ASSOCIATION OF EUROPEAN
SPACE RESEARCH ESTABLISHMENTS

ESRE recommendations for the DG DEFIS – ESRE workshop on "Space Challenges for EU"

Provided by ESRE

The Association of European Space Research Establishments, June 2023

Foreword

In June 2022, DG DEFIS and ESRE had a first meeting on the next Space Challenges for the European Union.

At the end of the meeting, DG DEFIS and ESRE agreed on having further occasions to exchange point of view. Specifically, DG DEFIS encouraged ESRE to provide views and advice on the EU priorities players, in particular as to

- Secure Connectivity Programme
- New Space
- Space Situational Awareness and Space Traffic Management

In a later stage, the Commission also set two further topics as priority, as to

- Synergies between space and defence – implementation of the EU Space Strategy for Security and Defence
- The new Strategy for EU Space R&I

With regard to the above topics, ESRE means to provide its comments and recommendations on how Europe can improve its innovation capabilities, with a view to the existing and the future EU space-related programmes, and hopes that this contribution will prove to be helpful not only for the further Strategic Planning based on the future new Strategy for EU Space R&I, but also for the selection of possible topics for future collaborative R&D as well as for topics for future road-mapped-based R&D.

With the current paper, ESRE confirms its full commitment to support the European Commission in implementing its strategy, offering the point of view of the Research side, in consideration of the neutral role played as an association of public research organizations.

ESRE
The Association of the European Space Research Establishments — ESRE — was formally established in March 2016 as an international non-profit organisation. Present member organisations of ESRE are the national space research centres CBK (Poland), CIRA (Italy), DLR (Germany), INCAS (Romania), INTA (Spain), NLR (Netherlands), ONERA (France) and VZLU (Czech Republic).

Through ESRE, these national space research centers strengthen their cooperation and propose European Research and Development (R&D) actions to advance science and technology both to support the competitiveness of the European space sector and to address the grand societal challenges.

https://www.esre-space.org/

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I. Innovation, New Space, IRIS² (as a flight opportunity) and the role of ESRE and RTOs

1. Innovation Policy

In order to stay competitive, Europe has to improve its innovations capabilities, e.g. provide more possibilities/incentives for innovators, shorten innovation cycles, and lower the bureaucracy and related costs involved in innovation processes.

The Commission is very well aware of this need and has been tackling this issue via a variety of instruments, in particular by redesigning the research framework programme to its present "Horizon Europe" form, which also features a dedicated innovation pillar.

With regard to the European space effort, competitive pressure, in particular coming from the US, has been particularly strong over the last years. This is mainly due to the fact that many US companies have switched to a new innovative and disruptive space project management method, appropriately called **"iterative design/agile management"** (see Annex).

This new approach, more commonly known as **"New Space"**, has been over the last years also strongly supported by NASA, DoD, and other American public institutions due to its huge innovation as well as time and cost saving potentials.

To come to full fruition, this **new "iterative design" approach needs however also the sufficient availability of flight opportunities**.

So far, Europe has not been able to react to this challenge to a satisfactory extent.

However, with the upcoming IRIS²-constellation Europe will possess a new tool which will allow it to improve its response to these competitive pressures materially.

In the following, ESRE will first provide some further comments and recommendations on how Europe can improve its innovation capabilities, with a view to the existing EU space-related programmes and accompanying legal provisions, that is with a view to

1) Horizon Europe
2) IOD/IOV and flight opportunities both via HE and the EU space programmes
3) Legal provisions related to IOD/IOV
4) Legal provisions in IRIS²-regulation requiring a "comprehensive debris mitigation plan"

Thereafter, ESRE will provide some further, more general comments/recommendations related to New Space and innovation beyond IRIS².

Horizon Europe and Low TRL-activities

Any innovation benefit derives from related low TRL work previously performed in the sector. Furthermore, innovation needs fight demonstration/validation before it can enter the market.

In publicly funded activities, flight demonstration/validation is usually performed within the dedicated "space programmes" like Galileo, Copernicus etc. (where the satellite/the payload in general is also expected to become directly fully operational).

