirements for MTC and IIoT. Most of these points are included in the other Streams/Strands (wireless, NTN,**
- The proposed content of the two clusters seem to leave out many disruptive technologies for 6G with great potential to be game changers, as novel radio interfaces and others. **Wireless communications has a dedicated strand with resources allocated for potentially 3 large projects.**
- Although sustainability as part of Green Transition is mention as relevant in the document, including power consumption reduction, it is not enough targeted neither synergies between communication and sensing or photonics and Photonics PPP synergy. **Synergies with Photonics PPP is not currently possible as they don't allocate any resources for connectivity related topics**
- Novel architectures for optimal (in terms of energy efficiency. latency, etc.) for jointly distributed compute, communications, and sensing **Although these topics are included already to some extent for low -TRL, the proposed area has been funded for research during the past 3 SNS calls.**
- B01-01-01 should not only focus on IOT and device technologies. Other PHY technologies should also be considered, e.g., AI and ISAC. **ISAC is included in B-01-01-01 and AI in B-01-01-02**

“mostly covered elsewhere, elsewhere”

- Need focus on the transport side of the network especially in dynamic / nomadic networks to support verticals like public safety. – **Interesting statement there is already a lot of work at R&D level for nomadic nodes since the 5G era. The incorporation of such solutions for verticals is fully open in Stream D.**
- I wonder if Neural Radio Protocols Stacks should be part of STREAM-B-01-02 instead. **As this is less mature as a technology the choice is to keep it under the low TRL topics, but of course will be a matter for the B01-02 proponents to assess the maturity of this solution to impact standards.**
- Some topics, for example battery less devices or goals-oriented comms are already addresses by existing project with higher TRL than 1-3. How to differentiate ? Are we looking for other approach (if any ?) ? **These topics have been covered only to a limited extent in the previous calls. It will be for the proponents to identify new solutions and clearly present the added value from SotA solution**

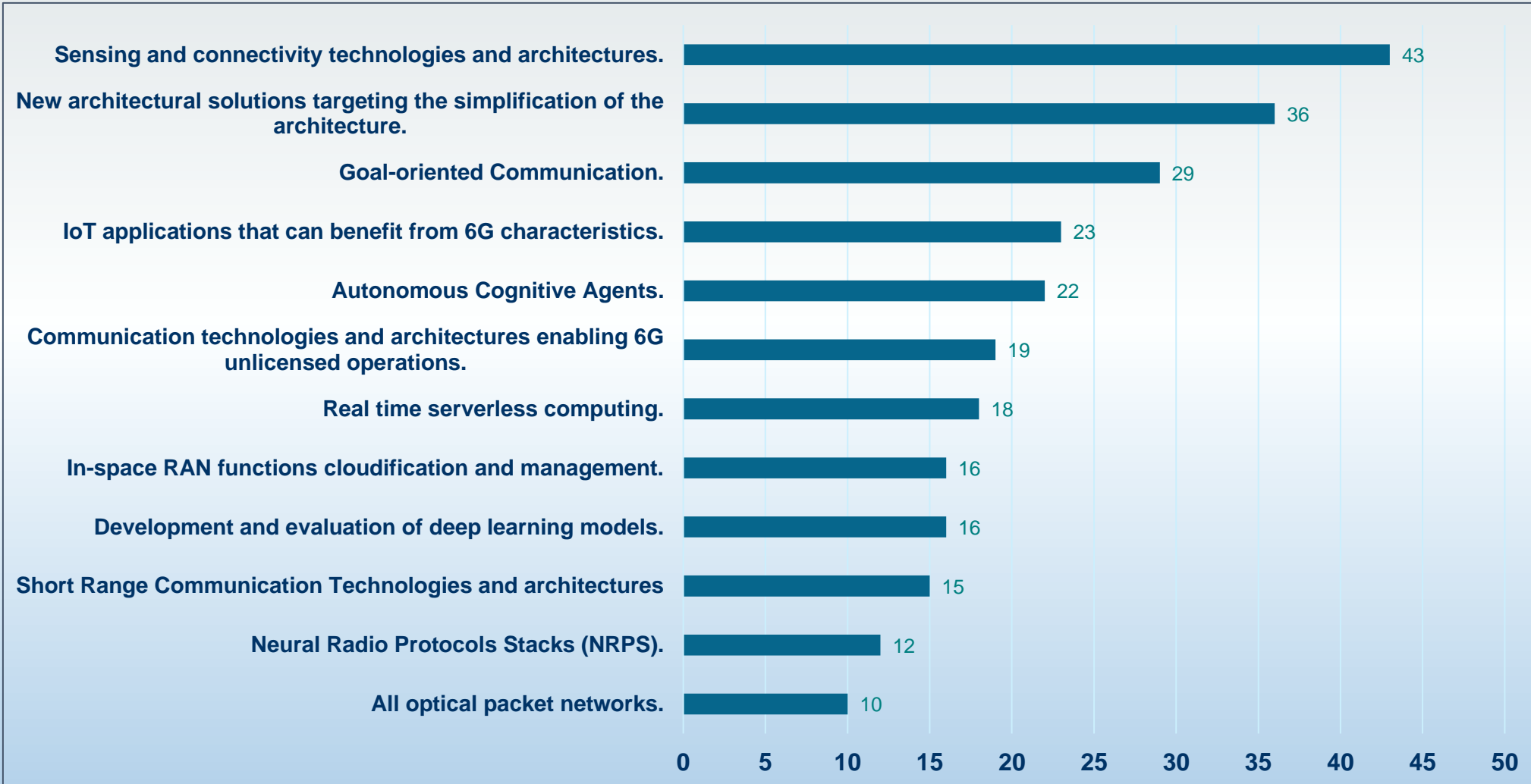
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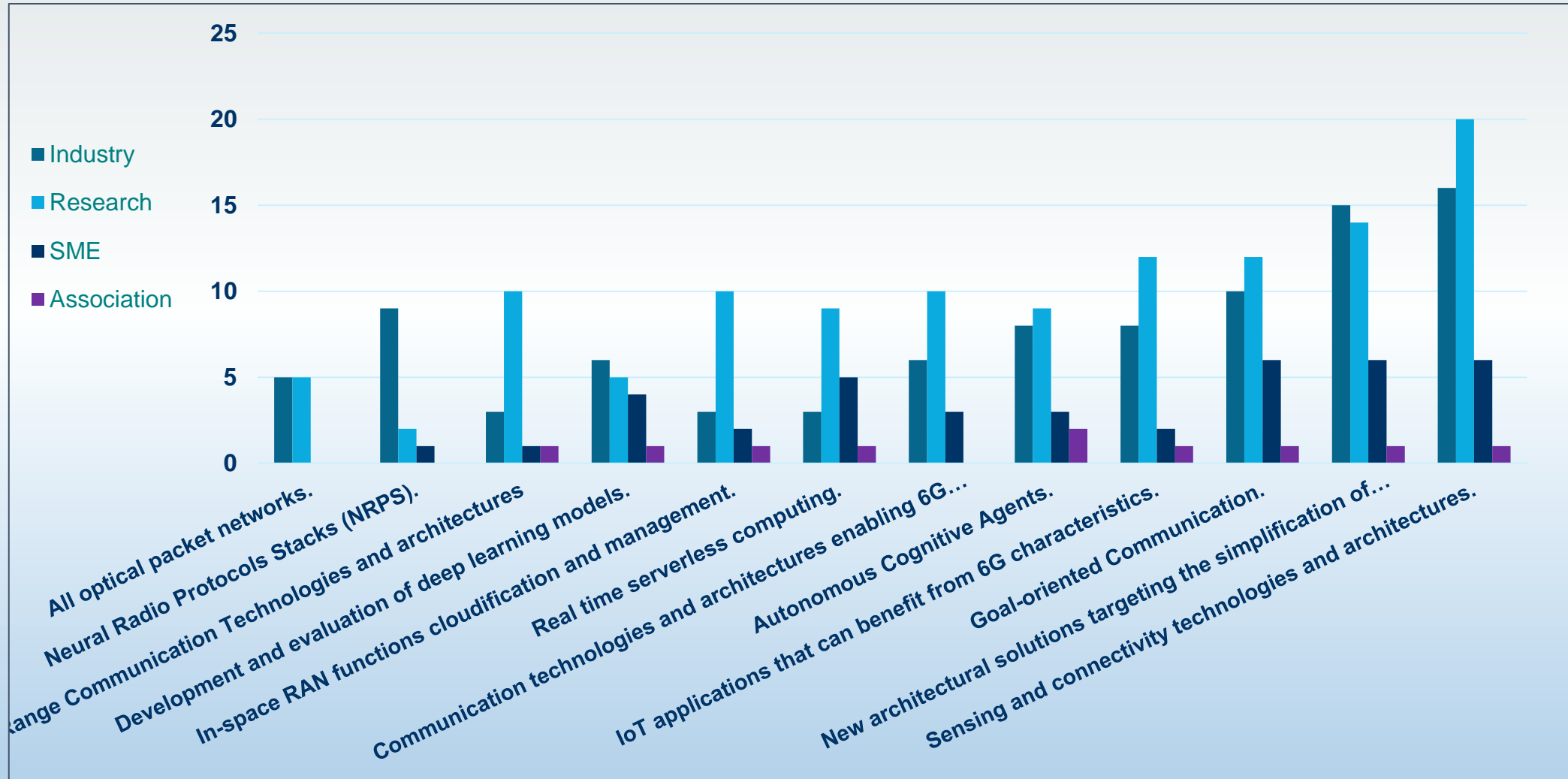
“considered, with different results”

- More programability expected in B-01-01-02 **This part is included currently in the first scope bullet**
- AI must not be limited to Deep Learning. Topics: setting frequency range from 5 to 6Ghz may limit the scope of lower frequencies, highly suitable for IoT. Current list of bullets mixes concepts of different levels of granularity. Some very specific could be merged with other general topics. **The text was revised.**
- Mostly agree, though for B01-01-02 we see topics that are wider than others, so funding the same number of projects for each of them may not be appropriate – **final selection was made based on gap analysis and consultation feedback.**
- Most topics have a clear 6G-related goal, but not "Development and evaluation of deep learning models" and "Neural Radio Protocols Stacks (NRPS)", which focus on developing specific methods/concept. It is better to merge them into other topics so that there is a connection between goal and method. **The text was revised including text in B-02 (not possible to cover all topics in B-01).**
- For "Development and evaluation of deep learning models", it is not clearly described the potential role, scope and applications of these models. **The scope and role is left open to proponents**
- Good to indicate to select the highest ranking proposal for each topic **This is indeed the way forward for the final selection**

