

Чернівецький національний університет імені Юрія Федьковича
НКП «Нанотехнології, сучасні матеріали та
передові промислові виробництва»

**«Нанотехнології, сучасні матеріали та
передові промислові виробництва»**

Київ 11.10.2017



Юрій Халавка

“Leadership in enabling and industrial technologies – Nanotechnologies, Advanced Materials, **Biotechnology** and Advanced Manufacturing and Processing”.

- **FOUNDATIONS FOR TOMORROW’S INDUSTRY**
- **TRANSFORMING EUROPEAN INDUSTRY**
- **INDUSTRIAL SUSTAINABILITY**

Innovation actions

- Funding is more focused on closer-to-the-market activities. For example, prototyping, testing, demonstrating, piloting, scaling-up etc. if they aim at producing new or improved products or services.
- Who?
- Consortia of partners from different countries, industry and academia.
- Funding rate: 70% of eligible costs (except for non-profit legale entities, where a rate of 100% applies)

Research and innovation actions

- Funding for research projects tackling clearly defined challenges, which can lead to the development of new knowledge or a new technology.
- Who?
- Consortia of partners from different countries, industry and academia.
- Funding rate: 100% of eligible costs

Coordination and support actions

- Funding covers the coordination and networking of research and innovation projects, programmes and policies. Funding for research and innovation per se is covered elsewhere.
- **Who?**
- Single entities or consortia of partners from different countries, industry and academia.
- **Funding rate:** 100% of eligible costs

1. FOUNDATIONS FOR TOMORROW'S INDUSTRY

The call covers:

- Open Innovation Test Beds will provide the development and upscaling of advanced materials and nanotechnologies, combining digital, chemical and physical advances for innovative new products and services.
- Advanced characterisation tools, predictive modelling of materials at different scales, and support for a framework to ensure public safety in nanotechnology.

The call is expected to create about 20 Open Innovation Test Beds for materials development and upscaling in six technology domains, four Open Innovation Test Beds for materials characterisation and four Open Innovation Test Beds for modelling, in addition to the already existing NanoSafety Platform³. These are expected to collaborate in order to create a European ecosystem.

The call will contribute to the focus area on Digitising and Transforming European Industry and Services, by supplying the innovation test beds for upscaling, characterisation and modelling that will complement the digital innovation hubs.

Open Innovation Test Beds

- are physical facilities, established in at least three Member States and Associated Countries, offering technology access and services.
- The objective of Open Innovation Test Beds is to bring nanotechnology and advanced materials within the reach of companies and users in order to advance from validation in a laboratory (TRL 4) to prototypes in industrial environments (TRL 7).

- They will be expected to become sustainable, by making their facilities and services accessible to industry at fair costs and conditions, and to demonstrate their ability to attract, and interact with, a community of users, investors and other stakeholders from regional to European level.

Appropriate disciplines of Social Sciences and Humanities should be included!

- including broader forms of expertise at early stages of the innovation process, to consider relevant socio-economic, ethical and environmental considerations in the relevant research decisions.

Open Innovation Test Beds for upscaling nanotechnology and materials will be funded in **the following technology domains:**

- Lightweight nano-enabled multifunctional materials and components
- Safety Testing of Medical Technologies for Health
- Nano-enabled surfaces and membranes
- Bio-based nano-materials and solutions
- Functional materials for building envelopes
- Nano-pharmaceuticals production

Conditions for the Call - FOUNDATIONS FOR TOMORROW'S INDUSTRY

Opening date(s), deadline(s), indicative budget(s):¹⁰

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 31 Oct 2017				
DT-NMBP-01-2018 (IA)	75.00			23 Jan 2018 (First Stage)
DT-NMBP-02-2018 (IA)				28 Jun 2018 (Second Stage)
DT-NMBP-07-2018 (IA)	44.00			23 Jan 2018 (First Stage)
DT-NMBP-09-2018 (IA)				28 Jun 2018 (Second Stage)
NMBP-13-2018 (RIA)	30.00			
NMBP-14-2018 (RIA)				
Opening: 16 Oct 2018				
DT-NMBP-03-2019 (IA)		50.00		22 Jan 2019 (First Stage)
				03 Sep 2019 (Second Stage)
DT-NMBP-08-2019 (RIA)		37.80		22 Jan 2019 (First Stage)
DT-NMBP-10-2019 (RIA)				03 Sep 2019 (Second Stage)
NMBP-15-2019 (RIA)		27.80		
DT-NMBP-12-2019 (CSA)		4.00		03 Sep 2019

DT-NMBP-01-2018: Open Innovation Test Beds for Lightweight, nano-enabled multifunctional composite materials and components (IA)

Specific Challenge: The field of new smart lightweight nano-enabled materials has made remarkable progress in recent years. Many different types of materials, with radically enhanced properties and functionalities, are today available for a wide range of industrial applications; e.g. lightweight solutions for transportation and construction, enhanced properties for packaging materials and processes, incorporating smart interacting sensors or indicators, and materials offering enhanced electrical performance and reliability, high-performance thermal and/or electrical conductivity, and UV shielding. The challenge is to scale up and enable industry and users, in a cost-effective and sustainable way, to develop, test, and adopt new lightweight, high performance, multifunctional, and environmentally friendly materials for high-value composite components and structures.