Against this background, it has become a common practice on the European level (EU + ESA) to provide roughly **10% of the public funding for low TRL research and non-operational IOD/IOV** and roughly **90% for the infrastructure/space programmes** (e.g.: in EU: EU space programme (before IRIS²) ~ 16 bn €, Horizon Europe space slice: ~ 1,5 bn €).

With the positive IRIS²-decision the EU's space programmes´ funding increased substantially, while Horizon Europe and its space slice had to be cut (together with many other programmes/regulations), in order to support the IRIS² funding decision.

Consequently, the above ratio has now deteriorated at the expense of Horizon Europe -low TRL - IOD/IOV, despite of the fact that far more and faster innovation, and therefore more R&D and more IOD/IOV flight opportunities are needed.

ESRE therefore recommends to prepare the next MFF in such a way, that the low TRL – IOD/IOV funding via the research framework programme reaches at least a level of ~ 10+% in relation to the EU space programme/infrastructure funding (including IRIS²).

IOD/IOV and flight opportunities both via HE and the EU space programmes

The IRIS²-regulation requires that the IRIS²-satellites also provide for the possibility of additional subsystems/payloads. While it is being understood that these additional payload slots are mainly reserved for Galileo and Copernicus enhancement purposes, the regulation, however, does not exclude the possibility of using these slots also for more generic R&D, science and IOD/IOV purposes.

ESRE recommends to

- **Provide regularly some of the additional payload slots for technology-IOD/IOV and science experiments selected via Horizon Europe/FP10**
- **Consider funding and offering some of the IRIS²-busses through Horizon Europe/FP10 or the EU space programme to provide further possibilities for IOD/IOV both for generic IOD/IOV and IOD/IOV dedicated to the EU space programme** (e.g.: to be flown piggyback on operational IRIS²-launches supported by the corresponding programmes or via the Ready-to-Fly Initiative)
- **Consider the use of flying IOD/IOV-satellites piggyback on operational IRIS²-launches also for expanding the framework of the recently announced new Ready-to-Fly initiative of the Commission (if LEO-compatible)**

Presently, the possibilities for the speeding up of innovation in the EU space programmes seem to be too limited. For example, in Galileo there are only a very few IOD/IOV-slots available on the operational satellites. Furthermore, experiments/IOD/IOV in these slots also have to fulfill very restrictive requirements (full ECSS-compliance).

ESRE therefore recommends to consider introducing dedicated IOD/IOV-technology missions in the EU space programme in direct support of Galileo, Copernicus and IRIS², making use, where possible, of LEO and therefore IRIS² launches and related possibilities.

Legal provisions related to IOD/IOV

It is assumed that the IRIS²-procurement contracts for the satellites will allow for the application of the iterative design approach/agile management method. It is therefore expected that a new type of EU-

contract will be soon available, which allows for different types of project management methods, different component/quality standards and therefore more engineering freedom. Also new project control methods are expected in these new contracts (all of this compared to the standard ECSS-approach, ESA is presently exploring similar new contracts options).

ESRE recommends to allow for all technological IOD/IOV-activities and science experiments supported by the EU the utilization of the iterative design/terrestrial standards approach

Such a flexibility would of course also allow for a further utilization of ECSS or any tailored version of it.

Legal provisions in IRIS²-regulation requiring a "comprehensive debris mitigation plan"

The IRIS²regulation requires in its Article 8 "Environmental and space sustainability" the use of collision avoidance and the submission of a "comprehensive debris mitigation plan".

ESRE recommends to make use of this mandate **to increase R&D in the related areas of STM, orbital analysis, re-reentry/removal, on-orbit servicing** etc. in order to bring Europe into a leading position with regard to space sustainability.

2. Ecosystem for New Space

Presently, there is no official definition of "New Space". However, in the context of this document and with a reference to the excellent EIB-report "The future of the European space sector", 2019, and in particular its Chapter 2.2.4 "Agile development and industrial standard implementation", we see as

a <u>defining feature</u> of "New Space" a **<u>new space project management approach</u>**,

- which replaces the traditional **"waterfall model" project management** by **agile managements methods/iterative design methods** (comprising here any approaches allowing for *incremental* developments and *concurrent* testing/engineering), and
- which replaces **"space" standards** for components and manufacturing by **terrestrial standards** (quality and production), <u>*wherever possible*</u> (which also allows for Commercial-Off-the Shelf (COTS))

It has to be underlined that in Europe, the **<u>ECSS-standards</u>** prescribe both the management method ("waterfall model") and the space-specific component and manufacturing standards which have to be used in the context of public procurement contracts (up till now)

Over the last years, agile project management methods have gained acceptance in many other industries, e.g. in automotive industry.