Q2: Concerning Strand B01-01 (Disruptive Technologies for 6G), can you please select your top 5 Technical Topics from the list in Q1



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- Selections assume the entire provided technical scope of each topic as per WP 25 draft. Another interesting topic could be short range communications and architectures in absence of conditioning to high-frequencies (it is assumed here 24+ GHz and above for the lack of an absolute indication). – **There is no indication for any frequencies. This is left open for the proponents**
- Related to 6G-unlicensed, I'll consider that the topic should be larger and address different new option to share / coexist on same spectrum. There is some middle ground between "unlicensed" and "dedicated band" **Spectrum sharing is already in scope in B-01-02 Wireless strand**
- Sensing and connectivity is addressed in 3GPP and ETSI already. Several topics are addressed by 3GPP and ETSI. **The idea here is to focus into new breakthroughs. This topic appears to be the most popular in the current consultation.**
- Should it possibly Integrated Sensing & Communication Tech.? **The question is not clear**
- We tried to prioritize the topics especially to enable dependable critical communications and applications. We consider the all-optical network solutions as important integral part of x-haul solutions in simplification of architecture, even it is not listed in our prioritization. **Noted**
- Should also including ISAC and AI core network, which are two potential Disruptive Technologies for 6G **AI core is included in B-01-01-02 and ISAC for core was a key part of the B-01-01 in the WP2024**
- It is important to insist on innovation that help address sustainability at societal, environmental and economic levels. Concrete KVIs and Key Sustainability indicators must be part of the work. **They are part of it by default – see expected outcome**

Q3: Concerning Strand B01-01 (Disruptive Technologies for 6G), is there potentially one top priority Topic currently missing? If yes, please include in the Comment box below

44% YES

“covered elsewhere, elsewhen”

- Nomadic networks – See previous reply – **NNs is a concept considered even during 5G R&D era.**
- Quantum technologies – **Quantum technologies per se are not in the core of the SNS**
- Network transformation based on novel concept of intelligence, decentralization and service creation – **these topics have been covered extensively in previous calls**
- Hardware security technologies for time and energy constrained systems - **Security topics are covered under B-01-04**
- Hardware and antenna technologies are poorly addressed and seem limited to IoT. The technologies in – **There is a dedicated topic on FEM**
- Novel radio interfaces – **These are covered in B-01-02**
- Smart repeaters and reconfigurable intelligent surfaces are missing – **These topics have been already covered in previous calls. Not clear why they should be considered for low-TRL topics**
- Development and evaluation of deep learning models – **Already included in the text**
- Software Defined Security leveraging Quantum Technologies - **Security topics are covered under B-01-04**
- Edge Computing and orchestration (they are tightly coupled with IoT) – **Already included in Stream C**
- Fully integrated sensing and communication. **Already included**
- virtual worlds– **digital twinning in various forms has been considered in previous calls**

Q3: Concerning Strand B01-01 (Disruptive Technologies for 6G), is there potentially one top priority Topic currently missing? If yes, please include in the Comment box below

44% YES

“mostly covered elsewhere, elsewhere”

- Zero touch management and orchestration should also be included – This topic has been extensively studied and funded to be considered for low-TRL
- quantum comms (optics or free space), and under-water under-ground air space Moon Mars continuum. The quantum comms is covered in B-01-03-01. The Moon Mars continuum appears too specific and currently too challenging for eventual validation in the scope of SNS
- Secure application interoperability across 6G clouds – Already included in B-01-04 and Stream C
- Deep Learning models for the realization of Real-time intelligent controller to URLLC applications – Already included in the current version. Specific solutions can also be considered in Stream D projects

“considered, with different results”

- RAN Virtualization and Open RAN – not clear why this is a low TRL topic
- wildcard / new approach for drastic improvement of efficiency and sustainability – these are fully in scope and open for proponents to come up with excellent low TRL enablers
- Quantum technologies for exploring routing and entanglement control, quantum-classical convergence – Interesting suggestion, however of narrow scope not identified by other 6G-IA members
- In-vehicle communication, short-range industrial communication (i.e., not only body-area networks) – text added in the call
- Intent Based Networking –as such is not a low TRL-topic. Goal oriented communications is very related to this.
- Analog distrib. computation for data aggregation, coding and fed. learning in beyond 6G RAN (see Q20) – Considering the answer in Q20 this is addressed in the current version
- New industry protocol adoption in 6G – The suggestion is not clear
- New optical powering technologies providing autonomous operation – This topic was evaluated but could not be included – limited number to 8 topics overall for B-01
- Novel architectures for optimal (in terms of energy efficiency. latency, etc.) for jointly distribut - Suggestion was not complete

Latest version of the Orientations for B-01

B-01: Advanced Architectures Systems and Technologies

- New architectural solutions
- The development and evaluation of deep learning models
- Real time serverless computing.
- Autonomous cognitive agents
- Goal-oriented Communication

B-02: Advanced IoT and Device Technologies

- Sensing and connectivity technologies
- Communication technologies and architectures enabling 6G unlicensed operations for IoT
- IoT applications that can benefit from 6G characteristics

Q4: Concerning Strand B01-02 (Wireless), do you agree on the Expected Impact and Scope description?

88% YES
(42 Yes, 6 No, 11
no opinion)

- I think, we need to focus also on wireless transport and not just optical networks **Misplaced comment?**. The wireless solution is very relevant for fast and simple deployments.
- Neural Radio Protocols Stacks (NRPS) could fit here **This has been incorporated under AI/ML topics.**
- The Strand B01-02 could be possibly organized in two Sub-Strands like implemented in B01-03 and B01-04. **After thorough discussions a single-substrand approach was found to be more suitable.**
- It might be challenging to achieve a TRL 5 for topics such as protocol learning and semantic communication. **Target is TRL4). TRL5 is acceptable if there is a good reason to do so but not a must (see text in the specific conditions)**
- The call text also needs 'robotics', 'multi-hop robotics communications': exploring new protocols and algorithms that can better address the industrial robotics use case requirements such as time-synchronization, reliable communications for critical traffic, flexible QoS configuration, flexible physical layer adaptation, and robust communications in case of hard-to-reach areas such as industrial plants, ship-yards, and underground inspections. **These activities are more suitable for T&P in Stream D, under the industrial automation project.**
- The strand should also address: Massive MIMO OTA testing **Testing, although an important aspect, is not a research topic by itself. However, proponents are free to incorporate testing activities which are relevant to their projects** /RIS/stacked meta-surfaces **A number of proposals in past calls have addressed those areas.** Coexistence with other devices, eg. Radar not limited to 7-15 GHz **The suggestion is not fully clear** Studies on waveform should also address NTN if not addressed by B01-03-01 . **Can be part of B01-03-01 (unification)** Notably the issue of good frequency localization to ensure spectrum sharing between terrestrial and NTN networks. **This topic can be included under the umbrella of existing text. Propagation studies for flexible RAN in difficult conditions should be addressed Propagation studies can be a tool for the design of functionalities, algorithms, where needed (implicitly) .**
- NTN integration should be part of wireless strand. There are a lot of challengers (interference) as well as architectural (split RAN) that fit here rather than 'devices'. **B2 is only for terrestrial radios with focus on radio interface. Unification of NTN + TN is addressed in B3 since it requires a system perspective.**
- No, we do not see the need to further explore the PHY layer in the context of SNS, given the high maturity of this domain **A strong interest in this area was expressed in the wireless workshop conclusions** and the very limited space for radical/significant innovations with real impact. In addition, massive MIMO is already included in the first bullet (PHY layer). Note that even the length of the text in the scope section for MIMO is really brief. This could be integrated in the first bullet for PHY layer technologies, in case this bullet remains in the final text. **MIMO topic has been substantially expanded (e.g., req. to include cell-free, others above) Given its relevance and limited coverage in past calls, a standalone bullet is preferred.**
- compute continuum should be moved to B01-02 to B-01-01-02 to clearly keep B01-02 anchored to RAN **This topic was included as per wireless workshop conclusions**
- The first two bullets are repeated again and again the calls. What would be further breakthroughs in MIMO algorithms, waveform design, and the like? In our opinion, this strand should focus more on the other bullets (already in the scope), as well on other important topics, such as solutions for energy efficient radio access design up to the processor, as well as open solutions to achieve 6G RAN KPIs (one of which is energy efficiency). **All proposed points included –up to proponents to take them or not. The ones criticized are intrinsic to the stream and are by no means static. Strong interest expressed in the wireless workshop**
- Suggested to Remove Automation and disaggregation in the RAN segment, as Open RAN is not a technology but an implementation mode. Suggest to also add distributed MIMO with ISAC, e.g., cell-free MIMO, which is a potential architecture for 6G service opportunities with sensing, ambient networks, strengthen of outdoor and indoor coverage and experience etc. **Agreed on inclusion distributed and cell-free MIMO. ISAC prioritized in the wireless workshop for longer term (not in 2025 call)**

Latest version of the Orientations for B-02

B-02: Wireless Communication Technologies and Signal Processing – Standardisation and Follow-up/PoCs

- Physical layer technologies for enhanced spectral efficiency.
- Extreme exploitation of MIMO technologies
- AI/ML & semantic communications targeted at providing a native AI framework for RAN networks
- Spectrum sharing and RAN co-existence
- Automation and disaggregation in the RAN segment
- Agile use of function accelerators at the 6G RAN/compute continuum

Sustainability from environmental, economic and societal perspectives might be regarded as a horizontal aspect to be addressed by the aforementioned priorities, wherever possible.

Q5: Concerning Strand B01-03-01 (Communication Infrastructure Technologies and Devices / NTN), do you agree on the Expected Impact and Scope description?

82% YES
(42 Yes, 8 No, 9
no opinion)

Topic:

- Agree in general with the Expect Impact and Scope
- Rather than dedicating a call to NTN, it should be open to broader ideas to compete. → This is done in B01-01
- Also consider the design and technologies for TN and NTN with loose coupling. → Not the industry priority well expressed at the workshop.

Structure

- two projects, separating radio/antenna aspects and architecture aspects → work on arch and underpinning techs that allow for integration TR/NTN. We do not start from scratch
- Allow for two projects in this NTN context while doubling the budget. → Budget increase is catered for the 3 years programme approach.