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 specific materials compositions, including nano-particle/objects;
- Attention should be given to materials new functions, features, capabilities, and properties (functionalisation), and to processing techniques and optimisation of process parameters, from uniform dispersion and distribution of nano-particles within the materials (or nanoparticle aggregates) to the association of dissimilar materials;
- Potential regulatory, economic and technical barriers should be identified and assessed;
- A methodology for providing open access at fair conditions and cost as well as outreach and dissemination across Europe;
- Quality control processes and tools should be validated to allow on-line quality controls;
- Materials should be demonstrated in relevant industrial environments.

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 lightweight, nano-enabled and multifunctional materials and components, easily accessible to users across different regions of Europe;
- 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 materials or in applications using them;
- At least 15% improved industrial process parameters and 20% faster verification of materials performance for highly promising applications;
- At least 20% improvement in industrial productivity, reliability, environmental performance, durability, and reduction of life-cycle costs of these materials;
- At least 15% indirect reduction in energy consumption across sectors using lighter materials in their products and processes.

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

Type of Action: Innovation action

Open Innovation Test Beds for Safety Testing of Medical Technologies for Health (IA)

Specific Challenge: The medical technology industry is an important economic and social player in Europe. The challenge is to provide companies and users in this sector access to affordable and advanced testing facilities and services to facilitate the development of new and safe medical technologies. The two new EU regulations⁵ governing medical technologies (medical devices and in-vitro diagnostics) are introducing a new set of rules to improve the safety of medical devices for the benefit of patients. To preserve timely access to innovative healthcare solutions and support the competitiveness of the European industry, testing facilities support services are needed to help industry and users develop and test medical devices in compliance with EU safety regulations. A bonus would be to define new methodologies for clinical testing, when relevant.

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/existing medical devices in compliance with EU regulatory frameworks since the beginning of the development process;
- Test Beds could also contribute to develop methodologies to accelerate and simplify the subsequent pre-clinical and clinical testing in accordance with EU rules;
- Potential regulatory, economic, organisational and technical barriers should be identified and assessed. Where applicable, considerations regarding risk-assessment procedures that take into account potential gender differences should be considered;
- Open access at fair conditions and cost as well as outreach and dissemination across Europe, based on a distinct methodology;
- Quality control processes and tools should be validated to allow on-line quality controls;
- Medical devices should be demonstrated in relevant industrial environments.

Proposals submitted under this topic should include actions designed to facilitate cooperation, across Europe, 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 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 new medical devices easily accessible to users across different regions of Europe;
- Attract a significant number of new SME users, with at least a 20% increase for existing test beds;
- Cost effective, innovative, and safe healthcare medical devices in compliance with EU safety regulations;
- Faster assessment of new medical devices' compliance with EU safety regulations;
- Reduced time to market of new medical devices (earlier determination of safety profile and facilitation of subsequent pre-clinical and clinical testing);
- Indirect substantial benefits for European citizens' safety and access to new and innovative medical products;
- New market opportunities for providing services to non-EU players interested in testing facilities to ensure compliance with EU regulatory frameworks for their export products to Europe.

DT-NMBP-07-2018: Open Innovation Test Beds for Characterisation (IA)

Specific Challenge: Efficiency of materials up-scaling and use in new products in European manufacturing industries depends on advances in characterisation and testing. Essential industry competencies comprise technologies, know-how and proficiency in interpretation of results, data, and characterisation standards in order to help bring new materials into products. The challenge is to establish open user-driven characterisation test beds including all aspects of novel multi-scale and multi-modal characterisation solutions management, analytics and mining of the resulting data (Materials Informatics). Interaction is required between the stakeholders regarding the latest technological solutions, such as non-destructive characterisation approaches.

Scope: Proposals should establish an open innovation characterisation test beds that will create, sustain and drive the use of novel materials characterisation techniques to support industrial innovation and will network materials characterisation stakeholders and concretely implement an integrated approach. In particular:

- Collectively develop novel advanced solutions for specific and relevant industrial problems. Support advanced data analysis and storage, standardisation, reference materials, regulation and safety;
- Facilitate common approaches to common problems for fast adoption of innovative tools for characterisation by industry and strengthen the interface between academia and industry;
- Enable the integration of information based on materials modelling and characterisation through the development of widely agreed and standardised datasheets to enhance value chain interactions;
- Network relevant stakeholders across Europe for defining roadmaps, application of real-time methods, implementation of regulatory and safety requirements, training and management of information (including Materials Informatics) and development of new skills.

