November 2017

Association of European Space Research Establishments (ESRE):

Recommendations related to

Framework Programme 9

I. Budget, Structure of FP 9, European Innovation Council

Despite significant efforts in the Member States and via Horizon 2020, the EU is still trailing well behind many other market economies in terms of R&I investments and innovations reaching the market. This assessment, based on current related economic data, has also been the starting point of the recently published Lamy-High-Level-Group-Report[1].

As for Horizon 2020, the closing of this innovation gap must therefore also be one of the key goals of the EU's next research framework programme FP 9.

Since the framework programme possesses a scope and scale of cooperation and competition which cannot be matched by any other similar national or intergovernmental instrument in Europe, **it is recommended that in particular the budget for FP 9 should be substantially increased, in line with the recommendation of the Lamy-High-Level-Group-Report.**

As to the funding for space-related RTD it is recommended that the increase in FP9 budget covers at least the amount necessary for establishing the Joint Technology Initiative requested by the European Parliament.

In agreement with the majority views collected by the Horizon 2020 interim consultations, the interim assessment, and the Lamy-Report, it is felt that the general structure of Horizon 2020 was supportive to the EU's research and innovation policy goals.[2]

It is therefore recommended that the general structure of Horizon 2020 is preserved in FP 9; thus, as proposed by the Lamy-Report, FP9 might comprise the **three pillars: "Science and Skills", "Innovation and Competitiveness" and "Global Challenges".**

Furthermore, the proposal of the Commission to create a European Innovation Council (EIC) is supported.

Also for FP9 there is a strong political willingness to prioritize the research via a "mission"-oriented approach, where the "missions" will be mostly of a political societal or global nature (e.g.: "de-carbonization", "circular economy", "electrification of transport",…in pillar III) but sometimes also of a scientific or technological nature (e.g. "understanding and enhancing the human brain until 2030", "first quantum computer in Europe", etc. in pillars I/II). The mission-oriented approach would particularly foster multidisciplinary projects to be funded.

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[1] https://ec.europa.eu/research/evaluations/index_en.cfm?pg=hlg

[2] https://ec.europa.eu/research/consultations/interim_h2020_2016/consultation_en.htm (link to all position papers from stakeholders see bottom of page)

As the R&TD in support of such political missions will be organized in a technology-neutral way, there is obviously the danger of a substantial amount of uncoordinated and unnecessary double funding of technologies. For example, battery technologies could in principle be funded under pillar II "Competitiveness" or under pillar III "Challenges", in the latter under conceivable missions related to "de-carbonization" "circular economy" or "electrification of transport".

Also, various new generic instruments have been introduced in Horizon 2020 under pillars I and II (FET, FTI, SME Instrument, Prizes) with the special goal to foster rapid/disruptive innovation and technologies, at the outset without explicit coordination.

Thus the following recommendations are given:

- **FP 9 should retain the Horizon 2020 concept of "enabling technologies"**, that is technologies which are needed in many parts of the economy and to address most missions. In such a slice the FP 9 funding inherently comprises a coordinated technology approach. **"Space" should remain an "enabling technology" under pillar II**.
- In order to mitigate the danger of unwanted technology double funding, **EC Directorates should coordinate the overall work programmes of the different pillars and ensure cross monitoring of ERC, EIC, and mission activities with regard to the funding of key technologies.**
- **All specific innovation instruments should be placed under the responsibility and coordination of the European Innovation Council**, as now also recommended by the European Commission, in order to avoid unnecessary double funding.

II. Mission-oriented Approach

The mission-oriented top-down approach towards research has its obvious merits, not only with a view to meeting the societal and global challenges but also with a view to support innovation and scientific/technological progress.

Obviously, for the success of FP9 the efficient implementation of the mission-oriented approach will be crucial.

This implementation will however depend strongly on the scope and nature of the "missions" and the existence/feasibility of corresponding "mission implementation roadmaps" which are necessary to achieve timely progress towards the missions' goals.

While for the more science/technology driven "missions" a mission implementation roadmap (containing in general various technology roadmaps) will stay mostly within one area of scientific/technological competence, this will in general not be the case for the more complex societal/global "missions" (e.g. "electrification of transport" involves: battery technology + clean power generation + power grid, etc.).

Complementary to the above, FP 9 should across all pillars and areas continue to provide broad bottom-up calls (not directly driven by mission/technology roadmaps, but e.g. only by mission goal, or as in Horizon 2020 by accepted policy directions) in order to leave sufficient room for the entrance of disruptive new ideas.

With a view to FP 9, it is therefore recommended

- **to apply a mission-oriented approach in general only in combination with a clear structure(s)/organization(s)** capable of **working out a mission implementation plan/roadmap** and related technological roadmaps**,**

- **to partially focus the scope of the calls in the area of "enabling technologies" by pursuing more frequently a technology-roadmap approach ("technology mission-oriented approach")**

- **to continue to provide broad bottom-up calls throughout FP9, in order to reach out to all ideas and stakeholder in the research community** (even though this might imply a high degree of over-subscription),

III. General Funding Principles

Horizon 2020 gave a special focus on specific instruments fostering the European ability to introduce more rapidly innovative technologies and solutions into the market. This has led to a stronger funding of higher TRL activities (TRLs 4/5-6/7), for definition see Annex), but also to a wider introduction of loans as a funding instrument.

It is very important to recall that science and low TRL activities represent the very basis for any innovation and in particular the source for breakthrough technologies for the medium- to long-term.

Furthermore, it has to be stressed, that loans suit themselves only for near-market investment activities in the private sector, and not for high risk research and technology development purposes.

Correspondingly, most public research establishments are legally not allowed to use loans for financing their R&TD activities, which also prohibits any R&D cooperation with industry on a loan-funded basis.