Scope

- Evolution of space context, spectrum/constellations scarcity, regulation: → spectrum capacity, number of constellations addressed elwhere: ESA, SA's, ITU, Regulators. R&I work on the parameters of simul tools (waveform spectral efficiency, adjacent channels I/F...)
- More focus on autonomous/intelligent operation of the integrated TN/NTN networks. → Text allows for it, next phase further developments.
- Further R&I on NTN/HAPS processing capabilities: . → works is not implementation specific, transparent of regenerative systems in scope
- Also address agile antennas technologies for NTN-TN, exploiting synergies with ESA programs. → see consultation 1. Antennas are extremely costly for space and are taken into account from their design characteristics, not implementation.
- TN/NTN integration is more architectural issue than infrastructure. → protocol development/adaptation issues geo beyond architectures.
- Multi/dual-link connectivity and cross/multi-domain orchestration should be more clearly highlighted. The support for optical links for both inter-spacecraft and feeder links should be included → multi link connectivity is part of the text and is clarified Optical links are taken into account from their design and functional properties, not from an implementation view point.
- PNT (Positioning, Navigation and Timing) and GNSS-less operation could also be added to the scope. IOD could be considered as an added and differential value for SNS. → In principle part of next phase.. (See NTN report and phases as proposed). PNT added
- Reference to a proprietary commercial technology of a single company, KeplerGen2, and not even European. e.g., cubesta → OK, amended

Latest version of the Orientations for B-03-01

B-03-01: 6G NTN-TN Unification/Integration

- Unified TN/NTN Control Plane for cross domain service provision;
- Management capabilities for independent reconfiguration of the NTN part for performance, security and resilience optimization
- Dynamic routing in multi-dimensional networks with selection of optimal paths for traffic, (inc ISL);
- Extension of a reference multi orbit constellation system(s) as evaluation framework
- Spectrum issues, FR3 sharing;
- Multi tenancy and end to end resource slicing capabilities across multiple tenants,
- Scheme versatility, beyond satcoms.

Q6: Concerning Strand B01-03-02 (Communication Infrastructure Technologies and Devices / Optical Networks and Photonics), do you agree on the Expected Impact and Scope description?

85% YES
(36 Yes, 6 No, 17
no opinion)

- Does it also support wireless infrastructure? **It is the main purpose to support the overall 6G network architecture. In draft Orientation on B01-03.02 the integration of optical and wireless systems is mentioned.**
- Energy efficiency shouldn't be restricted to 6G but apply also for fixed access networks and transport network. Easy to use passive optic (connectors..) should also be topic to develop optical LAN in SoHo and at home. **In the introductory part there is no limitation to 6G. However, in the expected outcome the 6G-architecture is mentioned. But 6G is the main purpose of SNS.**
- It is not clear why optical network technologies fall within SNS research scope. The interplay between 6G and optical needs to be better highlighted in the topic description. **In the introductory part to B01-03 it is explained that optical network technologies are an integral part of the 6G architecture.**
- 99.9% agree but propose small changes: 1)Outcome: "Integration (E.G. INTERFACING, IN-BOARD MOUNTING, ETC) of photonics and wireless systems including sensing AND SIGNAL HEALTH MONITORING." - Clarifies type of integr. activities. - Health monitoring needed to see if it works; **This suggestion appears to be too specific. The current text allows proponents to investigate this if they want to propose this.** 2) Scope: "Integration of wireless and optical and optical sensing as support for services INCLUDING SIGNAL HEALTH MONITORING." **Same as for the previous suggestion** 3) Remove "AND POTENTIALLY OPTICAL SPACE LINKS IN NTN SYSTEMS" since this is already in B1-3-1 **The bullet in scope only mentions the integration of space links, which are developed in other initiatives.**
- In photonics, it could expand to visible light wireless comms (e.g. LiFi and beyond) - not only to optical/wired comms. **The 6G-IA photonics workshop was concerned with LiFi due to a missing business model. Visible light communication is a special case of optical wireless and therefore implicitly included.**
- I'm not much sure about mentioning optical links for NTN in the scope of this strand, since this is pretty much more relevant for the other strand. Or at least (as mentioned in the answer in the previous box Q5), could be indicated in both stands **This is already commented above.**
- We suggest to clarify the wording when referring to "optical", "photonic" components or "photonics" as a discipline. We suggest to rewrite the last bullet point in the scope to make it understandable, maybe as "Impact of photonic systems in 6G energy consumption / sustainability". **This proposal can be accepted like "Impact of photonics systems on 6G energy consumption to support sustainability." This will be covered in the next version of the Orientation Paper.**
- I would have two project, of which one on Free Space Optical or Optical Wireless Communication, **The available budget only allows for one project. Otherwise, there would be too much fragmentation for RIA.**
- At "Scope" of this Strand B01-03-02, the sentence "and potentially for optical space links in NTN systems" should be removed. The Strand B01-03-01 already covers technologies and devices for NTN. Mixing NTN here, with the rest of the scope topics, generates weakness and less impact. On the other hand, some reference to, e.g., "power and signal monitoring" is missing, though it is relevant for quantum networking to assure adequate balance between quantum and classical channels over fibres. **This is already commented above.**
- Optical and radio converged architectures and resource scheduling mechanisms; **This specific topic is not explicitly mentioned. However, by the bullets on integration such topics are implicitly included and can be proposed. The text should not be too descriptive and too specific.**

Latest version of the Orientations for B-03-02

B-03-02: Higher Speed Optical Access Networks and future end-to-end Packet Optical Network Architecture in 6G

- Higher speed optical access networks and end-to-end packet optical architectures integrated and interfaced to the overall 6G architecture
- Integration of optical and wireless systems
- AI support of network automation
- Quantum networking over fiber
- Support of sustainability (low energy demands)

Q7: Concerning Stream B, Strand B01-04-01 (Reliable Services and Smart Security / Security Services), do you agree on the Expected Impact and Scope description?

88% YES
(39 Yes, 5 No, 15
no opinion)

- It seems to me that the scope addresses mostly 6G security and trustability. To develop new business model, 6G is expected not only be trustable but also to be a source of trust. 6G infra should be capable to support building trust between initially untrusted partners thank to the way 6G exchange and process information. I don't see 6G as a source of trust in the scope and outcomes **This topic can be incorporated as a secure service and on the security architecture.**
- In the scope the following two additional topics should be added: 1) Simple integration with external systems and infrastructures 2) Deployment flexibility, supporting isolated and temporal deployments, private deployments For both aspects all stakeholders have to be considered for providing end-to-end security: this covers the network provider side as well as the user (e.g. vertical) side and this should be reflected in the scope description **These seem to be covered by the “secure services” component.**
- Would prefer to merge the two subtopics into a single topic. **Separation allows the assurance that everything will be covered.**
- The strand should also include physical layer security . **The aspect is left to the proponents, but not centric in the call (see next answer).**
- This topic does not seem to support the continuation of work on “Physical layer security”, which is one of the conclusions of the April 2024 workshops. We suggest rewriting the outcome and scope of this topic to accommodate such line of work **Physical layer security depends on the physical layer, which is not the scope of B01-04. NTN 01-03-01 already includes it. B01-04 is holistic, does not preclude physical security.**
- Reliability and security should go hand in hand with inclusion, acceptance and sustainability. **Addressing holistic approaches allow for these aspects to be considered.**

Q8: Concerning Stream B, Strand B01-04-02 (Reliable Services Operation), do you agree on the Expected Impact and Scope description?

88% YES
(38 Yes, 5 No, 16
no opinion)

- The aspects on data privacy, AI (and AI data) privacy, data protection through custom and specific crypto (e.g. homomorphic encryption...) should be more explicit in the Scope. There are many other aspects that enable these privacy concerns and needs, as well, which could be explicit, as they tie closely to 6G architecture and HW choices (e.g. HW acceleration for dedicated crypto...). **B-01-04 covers privacy. AI privacy is not explicitly covered. B01-04-01 covers the other aspects**
- Now I see here some part of the trust aspect I was excepting from 04-01. However here I was excepting service reliability concern (i.e. mode of deployment and operation to warranty service reliability and availability) than trust question. Maybe we should clarify 'non trustable provider' because trust can have very different meaning. **B-01-04-02 would be expected to provide solutions along the concerns here, but the vagueness is precisely to allow differentiated proposals to be submitted.**
- The scope should not only be on the operation aspect of reliable services but also on technical approaches to provide reliable services from an end-to-end perspective. The security aspects in B-01-04-01 are taking care of part of it, but resilience as a whole needs to be addressed as well. **The text includes “fully resilient infrastructures and self-healing” already.**
- I am not an expert, but the Scope description seems too concise and generic. **It allows a diversity of approaches to be proposed.**
- Explicitly include cloud-edge-mist computing service provisioning, service migration among edge/mist instances, distributed computing. **The coverage of multi-stakeholders allows these aspects to be presented. But there is no clear consensus that they must be presented, will depend on the security architecture envisaged.**
- We would include QKD and reinforce the concepts of Security and Trust in the call text. **QKD is now ongoing, is not a challenge for 4 years from now (when the projects would be mature).**
- Enhancing O-RAN security and reliable multi-vendor interoperability **O-RAN is now ongoing, not for 4 years from now. Multi-vendor is in-scope.**

Latest version of the Orientations for B-04-01 an B-04-02

B-04-01: Smart Security / Security Services

- Secure 6G architecture, full life cycle service integration across multiple stakeholders
- Secure services and security services, secure policies
- Security evaluation, continuous security assessment (across the whole lifecycle)

B-04-02: Reliable Services Operation

- Automation and Intelligence in security operations
- Service development methodologies
- Novel instantiation methodologies for run-time dynamics
- Cooperative remediation of various type of failures/attacks
- Multistakeholder service auditing mec

Q9: Concerning Stream B, Strand B01-05 (Microelectronic – Front-End Module (FEM)), do you agree on the Expected Impact and Scope description?