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 around EUR 9 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:

- Translation of industrial needs into characterisation workflows, increased awareness and uptake by industry, and effective access of materials manufacturing companies to the know-how and advanced tools;
- Measurable reduction of costs for product design and time-to-market by means of faster and cheaper evaluation of production process deviations;
- Increased ability and quantifiable cost reduction for industry to comply with regulations.

Type of Action: Innovation action

DT-NMBP-09-2018: Accelerating the uptake of materials modelling software (IA)

Specific Challenge: European modellers have created a large set of materials modelling software of which a major part remains an untapped and unused source of information while having a large potential for exploitation. Further model development and software engineering is needed to make this available to third parties in order to provide industry ready software solutions.

Scope: Development and adaption of existing models and interoperability software developed by academics and SMEs should provide industry-ready integrated, standardised, interoperable software solutions.

- Existing academic codes (models, solvers, post-processors and interoperability modules) or codes owned by European RTO's and SMEs, are to be further developed and integrated into commercial software according to industrial needs;
- Software packages to be developed should form a modelling framework allowing the seamless integration with and re-use of various existing models used in industry. Coupling and linking of models should allow reliable top-down and bottom up design of new materials and processes for faster product development;
- The new packages should use existing and emerging standards for semantic interoperability across domains;
- Apps should be developed to remove the underlying complexity of the models in order to facilitate the use by the end-user;
- The upscaled software and services for maintenance and support should be available via the existing and future European Materials Modelling Marketplace and the network of modelling translation environments and the Open Innovation modelling test beds.

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 7 at the end of the project.

The Commission considers that proposals requesting a contribution from the EU around EUR 4 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:

- Increased use of discrete and continuum models in manufacturing industry, which will reduce the number of trial and error experiments by a factor of 5 and thus support the Digital Single Market (DSM) objectives and significantly reduce the development cost for industry;
- Additional exploitation channels for academics and research organisations in Europe which should increase the impact of earlier model developments by a factor 2;
- Widening and upscaling of software of commercial companies into better, faster, optimised materials modelling suites enlarging application possibilities in all industry sectors.

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

Type of Action: Innovation action

NMBP-13-2018: Risk Governance of nanotechnology (RIA)

Specific Challenge: Significant progress has been achieved in relation to research regarding the safety of engineered nanomaterials and the transfer of this knowledge into regulation. Still, more needs to be done as nanotechnology reaches the market. To fill this gap, transdisciplinary risk governance is required based on a clear understanding of risk, its management practices and the societal risk perception by all stakeholders. It should propose and apply clear criteria for risk evaluation and acceptance and for transfer of acceptable risk. It should develop reinforced decision making tools incorporating those aspects and facilitate risk communication to relevant stakeholders, including industry, regulators, insurance companies and the general public.

Scope:

- Data and information management and framework tools with regard to the safety of nanomaterials for risk assessment, hazard and exposure, human health and environment, and risk mitigation including regulatory aspects of safe-by-design;
- Responsible communication with stakeholders and the civil society based on good quality information and valuable feedback;
- Plans for future scientific and regulatory research paying attention to social, ethical and environmental aspects, to achieve completeness, consistency, maximum synergy of actions and international cooperation;
- Mechanisms to monitor progress in several industrial sectors and to revise plans.

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 around EUR 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:

- A transparent, self-sustained and science-based risk governance council;
- Governance framework tools for managing possible nanotechnologies risks in regard to social, environmental and economic benefits;
- Availability of high quality data for industry and regulators decision making;
- Sustainable solutions demonstrated at a level that will allow both consistent integration of scientific results and regulatory application of scientifically sound concepts;
- Consistency of science based risk management approaches in all EU Member States and synergy with similar actions internationally.

Type of Action: Research and Innovation action

NMBP-14-2018: Nanoinformatics: from materials models to predictive toxicology and ecotoxicology (RIA)

Specific Challenge: Despite the significant amounts of data on physico-chemical and toxicological and ecotoxicological properties of nanomaterials generated over the last decades, detailed knowledge on how these properties are linked to specific physico-chemical characteristics is only beginning to emerge. The challenge is to develop and implement modern methods, more cost effective and less reliant on animal testing, for toxicity investigations in each stage of product innovation, through making best use of joining existing and emerging data with the help of progress in nanoinformatics.

Scope:

- Development of models that support the prediction of both specific functionalities and hazard and are crucial to establish safe-by-design principles at early stages of material development;
- Development of a sustainable multi-scale modelling framework, based on the integration/linking of different types of nanoinformatics models in order to advance towards predictively linking of physico-chemical NM property models to NM functionality and hazard;
- Uptake and valid use of these tools and nanoinformatics models, user-friendly interfaces to enhance accessibility and usability of the nanoinformatics models, and clear explanations of their applicability domains, especially regulatory compliance, should be provided for different stakeholders (industry, regulators, and civil society).

