

The importance of manufacturing research and innovation for the future competitiveness of the EU

Joint Position Paper on FP10, by ManuFuture ETP, EIT Manufacturing KIC and EFFRA

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Summary

The EU's geopolitical future and technological leadership depends on **advanced manufacturing technologies** which are essential to enable and scale advances in many other technologies, such as digital and AI-driven technologies, advanced materials, biotechnologies and quantum technologies.

Advanced manufacturing processes and equipment are crucial for turning ideas into new products and producing them in a competitive and sustainable way. Manufacturing technologies are also crucial for increasing productivity and regaining competitiveness – areas where Europe is falling behind as pointed out in the Draghi-report. This includes “common use technologies” which are needed to the prosperity and security of the European citizens. To achieve synergies and to strengthen European strategic autonomy, FP10 must leverage the R&I potential in manufacturing promoting security, and civil and military research in a complementary manner.

We therefore call for an integrated, transversal priority area on advanced manufacturing technologies which covers the full innovation chain from basic research to scale-up investments across pillars and programs.

Improved, bidirectional links between basic research, applied science and innovation should be one of the major innovations of FP10, facilitating fast and easy transition of new knowledge to application, whilst maintaining Pillar II as a collaboration hub for R&I competitiveness, mutual inspiration and knowledge transfer between the three pillars. This priority area should, among other topics, address the challenges of manufacturing in a green and competitive circular economy.

Operational speed must be increased: Programmes must become more agile and allow the rapid uptake of new ideas and research needs, e.g. through more bottom-up elements.

Demographic change and a growing skills gap are big challenges for Europe. Considering the increasingly faster pace of knowledge development, exploitation and obsolescence, there is a need to combine technological development and uptake with education and training. FP10 must contribute to make Europe an attractive place for young scientists and engineers, building upon the concept of Open Knowledge (intended as the sum of Innovation and Education) which is an asset of the European system.

1. Retaining the EU's cutting edge

The Framework Programmes for Research and Innovation have always been an asset to the EU. They facilitate the achievements of its researchers and businesses and contribute to its innovation capabilities. To maintain this high standard, the next Framework Programme (Framework Programme 10 – FP10) will have to go further. It must continue to ensure the EU remains at the cutting edge. This will be crucial to achieve the goal of Open Strategic Autonomy, itself, an important element of the EU's global positioning.

Technological progress and manufacturing capabilities have become geopolitical forces in themselves. The regions that master the future technologies on which everything else will be built and their production will command the strategic nodes in supply chains and establish strategic dependencies within international value chains. Other parts of the world have recognised this and are funding accordingly. In 2022, the US invested 3.46% of its GDP in research and development (R&D), while China's investment rose from 1.91% in 2012 to 2.41% in 2022. The EU is at risk of lagging behind. In the same year, its R&D expenditure relative to GDP was 2.22%.

A recent McKinsey report¹ comparing performance in terms of a selection of transversal technologies such as artificial intelligence (AI) and quantum computing found that Europe is only leading on two of the ten most significant. Industries where Europe has traditionally been a global leader, such as the automotive industry, are being overtaken by advances, in this case, autonomous vehicles. Lack of investment and poor take up of new technology are hindering Europe's ability to take advantage of new opportunities, particularly compared to the US and China. This will cause one-sided technological dependency, which undermines the transition to a digital industry and a more sustainable future, as well as the EU's geopolitical position and ultimately, the European social model.

The strategic position and technological leadership of the EU must be substantially improved. Leadership in specific technologies alone is not enough, it must be turned into competitive products and solutions. The EU must develop the capabilities needed to produce and export competitive products. It needs to reduce one-sided dependency, which arises when Europe cannot produce in a fully competitive way. Manufacturing is the key link in the chain that translates ideas into new products, and which enables them to be produced at scale.

It is crucial that the next European Framework Programme provides the foundation for a consistent competitiveness and technology strategy which makes the EU the world's most attractive place for technological research, development and innovation (R,D&I). If this is done right, it has the potential to be the place where new leading technologies are created, where investments are made and

¹ <https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/securing-europes-competitiveness-addressing-its-technology-gap#/>

where innovative products are designed and produced together with high-quality services in a globally competitive and sustainable manner.

2. The importance of advanced manufacturing

The vision of an innovative, competitive, sustainable and secure European Union cannot be achieved without a strong manufacturing sector, the mastering of advanced manufacturing technologies and world-class manufacturing equipment. Manufacturing as a sector has 2.1 million enterprises and employs nearly 31.6 million people (Openpolis). It generates a turnover of EUR 8 300 billion (EUROSTAT). It also produces world-leading technologies and manufacturing equipment which are enablers for sectors such as food, mobility, clean and sustainable products, health and many others. Manufacturing is needed to address the challenges of the coming decades and achieve the strategic policy objectives of the European Union. It has an important role to play in facilitating the green and digital transition, achieving Open Strategic Autonomy, ensuring the EU's security, tackling the demographic challenge and contributing to prosperity. Advanced manufacturing has also a huge potential to increase productivity in many sectors – a core challenge for Europe according to the Draghi-report.