91% YES
(32 Yes, 3 No, 24
no opinion)

Topic

- OK, but the microelectronics environment has already plenty of resources in HEU → **Few on this topic. Needed to link into Chips JU**

Structure

- Total budget for this strand increased and be split into several projects and categories like: FEM for high-frequency spectrum (mm-wave, sub-THz, ...) FEM for FR3-range (7 to 15 GHz with possible extension up to 24 GHz FEM to support FR1 and FR2 like scenarios → **This has been rationalised with priority on FR3 as expressed by industry. Complement in next phases possible.**
- Note that the total budget (12M) and the indicative budget (~15M) for this topic are mismatched and create confusion. Please address. In addition, FR3 prioritization should be made much more explicit. → **corrected**

Scope

- Worth exploring photonic integration for optics or quantum key distribution (QKD) → **this is an implementation issue that depends on the retained architectural solution. Call is not tech prescriptive.**
- Does the FEM include antennas? in any case, the integration of beamforming antenna with FEM should be enhanced. → **Yes, FEM includes antenna and beamforming. Highlighted.**
- When referring to SoC, it could be of interest for the community to develop RISC-V based architectures which might allow a more open market approach and that are addressed by numerous EC based SMEs → **it may be included as part of the implementation options, but should not be prescriptive.**
- Otherwise ok but the expected outcome and scope misses above 71 GHz work although it is mentioned in the specific challenges and objectives. We propose to add: “Heterogenous packaging concepts for full duplex operation and efficient heat handling for D-band and above frequencies enabling inherently scalable phased-arrays for > 100 Gbs wireless connectivity”. → **it is clarified that these frequency ranges are not part of this focused work.**

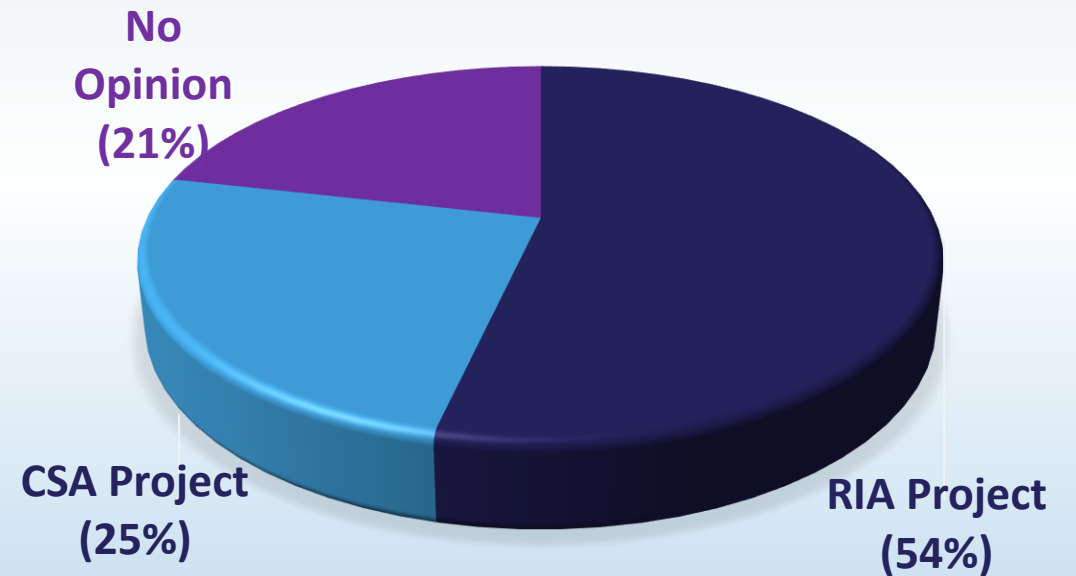
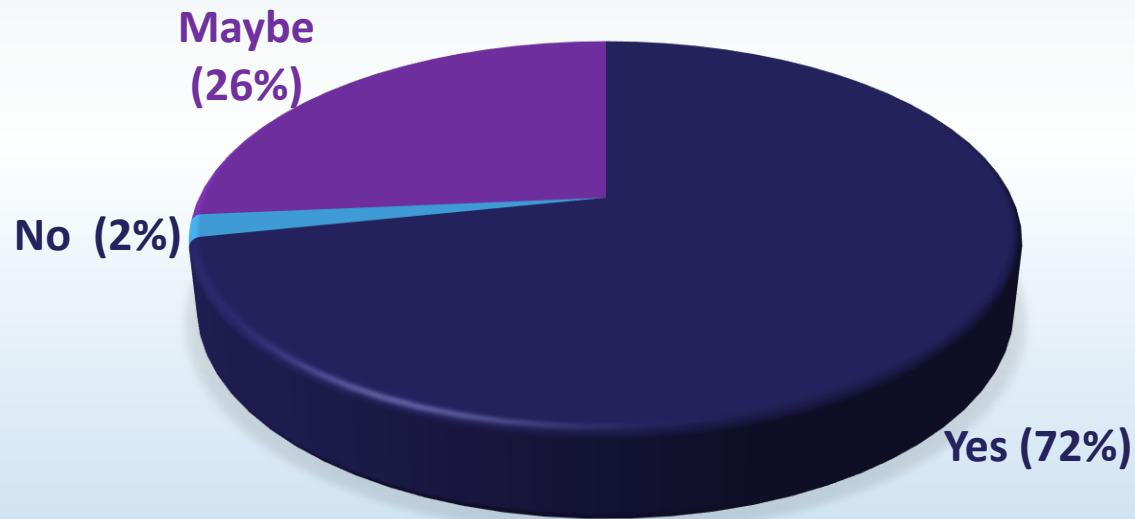
Latest version of the Orientations for B-05

B-05: Microelectronic – Front-End Module (FEM)

- Characterisation of FR3 Use cases, cellular (FR1) or FWA (FR2) like;
- FEM detailed design for FR3 Operations (7-15 GHz)
- 200 MHz channels, high capacity..performance capabilities close to those of ITU 2030 Framework Rec. ITU-R M.2160-0, energy savings
- Design including Digital, RF, beamforming, antenna, packaging; SoC technology capability
- Support of ICAS
- Planning for Pilot Line transfer (Chips JU)
- ML/AI for performance optimisation as appropriate
- Spectrum sharing, impact of design;

Q10: Concerning Stream B, Strand B01-06 (International Cooperation EU-US), do you agree on the interest to potentially include in the draft WP2025?

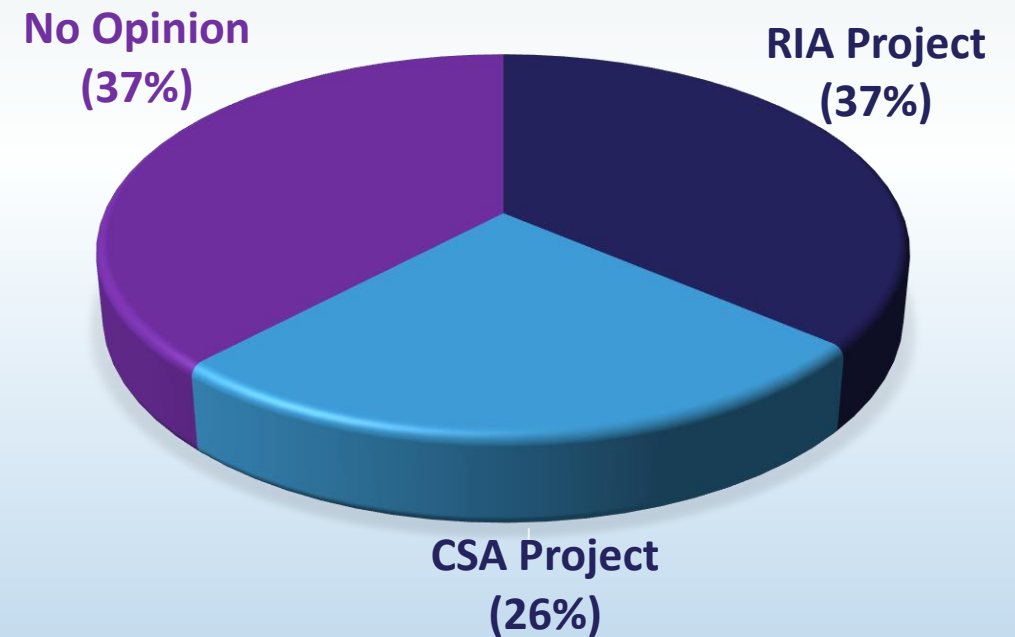
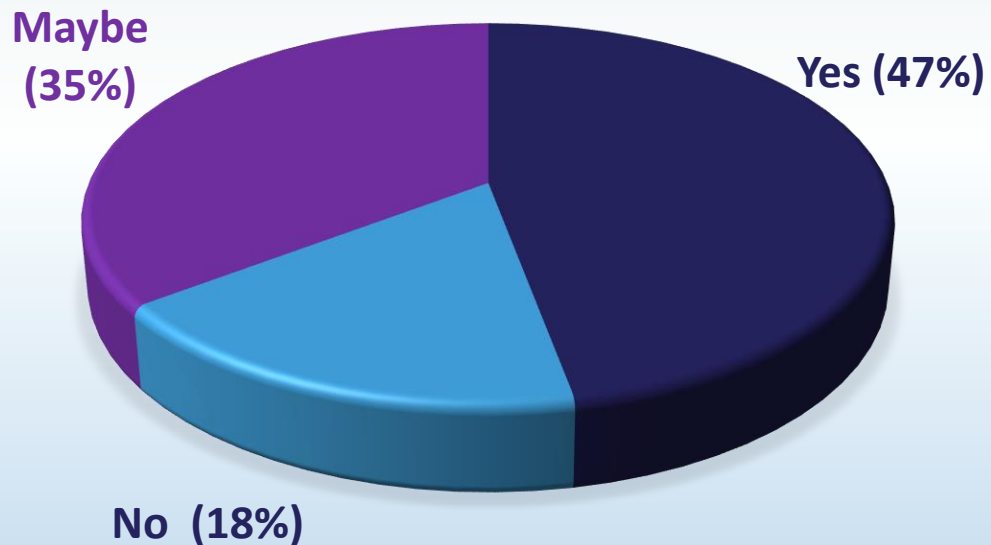
Q11: Concerning Stream B, Strand B01-06 (International Cooperation EU-US), if you agree on the interest to potentially include in the draft WP2025, do you think the project should rather be a Research and Innovation Action (RIA) project or a Coordination and Support Action (CSA) project.



No international collaboration in SNS R&I WP 2025

Q12: Concerning Stream B, Strand B01-07 (International Cooperation EU—IND), do you agree on the interest to potentially include in the draft WP2025?

Q13: Concerning Stream B, Strand B01-07 (International Cooperation EU-IND), if you agree on the interest to potentially include in the draft WP2025, do you think the project should rather be a Research and Innovation Action (RIA) project or a Coordination and Support Action (CSA) project.



No international collaboration in SNS R&I WP 2025

Q14: Concerning Strand C01-01 (SNS Telco cloud for 6G and Service Platform and Open Source), do you agree on the Expected Impact and Scope description?