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is particularly encouraged.

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 around EUR 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:

- Reliable nanomaterials safety data systems, models and strategies to allow material characteristics to be linked to adverse outcomes;
- A validated accessible framework, designed to predict human and environmental toxicological hazards;
- Increased confidence in nanosafety nanoinformatics predictive models through agreed standards, harmonised standard operating procedures, considering OECD validation principles.

Type of Action: Research and Innovation action

2. TRANSFORMING EUROPEAN INDUSTRY

The call covers:

- the manufacturing process itself, ranging from manufacturing excellence and flexibility to increased reliability, accuracy and durability, from improving energy efficiency and re-use of materials or re-manufacturing to skills development and novel ways for human-machine interaction;
- the development of emerging and potentially disruptive biotechnologies;
- the development of medical technologies for diagnosis and treatment.

Conditions for the Call - TRANSFORMING EUROPEAN INDUSTRY

Opening date(s), deadline(s), indicative budget(s):¹⁶

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 31 Oct 2017				
DT-FOF-01-2018 (CSA)	2.00			22 Feb 2018
DT-FOF-02-2018 (RIA)	79.00			
DT-FOF-03-2018 (RIA)				
DT-FOF-04-2018 (IA)				
BIOTEC-03-2018 (RIA)	30.00			23 Jan 2018 (First Stage) 28 Jun 2018 (Second Stage)
NMBP-22-2018 (RIA)	24.00			23 Jan 2018 (First Stage) 28 Jun 2018 (Second Stage)
BIOTEC-01-2018 (CSA)	2.00			22 Feb 2018
CE-BIOTEC-04-2018 (RIA)	10.00			25 Apr 2018

DT-FOF-01-2018: Skills needed for new Manufacturing jobs (CSA)

Specific Challenge: Breakthrough education and training paradigms for continuous training of the existing workforce are needed, that will enable the European industrial workforce to develop new skills and competences in a quick and efficient way. This should put workers, both women and men, at the forefront of innovation and drive industry towards a smooth transition to the use of increasingly sophisticated machines and new technologies.

Advanced Manufacturing, one of the six Key Enabling Technologies (KETs), is a highly innovative sector in Europe. In line with the New Skills Agenda for Europe, there is a need to strengthen human capital, employability and competitiveness for this KET. The Blueprint for Sectoral Cooperation on skills is one of the ten actions in this Agenda. This topic will support the implementation of the Blueprint beyond Additive Manufacturing within several areas from the Factories of the Future priorities.

Scope:

- Identify shortages and mismatches in technical and non-technical skills, knowledge and competences in Advanced Manufacturing (including digital capabilities);
- Map the most relevant existing national initiatives upskilling the existing workforce in order to develop an EU wide strategy;
- Put in place activities related to lifelong learning and granting of qualification for personnel in industrial settings. Develop real case scenarios providing efficient methodologies that can be applied in a variety of industrial areas;
- Innovative and hands-on approaches, including Social Sciences and Humanities (SSH) elements, in upskilling of the existing workforce and attracting more women to the field, through training activities (including training of trainers) and knowledge management with direct involvement of senior employees. On-site, modular and e-learning education should be offered free of charge for re-use;
- Exchange of information between industry, trade unions, educational centres, national employment agencies at European scale.

Proposals are also encouraged to seek synergies with national initiatives funded under the European Social Fund, projects from the Skills Alliances and, where relevant, other future initiatives launched at European level.

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately.

Expected Impact:

- Real and measurable steps towards the reduction of identified skill gaps leading to the upskilling of the existing workforce in Europe and, as a consequence, increased innovation performance in the industry concerned;
- At least 15 new job profiles per industrial area analysed, leading to a longer work life for jobholders;
- Close and continuous engagement between relevant industry, trade union, academia, educational centres (including vocational schools) across Europe to stimulate networks in the European Research Area as a whole.

Type of Action: Coordination and support action

DT-FOF-02-2018: Effective Industrial Human-Robot Collaboration (RIA)

Specific Challenge: Human-Robot Collaboration (HRC) on the factory floor has a high potential economic impact for European industry.

Past research to implement HRC in an industrial setting concentrated largely on safety of humans, allowing workers and robots to share working space without fences. Most of the developments started from existing industrial robotic arms, augmenting it with technologies to make it safe for humans to interact with the robot. This has already led to production environments with safe interaction between humans and robots. However genuine collaboration between humans and robots require more holistic solutions encompassing smart mechatronic systems designed to improve the quality of the job performed and to increase flexible production. Such systems have not yet been demonstrated for manufacturing purposes.