It is therefore recommended to pursue in FP 9 a balanced approach regarding the funding of higher and lower TRL activities in order to achieve optimal results over the full cycle of R&I.

Furthermore, it is recommended to limit in FP 9 the use of loans to exceptional cases of near-market investments (while expanding the use of loans for the fostering of innovative SMEs and companies outside the framework programme, in particular in the context of the European Fund for Strategic Investments (EFSI) and the established instruments of the EIB).

IV. Funding Instruments

It is in particular the high amount of special funding instruments, e.g. the various constructions of Public Private Partnerships (JTIs, cPPPs..), the EIT Knowledge and Innovation Communities and the Public-Public Partnerships ranging from Article 185s to Era-Nets and Eureka Eurostars which make Horizon 2020 overly complex and difficult to access.

Furthermore, not all instruments are equally versatile or appropriate for meeting the requirements of FP9. For example, a JTI is much more suitable than a cPPP for becoming responsible for FP 9 "mission"-related tasks since it possesses an executive capable of running FP 9 calls.

It is therefore recommended, that for FP 9 the number of these additional funding instruments will be reduced, keeping only the most appropriate ones for the FP 9 objectives and structure.

V. Basic Funding Model, Simplification

A clear and simple set of rules is a decisive factor for the attractiveness and acceptance of any framework programme.

While some simplification of the basic funding model has been achieved, this simplification has also led to a very strict definition of direct costs. Consequently, this has increased the administrative burden and resulted in a more complicated auditing process.

With a view to FP 9, it is recommended that the related national methodologies and accounting practices are accepted, which would also allow for a sufficient coverage of large research infrastructure costs.

VI. Joint Technology Initiative (JTI) related to Space, 3 "O" Policy

Overall, the aeronautical sector has made very positive experiences with the two "Clean Sky I+II"JTIs. Assuming a convincing proposal by the space industry for a corresponding JTI related to space, the member organisations of ESRE would support the establishment of a JTI in the context of FP 9 and be principally prepared to join such a construction.

As lessons learned from "Clean Sky" II, it is recommended, that the **Commission should consult early and in a non-binding way ESRE and other public research establishments on the proposal for the establishment and governance of such a FP 9 JTI.**

It is also recommended that for the agreed RTD fields of the JTI not only higher TRL activities (TRL 4/5-6/7) are being incorporated (preferably via technology roadmaps) but also relevant lower TRL activities (3 $\leq$ TRL $\leq$ 4), where the related **lower TRL calls should follow a bottom-up approach and be open to all interested parties in Europe.**

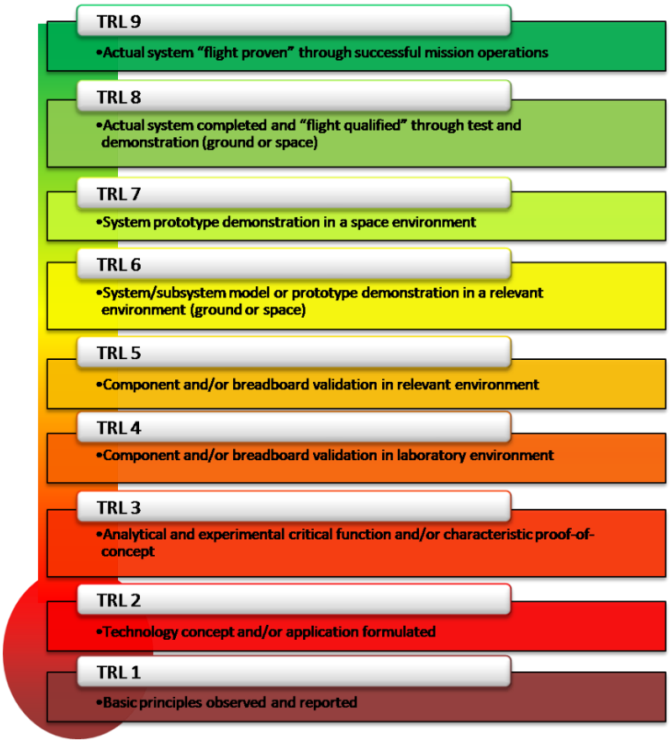
Furthermore, and in view of the requested in-kind contribution of industry/partners, it is recommended to avoid the introduction of "additional activities", as this involves complex and time-consuming legal analyses and clearance procedures.

Finally, it is recommended to establish in FP9 an IPR policy "as open as possible but as closed as necessary", that is a policy which respects the fact, that for activities close to the market, and therefore close to competition, **IPR cannot be a public good.**

ANNEX - Technological Readiness Levels

See also: EARTO discussion paper:
http://www.earto.eu/fileadmin/content/03_Publications/The_TRL_Scale_as_a_R_I_Policy_Tool_-_EARTO_Recommendations_-_Final.pdf

Established NASA and aerospace sector definitions of Technological Readiness Levels:



TRL scale used in Horizon 2020:

Table 1:

TRL scale used in Horizon 2020

TRL Scale	Description
TRL 1	Basic principles observed
TRL 2	Technology concept formulated
TRL 3	Experimental proof of concept
TRL 4	Technological validity in a lab
TRL 5	Technology validated in relevant environment
TRL 6	Technology demonstrated in relevant environment
TRL 7	System prototype demonstration in an operational environment.
TRL 8	System completed and qualified
TRL 9	Actual system proven in operational environment

1) Examples of schemes for integrating several TRL levels

- **OECD:** Basic research (TRL 1-3), Development (TRL 3-5), Demonstration (TRL 6-7), and Early Deployment (TRL 8-9).

- **European Investment Bank:** Research (TRL 1-3), Development (TRL 3-6), Innovation (TRL 6-8) and Production support (TRL 9)**.**