87% YES
(39 Yes, 6 No, 14
no opinion)

- I agree with the scope; our comment is that only one 15M project for this might not sufficiently cover the targets; two projects, of 10M each if possible, could be preferable – **Having two projects providing alternative solutions will affect the expected impact for a pan-European solutions. In addition the maximum budget available for C01-01 is 15 ME, not 20 ME**
- I believe there are better alternative funding outside of SNS JU to cover this work. The budget is too big for one SNS JU project on this and at the same time will be too small to have a real impact on cloud. Lack of actual experimental platforms. **There are already 4 experimental platforms on various aspects. This topic is a clear and immediate need from the European telco sector. The target is to coordinate with other instruments. This has started to be synergized, including with IPCEI CIS and on-going EC HEU Cluster 4**
- Despite agreeing to the expected impact and scope it may be worth it to kindly reconsider the benefits of two two smaller projects in Stream C rather than a single bigger project as currently proposed in the SNS WP'25 draft. Two smaller projects may better cater to a diverse EU R&D testbed ecosystem, being more agile, easier to manage and potentially more efficient in terms of resource allocation than a single big project. **This project is not targeting on agility and different options but rather on impact on a pan-European level**
- As it is already known, alignment with IPCEI and Cluster 4 is mandatory, as well as a proper differentiation – **This is already considered**
- Explicitly mention distributed services, service migration and intelligent orchestration. **These topics are included – text has become more clear**
- We believe that Stream C projects could also build on top of previous results generated in Stream C. This is not mentioned in the text. **This is up to proponents to re-use results from phase 1 SNS Stream C projects on telco cloud.**
- ITRI advocates for sustained investment in large-scale experimental networks to advance 6G development and standardization. They stress the importance of international collaboration, particularly with Taiwan, a leader in ICT, microelectronics, and semiconductors, to accelerate progress. Call to Action: ITRI urges the EU to prioritize investment in experimental networks and strengthen collaboration with Taiwan to lead in 6G standards. **Point noted, but this project is focusing on telco cloud. A Stream C project on micro-electronics was in the call of 2024. Microelectronic is directly addressed in WP2025 / B01-05 FEM**
- A significant number of research infrastructure providers should be mandatory to develop synergies with European and national projects on e2e infrastructures **This is a valid point and it is up to the proponents to build the consortium. Having said that, the SNS is targeting on solutions that will be adopted by the European Industry**
- Stronger emphasis to already defined 6G end-to-end architecture validation and enabler integration. **Text was adopted accordingly**
- The topic could add explicitly “activities and links with EDIH network”, along with “develop Synergies with other [...]” as a means to disseminate the technologies, but also to gather requirements and objectives from stakeholders. The EDIH network is a tool for ensuring the impact and take up of technologies at EU level. EDIHs are focused on different technologies uptake by the SMEs: communication is an area that is linked to 6G, and also AI applications can be related to this topic. **This is an interesting suggestion. However the first step is to develop a European open-source solution on telco-cloud to be used by operators. During a next phase this solution will be also become available to SMEs via various tools like EDIH.**
- “In view of ensuring maximum take up of the validated technologies, proposals should include a significant representation of European players with strong demonstrated impact at standardisation level and the contribution to the relevant open-source activities.” – suggest to also adding global industry partners which is benefit for the global unified 6G consensus. **The formation of the consortium is left open to the proponents**

Latest version of the Orientations for C-01

C-01: 6G Telco Cloud and Service Provision Enablers

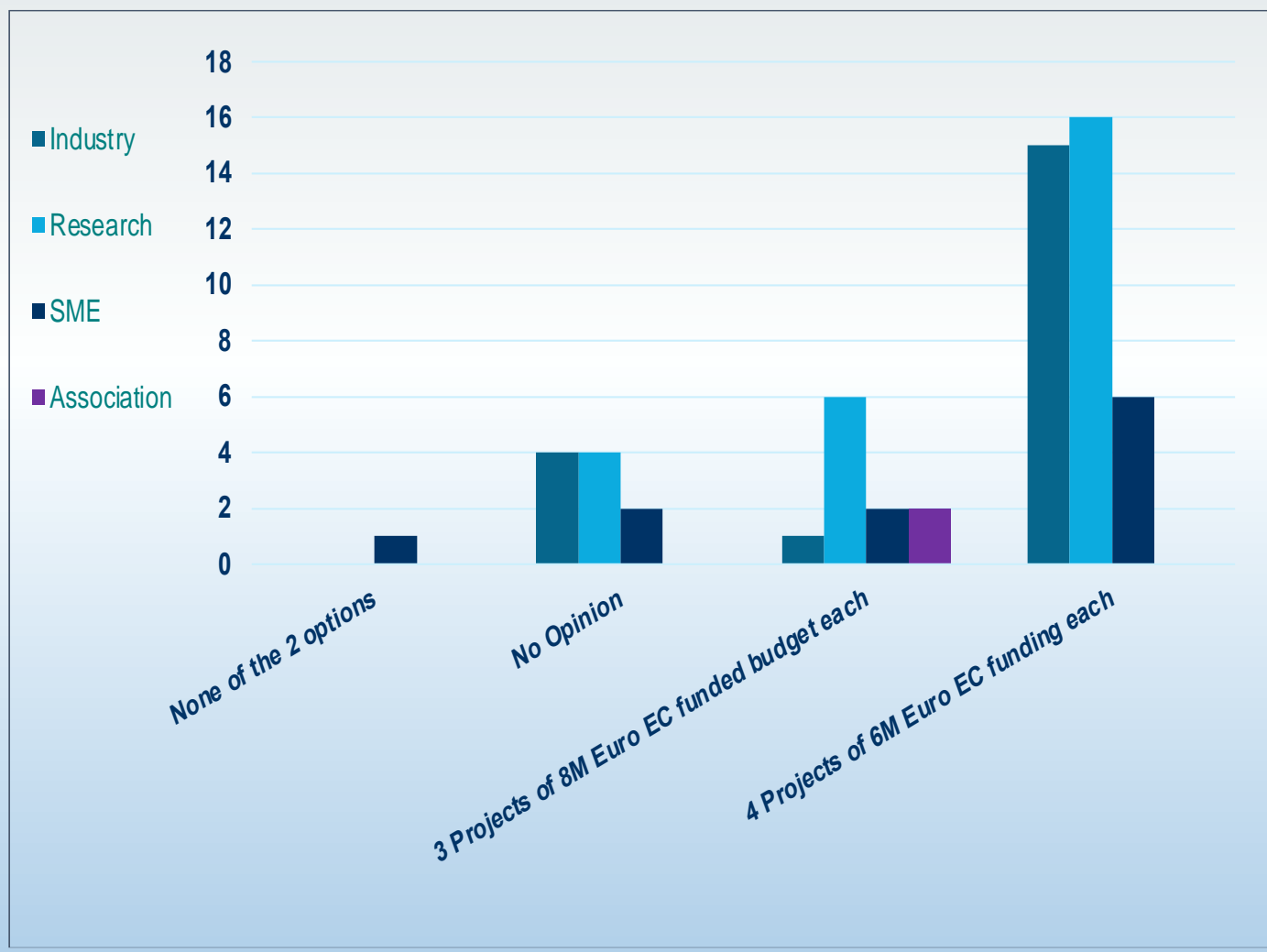
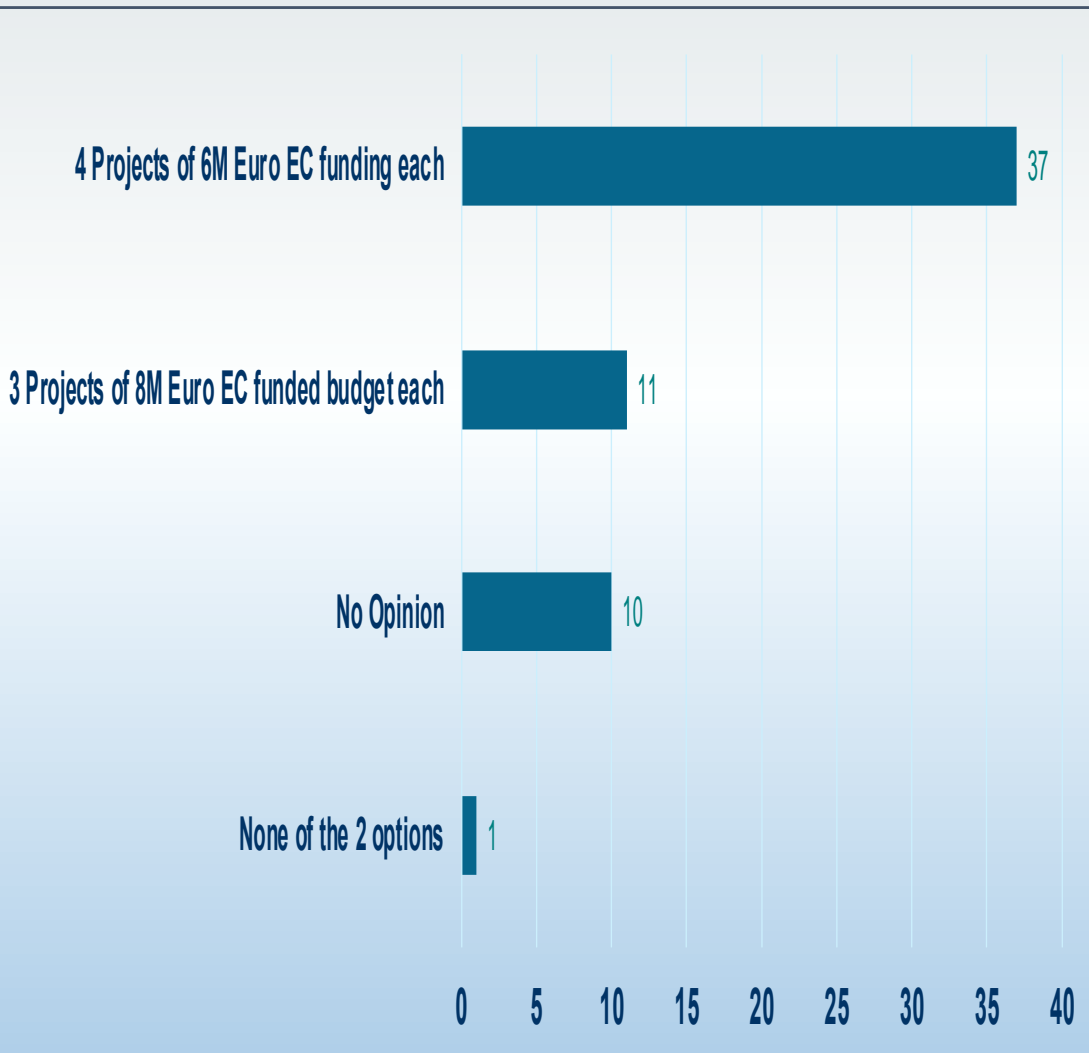
- Develop a 6G Service Platform (both network services and user services) and Telco Edge Cloud, including Far Edge and Near Edge integration, leveraging and influencing Open-Source developments.
- Develop 6G telco cloud solutions considering 6G technologies, features, and components at system or sub-system level,
- Target impact in standardization and eventually adoption at the market level.
- Efficiently support advanced 6G applications and use cases not already supported by current 5G and 5G Advanced systems while contributing to core KVI's, notably sustainability.
- Cloud native management of the platform and its telco applications.
- The platform should support AI native solutions.