In order to move from a structured factory floor where robots work behind closed fences to an open environment with smart mechatronic systems and humans collaborating closely, interdisciplinary research in the fields of robotics, cognitive sciences and psychology is required, also taking into account regulatory aspects. More attention has to be paid to develop novel inherently-safe robotic concepts where collaboration with humans is taken up already in the design phase. In order for effective HRC to be taken up by industry, beyond safety aspects, including ergonomics, adaptability, liability issues, inclusiveness of vulnerable workers, acceptability and feedback from users need to be considered in a holistic way.

Scope: Proposals need to extend the current state of the art of individual HRC to work environments where robots and workers function as members of the same team throughout the factory.

Proposals should cover two of the following three areas:

- Integration in industrial production environments of novel human-centred designed smart mechatronic systems such as for example soft robotics for high payloads;
- Implementation of novel artificial intelligence technologies capable of massive information processing and reacting in real-time to enable new levels of autonomy, navigation, cognitive perception and manipulation for robots to collaborate with humans in the process;
- Development of methods for robotic hazard assessment and risk management to clarify trade-offs between productivity and safety for mixed human-robot smart devices environments.

Proposals need also to take into account Social Sciences and Humanities (SSH) elements regarding human-related barriers for the uptake of smart mechatronic systems including robot technology in industrial environments such as ergonomics, user experience, comfort, trust, feeling of safety and liability in modern production facilities, taking into account age and gender aspects.

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 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% reduction in production reconfiguration time and cost.

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

Type of Action: Research and Innovation action

DT-FOF-03-2018: Innovative manufacturing of opto-electrical parts (RIA)

Specific Challenge: Optoelectronics and opto-electrical components involve the interactions of photons and electrons. They are used in parts such as lasers, photodiodes, image sensors, optical amplifiers, modulators, solar cells, embedded optics and light-emitting diodes.

Previous research led to rapid developments and new applications in optoelectronics and photonics. However, new processes need to be introduced into production systems. When going into the scale-up phase, many processes need to be adjusted to fit the production of complex, often free-form components. The adjustments include both component specific changes as well as standard process steps. Due to the need to produce large varieties of parts in small batches, process adjustments have to be both rapid and accurate.

The equipment for testing, failure analysis and control equipment needs to follow a fast pace of technical advancement, and cover a range of sensors, such as electrical, optical, magnetic and thermal sensors.

Scope: Proposals need to present a variety of new processes applicable to the production of opto-electrical components, for instance material handling, material strain engineering, patterning, material deposition, assembly, joining and bonding. Furthermore, quality needs to be ensured by reliable sensors throughout the production line. The processes need to include a level of sustainability that allows the final products to be recycled and reintroduced into the value chain. Proposals need to cover all of the following areas:

- New, flexible, and innovative process chains to handle complex designs that include opto-electrical functionalities;
- Improved sensor equipment for quality control in the different processing steps as well as the final functionality of the component;
- Methodologies for improving quality through high-precision automation using the sensor data, including non-destructive in-process evaluation of material and functional component properties;
- Re-use and requalification of key components and precious materials within the process chain from products at their end of life.

Proposals are expected to include a variety of use-case demonstrations of typical opto-electrical components, in which the robustness of the processing, work piece handling, sensing and the automation approach can be demonstrated.

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.

Expected Impact:

- 15% yield improvement because of the introduction of new sensor equipment, related metrology and automatic non-destructive control;
- 15% time reduction for reconfiguration of key process tools in a production line due to change of type of component;
- A tangible part ($> 10\%$) of the production cost of the parts should originate from recycled products and materials.

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

Type of Action: Research and Innovation action

DT-FOF-04-2018: Pilot lines for metal Additive Manufacturing (IA 50%)

Specific Challenge: Costs and unpredictable defects in final parts and products are preventing complete deployment and adoption of Additive Manufacturing (AM) in the metalworking industries.

The industrial demonstration in a pilot line will show the full potential of metal AM in real manufacturing conditions and it will serve as a flagship example for other stakeholders. Quality aspects to be significantly improved include robustness, stability, repeatability, speed and right-first-time manufacturing.

Scope:

- Multi-scale and multi-physics simulations of the process and of the whole system from the early design phase, to avoid costly trial and error runs. The prediction and minimisation of distortion and their effect on durability and expected lifetime for post processing steps will also avoid propagation of defects to downstream stages;
- In-line non-destructive testing and in-situ analysis of product, including metrology aspects;
- Integration and inter-operability of AM processes into multi-stage production systems, with in-process monitoring, feedback and control;
- Hybridisation of Additive Manufacturing with other manufacturing and assembling processes;

- Certification, regulatory and standardisation activities related to the proposed solutions and AM produced parts;
- Occupational exposure in terms of health, safety and environment should be carefully observed together with the recycling of unused materials.

