



HORIZON 2020 WP-2019 Topics with Relevance for Textile Research

Extracts of HORIZON 2020 2018-20 workprogramme

The official texts and all guidelines and application documents are available at the EU Research Participants Portal at

<http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/index.html>

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DT-ICT-01-2018-2019 Smart Anything Everywhere

Specific Challenge:

"Smart anything everywhere" stands for the next wave of products that integrate digital technology. The challenge is to accelerate the design, development and uptake of advanced digital technologies by European industry - especially SMEs and mid-caps - in products that include innovative electronic components, software and systems, and especially in sectors where digital technologies are underexploited[1].

Scope:

a. Innovation Actions SAE

As Phase 3 of Smart Anything Everywhere, this sub-topic calls for Digital Innovation Hubs that strengthen European SMEs and mid-caps by experimenting and testing with one or more of the following technologies, or by supporting them to manufacture these products. Projects should also support eco-system building for promising platforms developed in earlier R&I products.

Area 1: Cyber-physical and embedded systems: the goal is to help businesses from any sector uplift the quality and performance of their products and services by including (semi)-autonomy, paying special attention to security and privacy and to the collaboration between humans and machines.

Area 2: Customised low energy computing powering CPS and the IoT: the goal is to help businesses who are developing products for situations where high computing capacity and low energy would be a competitive advantage.

Area 3: Flexible and Wearable Electronics: the goal is to help businesses in further maturing, innovating and validating their products with thin, organic and large area electronics technologies, including wearable, portable and embedded objects. Focus is on i) access to design, technology and prototyping which are ready to use, and ii) application experiments driven by concrete user requirements and business cases.

Area 4: Widening Digital Innovation Hubs: it addresses all three technology areas mentioned above and the technologies addressed in I4MS[2]. It calls for Digital Innovation Hubs in industrial regions which are so far underrepresented in Smart Anything Everywhere and I4MS[3], and builds upon a mentoring programme developed by I4MS[4]. These hubs should strongly collaborate with other Innovation Actions funded under SAE and I4MS, e.g. through joint highly innovative cross-border experiments.

All proposed innovation actions may involve financial support to third parties (typically in the order of EUR 20 000 – 100 000[5] per third party).

For this topic, the four requirements described in the introductory section 'Support to Hubs' have to be applied.

The Commission considers that proposals requesting a contribution from the EU of up to 8 million would allow all areas to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. At least one innovation action is supported for each area.

b. Coordination and Support Activities SAE

The action will support the SAE network and help achieve broad coverage in technological, application, innovation, and geographic terms, and to link up with regional/national innovation initiatives, and other Digital Innovation Hubs. Its tasks and services shall include maintaining a single innovation portal, sharing of best practices, dissemination, brokering, leveraging further investment and training. For these support actions, close cooperation with ECSEL, and other CSAs funded under the Digitising European Industry focus area is looked for.

Expected Impact:

Proposals should address all of the following impact criteria, providing metrics to measure success when appropriate.

Attract a significant number of new users of advanced ICT in the manufacturing sector, and more innovative technology suppliers, in particular SMEs and mid-caps.

Creation of a sustainable network of Digital Innovation Hubs, providing European added value to investments done at national and regional level in Digital Innovation Hubs.

Availability of Digital Innovation Hub services across Europe and its regions with strong industrial capacities

Type of Action: **Innovation action, Coordination and support action**

DT-ICT-07-2018-2019: Digital Manufacturing Platforms for Connected Smart Factories

Specific Challenge:

Digital manufacturing platforms play an increasing role in dealing with competitive pressures and incorporating new technologies, applications and services. Advances are needed in digital manufacturing platforms that integrate different technologies, make data from the shop floor and the supply network easily accessible, and allow for complementary applications. The challenge is to fully exploit new concepts and technologies that allow manufacturing companies (especially mid-caps and SMEs) to fulfil the demands from changing supply and value networks.

Scope:

a) Innovation Action - Develop and establish platforms for the connected smart production facilities of the future including their supply chains, driven by EU actors and safeguarding European interest in an area of key importance for the European economy. Proposals need to address at least two industrial sectors with several different use cases, especially in their piloting activities. In accordance with the strategy defined in the multi-annual roadmap[1] of the FoF cPPP, proposals should target at least one of the following 'grand challenges':

Agile Value Networks: lot-size one (2018 call)

Excellence in manufacturing: zero-defect processes and products (2018 call)

The human factor: human competences in synergy with technological progress (2019 call)

Sustainable Value Networks: manufacturing in a circular economy (2019 call)

Reference implementations are preferably developed in open-source, with (as far as possible) one permissive open-source licence to be selected for all open-source components. Where applicable, APIs and SDKs are made available to third party developers to develop complementary applications.