Q15: Concerning Strand D01-01 (Trials and Pilots (T&Ps) with Verticals), do you agree on the Expected Impact and Scope description?

94% YES
(49 Yes, 3 No, 7
no opinion)

- 1) The project funding model should be RIA, since especially from a vertical context quite some research activities are in the focus and since this is comparable to Stream C activities. It is not exactly in the scope of the SNS to develop lower TRL solutions for verticals. Stream D projects target is still IA project as most of the work is Innovation and not Research, e.g. experimentation, validation... 2) There should not be a pre-defined dependency on Stream C infrastructures. The dependency is not mandatory as it is also not mandatory for the national initiatives. At the same time the overall spiral model of the SNS is designed to make use of results if these are suitable and desired 3) Trialling on private deployment scenarios should be more in focus and explicitly mentioned to be addressed **Included in draft V3.0.** 4) It should be pointed out more clearly that standardization activities could and should also be addressed in the projects **As for Streams B and C, Standardization opportunities are mentioned in Stream D in the introductory part, Expected Outcome and Scope and is for the proponents to select where their work can be submitted**
- When onboarding vertical stakeholders, it's advisable to set a minimum percentage for participation, such as ensuring that 40% of participants come from the same vertical. This approach is particularly beneficial for testing viable business models for various use cases. Additionally, this stream should include clear metrics to measure engagement with each vertical (it's not acceptable having a project with twelve partners and only 1 belonging to the vertical). **Addressed in draft V3.0 with each Project to be focused on 1 or maximum 2 Verticals and single center of gravity**
- Reference to IPCEI should be added, as in other Streams. Level of TRL should be slightly increased, being quite advanced in the process now.. Suggest to edit the description in this way "Viable business models and societal tangible impacts for innovative digital use-cases tested across various vertical sectors". IPCEI CIS is related to the telocloud Stream C only. **The proponents are free to choose any further synergies if this is desired. IPCEI CIS is mentioned in draft V3.0 as well as national initiatives**
- ITRI is convinced that scaling up Trials and Pilots (T&Ps) with Verticals, supported by a budget of 24 million euros, will yield substantial returns in technological advancement and market adoption. Taiwan, with its robust technological capabilities, strong industry partnerships, and active 6G national initiatives, presents a unique and valuable opportunity for collaboration. Leveraging Taiwan's 6G national initiatives efforts offers a strategic gateway to influence Asia. **This is open for the proponents how to form the consortium**
- Adding a scheme of Financial Support to Third Parties (FSTP) projects will ease the onboarding of stakeholders/SMEs and others, and adopt the solutions in the verticals. FSTP will support the validation of the 5G/6G solutions in the verticals, widening the impact and involving external stakeholders, which can test and involve these solutions in their common portfolio. Projects' business models can engage the FSTP users for maximizing the impact of the implantation of 5G/6G technologies. **FTSP presents benefits but also increased administrative burden. This is not targeted to include Open Calls in WP2025 with projects of 6 ME funding. Open Calls may be further considered in draft WP2026 and WP2027**

Q16: Concerning Strand D01-01 (Trials and Pilots (T&Ps) with Verticals), knowing that Stream D projects will include work for adaptation of SNS Stream C platforms or/and platforms from national initiatives, do you prefer



Q16: Concerning Strand D01-01 (Trials and Pilots (T&Ps) with Verticals), knowing that Stream D projects will include work for adaptation of SNS Stream C platforms or/and platforms from national initiatives, do you prefer:

- Each project should solely target one vertical. **The target will be to address 1, maximum 2 Verticals, with center of gravity on 1 specific Vertical**
- Each project should focus in one of the four priorities. Adding a second vertical in the same project could provoke deviation of this goal. **The target will be to address 1, maximum 2 Verticals in case of existing commonalities/complementarities between the 2 verticals. If addressing 2 verticals, proponents should clearly indicate the center of gravity**
- We propose the selection of more projects with less funding, e.g. 6 projects of 4M euro each. From our experience, larger consortia are facing larger coordination issues, while, on the other hand, smaller consortia can focus more easier to specific subjects and bring more valuable results. **The orientation will be indeed 4 Verticals projects of 6 ME EC funding**

The focus of the WP2025 is to have impactful results for verticals. Serving multiple verticals in SNS Call 2025 (6 ME funded Projects) cannot attract/engage key vertical stakeholders or provide promising solutions to be used after the completion of the project. See also Q18 results. **As captured in draft V3.0 "While in previous WPs we focused in assessing widespread technology usage with the coverage of many verticals under one project, in this WP2025 we rather aim the in-depth study of existing (potentially single) vertical pain-points to adopt 5G advanced and 6G solutions with the ultimate target that the produced solutions will have a very high prospect to be used by the vertical sector in the near future"**

Q17: Concerning Strand D01-01 (Trials and Pilots (T&Ps) with Verticals), do you agree on the orientation to include Platform(s) work for adaptation of SNS Stream C platforms or/and platforms from national initiatives inside the Stream D project?

93% YES
(41 Yes, 3 No, 15
no opinion)

- C platforms should be utilised where suitable and feasible. The use of existing platforms should not be mandatory or a condition for participation. If an existing platform is suitable and well developed it will certainly be used. However, no consortium should be forced to utilise an existing platform if the use of this platform could cause additional costs or the need for additional development. This would put a financial burden and a time constraint on future projects. **This is the key principle of the draft text. However, Stream D projects shall not engage totally new Platforms work/development, targeted to be funded inside the project. As captured in draft V3.0 “Where relevant, the projects should aim to take advantage of developed platforms and/or elements from previous SNS Stream B, C and D projects, and if needed, up-grade them to keep them operational for next SNS phases, as well as platforms developed in the context of national initiatives or any other EU based solutions that integrate and offer preliminary 6G network solutions.”**
- Yes but such adaptation should represent only a very reasonable part of the overall project cost. **This is the key principle of the draft text, it is open to the proponents (see related point above)**
- There should not be a pre-defined / mandatory dependency on Stream C infrastructures or other initiatives. Of course making use of existing infrastructures is appreciated but should not be mandatory, since this would restrict the opportunity of trialing private deployment scenarios. **This is the key principle of the draft text (see related point above)**
- This a critical activity for the sustainability of the SNS Work-programme. Probably a Work-Package dedicated to this activity is needed. **This is left open to the proponents**
- STREAM D should be fully devoted to use cases and trials. A lot of SNS previous projects and resources have been devoted to generic "platforms". Hybrid projects platforms/trials will not add any value to SNS goals. **According to the current draft text this is open to the proponents. As captured in draft V3.0 “The focus for Stream D projects should be on the experimental validation and the support to monetize 6G services and applications for Verticals.”**
- All previous Stream D tried to develop their platforms, so reuse and upgrade as the first option should be mandatory **According to the current draft text it is fully open for the proponents to use any available platform if so desired**

Q18: Concerning Strand D01-01 (Trials and Pilots (T&Ps) with Verticals), do you agree on the orientation to target 1-2 (maximum 2) Vertical Sectors per Stream D Project?

94% YES
(51 Yes, 3 No, 6
no opinion)

- 2 verticals per project preferred. 6G should be an infrastructure across domains. Focusing only on one vertical domain will not allow to identify commonalities across domains. **The target will be to address 1, maximum 2 Verticals, with center of gravity on one specific Vertical**
- More vertical sectors per project shall be allowed, otherwise potentially limiting consortia constitution. **Target is maximum 2 Verticals considering both the maximum 6 ME funding and the targeted higher impact / engagement from Verticals stakeholders**
- It is advisable to not spread too thin in scope given an indicative budget of 6M. Rather 1 topic only would be best, but in some cases, e.g., manufacturing + logistics, it may be that same solutions may be well replicable in addressing problems cross verticals (max. 2) with a meaningful integration or complementarity. **The target will be to address 1, maximum 2 Verticals in case of existing commonalities/complementarities between the 2 verticals. If addressing 2 verticals, proponents should clearly indicate the center of gravity**
- 1 vertical maximum per project with clear engagement from the verticals. Stream D projects should be clearly led by industrial partners. **See previous point above. Concerning Consortia, this is up to Proponents to define their project consortia**
- As indicated above, the verticals should be added not only on the basis of the business, but also referring to the potential societal impact they could have working on 6G. **As captured in the draft V3.0 "The focus for Stream D projects should be on the experimental validation and the support to monetize 6G services and applications for Verticals.", "...targeting tangible sustainability results (in terms of societal, business and environmental aspects).", "Special focus on targeting and achieving, tangible results for environmental, societal and economic aspects by the end of the project..."**
- Defining only 1 vertical may help the evaluators. Adding a second one could create doubts. **See previous points above**
- I strongly support restriction to 1 vertical sector from the 4 proposed. **See previous points above**

Q19: Concerning Strand D01-01 (Trials and Pilots (LST&Ps) with Verticals), do you agree on the orientation to prioritize the following Vertical Sectors in WP2025 Stream D: Industry/Manufacturing, Media, Transportation/Logistics, Emergency and Safety Services and Health?