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 H, the funding rate for direct 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:

- Increase in robustness of metal AM-based processes by 40% and production speeds by 25%;
- Reduction of time to market by 25% and 'right first time' capability by 40%;
- Reduction of uncertainties of selected material quality parameters by 50%, resulting in improving product quality by 40%;
- New certification schemes for industrial "3D-Printed" parts and products in collaboration with relevant certification stakeholders;
- New standardisation of specific categories not included in current ISO/ASTM/CEN CENELEC TCs.

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

Type of Action: Innovation action

DT-NMBP-20-2018: A digital 'plug and produce' online equipment platform for manufacturing (IA)

Specific Challenge: One of Europe's strengths in manufacturing is its abundance of SME equipment manufacturers with the capability to offer world-class products of highest quality and precision. A further strength is the large number of actors having off-the-shelf prototypes ready for experimentation and for market uptake. To increase their visibility towards global users of equipment and to further support digitisation of manufacturing, industrial online platforms needs to be developed and set up for use on the market.

Scope: (a) design and build the digital platform that brings together suppliers and users in a transparent and efficient way; and (b) populate it with adequate product information. This will constitute a set of pilot implementations intended to sell ‘plug and produce’ industrial equipment and services to customers globally. The platform should therefore facilitate B2B transactions and host associated services in the form of digital product models allowing users to simulate (e.g. digitally test) the capabilities of the equipment on offer and its compliance to standards. This will ultimately boost product quality, transparency and usability based on Return on Experience The digital platform should enable all of the following:

- Transparency of product features, capabilities, resource use, associated add-on services and price;
- Customer feedback, real-time use feedback (anonymised as needed) and associated options;
- Scalability with respect to technological development and manufacturing application domains;
- Information about standards and regulatory compliance (e.g. the facilitation of re- and de-manufacturing) as well as security requirements.

Social Sciences and Humanities (SSH) elements should cover issues such as business model/ownership economics and adequate administration. Work should cover in particular user interface aspects to encourage active customer feedback.

Activities under (b) include the incorporation of suppliers or users of the equipment pilots and/or developers of additional applications and services where appropriate. Beneficiaries may provide support to third parties as described in part K of the General Annexes of the Work Programme. The support to third parties can only be provided in the form of lump sums. The respective options of Article 15.1 and Article 15.3 of the Model Grant Agreement will be applied.

Each consortium will define the selection process of the third parties for which financial support will be granted. The typical amount per party shall be in the order of EUR 50 000 to 100 000, as these parties are responsible for achieving the objective of activities under (b).¹¹ Around one third of the EU funding requested by the proposal shall be allocated to the purpose of financial support to third parties.¹²

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 5 and achieve TRL 7 at the end of the project.

This topic is part of the lump sum funding pilot scheme¹³. Funding for grants awarded under this topic will take the form of a fixed lump sum of EUR 7.5 million.

Expected Impact:

- Deliver a B2B online platform covering at least one key industrial equipment domain and mobilising actors across Europe;
- Demonstrate the full capability of the platform in one dedicated industrial domain including associated product services (e.g. digital models enabling functional simulation and including the services from all third parties selected in line with the conditions set out in Part K of the General Annex;
- Showcase the platform's scalability capability (towards all relevant industrial domains via a reference architecture;
- Deliver a credible business plan that ensures long-term deployment and profitability, as well as scalability beyond the initial public financing phase;
- Demonstrate industry-wide support through an inclusive governance structure;
- Increase market opportunities for the users of the platforms, including SMEs.

Type of Action: Innovation action

BIOTEC-01-2018: Standardisation in Synthetic Biology (CSA)

Specific Challenge: Systems biology and synthetic biology are scientific fields with potential to transform our way to understand and interact with nature. Synthetic biology combines knowledge and tools from biology and engineering for the design of biological systems that are thus programmed to do what we want them to do, be it for pharmaceutical products (e.g. active pharmaceutical agents or enzymes), in the environment (e.g. bio-pesticides), or industry (e.g. biochemicals).

Standardisation in electric and mechanical engineering has underpinned the success of global industrial production. However, the question remains about how much of this can be imported into the biological domain. Standards for the biological components used by synthetic biology will facilitate creating the blueprint of a given component with identical representation methods. This could bring major advancement in biotechnology and strengthen European leadership in future biotechnological research and production.

Scope: Proposals will be based on equivalent standardisation experiences that can be imported into the biological realm along with a thorough analysis of the functions of live systems that can be amenable to standardisation, generating new approaches where previous experiences do not apply. It will involve a dialogue with experts of the relevant disciplines on the necessary steps to set up principles for understanding, measuring, refining and, to the extent possible, standardizing the engineering of biological systems in support of their broad application in different industrial sectors. Standardisation will be considered in the following fronts: designation of the component/part, specifications, methodologies involved and assembly. Proposals will take into consideration worldwide actions to create synergies and partnerships between leading EU and international scientists, engineers and industrialists.