For the Innovation Actions in this topic, the four activities and impact criteria as described in the introductory section 'Platforms and Pilots' have to be applied. For large-scale piloting and ecosystem building activities, proposals may involve financial support to third parties, as explained in the introductory section 'Platforms and Pilots', to support SMEs in piloting and developing prototype applications on top of digital manufacturing platforms.

b) Coordination and Support Activities are needed to cross-fertilise the Industrial Platform communities, allowing for easier take-up of digital technologies from ongoing and past research projects to real-world use cases, and supporting the transfer of skills and know-how between academia and industry in both directions. Coordination and Support Activities are targeted in the 2019 call.

The Commission considers that proposals requesting a contribution from the EU up to EUR 16 million for Innovation Actions and up to 2 M€ for one CSA would allow the areas to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. At least one innovation action is supported for each 'grand challenge'. Maximum one proposal will be selected for the CSA.

Expected Impact:

Significant increase in the options for SMEs and mid-caps to integrate different technologies, unlock the value of their data, deploy complementary applications, and to become a more responsive link in changing supply and value networks.

Strengthened competitive position of European platform providers.

Increased cooperation between industrial and academic communities; increased synergy and collaboration between projects.

Type of Action: **Innovation action, Coordination and support action**

DT-FOF-12-2019: Handling systems for flexible materials (RIA)

Specific Challenge:

The handling of soft materials with the involvement of robots remains limited. The control systems of the robot need to be very sensitive, accurate and fast to prevent unwanted irreversible deformations and damages. Further research is needed in order to develop handling devices which are not pre-programmed for one specific task, but are intelligent and universally dexterous.

Future robots will have to be able to handle soft products while controlling their level of deformation, e.g. in situations where the objects are being manipulated with multiple contact points. Low-cost robots are essential. New handling technologies for flexible materials will lead to disruptive innovations in textile, paper and food processing, and will support a widespread implementation, in particular by SMEs.

Scope:

In order to automate production processes involving soft and flexible materials, Proposals need to cover both of the following areas:

Innovative technologies for the handling of the soft and flexible materials such as gripping, moving, positioning, sorting, joining etc. so that it can be included in larger automated production processes. Low-cost and universal dexterity are key concepts;

System solutions that can manage all product and material related data (size, shape, weight, colour, material composition, defects, etc.), so that their automated handling can be embedded in larger production and process management systems.

Activities should start at TRL 4 and achieve TRL 6 at the end of the project.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Demonstrating the potential to bring back production to Europe;

15% increase in OECD Job Quality Index through work environment and safety improvement;

20% increase in productivity.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

Type of Action: **Research and Innovation action**

DT-FOF-05-2019: Open Innovation for collaborative production engineering

Specific Challenge:

The transfer to industrial companies of the Do It Yourself (DIY), fablabs, micro-factories and makers approaches can pioneer ways towards engineering solutions throughout the whole value chain. These innovative methods can lead to new processes, machines and products with new functionalities and shorter time to market.

Industry is not yet widely using such innovative approaches to engage consumers and respond to societal needs, also taking into account the individual preferences of women and men. Collaborative production liaising companies, especially SMEs, with these new approaches can however create Open Innovation networks that can unroll a wide range of entirely new business opportunities for the benefit of consumers.

Scope:

Proposals should particularly cover consumer-goods sectors and couple design, creativity and knowledge with a customer-driven production. The co-creation of products in both ends of the value chain represents customer involvement in the production. In particular, proposals should cover at least three out of the following areas:

Novel approaches to capitalise on the knowledge and ideas of design and engineering coming from different and even new actors;

Design of new strategies based on creative and agile methodologies for analysis;

Development of knowledge, technologies and tools to share and analyse relevant data and demands from users as well as to fully enable collaborative engineering in the production network, allowing all actors to propose innovative solutions;

Development of open source product data exchange and standard representations of products and processes that ensure the compatibility of modelling and simulation with different process information systems;

Development of new Manufacturing Demonstration Facilities (MDFs), where companies will test new technologies in cooperation with fablabs and makers in order to develop real industrial products and where training is offered.

Proposals also need to take into account Social Science and Humanities (SSH) aspects regarding creativity.

Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.

Activities should start at TRL 4 and achieve TRL 6 at the end of the project.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Establish Open-Innovation networks for manufacturing that support customer-driven production all around Europe;

Creation of specific business models for the engineering of customised solutions, particularly for SMEs, rapid demand changes and shorter time to market;

Improvement of the co-design and co-development capabilities towards a reduction of development costs of new products and services;

Increase of product variety and personalisation for higher customer satisfaction and loyalty.