However, a shift towards agile management represents also a **cultural challenge**, since it normally is accompanied with other organizational changes and procedures, as is known from the software industry (very flat hierarchies, team-structures, self-organization, sprints, etc.). Besides, it requires a different mindset with regard to the tolerance of failure.

Furthermore, as already mentioned, such a shift also requires a **new contractual approach** from the side of (public) contracting authorities, since the monitoring of the project's progress becomes more

difficult due to the iterative design approach, and the accompanying different sets of documentations including testing.

Therefore, an **opening up of IRIS²** both for Horizon Europe IOV/IOD activities and agile management/iterative design methods would not only accelerate innovation in the context of the EU space activities but also serve as an important instrument of change management, **supporting a broader promotion/proliferation of the "New Space"-approach in Europe** beyond satellite communication.

In in this context, it is also important to recall that the impact of the "New Space"-approach obviously depends directly on the **ample availability of access to space** and therefore on the related costs.

Furthermore, the iterative design approach involves a substantially higher rate of testing which might make it necessary to ease the access to **public testing infrastructures**, also via the deployment of EU funds or proper instruments.

Finally, it also appears to be conducive to the successful establishment of "New Space" in Europe that the "New Space" industry and public funding and contracting authorities increase their **awareness of next generation technologies**, which may be substantially quicker demonstrated and validated using the new project management methods.

ESRE and its members, but also other public association, RTOs and universities could contribute to this raising awareness by acting as a **technology radar/watch** and proposer.

Such **technological advice** could also be provided by ESRE and others public R&D players with regard to the certain **technological feasibility aspects** which might arise in the context of **EU legislative processes related to the EU space effort**.

Following the above considerations, ESRE therefore recommends to:

- **Open up IRIS² for Horizon Europe IOD/IOV and new management method** also with a view to help the establishment of "**New Space"** in Europe **beyond satellite communication**
- Continue, also with a view to the next MFF, to **support R&D on reusability, new space transportation systems etc.**, in order to further lower costs for European access to space
- Consider to deploy in the future also **EU funding to ease the access to public testing facilities** in order to speed up the establishment of "New Space" in Europe
- **Deepen the cooperation with ESRE** and other public RTOs and universities with a view to **establishing a technology radar/watch and advisory mechanism both for "New Space" and technological feasibility aspects related to EU space legislation**

3. Summary/Essence of Policy Recommendation

Though IRIS² is a LEO-constellation consisting of small satellites, which brings some constraints concerning orbits, mass and power etc., ESRE sees a huge innovation potential in IRIS², not only as a space-based communication infrastructure and enhancement possibility for Galileo and Copernicus, but also as an outstanding IOD/IOV and science experiment flight opportunity.

Furthermore, IRIS² is seen as an instrument to support the **change management** necessary to move the more traditional European space management approach more strongly into the direction of faster innovation cycles, iterative design and a higher tolerance for risks and failures.

Key take-away messages

In order to increase innovation and to shorten innovation cycles, ESRE recommends to*:*

- ***Increase in the next MFF the funding of space-related R&D via FP 10*** *(in an appropriate relation to the funding of the EU space programmes)*
- *Make* ***maximal use of the additional IRIS²-payload slots, the IRIS² standard busses and the related launches for increasing the technology IOD/IOV/science experiment opportunities*** *for the European space effort*
- *Consider introducing* ***dedicated technology IOD/IOV missions*** *in the EU space programme*
- *I****ncrease R&D in the related areas of STM, orbital analysis, re-entry/removal, on-orbit servicing*** *etc. in order to bring Europe into a leading position with regard to space sustainability.*
- *Allow for all EU-IOD/IOV/science experiment activities the* ***utilization of the iterative design/New Space-approach***
- ***Open up IRIS² for Horizon Europe IOD/IOV and new management method*** *also with a view to help the establishment of "New Space" in Europe* ***beyond satellite communication***

