

POSITION PAPER

Brussels, 30 January 2020

Orgalim recommendations for the strategic planning in Horizon Europe and beyond to support the industrial transition in Europe

1. EXECUTIVE SUMMARY

This paper outlines Orgalim's recommendations on the implementation of Horizon Europe, to ensure high impact and support the competitiveness of our industries.

The world and the economy are undergoing an unprecedented transition. Yet, three main challenges must be considered to manage this evolution: 1) the technology challenge with shorter innovation cycles and a rapid digital transformation, 2) the sustainability challenge, including climate, energy and environment, and 3) the societal and economical challenges.

To overcome these challenges, the paper identifies concrete research areas and holistic building blocks of competitiveness. These elements are, among others, improved access to technologies for companies of all sizes and regions, more agile and adaptative cyber-physical production systems, encouraging investments in innovative solutions created in existing companies as well as in start-ups and new ventures, and focusing on closing gaps between the actors needed for a circular economy.

2. INTRODUCTION

1.1 Europe's Technology Industries

Orgalim represents the backbone of European industry, with 11 million people directly employed across Europe, and generates an annual turnover of around €2,000 billion. Europe's technology industries include many of Europe's most successful and most innovative companies. The technology industries are not only a substantial sector by themselves: they are also at the heart of Europe's strategic value chains and enable innovation, competitiveness and sustainable solutions in a wide range of economic areas.

Orgalim represents Europe's technology industries: companies that innovate at the crossroads of digital and physical technology. Our industries develop and manufacture the products, systems and services that enable a prosperous and sustainable future. Ranging from large globally active corporations to regionally anchored small and medium-sized enterprises, the companies we represent directly employ 11 million people across Europe and generate an annual turnover of around €2,000 billion. Orgalim is registered under the European Union Transparency Register – ID number: 20210641335-88.

1.2 Competitiveness/ Leadership of European industry

"Europe will build its competitive advantage on cutting-edge and breakthrough technologies, respect for our environment and biodiversity, investment in our people and smart European and global alliances"

Industry 2030 High Level Industrial Roundtable (2019)

The conditions for competitiveness have radically changed. The increasingly complex and interdisciplinary technological developments, combined with a rapid digitalisation and the enormous climate and energy challenges, affect the entire economy and society.

To manage the ongoing transition and support sustainability and competitiveness, Europe needs to continue investing in research and development (R&D). European companies as technology leaders and solution providers will need cutting-edge knowledge and know-how, excellent R&I resources and collaboration opportunities, as well as access to the relevant research outcomes.

It is therefore of the utmost importance that European research programmes allocate sufficient resources to the development of industrial technologies, thus bridging the non-linear gap between basic research and market innovation.

Orgalim calls for an increased budget of at least €120 billion for Horizon Europe to ensure that the new framework programme will be able to deliver on its ambitions. It is crucial that a sufficient share of the budget (which should be at least 60%¹) is allocated to Pillar II.

1.3 Transition challenges

The increasing speed of technological development, the pressing climate and environmental challenges, and fast-changing market requirements and conditions all call for a substantial transition in the way industry operates and develops. Furthermore, classical product concepts are increasingly being transformed into innovative value-added solutions. Products, services and business models are often integrated through digital technologies to create changing and new customer values.

To manage this transition and remain at the forefront of developments, an even more holistic, integrative, and systemic approach is necessary. To be successful, three main challenges must be considered:

- **New technologies and digitalisation:**
New and digital technologies will help to address challenges and increase competitiveness by offering new value-adding solutions. These technologies must be applied, deployed, and mastered by both industry and society.
- **Sustainability:**
Industry should continuously improve its environmental performance, whilst also ensuring economic and social sustainability. This requires constant change and innovation, in areas such as products, processes, value chain cooperations, attitudes and business models.
- **R&I Ecosystem and the societal and economic challenges:**

¹ Orgalim call together with other industrial associations and EARTO, call for at least 60% of the budget dedicated to Pillar II. <https://www.orgalim.eu/news/industry-and-rtos-call-ambitious-horizon-europe-support-eu-competitiveness>

Humans have always have used technology to improve their lives and overcome challenges. However, technological development is changing society at a higher speed than previously, which can sometimes create resistance. In order to exploit the potential of technologies for society as a whole, this transition must be shaped in a purposeful, sustainable and ethical way. The European R&I Ecosystem needs to develop accordingly and take these challenges into account.

