

# Horizon 2020

## Work Programme 2018-2020

### *5. Leadership in enabling and industrial technologies - Introduction*

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## **Introduction**

### **Policy context and objectives**

Leadership in enabling and industrial technologies (LEIT) includes the parts of Horizon 2020 providing new opportunities for industrial leadership in Key Enabling Technologies (KETs), ICT and Space. These are areas of key industrial competences determining Europe's global competitiveness, and providing key components and systems needed for solutions to the Societal Challenges.

Aiming at new and breakthrough technologies, this part of the programme will contribute to boosting competitiveness, creating jobs and supporting growth. In line with the renewed EU industrial policy<sup>1</sup>, the goal is to reinforce Europe's industrial leadership and strengthen our industry's ability to continuously adapt and innovate by embracing new technologies, digitisation and the transition to a low-carbon and more circular economy.

This Work Programme emphasises Open Innovation, that is, opening up the innovation process to all relevant players. It also represents an important component of the EU Strategy for Key Enabling Technologies<sup>2</sup>.

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<sup>1</sup> 'Investing in a smart, innovative and sustainable Industry – A renewed EU Industrial Policy Strategy' (COM(2017)479 final)

<sup>2</sup> 'Preparing for our future: Developing a common strategy for key enabling technologies in the EU' (COM(2009)512); and 'A European strategy for Key Enabling Technologies – A bridge to growth and jobs' (COM(2012)341).

## **1. Research and innovation to strengthen Europe's industrial capacities and business perspectives, including SMEs**

The emphasis of the LEIT part of the Work Programme is on areas of R&D and innovation with a strong industrial dimension, where mastering new technological opportunities will enable and drive innovation. The activities included have been primarily developed with reference to relevant industrial roadmaps, including those of European Technology Platforms and associations involved in contractual public-private partnerships signed with the European Commission. The involvement of industrial participants, and of SMEs in particular, is crucial in maximising the expected impact of the actions.

A key element is the support for the development and deployment of Key Enabling Technologies (KETs) – micro-and nano-electronics, nanotechnologies, advanced materials, advanced manufacturing and processing, biotechnology and photonics, enabling innovation in all key industrial sectors. To help reap the opportunities of the industrial transformation, this part of the Work Programme is making a substantial investment in advanced manufacturing. Beyond this direct support, a number of activities across this Work Programme are dedicated to support EU manufacturing. Complementing this approach, the part of Horizon 2020 on Future and Emerging Technologies includes support for KETs at lower Technology Readiness Levels (TRLs) than in the LEIT part. Further support for manufacturing and KETs comes from the Societal Challenges, notably Energy, Transport and Environment.

The funded projects will be outcome-oriented, developing key technology building blocks, bringing solutions closer to the market, and paving the way for industrial and commercial implementation, including in areas of societal challenges. Proposers are asked to demonstrate how the exploitation of results will lead to the expected impact and contribute to the European economy.

Several research and innovation activities in this part of the Work Programme may be enhanced through a combination of funding sources, from other EU, national or regional programmes (supported or not by the European Structural and Investment Funds<sup>3</sup>), and from financial instruments. Consortia are encouraged, where appropriate, to use synergies with structural funds (ESIF) in the context of smart specialisation, or to mobilise funding from other available instruments, to pilot and deploy their technologies.

This combined funding can specifically support the access of SMEs to appropriate facilities such as test beds, and the development of such facilities. For innovative SMEs in particular, it is important to ensure a full involvement in industrial value chains, and access to test beds and other facilities offering relevant services SMEs, allowing them to design, prototype, test and ultimately produce their innovations.

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<sup>3</sup> For more information on R&I funding from ESIF, see [http://ec.europa.eu/regional\\_policy/activity/research/index\\_en.cfm](http://ec.europa.eu/regional_policy/activity/research/index_en.cfm)

## **2. Public-private partnerships (PPPs)**

Public-private partnerships (PPPs) are vehicles to implement technological roadmaps in particular areas and achieve leverage of private funding. They are implemented either through Joint Technology Initiatives (JTIs) using Joint Undertakings based on article 187 TFEU, or through dedicated calls for proposals and topics (contractual PPPs).

The LEIT part of Horizon 2020 includes support for the following PPPs:

### **Joint Technology Initiatives:**

- The Joint Technology Initiative on Electronic Components and Systems for European Leadership (ECSEL)
- The Joint Technology Initiative on Bio-based Industries.

These two JTIs will develop their own work programmes, which will be decided and implemented through their specific governance mechanisms and rules.

### **Contractual PPPs (cPPPs):**

- Factories of the Future, Energy-efficient Buildings, Sustainable Process Industries (SPIRE), Advanced 5G Network Infrastructure (5G), Robotics, Photonics, High Performance Computing, Big Data, Cybersecurity and Green Vehicles.