In order to speed up the establishment of "New Space" in Europe, ESRE recommends to

- *Continue, also with a view to the next MFF, to* ***support launcher R&D*** *on e.g. reusability, new space transportation systems etc., in order to further lower costs for European access to space*
- *Consider, to deploy in the future also* ***EU funding for test infrastructures*** *in order to ease the access to public testing facilities*
- ***Deepen the cooperation with ESRE*** *and other public RTOs and universities with a view to* ***establishing a technology radar/watch and advisory mechanism*** *both for "New Space" and technological feasibility aspects related to EU space legislation.*

II. Space Situational Awareness and Space Traffic Management

1. The role of Research Establishments in Space Sustainability

The European Union has a range of societal needs that can be addressed through space-based solutions. This has led to an augmented interest and activity in the space domain of the EU, building out more space infrastructure to increase its strategic autonomy and provide essential services to its citizens. As such, the EU is aware of, and must mitigate the risks to, its own critical space infrastructure.

On the 23rd of May 2023, the Council of the EU adopted conclusions on the 'Fair and sustainable use of space', and made a call to action on space traffic management[1].

The EU, in particular in recent years, has demonstrated its ability to set international standards and regulations that reach beyond the borders of the Union, especially in the digital domain. Therefore, although space is not confined to borders, the EU can have a positive impact on space sustainability for all humankind.

As the association of European Space Research Establishments, ESRE is ready to support the European Commission through innovation and technical expertise, supplementing the Commission's policy instruments.

2. Space Sustainability

With IRIS^2, the Commission plans to have around 170 satellites operational in LEO from 2027. This is the most congested region of space today. Both as a responsible operator in space, as well as having a need to secure its own infrastructure, the Commission already expressed its concerns related to STM and space sustainability.

Whatever the policies and rules that will be defined to remove barriers towards and to regulate STM, in answer to the current need of commonly adopted rules, conjunction analysis forms an important part of any form of STM.

The performance of conjunction analysis, addressing technical needs and challenges to avoid that rules cannot be respected by a technology point of view, is still relatively resource intensive.

In consideration of the neutral role played as an association of public research organizations, **ESRE is ready to provide its support on the definition of future policies and regulations**, e.g. addressing impacts and feasibility of technology developments.

To improve the sustainability of the IRIS^2 constellation itself but also the impact it has on the space sustainability in general, **ESRE suggests to support the development of systems/technologies/instrumentation useful for IRIS^2 constellation**, and to consider **the use in the IRIS^2 constellation of "R&TD" satellites properly equipped for the development of such technologies.**

The following may be considered as very first examples of equipment for **IRIS^2 satellites:**

- Autonomous **collision avoidance system** on each satellite (similar to Starlink satellites)

[1] https://www.consilium.europa.eu/en/press/press-releases/2023/05/23/the-council-calls-for-a-european-approach-on-space-traffic-management/

- **Deorbiting devices,** or technologies for satellite deorbiting based on deployable/inflatable shields in order to minimize time in orbit at the end of life
- **Active debris removal subsystems** (i.e. net capture, harpoon capture, and robotic arm capture), whereby satellites have the option of linking up with failed satellites
- **Sensors that improve space situational awareness,** for instance to measure Space Weather conditions or to perform in-orbit SSA, improving the picture of the space environment
- **Electric propulsion systems** or **air-breathing electric propulsion systems** in order to improve performances and have an increment of the mission's payload.
- **New materials and structures** that are lightweight and resistant to the harsh conditions of space (self-healing, low adhesion, radiation resistant, etc.), while also being cost-effective and easy to manufacture.
- **Technology experiments to investigate COTS avionic components' behaviour** with respect to radiation environment in view of low-cost deep space exploration mission design. In particular in polar orbits, where the radiation environment is stronger, the experiments would compare the performance of non-shielded components versus shielded rad-hard ones.
- **Technology experiments/missions** devoted to **investigate break up phenomena** with the aim to improve fidelity of D4D (Design for Demise) tools and methodologies.