Manufacturing innovation is the key to making the green transition possible – by reducing costs and enabling scale-up, while guaranteeing quality, flexibility and reliability. New manufacturing processes will enable the creation of more efficient products that are easy to reuse, repair or remanufacture. Manufacturing innovation is also needed to make business competitive. It can create space for new business models and enable resilient and performant value chains – including in relation to a traditional European stronghold: advanced materials. In particular, the circular economy calls for innovative manufacturing business models and ecosystems with a seamless flow of goods and data. A strong manufacturing ecosystem is needed to keep industrial R&I and value creation in Europe.

The current geopolitical landscape calls for special attention to be paid to defence. In this field there is a fast-emerging need for autonomy. It is critical to build a European supply chain, as pointed out in the Letta report². It found that, "of all the military equipment dispatched by European countries to Ukraine since the onset of the conflict, 78% was acquired from non-EU producers." To build up autonomous European value chains, the EU's defence industry should expand its capabilities. In terms of manufacturing, the defence industry faces familiar challenges, namely quality control, flexibility, circularity, agility and timely, high quality, good value production. The research and innovation programmes that address the needs of civilian industry must take into account the needs of the defence industry. Such an approach provides benefits in terms of better utilisation of

² <https://www.consilium.europa.eu/media/ny3j24sm/much-more-than-a-market-report-by-enrico-letta.pdf>

resources, advancing both the defence and civil industrial sectors and protecting European sovereignty.

In recent policy initiatives, the EU has acknowledged the role of manufacturing, for example in the Net-Zero-Industry Act or the Industrial Defence Strategy. The European Industrial Strategy identified strategic dependencies on foreign suppliers and recognised the importance of increased manufacturing capacity in Europe. To reach Open Strategic Autonomy and economic resilience, a globally competitive manufacturing innovation ecosystem in Europe is needed. If manufacturing innovations and cutting-edge production equipment are developed and produced outside the EU, any resilience achieved will only be an illusion and will require continuous subsidies.

The majority of the investments in technologies will need to come from private investors and industry. The European Commission estimates that “investments of over €620 billion annually will be needed to meet the objectives of the Green Deal and RepowerEU.” It concludes that the greatest part must come from private funding. It is evident that in terms of financing the enormous investment needs, FP10 cannot and should not play a major role. Other instruments and bodies such as the European Investment Bank (EIB) and the European Investment Fund (EIF) should contribute to manufacturing initiatives through dedicated investment schemes and models.

Where FP10 has significant potential to make a difference is by providing seed money. It can offer important support by facilitating the sharing of technological and financial risks and encouraging collaboration in the pre-competitive phase. The value of Framework Programme 9 was in the platform it provided for researchers and scientists from businesses, universities and research institutes to work together to create new solutions and technologies. Models such as Public Private Partnerships (PPPs), including the EIT Knowledge and Innovation Communities (KITs), such as EIT Manufacturing, and the contractual PPPs, such as Made in Europe, have proven to be an effective way to bring businesses, science and research policy together.

3. Core innovation for FP10

We advocate for a transversal priority area on advanced manufacturing including market exploitation. This will be critical to manufacturing innovation, which is what will turn ideas into new products and allow for a scaling-up of production in a competitive and sustainable way. This priority should in particular address the challenges of a green and competitive circular economy.

4. Designing FP10 for success

To achieve the desired technological leadership, the uptake of results from basic research and the transfer to industrial application must be more effective, fast and agile. The supply chain of research innovation that transitions from basic research via applied research to innovation and industrial uptake must be strengthened. Without a continuous flow from basic science, it will be impossible to sustain the competitiveness of manufacturing in the medium to long term. Since global

competitors are not waiting, it is crucial to quickly valorise the results of basic research through uptake of results and manufacturing of innovative products in Europe before competitors from the rest of the world take advantage of them.

In addition, there must be a bidirectional flow of information that communicates to those in the basic science facilities, what knowledge bottlenecks manufacturing and other industrial technologies are facing. If information and knowledge-sharing in this way is achieved, it could represent one of the major cultural innovations introduced by FP10. This is also in line with the European approach of breaking down barriers to create a more united and collaborative scientific community.