These cPPPs are implemented according to the contractual arrangements signed on 17 December 2013 (for all except for Big Data cPPP which was signed on 13 October 2013 and Cybersecurity which was signed on 5 July 2016), by the European Commission representing the public side and the respective industrial research and innovation European association representing the private side of each cPPP. These contractual PPPs are implemented in this work programme through different topics and calls. Robotics, Photonics, 5G and Cybersecurity are exclusively covered under the ICT part, while Factories of the Future, Energy Efficient Buildings and SPIRE are cross-thematic, in that some of their topics are placed elsewhere in the Work Programme. It is to be noted that a significant part of the activities supporting the implementation of the Cybersecurity cPPP is also covered in the part dedicated to the Societal Challenge on 'Secure Societies'.

*A list of cPPP topics in the Work Programme 2018-20 is provided in a separate document (LEIT List A<sup>4</sup>).*

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<sup>4</sup> [http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/h2020-wp18-20-list-cpps-kets\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/h2020-wp18-20-list-cpps-kets_en.pdf)

### **3. Strategic orientation on innovative technologies closer to the market**

Activities will develop innovative technologies bringing them closer to the markets, including a progress towards higher Technology Readiness Levels (TRLs).<sup>5</sup> This will help the manufacturing sectors to adapt to global competitive pressure by improving their technological base. As proposed in the European KET Strategy, the KET parts of this work programme use TRLs where relevant. This Work Programme spans TRLs from 3-4 up to 7, with an overall centre of gravity in the range from 5-6, with the highest level reserved for cases where there is strong industrial commitment. In this Work Programme, efforts have been made to propose fewer, wider topics than in previous Work Programmes of Horizon 2020, with emphasis on engaging with the widest possible range of end users.

To optimise impact, the following aspects should be considered by proposals wherever appropriate:

- Well-targeted value chains enable to capture value to Europe – this aspect should be reflected in the quality of the consortium and the work plan to ensure optimal structure to maximise impact.
- Adequate balance of industrial and research partners for the delivery of the expected outcome beyond the end of the project, including participation of manufacturing SMEs and involvement of all users.
- In order to facilitate up-scaling, aspects such as demonstration, transfer and piloting should be included as a part of the R&D&I actions. Where standardisation needs are identified, they should be followed up.
- The integration of business development, time to market, and market understanding, together with the understanding and exploitation of customized and personalized products and services in the business-to-business context is necessary to meet innovation needs in the range TRL 5-7.
- Proof-of-concept prototypes, demonstration, assessments, platform-building activities, and pilots help to overcome the acceptance barrier, increase trust and convince potential users, express additional value benefits for diversified communities, provide seeds for new projects of the proposers also in other parts of Horizon 2020, and develop mechanisms for facilitating value creation in the real economy.
- Non-technical and regulatory issues regarding health, safety and the environment should accompany the development of industrial applications, especially in fields such as nanotechnologies, where potential risks and public concerns have been identified.

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<sup>5</sup> See COM(2012)341, pp. 17-18 and General Annex G to the Work Programme

- Including social sciences and humanities (SSH) expertise in the approach can provide a constructive and critical accompaniment of the scientific and technological developments in funded projects.

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#### **4. Focus areas and Societal Challenges**

Future solutions to the major Societal Challenges will require the deployment of ICT components and systems, key enabling technologies, communication infrastructure as well as data derived from the Union Earth observation and satellite navigation programmes. The activities under this part of the Work Programme will further develop the technologies that will enable promising solutions for applications providing solutions to societal challenges. At the same time, they will ensure that EU industry remains strong in the core technologies that are at the roots of future value chains.

The societal benefits deriving from the technologies in the LEIT part and their convergence (including with the other key enabling technologies) will be showcased through significant contributions to all four focus areas in 2018-20, which cut across the programme boundaries:

- Building a low-carbon, climate resilient future
- Connecting economic and environmental gains – the Circular Economy
- Digitising and transforming European industry and services
- Boosting the effectiveness of the Security Union



## **5. Cross-cutting KETs**

Cross-cutting KETs bring together and integrate different KETs and reflect the interdisciplinary nature of technological development. They have the potential to lead to unforeseen advances and new markets, and are important contributions to new technological components or products.

The integration of different KETs represents a vital activity in Horizon 2020. Over the course of Horizon 2020, around 30% of the budget allocated to KETs will go to integrated KETs projects. Cross-cutting KETs activities will in general include activities closer to market and applications. Examples include test beds and demonstrator projects at high Technology Readiness Levels (5-7), but also activities at lower Technology Readiness Levels, which match specific value chains (with a view to subsequent innovation at higher TRLs). Manufacturability will often be a key issue on the innovation path towards the market, and pilot activities will normally combine at least two different KETs and integrated advanced manufacturing technologies/processes, in a way that value is created beyond the mere addition of the individual technologies for a component or product.