3. Orbit Sustainability

Space sustainability is usually approached looking at satellites that use orbits, but having options for deorbiting or on-orbit servicing in place to either limit the time spent in orbit or extend their operational lifetime.

However, Space Sustainability can be alternatively approached by considering orbits not usually used. This is for example the case of **VLEO (250-350 km)**, where the relatively short lifespan of satellites, due to drag effects, automatically remove them within a short amount of time.

Further to the undeniable positive impact to Orbit Sustainability and Space Sustainability as a whole, VLEO is also beneficiary to various applications or domains, such as

- Communication, because of the lower latency data transfer and educed power needs for data transmission
- Earth Observation, since because of closer proximity to the surface of the Earth, the sensor performance (resolution) of Earth Observation instruments increases consistently
- Space Transportation, because of the less required energy for launch, which also may represent a boost for the development of micro-launchers

in addition to the high rate of interest of those orbits for military scopes.

Against this background, **ESRE recommends to boost research on the use of this orbital regime**, through grant opportunities in the corresponding funding programs (Horizon Europe, European Defence) and a higher consideration in the next MFF .

In order to make more effective use of VLEO, **ESRE proposes a preliminary set of areas where research should be addressed**:

• **Communication infrastructure**, as the link time of the satellite with ground stations is more limited than higher satellites.

• **Attitude control systems**, since the increased drag effects also cause perturbations on the satellite that impact sensor accuracy.
• **Propulsion systems**, for VLEO satellites to remain in orbit for long enough to be useful, such as airbreathing engines that make use of the ionized particles in the upper atmosphere.
• **Decrease of the commissioning time** of satellites, making satellites have the ability to become operational faster.

Key take-away messages

ESRE is ready to provide its support on the definition of future policies and regulations, *such as addressing impacts and feasibility of technology developments*

ESRE suggestions to support space sustainability

- *Consider the development of technologies supporting space sustainability, as*
  - *Single satellite on board autonomous collision avoidance system*
  - *Deorbiting satellite devices, such as deployable/inflatable shields*
  - *Active debris removal subsystems (net capture, harpoon capture, robotic arm capture)*
  - *Sensors to measure Space Weather conditions or to perform in-orbit SSA*
  - *Electric propulsion systems to improve performances*
  - *New materials and structures (lightweight, self-healing, low adhesion, radiation resistant, …)*
- *In the frame of IRIS^2, consider to use "R&TD" satellites properly equipped for the development of such technologies*

ESRE suggestions to support orbit sustainability

- *Strongly consider the use of VLEO (250-350 km) and the development of related technologies or areas, such as ACS, propulsion systems (airbreathing engines), aerodynamics, communication link with ground infrastructures…*
- *Increase research on VLEO orbital regime, through grant opportunities (RIA, CSA) in the funding programs (Horizon Europe, EDF) and a higher consideration in the next MFF*

III. Synergies between Space and Defence

1. Implementation of the EU Space Strategy for Security and Defence

This section intends to introduce ESRE recommendations in the recently released EU Space Strategy for Security and Space (JOIN(2023) 9). Gathering Research and Technology Organizations (RTOs), ESRE focuses its comments on the possible contributions from research, or on the possible impacts on research of the Strategy**. In this regard, ESRE focuses its comments on three highlights of the Strategy:**

- **The role of New Space actors in security and defence,**
- **The articulation of this EC strategy with the EDA.**
- **The way to achieve technological sovereignty and to reduce strategic dependencies**

2. The role of New Space actors in security and defence

The Strategy states that "*New Space plays an increasing role in service-delivery, including for security and defence. It can propose new ideas, solutions, disruptive technologies and efficient industrial processes, which can also support security and defence*" and that "*the Commission will incentivise more collaborative work between space, security and defence start-ups in the areas of R&D*".

ESRE acknowledges this dynamic role of New Space actors but also considers that they can hardly bring breakthrough innovations in the cost-intensive defence sectors. Indeed, such start-ups are driven by market considerations whereas many of the defence needs and requirements offer few anchor markets and demand massive investments without any short-term returns on investments.

Therefore, ESRE stands ready for cooperating with such New Space start-ups especially in the low and intermediate TRL segments, but it considers that related projects management methods should be finely tuned, for instance starting on by small pilot projects associating research-oriented RTOs and market-driven start-ups before envisaging generalizing such an approach.