2. PRIORITIES TO ACHIEVE IMPACT - NEW TECHNOLOGIES AND DIGITALISATION

The rapid technological development and digitalisation, in combination with growing global competition around new knowledge and research-based innovation, are putting our industries and society under pressure. At the same time, they also create new opportunities.

Exponential technologies² fueled by digitalisation will drive an unprecedented wave of innovation through all industries: new, advanced processes and equipment will use data and innovative materials to manufacture the products of the future accompanied by value-added, data-centric services.

Companies having digital transformation as a strategy use the transformation to change the market by bringing in new business models and services. This transition will provide most benefits to those companies, people, and societies that adapt the fastest and master this change.

In order to exploit the opportunities of new technologies and achieve substantial impact, the following areas must be prioritised:

- Increasing the range of relevant new technological and digital building blocks (materials, processes, methods) and the co-creation of knowledge and capabilities through targeted, cross-border and collaborative R&I actions,
- Improved access to technologies for companies of all sizes and regions, through innovation networks, know-how and technology transfer, and industry-driven research actions,
- Significant progress in digitalisation of manufacturing systems through deployment and use of concepts like Industrial IoT or digital twins across value networks and companies of all sizes, sectors and regions,
- Encouraging investments in innovative solutions created in existing companies as well as in start-ups and new ventures.

² <https://www2.deloitte.com/us/en/insights/tags/exponential-technology.html>

3. PRIORITIES TO ACHIEVE IMPACT – SUSTAINABILITY

"European technology companies are leaders in providing solutions to the societal challenges, and will be at the forefront of the development and delivery of clean technologies and systems."

Orgalim Vision 2030

There is an urgent need to turn decarbonisation challenges into opportunities and make our society and economies more resource-efficient and circular - and hence to contribute proactively to the UN Sustainable Development Goals.

Europe can still claim global technology leadership and drive new solutions and new businesses towards a more productive, higher added value and more sustainable economy in the EU and globally if the right policy framework is set in place. Cutting-edge technologies and new business models are essential to achieving these goals.

- In order to turn challenges into opportunities, the following areas must be prioritised: continuing the innovation-led, sustainable transformation of the economy,
- Substantial, cost-efficient progress towards a climate-neutral economy, by further improving processes and products, using synergies and digital solutions and optimising value networks,
- Substantial improvement in "doing more with less" in an increasingly more resource efficient, energy efficient and more circular economy,
- Focusing on closing gaps between the actors needed for a circular economy; for example through new market places, dialogue platforms and cross-sector, multidisciplinary R&I actions.

4. BUILDING THE EUROPEAN RESEARCH AND INNOVATION ECOSYSTEM OF THE FUTURE

4.1 Cornerstones of the future European Research and innovation ecosystem

- An agile, re-engineered thriving innovation ecosystem building upon European strengths

Industrial innovation is experiencing a fast acceleration of research and development activities and is facing growing competition on a global level. An agile and interdisciplinary development process and connected innovation methods are needed to deliver timely and relevant results. The traditional boundaries between basic and applied research and market innovation are increasingly overlapping, making the linear model of the "TRL³-scale" obsolete. Long-term roadmaps and mission-oriented thinking are challenged.

The European innovation ecosystem must adapt to these developments and innovate itself, building upon strengths such as a culture of cross-border cooperation between industry, universities, and research institutes. Technology industries' firms are increasingly looking for collaboration platforms and ecosystems where global firms, SMEs, start-ups, NGOs and research institutes can jointly work on research challenges.