Proposals will include Social Sciences and Humanities (SSH) elements regarding the ethical dimensions and the environmental impact of products issued from synthetic biology research.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is particularly encouraged.

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.

The Commission considers that proposals requesting a contribution from the EU up to EUR 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

- A list of the most urgent standardisation needs via current practice leading to homogeneity in research and production;
- Identified scientific research gaps whose elucidation would accelerate standards-driven biological engineering;
- A realistic strategy based on research programmes, resources, facilities and structures needed to sustainably support the establishment of and compliance with standards for synthetic biology in the EU in the medium to long term.

Type of Action: Coordination and support action

BIOTEC-03-2018: Synthetic biology to expand diversity of nature's chemical production (RIA)

Specific Challenge: For years, industries have relied upon living organisms as a source of compounds or natural products, most of which result from interactions between them. Finding these compounds has very much depended on massive screening assays. Moreover, these compounds are chemically complex and their production often involves dozens of genes controlled by intricate regulatory networks. Both the nature of these molecules and the difficulties to obtain them via chemical synthesis have restricted their commercial utilisation.

However, now synthetic biology offers unique opportunities to create analogues of natural products or even to go beyond those. It has the capacity to modify the genomes of microorganisms, discovering novel routes to obtain complex chemicals, thus expanding the chemical diversity of molecules for the production of new compounds. The use of engineering principles and tools in biological systems overcomes the bottlenecks of molecules which are not amenable for large-scale production and expands the options of new compounds for applications ranging from medicine to agriculture and materials.

Scope: Proposals will consist of the bioengineering of the genome of organisms (e.g. yeast, algae, bacteria) to be used in industrial processes in order to optimise molecular pathways. This should lead to the design and synthesis of naturally unavailable and efficient pathways for the production of new complex and high value added chemicals for the pharmaceutical, agricultural or material sectors. Emerging synthetic biology techniques (engineering of large genomic regions, synthetic regulation for the control of gene expression and gene editing, among others) can be combined with knowledge of synthetic chemistry, enzyme engineering, systems biology and bioinformatics.

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 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:

- New approaches for the production of complex chemicals;
- Pathway design and validation for the production of at least two new compounds that would be difficult to make exclusively by chemistry, including an assessment of the related environmental benefits and risks;
- Proved contribution to the standardisation of synthetic biology genetic parts and gene clusters.

Type of Action: Research and Innovation action

CE-BIOTEC-04-2018: New biotechnologies for environmental remediation (RIA)

Specific Challenge: Contamination of soils, sediments, ground and surface water caused by waste resulting from human action and leakage into water sources is a serious problem. This pollution contains compounds having toxicity and durability which creates important concerns from the health and environmental viewpoints. Moreover, it represents a significant economic burden for society.

In some standard remediation strategies, for example burying polluted soils in landfills, pollutants are not destroyed and the problem is merely postponed. Chemical remediation and the disposal of contaminated waste increase the health risk for workers. Bioremediation, which uses naturally occurring microorganisms, is a more sustainable and gentle alternative to physicochemical options.

Microorganisms have developed countless strategies to depollute their environment and to transform harmful environmental contaminants into harmless end products. However, the effectiveness of bioremediation faces a number of challenges, for instance the concentration of the contaminant, the combined biological activity of the microbial community over time and space and the consumption of energy.

Scope: Proposals should include research and innovation for efficient and low cost remediation strategies using microorganisms by means of (bio-)electrochemical systems, or alternate systems that require minimum or zero external energy or chemicals. The work should ensure that an acceptable performance for field applications can be attained. Remediation should cover hydrocarbons and their derivatives, metals, nutrients, antibiotics or micropollutants. Moreover, the system developed should remove different contaminants, including complex mixtures, the remediation time should be accelerated and it should work with mixed microbial communities.

This topic is part of the EU-China flagship initiative on Biotechnology for Environment and Human Health, which will promote substantial coordinated and balanced research and Innovation cooperation between the EU and China. China-based participants have the possibility to apply for funding under the Chinese co-funding mechanism and other Chinese sources¹⁴.

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 up to EUR 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:

- Remediation of at least two toxic contaminants;
- Proof of the feasibility of scaling up the technology for field testing, including an assessment of the related environmental benefits and risks;
- A demonstration of the benefits over standard physicochemical remediation approaches, including energy efficiency.

Type of Action: Research and Innovation action

NMBP-22-2018: Osteoarticular tissues regeneration (RIA)

Specific Challenge: EU demographic change requires innovation to enhance active ageing, whereby a growing market for osteoarticular tissue regeneration is created. To reduce patients' sufferings, mitigate the economic burdens to health systems and exploit market opportunities it is crucial to conceive innovative designs and development of innovative biomaterials that enables the delivery of smart, nanostructured and functionalised tissues to regenerate and integrate bones, cartilages, tendons and joints.