78% YES
(40 Yes, 11 No, 8
no opinion)

- Mobile Broadband services for mobile operators, the most popular service by far, should be considered. As captured in draft V3.0 “The proponents should select their targeted vertical sectors according to the project objectives and use-cases, considering the vertical priorities for (1) Industry/Manufacturing (including robotics), (2) Media (including gaming, broadcasting...), (3) Transportation/Logistics, (4) Emergency and Safety Services and (5) Health (indicative order not prioritized).”
- Yes with specific targeted up-dates/grades: Industry/Manufacturing is one key priority. “XR technologies and multimedia” and “industrial digital twin” use-case shall be explicitly included in the Scope of Strand D01-01 Projects. Definition of the 5 Verticals Priorities (see related point above). XR and multimedia and Digital Twins clearly expected to be addressed in Proposals, this will be up to Proponents
- To me there it too many prioritized vertical sectors. It seems to me that Media is the one that could be removed. Media is clearly one of the top targeted for 6G, as also acknowledged in the first 6G-IA Members Consultation
- the energy context is missing (energy distribution, energy generation, etc.). The selection was made based on the results of the previous consultation
- Given the new capabilities that 6G promises, the industry, manufacturing, and media sectors should be clearly targeted. More in-depth definitions of the targeted verticals are probably needed – media may be “ gaming, broadcasting...”. Definition of the 5 Verticals Priorities (see related point above).
- We would widen the scope to CCAM where 6G can become an enabler for the emerging software defined vehicles. CCAM is not prioritized in WP2025. Transports/Logistic is included CCAM to be further addressed for potential inclusion in draft WP2026 / WP2027
- We should make special efforts in Manufacturing because of business possibilities in this vertical. The selection was made based on the results of the previous consultation. Definition of the 5 Verticals Priorities (see related point above) is including Manufacturing
- Include agriculture, possible instead of industry/manufacturing. The selection was made based on the results of the previous consultation
- Smart Cities and Smart Communities are yet and will be important verticals, would like to see also them included. The selection was made based on the results of the previous consultation
- Media should be prioritised to get the more from the funding. The regulation and technical barriers in the media sector are more flat while the requirements are still challenging enabling the projects to focus on interoperable solutions and technologies. Some verticals imply to invest time and effort in handling integration, regulation and stack singularities. The selection was made based on the results of the previous consultation. Definition of the 5 Verticals Priorities (see related point above) is including Media
- Should add Robotic as one of the important use cases for 6G. current Hexa-X-II only consider the industrial robotic. Whereas, future common cerial usage wide area robotic is also very promising. Definition of the 5 Verticals Priorities (see related point above) is including “Industry/Manufacturing (including robotics)”
- I would expect more on use of next generation networks and services to address major environmental challenges This is a de facto topic for all verticals

Latest version of the Orientations for D-01

D-01: SNS Trials and Pilots (T&Ps) with Verticals

The projects are expected to cover at least:

- Demonstration of clear benefits for a limited number of verticals (i.e., 1 or maximum 2 verticals per project) with stakeholders of the considered 5G advanced / 6G technologies and architectures in terms of innovative 6G smart networks and services addressing multiple aspects (e.g., scalability, security, resilience and performance improvements) in line with medium to long-term diverse socio-economic scenarios
- Special focus on targeting and achieving, tangible results for environmental, societal and economic aspects by the end of the project

The applicants should select their targeted vertical sectors according to the project objectives and use-cases, considering the vertical priorities for (1) Industry/Manufacturing (including robotics), (2) Media (including gaming, broadcasting...), (3) Transportation/Logistics, (4) Emergency and Safety Services and (5) Health (indicative order not prioritized). The afore verticals to be considered should be in line with the European view on 6G use-cases that were presented during the 3GPP SA1 Workshop in May 2024. The projects are expected to focus on specific verticals sectors (one or maximum two verticals per project, in the case of existing commonalities/complementarities between the selected two verticals; nevertheless, if addressing two verticals, applicants should still clearly indicate the centre of gravity, i.e the main vertical of the project, for evaluation purposes)

Q20: Please capture below your key feedbacks and perspectives on WP2025 and Calls structuring (also potentially including perspectives related to Phase 1, Call 2023 and Call 2024 structuring and return on experience). You may include any further points that you would like to address for this second consultation that is not covered by the above questions?

- If we were to aim at major mass events such as Olympics or similar popular events for presentation of 6G technology to the public we would repeat the 5G mistake committed in Seoul. 6G will not be ready by 2028 and the industries would get further under pressure. This might cause a premature presentation of 6G technology and a subsequent prolonged development and dissemination phase. **Valid point – open to the proponents if they think this would be feasible**
- We tend to see budget for Stream C a bit scarce; 2 projects of 10M - 12M, if possible, would help to reach better the purpose. **Addressed in the replies in the previous slides**
- Increase the pressure for projects in Stream B to leverage the effort done in Stream C and D. This can be done by forcing Stream B applicants to reserve a budget to work on these platforms when the selected proposals have been announced. **An interesting proposal but is challenging to integrate novel solutions while developing them**
- "6G-IA SNS Office effort in coordinating the SNS activities is highly valued. A full picture of the SNS portfolio including Phase I and Phase II (especially the ones granted in SNS '24) projects would be additionally appreciated alongside the summary and discussion around the second consultation for WP2025. Kindly consider that without any meaningfully detailed background previously provided in the SNS draft WP'25 the feedback to Q10-Q13 might be superficial." **There will be an event to present the newly retained projects**
- "Concerning Q18, 1-2 Verticals Sectors per project should be kept and not reduced to 1 Vertical Sector per project, as work on cross-Sectors synergies is also important. Industry/Manufacturing is one key priority. "XR technologies and multimedia" and "industrial digital twin" use-case shall be explicitly included in the Scope of Strand D01-01 **WP2025 now allows up to 2 Projects**. Concerning B01-01 or/and B01-04 and Quantum / Challenges to build quantum networks with quantum repeaters (quantum internet). The challenges to be addressed are twofold: (1) in hardware, develop the right technology to build the future quantum repeaters (quantum memories, entanglement swapping, light-to-matter and matter-to-light qubit transduction) and (2) in software, develop the right quantum network protocol stack. **The suggestion was considered but could not be supported as there were more topics than available resources**

Q20: Please capture below your key feedbacks and perspectives on WP2025 and Calls structuring (also potentially including perspectives related to Phase 1, Call 2023 and Call 2024 structuring and return on experience). You may include any further points that you would like to address for this second consultation that is not covered by the above questions?

- "Overall, Open Fiber welcomes the approach of the draft WP2025. In particular, we appreciate the focus on sustainability. We recommend prioritizing the following topics, which we consider strategic for reaching green and digital transition, ensuring a more resilient, competitive, inclusive and democratic European:-Advanced IoT technologies,sensing and connectivity technologies and architectures;-Advanced architecture systems and technologies with reference to optical packet networks;-Communication Infrastructure Technologies and Devices with reference to photonics and the increasing role of optical networks;-Higher Speed Optical Access Networks and future end-to-end Packet Optical Network Architecture in 6G;-Smart networks and services experimental infrastructure with reference to edge/far edge.Finally, we suggest to ensure adequate resources to finance such areas and to prioritize projects which have a high innovative content and that may be easily replicable." **the proposed areas are inline with the scope of the WP2025**
- I fully support the note about doing project selection not only in order of ranking but also in considering that each of the mentioned critical topic / vertical sector will have to be covered. **Thank you for your feedback**
- "1) A missing topic of the programme is the testability of 6G components and solutions concerning standard conformity: even if modularity is already in 5G a major focus in technical developments and standardization, there is a general approach missing to verify to which extent existing solutions are compliant to the standard. Research needs to be done on how to proceed here most efficiently so that the upcoming 6G modules are for sure compatible. **This is a valid point but as the SNS is an R&D Programme, it is not always feasible to test conformity to standards, as these usually come after the completion of projects.**2) It should be more prominently positioned and explained that the general approach from 5G to 6G needs to be evolutionary (not revolutionary): this means that in any case an upgrade from 5G to 6G should be possible without hardware exchanges. This is major sustainability requirement from environmental and financial (securing the invest in 5G) perspectives. Just to clarify: this does not mean that no revolutionary technologies may be developed, but in any case the smooth and low-effort migration path from 5G to 6G should be kept in focus" **The SNS is an R&D programme where various solutions are developed and evaluated. In some cases e.g., FEM HW is needed, whereas other solutions focus on software**

Q20: Please capture below your key feedbacks and perspectives on WP2025 and Calls structuring (also potentially including perspectives related to Phase 1, Call 2023 and Call 2024 structuring and return on experience). You may include any further points that you would like to address for this second consultation that is not covered by the above questions?

- "Here are general topics for your kind consideration:* The exploration of quantum technologies under Strand B01-01 (Disruptive Technologies for 6G) should be targeted somehow. Especially for exploring routing and entanglement control, or using teleportation to improve effective bandwidths, seeking quantum-classical convergence in telecom networks. **These topics not mentioned explicitly due to insufficient resources.** The development of training models requires data infrastructures. In that sense, the topic for Strand B01-01 (Disruptive Technologies for 6G) ""New architectural solutions targeting the simplification of the architecture"" could be best emphasize with the creation of ""Data-oriented environments for the development and evaluation of deep learning models"" as well as ""the development of new data-intensive services in support of distributed and collaborative AI.""* **AI for RAN included now in B-02** To reduce oversubscription in Strand B01-02 (Wireless), kindly consider to fund 3 projects instead of 2 (6 Meuros per project, instead of 8)." **The proposal was considered and implemented.**
- Just to enforce the message on the 3C and the Stream C. There are concurrent initiatives, in HEU Cluster 4, in DEP, in IPCEI, and the clear risk is that this Stream C proposal will be in hard competition, or will gather a level of interest which is not acceptable. Maybe it should be differentiated clearly, talking with the owners of the other calls. E.g. allowing more deployment-oriented mode in the other similar calls. **There are already ongoing discussions to address this point. The current narrative should be stable now.**
- The draft of the WP2025 looks generally good to me, at least for the parts concerning my knowledge/experience. I do not have additional feedback with respect to what expressed in the previous comments. **Thank you for your feedback**
- Some topics are being addressed by 2023 and 2024 projects, so it would be interesting to identify which expected outcomes are already being addressed and which need more attention (and prioritise the latter). **A gap analysis is being performed already considering all calls and the recently retained projects**

Q20: Please capture below your key feedbacks and perspectives on WP2025 and Calls structuring (also potentially including perspectives related to Phase 1, Call 2023 and Call 2024 structuring and return on experience). You may include any further points that you would like to address for this second consultation that is not covered by the above questions?