Type of Action: **Innovation action**

DT-FOF-08-2019: Pilot lines for modular factories (IA 50%)

Specific Challenge:

Rapid changes in a production line require a significant flexibility of reconfiguration. Modular production equipment can create highly adaptable production lines to enable efficient production of small series tailored to customer demands. Previous research has shown that the modularity can be at two levels, either as complete machines with their own interface and material handling system or as interchangeable tool heads. In both cases, the advantage of modularity should be demonstrated by the ease of use and plug-and-produce features allowing for rapid modification.

The functionality of the modules should enable the production of the widest variety of complex products. The modules need to allow rapid physical rearrangements, through either automated processes or manual intervention; and have accessible, secure interfaces in order to be connected to a common data system for production control. The interfacing with the existing hardware and legacy software is another aspect that needs to be covered.

Scope:

Proposals are expected to start from existing test beds that are flexible enough to allow for the introduction of multiple modular process units. Proposals should cover all of the following areas:

The development of a range of production modules covering several different disciplines such as mechanical cutting tools, thermal processes, laser treatments and additive manufacturing technologies, taking into account safety aspects;

The integration of comprehensive production management systems, including real-time process control in a reconfigurable line, which includes considerations for data interoperability between modules and process line (including legacy hardware and software);

Pilot production of different products covering processing technologies and features such as multi-functionality (mechanical, electrical, thermal, optical, etc.), multi materials, and complex shapes.

The production modules could be considered as demonstrators on their own. However, their integration in the pilot line as well as an actual production demonstration with a variety of components or product prototypes should be achieved before the end of the project.

Proposals are expected to cover demonstration activities driven by the industrial community.

Activities should start at TRL 5 and achieve TRL 7 at the end of the project.

The Commission considers that proposals requesting a contribution from the EU between EUR 12 and 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

As an exception from General Annex D, the funding rate for eligible costs in grants awarded under this topic will be differentiated: 100% of the eligible costs for beneficiaries and linked third parties that are non-profit legal entities; and 50% of the eligible costs for beneficiaries and linked third parties that are for profit legal entities.

Expected Impact:

At least 15% reduction of time to reconfigure the production line (alternatively 15% reduction in downtime);

10% higher resource efficiency due to more suitable processing equipment for customised products;

Reduction of at least 15% of the overall cost of production;

Measurable yield improvement from run-to-run for small lot sizes.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

Type of Action: **Innovation action**

DT-NMBP-18-2019: Materials, manufacturing processes and devices for organic and large area electronics (IA)

Specific Challenge:

Europe is a leader in the development of materials for organic and large area electronics (OLAE) but the materials still need to be improved to maintain this position. In addition, there have been attempts to combine dissimilar manufacturing technologies in order to achieve seamless integration of the new technology into traditional products at constant/lower production cost and in a new generation of smart devices.

Scope:

Activities should include material development and improvement (electrical performance, processability, stability and lifetime during device operation), as well as prototyping of advanced OLAE based electronic products. New materials and process development should cover all of the following:

Combine materials with high uniformity and with high mobility in industrial quantities with high reproducible quality;

Improved environmental stability to enable operation in more robust environments and to reduce barrier requirements;

Seamless integration of the new technology into traditional and new products;

Advance the TRL of OLAE and enhance its manufacturability including high speed processes for the integration of flexible OLAE components onto flexible substrates;

Cost reduction for the structuring and processing of organic electronic materials into device structures;

Demonstration of OLAE-enabled prototypes in selected applications of flexible and wearable electronics.

Activities should start at TRL 3 and achieve TRL 5 at the end of the project.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

New products based on the combination of printed and OLAE processed electronics in flexible and wearable electronics;

Improvement in cost competitiveness, lifetime and processability as well as manufacturing capability for OLAE materials and electronics;

Improved environmental stability, water vapour transmission rates $< 10^{-6}$ gm⁻² d⁻¹ at 20°C/50% RH and oxygen transmission rates $< 10^{-6}$ cm³ m⁻² d⁻¹ bar⁻¹, of organic electronic materials for products. Improved printable commercial material charge carrier mobility $> 5 \cdot 10^4$ cm²/Vs;

Improved business opportunities and value creation in Europe by strengthening cooperation along the value chain as demonstrated by prototypes at TRL 5 that are taken to early-concept market trials with market introduction of new products in 2-4 years after project completion.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