Scope: To design and develop user-centred innovative and smart nanobiomaterials which may be also adaptable to remote control, that will lead to a personalised regeneration of osteoarticular tissues (bones, cartilages, tendons, joints). The nanobiomaterials should be designed to perform in host tissues affected by severe degenerative and/or inflammatory processes, which typically characterise Osteoarticular pathologies. Proposals should cover at least one of the following technologies, leading to a convergence of processes:

(i) 3D-bioprinting; (ii) stem cells seeding, recruiting, activation, functionalisation, and cell printing; (iii) nano functionalisation; (iv) 3D-printable biophoto-polymerisation; (v) use of light to expose/mask tethered signalling molecules, incorporating immune-modulatory materials such as complement regulators; (vi) additive manufacturing by laser sintering, rapid prototyping technologies, stereolithography, inkjet techniques; (vii) relevant cross-cutting KETs; (viii) electrospinning.

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 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:

- Alleviate heavy burdens on patients and healthcare systems by developing smart nano-engineered affordable biomaterials for tissue self-healing and regeneration; improve the well-being, health, quality of life and active ageing of populations;
- Boost industrial competitiveness and leadership of EU companies in personalised bio-intelligent materials responding to patients' clinical specificities;
- Enhanced incorporation of digitalisation and Internet of Things for innovative and affordable biomaterials;
- Increase EU attractiveness for the clinical development of regenerative medicine;
- reinforce the EU sector ecosystem to generate new markets and opportunities for SMEs, translating innovative biomaterials into pre-clinical tests for market uptake.

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

Type of Action: Research and Innovation action

Opening: 28 Nov 2017				
DT-NMBP-20-2018 (IA)	15.00			08 Mar 2018
Opening: 16 Oct 2018				
DT-FOF-05-2019 (IA)		106.60		21 Feb 2019
DT-FOF-06-2019 (IA)				
DT-FOF-08-2019 (IA)				
DT-FOF-12-2019 (RIA)				
BIOTEC-02-2019 (RIA)		31.00		22 Jan 2019 (First Stage) 03 Sep 2019 (Second Stage)
DT-NMBP-18-2019 (IA)		20.00 ¹⁷		22 Jan 2019 (First Stage) 03 Sep 2019 (Second Stage)
DT-NMBP-19-2019 (IA)		20.40		
CE-BIOTEC-05-2019 (RIA)		10.00		24 Apr 2019

3. INDUSTRIAL SUSTAINABILITY

The choice of topics supporting energy innovation reflects the four strategic priorities in Accelerating Clean Energy Innovation¹⁸

- Strengthening EU leadership on renewables;
- Decarbonising the EU building stock by 2050: From nearly zero-energy buildings to energy-plus districts;
- Developing affordable and integrated energy storage solutions; and
- Electro-mobility.

INDUSTRIAL SUSTAINABILITY

- CE-SPIRE-02-2018: Processing of material feedstock using non-conventional energy sources (IA)
- CE-SPIRE-03-2018: Energy and resource flexibility in highly energy intensive industries (IA 50%)
- CE-SPIRE-10-2018: Efficient recycling processes for plastic containing materials (IA)
- CE-NMBP-24-2018: Catalytic transformation of hydrocarbons (RIA)

- CE-NMBP-26-2018: Smart plastic materials with intrinsic recycling properties by design (RIA)
- LC-NMBP-30-2018: Materials for future highly performant electrified vehicle batteries (RIA)
- NMBP-33-2018: Innovative and affordable solutions for the preventive conservation of cultural heritage (IA)
- LC-EEB-02-2018: Building information modelling adapted to efficient renovation (RIA)

Conditions for the Call - INDUSTRIAL SUSTAINABILITY

Opening date(s), deadline(s), indicative budget(s):²⁵

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 31 Oct 2017				
CE-SPIRE-02-2018 (IA) CE-SPIRE-03-2018 (IA) CE-SPIRE-10-2018 (IA)	97.50			22 Feb 2018
LC-EEB-02-2018 (RIA) LC-EEB-06-2018-20 (IA)	35.00			22 Feb 2018
CE-NMBP-24-2018 (RIA) CE-NMBP-26-2018 (RIA)	38.00			23 Jan 2018 (First Stage) 28 Jun 2018 (Second Stage)
LC-NMBP-30-2018 (RIA)	25.00			
NMBP-33-2018 (IA)	16.00			
Opening: 16 Oct 2018				
CE-SPIRE-04-2019 (IA) CE-SPIRE-05-2019 (IA)		65.80		21 Feb 2019

Джерела

- <http://usw.com.ua/page/horizon-2020>
- <http://h2020.com.ua/uk/>
- <http://ibhb.chnu.edu.ua/ncp>

Дякую за увагу!