³ TRL Technology Readiness Level

The EU innovation ecosystem must become more agile, and should focus on multidisciplinary and self-learning. The future framework programme must have a strong focus on industrial challenges and opportunities. Instruments must allow long-term cooperation and strategical orientation, but at the same time must be agile, flexible and fast. Only in this way can we continue to attract researchers, talents, companies and investments to Europe, transfer research results into application, and hence create the jobs of tomorrow. Europe's manufacturing ecosystems strongly build upon these R&D&I developments and results. To foster the next generation of European research and innovation ecosystems, Horizon Europe should take the following enablers into account.

➤ Test and demonstration facilities and technology infrastructures

Having access to high quality and advanced test and demonstration facilities or technology infrastructures is a prerequisite to the scaling-up of technologies and implementing of innovations. Demonstrating the utility of new technologies is fundamental for ensuring public acceptance. Technology infrastructures speed up the innovation process, reduce risks, and provide access to technologies and networks. This is crucial especially for SMEs and start-ups as they often lack resources to test their innovations. Testbeds are also important in responding to societal challenges in new ways, where new policies or regulations need to be considered and tested.

To maximise the use of the different existing testing environments across Europe and facilitate access, Europe needs a more strategic approach to test and demonstration facilities. An "Industrial Testbed Europe" strategy, similar to the ESFRI⁴ roadmap for research infrastructures, could be one way of maximising their use in a more coherent and efficient way. Testbeds could be an important tool in developing the right policy framework in Europe to bring new solutions to the market.

➤ Partnerships that have impact and make business sense

Collaboration in European R&I communities such as the Public-Private Partnerships (PPP) is an efficient way to strengthen Europe's innovation capacity and global competitiveness that simultaneously meets the major societal challenges we face.

With an industrial focus, the PPPs could be the driver of a mission-oriented approach to develop timely solutions to our common challenges, and at the same time achieve global competitiveness in a more sustainable way. Industry should be seen as a crucial part of the solution and should therefore be closely involved in designing the next generation of PPPs, as well as the proposed missions. Only in this way can we ensure relevance, engagement, and consequently impact.

Without a strong engagement from industry, progress on big challenges such as climate neutrality or resource efficiency use will not be achieved.

Orgalim particularly welcomes the proposed industry-driven Partnerships such as: "Made in Europe", "Key Digital Technologies", "AI, data and robotics", "European Metrology". "Built environment and construction", "Clean steel", and "Smart and zero-emission waterborne transport".

⁴ <https://www.esfri.eu/>

➤ Trust in the ecosystem

Data plays an ever increasing role in bringing forward successful innovations and enhancing competitiveness, from data-based optimisation to data sharing. Therefore, a future-proof European data ecosystem and policy are required to strike a balance between being open and transparent and protecting companies investments. This is an essential precondition to stimulating innovation that will lead to market-ready technologies.

In particular, Orgalim is concerned by the idea of opening up “by default” all scientific data produced by future projects under Horizon Europe. If companies cannot protect the ideas and knowledge they have created, this may strongly hamper their participation in Framework projects. Particularly in activities of industrial research, IP protection is important. Using regulation or Horizon Europe conditions to forcibly “open” scientific data irrespective of source or financing is bound to discourage collaboration between the private sector and scientific research on one hand, and international cooperation between European researchers and researchers elsewhere on the other. Excessive openness requirements would thus harm the competitiveness of European industry and research.

4.2 Potential priority areas

It is more and more difficult to foresee technological developments and societal trends, therefore future R&I programmes must be flexible and adaptive. However, with a view to the challenges and the potentials, the technology industries suggest that the following areas should be addressed in Horizon Europe and in particular in its second pillar.

➤ Miniaturisation and Functional Integration

In order to efficiently address the major European challenges and to further enable technological progress in a wide range of applications, components and products must become still smaller – for example, sensors and micro-mechanical and electronic systems, low-energy components, or bio-hybrid components. Functions must be integrated in surfaces and in concentrated spaces. Products can become smaller, lighter, more robust and more energy-efficient.

