



NEREUS's views on Space Exploration in H2020

A NEREUS Position Paper,

(NEREUS: the Network of European Regions Using Space Technologies)

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As voice of the European Regions, NEREUS serves as an advocate for the regions in matters of space uses and also as a direct channel to the regional users of space technologies (such as local authorities, SMEs, universities and research institutes and citizens). The network is the key interface between the regional level and national and European institutions. NEREUS currently unites 25 European regions and 40 Associate Members with the common objective to spread the use and understanding of space technologies across Europe for the benefit of regions and their citizens.

NEREUS calls for highlighting space exploration and associated technologies in the up-coming Horizon2020-programme while putting emphasis on **encouraging and supporting innovations as well as more effective mission exploitation** for the benefits of European citizens. With science driven human and robotic exploration programmes, the dimension of space exploration is an important vehicle for all three key columns of the Horizon2020-proposal: *Excellent Science, Industrial Leadership and Societal Challenges*. Space exploration is an area of space inseparably linked with efforts to strengthen industrial competitiveness while striving for excellence in science and a well trained workforce. Above all, space exploration is a driver for innovations in numerous non-space sectors.

In order to enhance spill-over effects which will contribute to strengthening the downstream sector and a more extensive utilization of space data from existing and future missions, Horizon2020 needs to make the **interdependencies between exploration, innovation and science/technology development** more transparent and bring them into a more recognizable societal context. This is a prerequisite for **better linking space and non-space sectors** (Common RTD, Health, Energy, Robotics).

As far as exploration is concerned, NEREUS as a network of regions wishes to emphasise **public awareness raising/outreach to society and technology transfer**.

Inspiration of the broad public by the potentials of space exploration is a fundamental starting point for enhancing spin-offs of commercial and scientific relevance. The public has to better understand the benefits to Europe's science system and potential business opportunities and how to exploit them. Broad public awareness is pivotal for stimulating innovation dynamics. Thus a future R&D-program needs to emphasise **public outreach and education & training of the next generation to capitalize its space exploration efforts better at citizen level**. Promoting space exploration while demonstrating how it delivers in different ways to society is an essential prerequisite to ensure not only political and public support and allocation of public budgets but is also the first step to extend the use of existing exploration knowledge for commercial and scientific purposes. Space exploration is the most successful topic in attracting the youth to aspire science and technology careers and thus ensuring Europe's well trained and skilled human resources.

NEREUS developed a project idea with the title "**European Network of Exploratoria**" to reach out to the public at different levels and enhance technology transfer. This initiative has the potential to be a model case across Europe. The idea is to network already existing space facilities and centres (e.g. Cité de l'Espace (Toulouse), EADS Visitor Center (Bremen), National Space Centre (Leicester), Planetario di Torino --Museo astronomico e dello spazio (Turin), mobile Space Expo (EU) etc.) at European level with the objective to develop new mechanisms that enable these institutions to collaborate more effectively, provide new stimuli and expand outreach. A common mission and joint programme focused on promoting Exploration & Science themes across Europe holds them together. While co-operating on a joint agenda to educate and inform the public about the benefits of space, exploration and technology development, they make optimal use of existing resources and illustrative and explanatory material. Once established they will strive to involve new partners who do not yet have space facilities or exhibits and bring their material to new regions and countries. Part of the activities will be focused on showcasing the impact of space exploration in the new Horizon2020-program by identifying examples where activities in the context of human and robotic exploration contribute knowledge to the priority themes (e.g. Health, key enabling technologies etc.). The Exploratoria-initiative also aims to establish links with key exploration projects¹ that have been funded under FP7 and explore approaches to shape promotion material for the public based on the project results. Special efforts will be made through different educational initiatives² to inspire the

¹ E.g. THESEUS, EUROPLANET, ASTROMAP – All in all 13 exploration projects have been funded under FP7 between 2007-2013

² (e.g. Space Exploration Development Systems MSc/Master's Degree - Politecnico di Torino, Italy; ISAE, Toulouse; University of Leicester, UK)

next generation of scientists and engineers to choose space careers. To make the potential of new value chain interactions more transparent, the project underlines the linkage of the space and non-space sectors. In this context the project idea develops a cross-cutting initiative across topics, particularly where technology transfer and exchange are key features, e.g. energy sector and space sector working in tandem and using techniques, methods materials etc. in structured training initiatives.

Connecting the space and non-space sectors will address new business and industry communities, in particular SMEs, outside the space domain and encourage them to explore business opportunities through spin-offs. In addition, it will be possible to point out non-space Horizon2020 themes to which space exploration might bring a valuable contribution. This will ultimately pave the way for **a more extensive exploitation of space data** from exploration and science at the service of society and contribute to network different research and industry communities.

Ambitious global exploration endeavors demand rapid technology solutions in order to meet the challenges of accessing and studying space while also being cost-efficient. Therefore framework conditions that enhance the development of innovative technologies as well as an optimal use of available resources are fundamental.

In this respect NEREUS stresses **strong European partnerships** as indispensable prerequisites to advance Europe's space technology development. While space exploration infrastructure is mainly developed through coherent ESA-initiatives, space science and technology development capabilities are fragmented across Europe. With increasing global competition the European space community can afford neither duplications nor competing European teams leading to the need to coordinate space research efforts better and to support a strong European identity. The variety of relevant players, expertise and resources needed to mobilize the critical mass for ambitious exploration activities are often beyond the means of individual member states. Therefore relevant players have to increasingly pool capabilities at European scale, develop a coherent approach and bring the great value of working as joint European teams across. Building transnational partnerships at European level between industry and the academic/institutional research community will be a fruitful ground to enhance technology solutions and long-term engagements and contribute to a better coordination of European technology development. Further to this, strong transnational-European partnerships provide smaller organizations (in particular actors at regional level) with the opportunity to participate and contribute to large space science initiatives.

Another important point in this respect is that strong European partnerships with a joint coherent approach and common objectives will contribute to coordination and stimulation of synergies among Horizon2020-ESA and relevant member state programmes and thus make public spending more effective.

Consequently, the EU's R&D-program, Horizon2020 should place importance on supporting mechanisms that facilitate European partnerships and access to international co-operations. For instance the proposal to launch international technology "demonstrator projects", as outcome of the next ISEF Conference in US, is seen as a concrete action to start an international co-operation in Space Exploration among different space fairing nations.

Technology advances are one of the key factors for strengthening Europe's innovation capability. Horizon2020 should minimize risk-taking for industry in approaching new technology development by supporting the maturation of promising technologies (via testing and demonstrating new key technologies) and in particular by in-orbit demonstrations. When emphasizing key enabling technologies the focus of Horizon2020 should be on technologies with a strong potential for re-use.