3. The articulation of the EC strategy on space defence with the EDA

The Strategy points out a need for cooperation between key European agencies partaking to the European Union (EDA, EUSPA) or not (ESA). The articulation with EDA is introduced as manifold:

- To identify military requirements, defining associated capability priorities and fostering cooperation among Member States, including contribution to the definition of military user requirements for the GOVSATCOM and SSA components of the EU Space Programme,
- To boost the Joint Task Force (JTF) feeding the EU Observatory of Critical Technologies,
- To map all EU and national educational and training activities relating to space security and defence, to develop skills relevant both for policy design and at technical level.

ESRE expresses its commitment to support, at operational level, such an articulation of the EC strategy on space defence with the EDA, i.e., to support the JTF and to contribute to the mapping of relevant EU and national educational and training activities.

However, on those two points, ESRE recommends to carefully consider how to articulate such a synergy, especially if they imply research and innovation actions[2]. Horizon Europe is mostly based on competitive and open calls, a rationale which may not be necessarily shared when it comes to defence where national sovereignties often prevail.

ESRE therefore recommends splitting low TRL research synergizing defence and space, where such an articulation may be valuable, from high TRL research where it may rather not. Achieving such an articulation also requires saving **a significant part of the budget effort to such low TRL research**.

4. Achieving technological sovereignty & reducing strategic dependencies

ESRE hails the will expressed by the European Commission to achieve technological sovereignty and henceforth to reduce strategic dependencies. In this respect, the strategy relies mostly on large alliances and a system-based approach[3]. However, ESRE would like to underline that strategic dependencies start at the level of elementary technological bricks, which are often common to several large systems. As previously highlighted, recovering sovereignty therefore requires low TRL research, as performed within RTOs that are more disruptive than industrial players, often motivated by keeping market position or by cost-driven reasons.

ESRE recommends addressing the issue of reducing strategic dependencies by supporting the development of critical (and often dual) technologies through collaborative research projects and by allowing launch and test of associated prototypes in operational constellations such as Galileo or IRIS[2].

Key take- away messages

- ***ESRE stands ready for cooperating with such New Space start-ups*** *especially in the low and intermediate TRL segments,* ***but recommends to finely tune related projects management methods,*** *for instance starting on by small pilot projects associating research-oriented RTOs and market-driven start-ups* ***before envisaging generalizing such an approach.***
- ***ESRE is ready to contribute and to support the JTF and the mapping of relevant EU and national educational and training activities,*** *but recommends splitting low TRL research synergizing defence and space from high TRL research.* ***Achieving such an articulation also requires saving a significant part of the budget effort to such low TRL research***
- ***ESRE strongly support the will expressed by the European Commission to achieve technological sovereignty and henceforth to reduce strategic dependencies****. In this regard, it recommends supporting the development of critical technologies through collaborative research projects and by allowing launch and test of associated prototypes in operational constellations such as Galileo or IRIS[2]*

[2] As suggested by the claim that "*the Commission will develop joint programming between the EDF, the EU Space Programme and Horizon Europe to accelerate the development of capabilities that are relevant for the resilience of space systems*".

[3] As suggested by the sentences "*On the basis of the activities of the JTF and the EU Observatory of Critical Technologies, the Commission, together with Member States and industry, will assess the need to establish new industrial alliances related to technologies that are relevant for space and defence, in compliance with the EU competition rules*" and "*Developing further synergies in programming and funding can ensure continuity in the development of technologies up to systems".*

IV. EU strategy for Space, Research and Innovation

At the very beginning of 2023, DG DEFIS launched a process to review, update and extend its Strategy for Space Research & Innovation. Such a process has been initiated through a quite open "cross-fertilization platform" associating a large set of European space actors. It has been embodied by three successive brainstorming sessions[4].

ESRE already contributed to the revision process in partaking to these sessions. The present section intents however to provide DG DEFIS with additional comments and concise recommendations with respect to this strategy. In line with the scope of the strategy, these recommendations address strategic and long-term issues and not applications or products and services.