➤ Improving production

Advanced production processes (e.g. additive manufacturing, bio-based, bio-inspired processes, and circular-economy-production) are needed to open innovation spaces for new solutions and products, whilst ensuring scalability, affordability and reliability. Advances and industrial breakthroughs in production technologies such as laser-based production, Additive Technologies, Nano- and Micro-production, Machine Vision/Inspection, AI/Machine Learning, Robotics and Automation, will play an essential role.

➤ Cyber-physical production systems: Agility, Resilience, Adaptivity

Personalised products and customer expectations, changing markets and competitive pressure require adaptability and speed. This requires the permanent adaptation of the entire value chain. Cyber-physical production systems can be configured to adapt in relation to the demands of manufacturing load and decisions to optimise. A factory is understood as a complex, long-life and highly integrated system, which operates in the “room of parameters” for best performance and zero defects. Priorities in this area are re-configurability, modularity and remote operations supported by paradigms such as cloud or edge computing.

➤ Data Analytics, Machine Learning, and AI in manufacturing enterprises

Data Analytics and the more sophisticated methods of machine learning and AI in industrial value systems promise huge potential in terms of competitiveness and sustainability. With increasing levels of autonomy in decision making, data processing systems will have to meet the highest standards with regard to safety, reliability, quality and transparency. Research for data analytics in industry must be geared towards concrete applications in markets and value networks, and requires high levels of interdisciplinarity and close collaboration between industry and research institutes/universities.

➤ New Engineering, Design and Development methods and tools

In order to increase productivity and address sustainability, European companies will have to excel in problem-solving capacities. While excellence in production is still essential, differentiation will depend on how innovation, partnerships and ecosystems are led and orchestrated. Therefore, the engineering capabilities, creativity and efficiency of European innovators - engineers, designers, scientists, and entrepreneurs – must be enhanced. What is needed is to shape the next generation of business intelligence, knowledge and innovation management, system engineering, and efficient testing and validation methods.

➤ New business logics and business ecosystem engineering

To bring new, value-added solutions to the market in today’s complex, global business environment, horizontal and vertical cooperation in value networks is critical. This requires new ways of thinking - new business logics - to transform challenges and new technologies into business opportunities. For example, it is important to investigate the technical, legal and organisational aspects of business ecosystems and to develop systems for their description and design. Digital platforms create more efficient and, ideally, transparent markets. They offer companies new ways to cooperate with customers and industry partners. In particular, small and medium-sized companies benefit from improved global visibility for their own company and possible cooperation partners in the market.

Furthermore, products will evolve (by software upload for example) during their entire life-cycle. This will enable new business models, adaption of functionalities and efficiencies, but also raises new challenges in terms of digital/physical integration, data handling and engineering processes.

➤ Energy efficiency and power supply in manufacturing

The sector is committed to continuously improving its environmental performance and supports the timely implementation of the clean energy package. To turn the existing challenges of reducing manufacturing process-related CO₂-emission into opportunities, we recommend continuing the development and deployment of solutions where machines and factories can, amongst other things, master the increasing complexity of flexible and distributed power generation and the enabling and accelerating role that digitalisation can also play in this area.

In the manufacturing process itself, renewable energy generation, energy storage and energy harvesting/recovery can also contribute to reducing energy consumption and accelerate the transition towards a climate neutral economy. A more flexible energy system also brings benefits in terms of grid stability.

In addition, Orgalim advocates the implementing of the energy efficiency first throughout the economy due to its multiple benefits for consumers, industry and the environment.

5. CONCLUSIONS

To safeguard the long-term competitiveness of Europe's technology companies, Europe needs to rethink how it can strengthen its industries in a global context. With the recommendations in this paper, Horizon Europe can effectively support the future global leadership of Europe's technology industries and their ability to generate value for Europe's citizens. Orgalim and its members stand ready to further guide the work on Horizon Europe at a crucial juncture in the future of Europe's technology industries.