- I wonder whether the technology 'deception MTD' mentioned page 6 of the WP is an European concept or maybe it is known by different names in different places **this was a mistake: we meant to refer both to deception techniques and MTD. Text was adjusted.**
- "B 01 01 Why are disruptive projects focussed on IoT? there are other disruptive topics eg in physical layer waveforms. The technologies in unlicensed band should be extended to UHF and address mm-waves up to THz. Backscattering sensing (including mapping, R-SLAM) should be added. RIS technologies and future evolutions are not present. Same question in Stream C, there are issues for connexion between antennas and RF front-end that could be addressed. Physical layer security is an important topic that should be dealt with in B 01 04." **IoT was previously only under B-03 (not in WP2025) and is one of the topics with less coverage in the SNS. Topics related to wireless are covered in B-02. Stream C is mainly focusing on telco-cloud**
- "1) Given the oversubscription level of STREAM-B-01-02: Wireless Communication Technologies in past calls, it would be more than advisable to allocate budget for one additional project, for a total of $3 * 8 = 24$ Meuro 2) Additional topic for Strand B01-01 (Disruptive Technologies for 6G): see topic statement in answer to Q3. * Topic: Analog distributed computation for data aggregation, coding and fed. learning in beyond 6G RAN. * Scope: New distributed computation and communication paradigms that exploit the superposition principle of electromagnetic waves by letting signal addition be performed directly over the wireless medium, instead of by digital post-processing, this potentially resulting into reduced latency and increased reliability in long-term releases of 6G radio access networks." **3 topics are now allocated for B-03**
- "Given the fact that the projects selected from WP25 are going to start in Jan. 26, i.e. with Phase 1 projects concluded and Call 2023 project entering their last year, probably clearer expectations on how available results will be exploited would allow for a better programme continuity and eventually for making the projects more ambitious and further feeding the European 6G vision. Moreover as we move on in the last phases of SNS, the border between streams B and C is going to be thinner and thinner since stream B projects are expected to reach higher TRL and produce meaningful PoCs. As such, how is the in-out chain between Streams B and C (and possibly also D)?" **The overall framework structure is presented in the introductory part of the WP**

Q20: Please capture below your key feedbacks and perspectives on WP2025 and Calls structuring (also potentially including perspectives related to Phase 1, Call 2023 and Call 2024 structuring and return on experience). You may include any further points that you would like to address for this second consultation that is not covered by the above questions?

- "Stream D; if a project has to be selected for each vertical, then a subcall must be set out for each vertical; evaluations and rankings must be respected. Page 13 of the draft document; NOTE 4 says "Note 4: AI/ML open data sets to be made available through a common repository that may be openly accessed and used by SNS projects over the programme lifecycle.". It should also consider the use BEYOND the SNS programme **The Programme ends in 2031**. The application of AI must not be only limited to "Deep Learning", but also consider other techniques, such as Machine Learning, NLP (for consideration of LLMs), Genetic Algorithms, etc. This comment applies to the entire draft proposal, given that the term "deep learning" seems to have been used as an equivalent to AI, which is not accurate and leaves apart many AI techniques. **The spirit of the text is not to restrict research to DL only but encourage research AI in general. It is open for the proponents to organize the participation of the verticals.**
- "ITRI proposes allocating the WP 2025 budget for EU-Taiwan collaboration, similar to EU-US collaborations. The goal is to achieve global standardization and develop inter-regional synergies through cooperation in 6G equipment development. Building on the Horizon 2020 success with four EU-Taiwan joint projects, we emphasize the strong research and industry complementarities between the EU and Taiwan. This collaboration presents a win-win opportunity, particularly in 6G chip design, microelectronics and production. ITRI advocates for sustained investment in large-scale experimental networks to advance 6G development and standardization. They stress the importance of international collaboration, particularly with Taiwan, a leader in ICT, microelectronics, and semiconductors, to accelerate progress. Call to Action: ITRI urges the EU to prioritize investment in experimental networks and strengthen collaboration with Taiwan to lead in 6G standards." **There will be no INCO in WP 2025**
- "We consider that the current WP2025 draft provides a correct structure and direction as its topics are more open than in previous calls, but at the same time, current research challenges are targeted to adapt new technologies and solve existing drawbacks of 5G." **Thanks for your feedback**
- The calls are often too optimistic about new wireless technologies' maturity. Verticals are still exploring how to integrate 5G into their operations, hence, it doesn't make much sense to explore how 6G would be used by verticals yet. That can wait another 3-5 years. The essential things is to integrate technology components into testbeds and demonstrators, and to solve issues that might now appear in the standardization when we know more about which aspects that are practically useful. **Valid point currently covered under the scope of the different streams and strands.**

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- Autonomous driving will not be able to integrate the necessary digitalization and required technological applications (AI, digital twins, real-time communication, big data) without close networking between vehicles and associated operational control centers without 6G technology in order to enable smooth traffic flow. It is necessary that suitable public platforms are made available that provide the necessary potential. **This is a valid point but there was a dedicated call in WP2024**
- In the call 2024, the 6GStorm project ended on the reserve list. This project was the only project addressing 6G Core aspects. 6G core/cloud is clearly a crucial aspect (see now the C-01-01 stream). Would be great if a way was found to still arrange funding for 6GStorm. **Under the SBA and the HEU regulations this is not possible**
- There is no CSA identified. Should there possibly be one addressing the need to prepare for standardisation, e.g. seeing to (or minimum encouraging) that outputs from across the SNS JU projects will make its way to ETSI and 3GPP. There is likely a need to put a structure and organisation for how the results are entering the standard bodies as to avoid potential inefficiencies and confusion. The CSA will naturally be a liaison between SNS JU, 6G-IA and ETSI/3GPP. **the possibility of a CSA to make a standard emerge will remain limited. Standards in the mobile communication context are defined by industry contributions, not by project contributions. Hence, a CSA is useful to stimulate actors to bring their results to standardization bodies, but the actual work eventually rests with industrial willingness, actions, and prospect for valorising their work through IPR Coordination for standardization under analysis in the SNS Policy Strategic WG**
- "Reusing previous efforts in e2e infrastructure should be a priority in all the topics. Allocation of budget to create new experimental platforms, facilities or tools should be clearly justified in the proposals. Open calls in Stream D should be avoided. There are enough proposals in call 1 and call 2 to identify new requirements & applications. Now we should focus in demonstrating real improvements and impact in the four selected verticals with strong consortiums. From previous experience, I suggest to reduce the number of sites for experimentation to save budget and focus on a reduce number of locations per stream D. Even a single location with a good representation of European stakeholders would work properly" **Interesting points already answered. This is well in line with the current approach to reduce the size and scope of Stream D projects**
- As indicated at the document, taking advantage, where applicable, from already developed platforms or elements from the SNS previous Phase 1 & Phase 2 projects is desirable, providing a path for TRL improvement towards exploitation. **Interesting points already answered**

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- "The calls that have 70% payment (and 30% are from own resources/Bouget) is forbidding to small SMEs to participate. We are experiencing this difficulty in two projects we are in. There is no way the company can match up to the total expenses. Also, the condition that the company cannot charge with some reasonable cost (as we do our customers, when we lend them equipment) for the use of equipment we have purchased via previous EC research projects, creates an additional factor of difficulty to manage to continue work on R&D projects." **This is a valid point but 70% is the upper threshold of funding in HEU for IAs. The SNS has (compared to the other JU) the highest possible funding rates**
- Concerning Strand D01-01 (Trials and Pilots (LST&Ps) with Verticals), from previous WPs, with specific verticals, it can be of use to widen the scope including new or "open" verticals for applications; there are some areas that can be related to the proposed ones but are more specific and the pilots could get more impact. **Point already addressed in previous answers**
- Stream B 01 and Stream B 02 calls should include calls that specify the expected outcome in high-level (i.e., energy/resource usage improvement in radio access), rather than very specific topics, e.g., mimo algorithm/waveform design; so that the applicants can come up with innovative solutions that really matter for 6G but are not foreseen in the call. **Interesting proposal but one needs also to consider how to evaluate the proposals in practice when the topics can vary a lot**
- "I strongly disagree with the following "grants will be awarded to applications not only in order of ranking but at least also to one project that is the highest ranked within each of the above priorities". This introduces a high degree of randomness (and hence risk) into the process." **This suggestions is to safeguard a better coverage of topics**

Q20: Please capture below your key feedbacks and perspectives on WP2025 and Calls structuring (also potentially including perspectives related to Phase 1, Call 2023 and Call 2024 structuring and return on experience). You may include any further points that you would like to address for this second consultation that is not covered by the above questions?

- "Which stream of the 2025 SNS JU WP would be devoted (if any) to deal with testing of 3GPP Rel.19 solutions? Stream D-01-01 might be the place where such solutions could be tested, shouldn't such mention be directly added as scope or outcome there? It might be worth to consider to address seamless integration of NB-IoT (4G) solutions towards the 6G network architectures (i.e. to assure continuous evolution path). The B-01-03-01 - should re-consider two streams of work a) high level integration but also b) more lower level aspects (research challenges) to be resolved for properly addressing integration challenges. We suggest that upgrades of FRMCS standards towards keeping up with the 6G modernizations should be reflected in either scope/outcome of relevant calls of WP2025 SNS." **Potential synergy for FRMCS with RAIL JU – but requires more time**
- Concerning Strand D01-01, I believe that the orientation should also include Platform(s) work for adaptation of Previous SNS Stream D platforms, since they also created platforms and testbeds for 5G Advanced **the key point here is *ADAPTATION* work. This idea is already included,**
- The call may include topic of Generative AI use for dynamic creation of code for 6G Software defined radios **Code development itself is not a research topic by itself. Proponents are free to use tools of their choice (incl. GenAI) for their projects work.**
- 1) We have strong concern on the "Protection of European Communication Networks as EU policy objective" chapter. It is neither no clear guidance on how to follow "restrictions for the protection of European communication networks", nor the details on how to evaluate it. There is also no EC law for the evaluation of the security in the EC research framework, including the SNS JU projects. Suggest to remove this chapter. **This chapter is introduced from the public side and according to the rules of the SBA and the HEU regulations. More clarifications are expected from the public side.** 2) For Stream B, should add Robotic as one of the important use cases for 6G. current Hexa-X-II only consider the industrial robotic. **The areas have been selected from the previous consultation.** Whereas, future commercial usage wide area robotic is more promising. 3) For cooperation: suggest to consider more the cooperation with industrial associations like 5GAA 5GACIA, which are important position to provide commercial use case and requirement. **This cooperation is open for the proponents** One potential way is adding industrial association to the consultant process, adding them as advisor in the project.
- We must ask each and every consortium to explain clearly how their work will contribute to address sustainability and societal concerns via elaboration and contributions to specific Key Value Indicators and Key Sustainability Indicators. Also, what about multi-disciplinary approaches: it should be more stressed. **This topic is evaluated for several streams and strands**