This topic will be co-funded by LEIT-NMBP and LEIT-ICT, for a total budget of EUR 20 million

Type of Action: **Innovation action**

LC-NMBP-32-2019: Smart materials, systems and structures for energy harvesting (RIA)

Specific Challenge:

The realisation of the European goals of increased energy efficiency, reduction in CO₂ emissions and the circular economy require novel ways of using, harvesting and storing energy. Smart materials and material systems/structures have already demonstrated the potential to reduce energy consumption as well as harvest, generate and store energy. However, implementation has been limited due to the materials' operational reliability as well as issues of recyclability and dependence on rare elements. In addition, cost concerns or lack of efficient manufacturing processes prohibit the wider implementation of such technologies. The next step is the implementation of these technologies in a wide range of commercial applications allowing the exploitation of the characteristics of smart materials. As the application of smart materials and developments in sensor technologies are dominated by SMEs in the EU, extending their innovation potential for smart materials applications is important for maintaining their market position and has a significant impact in improving EU competitiveness.

Scope:

Proposals should cover the following:

The development of new materials and material combinations with energy harvesting and storage capabilities (e.g. lead-free piezoelectric based devices for energy generation and energy storing automotive structural components or magnetic materials systems);

Clearly demonstrate reduction of around 25% in overall materials and processing costs relative to the state of the art and how the implementation of those technologies would be achieved;

Demonstrate the recyclability and reliability of new smart materials, as well as a reduction in the dependence on rare elements;

Integrate sensor technologies (e.g. MEMS based sensor concepts) and the potential linkage with the Internet of Things (IoT);

Assess market perspectives and patents as well as standardisation;

Activities are expected to start at TRL 3 and achieve TRL 5 at the end of the project.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

New materials facilitating technology systems for sustainable energy supply allowing a reduction of greenhouse gas emissions by at least 40% based on lifecycle analysis;

Reduction of hazardous waste by 50% through efficient manufacturing practices and/or materials selection;

Development of new technologies, applications and services providing direct support for the wider implementation of the DSM and IoT, (e.g. enable the development of wireless sensor networks, or, deployment of energy harvesting powered sensor nodes to monitor remote locations);

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

Type of Action: **Research & Innovation action**

DT-NMBP-03-2019: Open Innovation Test Beds for nano-enabled surfaces and membranes (IA)

Specific Challenge:

Nano-enabled surfaces and membranes have a vast range of applications in final products across many industry sectors. The challenge is to enable a cost effective and sustainable industrial upscaling and deployment of nano-enabled surface and membrane technologies, including thin film architecture, coating, surface structuration for improved properties (optical, surface energy, durability, reduced friction, etc.), and nanostructured membrane's functionalities. This will require the integration of state-of-the-art nano-scale processes for modification, functionalisation, and structuring/coating of surfaces or membranes.

Scope:

Open Innovation Test Beds should upgrade or develop materials facilities and make available to industry and interested parties, including SMEs, services for the design, development, testing, safety assessment, and upscaling of new nano-enabled surfaces and membranes;

New materials functionalities may include, among others, improved scratch and abrasion resistance, super hardness and mechanical resistance, improved corrosion, wear and friction properties, bio-functionality, bio-compatibility, control of reflectivity, sensing ability, self-cleaning, antimicrobial, permeability and selectivity properties;

Open access at fair conditions and cost as well as outreach and dissemination across Europe, based on a distinct methodology;

Applications can cover industrial as well as consumer products. Potential regulatory, economical and technical barriers should be identified and assessed;

Quality control processes and tools should be validated to allow on-line quality controls;

Materials should be demonstrated in relevant industrial environments;

Proposals submitted under this topic should include actions designed to facilitate cooperation, across Europe, with other projects and existing Pilot Lines; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.

Activities should start at TRL 4 and achieve TRL 7 at the end of the project.

The Commission considers that proposals requesting a contribution from the EU between EUR 7 and 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Open and upgraded facilities at the EU level for the design, development, testing, safety assessment, and upscaling of nano-enabled surfaces and membranes;

Attract a significant number of new SME users, with at least a 20% increase for existing test beds;

Increased access to finance (for SMEs in particular) for investing in these nano-enabled surfaces or membranes or in applications using them;

At least 15% improved process parameters and 20% faster verification of nano-enabled surfaces or membranes performance for highly promising applications;

At least 20% improvement in industrial productivity, reliability, environmental performance, durability, and reduction of life-cycle costs of these nano-enabled surfaces or membranes;

At least 15% indirect reduction in energy consumption for applications using novel nano-enabled surfaces or membranes.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

Type of Action: **Innovation action**