To support the overall technological ecosystems which enable European sovereignty, FP10 must contribute to making Europe an attractive place for young scientists, engineers and talent, building upon the concept of Open Knowledge. Here, the EIT KICs such as EIT Manufacturing will play a crucial role.

All this must be accompanied by a substantial increase in operational speed. Considering the acceleration of technological change and the speed at which new challenges are arising, the existing system of creating work programmes is too slow. Programmes must become more agile and allow the rapid uptake of new ideas and research needs, e.g. through more bottom-up elements.

To ensure relevance and uptake, participation of industry must be increased through more industry-relevant priorities and new, simpler and more flexible instruments. This applies in particular to small and medium-sized enterprises (SMEs). FP10 must actively engage SMEs and midcaps. The strength of this aspect of Europe's economy is a differentiating factor compared to other world regions. They strengthen the region's innovation capacity, inter-connectedness and job creation. While multinational companies may easily move production between geographical areas, SMEs, normally organised in ecosystems, are deeply rooted in their territory and keep knowledge, occupation and capabilities within Europe.

Whilst retaining excellence as the primary selection criterium, FP10 must use its own instruments and those of the Cohesion Policy to facilitate the inclusion of moderate and modest innovator countries and attract and engage researchers, innovators and entrepreneurs from across the EU.

In addition, a new coordinating governance structure should strengthen an efficient and effective European innovation ecosystem across executive agencies and EU Commission Directorates-General. Isolated political institutions should not be the only guides of this process. Unnecessary duplication of funding activities must be avoided.

5. Policy recommendations

1. Establish an integrated priority area focussing on manufacturing across the three pillars. It should create strong **bidirectional connections between the pillars** to guarantee the fast,

seamless flow of knowledge and information. It should link basic and applied science, pre-competitive research and innovative manufacturing communities. This has the potential to inspire applied research and businesses with new ideas.

2. Reinforce Pillar II with a **dedicated programme for advanced manufacturing**, making manufacturing innovation a priority. This should be designed to enable and inspire new products, solutions and businesses.
3. Strengthen **the focus on collaborative and precompetitive research in Pillar II** to encourage inspiration and cross-fertilisation across borders, sectors and between industry and academia. In general, the priority should be to support and encourage the long-term research strategies of European companies by offering a reliable strategic framework for sharing risks in the pre-competitive phase.
4. **Seek new applications** from areas of manufacturing innovation, such as defence and energy. Explore scope for new cooperation, such as with countries in Africa, and closer cooperation with EU candidate countries.
5. Increase the budget and use it more efficiently. **The level of funding should be connected to ambition and strategic importance.** To make manufacturing the cornerstone of a competitive Europe, identify core priorities and fund them sufficiently to make meaningful progress.
6. The work programmes must be structured to enable them to respond to the demands of the environment they are operating in. A substantial overhaul is needed to **make programmes more agile and to allow the quick take-up of new ideas and research needs.** This should be achieved through more extensive involvement of the private sector, a more widespread bottom-up approach, regular cut-off dates and more flexible project architectures.
7. **Calls and core projects must become more technology-focused**, avoiding the overload with non-technological requirements. Expectations in terms of exploitation and impact must be appropriate to the targeted maturity level. The exploitation and commercialisation of applied research results and prototypes should be strongly supported by providing opportunities for continuation in collaboration with EIT Manufacturing KICs, such as the Innovate Together Programme. Horizontal aspects, such as societal questions, could be handled in cross-cutting, dedicated actions.
8. R&I funding can only provide seed money for initial risk-sharing. **More of the investments for scale-up and commercialisation must come from private investors** to a limited extent industry policy instruments and other players, such as EIB and EIF. Pillar III can strongly support this through the EIT KICs and, especially for manufacturing, by the EIT Manufacturing. To identify relevant priorities and steer projects, involvement of industry, in particular SMEs, is essential. Additionally, flexible platforms to involve industry such as European Technology Platforms are needed.
9. Finally, the next Framework Programme must contribute towards **making Europe an attractive and inclusive place for young scientists, engineers, talent and skilled workers**, building upon the concept of open knowledge, which is an important component of the European system.

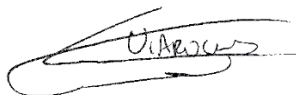
6. Conclusions

We advocate for a strong FP10, which contributes to pushing the EU to the forefront of technological research and innovation and to nurturing robust manufacturing innovation ecosystems. These ecosystems must not be limited to providing manufacturing capacities for the green transition and resilient value chains. They must be designed to enhance the **EU's competitiveness in global markets, based upon an industrial knowledge base created to ensure long-term leadership, sustainability and open autonomy**. This is the precondition for prosperity for all European citizens and for the European economic and social model.

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