These activities are considered as potential test cases for ambitious projects of industrial scale. They are therefore particularly suitable for efforts to combine funding instruments, including relevant national or regional research and innovation programmes, and European Structural and Investment Funds (ESIF) under smart specialisation strategies.

*Cross-cutting KETs are listed in a separate document (LEIT List B<sup>6</sup>) and grouped in main areas of industrial interest and innovation potential. Such activities are also available in the Societal Challenges and other parts of this Work Programme.*

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<sup>6</sup> [http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/h2020-wp18-20-list-cpps-kets\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/h2020-wp18-20-list-cpps-kets_en.pdf)

## **6. Business cases and exploitation strategies for industrialisation (LEIT-NMBP)**

This section applies only to those topics in the LEIT-NMBP part of this Work Programme, for which proposals should demonstrate the expected impact by including a *business case and exploitation strategy for industrialisation*. The business case and exploitation strategy will be evaluated under the 'Impact' criterion.

The *business case* should demonstrate the expected impact of the proposal in terms of enhanced market opportunities for European enterprises and innovators and enhanced manufacturing capacities in Europe, and thus growth and jobs in Europe, in the short to medium term. It should describe the targeted market(s); estimated market size in Europe and globally; user and customer needs; and demonstrate that the solutions will match the market and user needs in a cost-effective manner; and describe the expected market position and competitive advantage.

The *exploitation strategy* should be realistic and identify obstacles, requirements and necessary actions involved in reaching higher TRLs, such as

1. Improved material/product robustness and reliability;
2. Matching European value chains;
3. Securing an industrial integrator to adapt the new technologies to industrial scale;
4. Availability of large-scale testing, pilot and manufacturing facilities;
5. Standardisation;
6. IPR and technology transfer;
7. Product approval by regulatory and/or relevant international bodies;
8. User acceptance and the needs of industrial users, including SMEs;
9. Sustainability of financing (after the EU funding).

For TRLs 6-7, a credible strategy to achieve future full-scale manufacturing in Europe is expected, indicating the commitments of the industrial partners after the end of the project (including financial commitments). In the case of demonstrators and pilot lines, the planned use and expected impact from using the final installation should be considered.

Exploitation plans, outline financial arrangements and any follow-up will be developed further during the project.

The results of these activities as well as the further activities envisaged in this respect should be covered by the final report (and intermediate deliverables) of the project.

**Synergies with other funds:** Where possible, proposers could actively seek synergies with, and possibilities for further funding from other relevant EU, national or regional research and innovation programmes (including ESIF), private funds or financial instruments (including EFSI). In all these cases, business cases and exploitation strategies will outline such synergies and/or additional funding, in particular where they make the project more ambitious or increase its impact.

One possibility is that of cumulative funding with European Structural and Investment Funds (ESIF) in connection with smart specialisation strategies. Consortia could therefore identify, amongst other possibilities, the Smart Specialisation fields of their EU Member States or regions.<sup>7</sup> For this purpose the 'Guide on Enabling synergies between ESIF, H2020 and other research and innovation related Union programmes' may be useful.<sup>8</sup> Some projects may, moreover, contribute to regional smart specialisation strategies by capitalising on concentrated and complementary competences for the development of new industrial value chains and emerging industries with a clear EU added-value.

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<sup>7</sup> <http://s3platform.jrc.ec.europa.eu/map>

<sup>8</sup> [http://ec.europa.eu/regional\\_policy/sources/docgener/guides/synergy/synergies\\_en.pdf](http://ec.europa.eu/regional_policy/sources/docgener/guides/synergy/synergies_en.pdf)

## **7. Modelling**

Computational materials science has progressed into a predictive tool allowing explanation of the properties and behaviour of materials. Computational materials modelling is supported by a dedicated area in the NMBP part: 'Materials Characterisation and Computational Modelling'. Beyond these dedicated activities, the development and application of materials modelling may be included where relevant, and modelling is also highlighted in a number of topics.

Where materials modelling is proposed, the relevant work packages should be described similarly to the Review of Material Modelling.<sup>9</sup> If new software is developed, the software engineering quality should be covered.

Proposers are encouraged to contribute actively to ongoing activities, e.g. in the EMMC (European Materials Modelling Council), and EU funded clusters.

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<sup>9</sup> [http://ec.europa.eu/research/industrial\\_technologies/pdf/review\\_of\\_materials\\_modelling\\_iv.pdf](http://ec.europa.eu/research/industrial_technologies/pdf/review_of_materials_modelling_iv.pdf)