1. The overarching approach

ESRE supports the process of renewing the EU Strategy for Space Research & Innovation (EUSSRI) as it understands that various factors (US New Space strategy and its results, War in Ukraine, current depletion of EU launchers) imperilled the European autonomy and leadership on the sector. At the current stage however, it seems that two key points have not been sufficiently addressed yet:

- The articulation of this EUSSRI with ESA[5] which is the other key player in space research,
- The articulation and consistency of this tentative strategy with the existing ones, especially with the recently released EU Space Strategy for Security & Defence but also with the EU Space Strategy, the European Green Deal or Digital Europe.

Such consistent articulations seem mandatory to avoid mismatches, inconsistencies or duplication of efforts and ESRE advocates considering them in a later stage of the process, if not already planned.

ESRE also underscores that the EUSSRI endeavours are very ambitious, especially with such a tight schedule. Aligning in a single vision effort undertaken so far by various pillars (Space Programme, Horizon Europe including ERC/EIC, EDF) managed by different EC external agencies (EUSPA, HaDEA) or even by the EDA with different objectives, is highly challenging. **ESRE therefore deems as reasonable to plan a rendezvous or evaluation clause before the end of the current Multiannual Financial Framework** and in any case before the next one for assessing the impact of the EUSSRI.

In particular, the role of the much-expected co-programmed partnership on Global Competitive Space Systems (GCSS) in the implementation of such strategy is expected to be further specified.

2. Strategic objectives

ESRE acknowledges that the strategic objectives of the EUSSRI are not finalized yet and takes opportunity to put forward some comments directly connected to research and innovation.

On infrastructures, ESRE recalls that RTOs have developed, operate and maintain costly strategic infrastructures for space research. **ESRE considers that, when open and benefitting to all EU countries, the EUSSRI should valuably allocate some substantial funding to support directly or**

[4] 16-17 January, 29-30 March & 15-16 and 23 June.

[5] ESRE is well aware that the European Commission and ESA are currently negotiating their respective role in a new European Space ecosystem. This mention only aims at reminding that research should be soundly considered in this forthcoming articulation.

indirectly such strategic assets, their upgrade and the use of these infrastructures that are often underfinanced or for which only marginal costs are supported by industrial contracts.

On disruptive research, ESRE welcomes the intention to spillover support on the whole value chain, recalling that future high-TRL innovation is often enabled by present low-TRL research. ESRE insists that – with respect to steps forward achieved by main global competitors (USA, China) – **the EU should focus on actual disruptive solutions targeting next generation rather than on incremental mimics of past successes achieved by such competitors.**

On strategic autonomy, ESRE supports the idea to reinforce non-dependencies on critical space technologies. In coherence with the previous point and with its comment on the "*Implementation of the EU Space Strategy for Security and Defence*", **ESRE considers that the European Commission should give a strong boost to its support to low TRL research on "elementary bricks",** on which such dependencies are presently based.

ESRE also reaffirms its full commitment to embark in major international collaborations. It considers that such collaborations are strong incentives for showcasing the European excellence in space science and technology including by European citizens and ultimately by EU policy-makers. It therefore also encourages the Commission to lead or to incite to such international collaborations and **to reinforce strongly the EU narrative on the European excellence in this sector**.

Key take-away messages

ESRE recommends to the European Commission to

- *Consider carefully how the new EU Strategy for Space Research & Innovation (EUSSRI) will articulate with non-EC agencies such as ESA or EDA. It should also consider its articulation with the forthcoming Global Competitive Space Systems (GCSS). As these articulations may reveal sensitive, rendezvous clauses should be planned*
- *Clarify subsets for the "strategic objectives" in order to reflect which ones are directly depending on policy-making and which ones could are expected (social or economic) consequences of such policies*
- *Plan a stronger consideration and financial **support to research infrastructures** maintained by RTOs that are benefitting to the whole space sector and that are often underfinanced*
- *Focus its support on **actual disruptive solutions targeting next generation** in order step ahead existing solutions already implemented by our main competitors*
- *Especially focus its support on individual critical technologies on which depends the EU autonomy for many space systems.*
- *Initiate international collaborations and brand them so as to reinforce the EU narrative on space, fostering the European excellence in space science and technology as well as the European policy priorities*