



M-ERA.NET Call 2017

Guide for Proposers

14 March 2017

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1. What is M-ERA.NET

M-ERA.NET is an EU funded network which has been established in 2012 to support and increase the coordination of European research and innovation programmes and related funding in materials science and engineering. Between 2016 and 2021, the M-ERA.NET consortium will continue to contribute to the restructuring of the European Research Area (ERA) by operating a single innovative and flexible network of national and regional funding organisations. M-ERA.NET contributes to EU policies and is complementary to funding schemes at regional, national and European levels, supporting the exploitation of knowledge along the whole innovation chain from basic research to applied research and innovation. By stimulating scientific excellence and the creation of a new innovation oriented economy, M-ERA.NET will deliver lasting impact and significant breakthroughs. M-ERA.NET aims to develop a long-term cooperation between funding organisations from countries and regions across Europe and beyond.

What we offer:

M-ERA.NET provides a central forum where substantial pan-European research funding programmes can be aligned to support the European RTD community. M-ERA.NET aims to address societal challenges and technological needs with an interdisciplinary approach, providing a flexible umbrella structure to cover emerging topics in materials research and innovation, including materials for low carbon energy technologies and related production technologies. As a core activity, a series of joint calls for transnational RTD projects will be implemented. These calls will offer the European RTD community an opportunity to access coordinated funding across Europe and to gain access to leading knowledge world-wide. Over five years, the M-ERA.NET consortium aims to mobilise substantial national and regional public funding as well as EU funding.

Why?

Advanced materials technologies have been classified as Key Enabling Technologies (KET) with a wide range of product applications such as developing low carbon energy technologies and improving energy and resource efficiency. They have huge potential to fuel economic growth and provide jobs. In recent years, significant efforts have been made to ensure industry can meet the challenges it currently faces, in terms of the new materials being introduced and the stronger integration of products and processes required. Europe has a wealth of academic and

industrial expertise and to ensure it stays at the forefront of developments it is crucial to have a strategic programme that helps to develop projects with impact on a global scale.

Strategic impact

M-ERA.NET is a large network and a powerful tool to tackle European and global challenges in materials research. Improving the coordination and cooperation of national and regional programmes will reduce the fragmentation of public funding across Europe and align programme strategies for transnational collaboration, eliminating programme duplication and a wasteful use of resources. M-ERA.NET will enable collaboration between leading academic and industrial research partners from European and non-European countries and regions and will facilitate access to previously inaccessible new markets. The joint calls for transnational RTD cooperation will mobilise a critical mass of public funding to support key players in materials research to intensify pan-European partnerships and to encourage newcomers to transnational RTD cooperation to realise innovative RTD projects.

The M-ERA.NET Consortium

M-ERA.NET started in 2012 under the FP7 scheme and continues from 2016 to 2021 under the Horizon 2020 scheme as a network of more than 40 public funding organisations from around 30 different countries, including national, regional and non-European organisations. M-ERA.NET aims to identify further relevant materials research programmes and to establish cooperation with funding organisations from Europe and beyond.

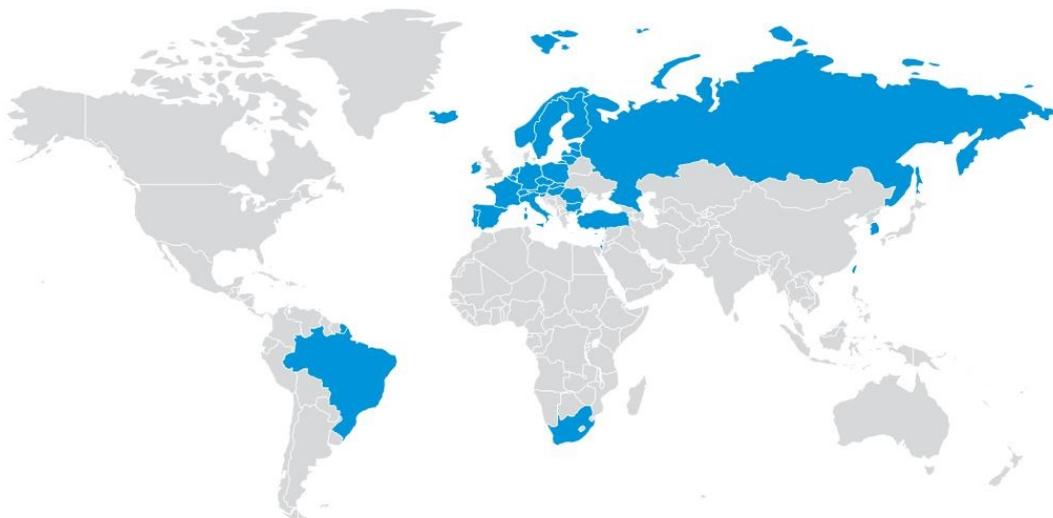


Figure 1: M-ERA.NET 2 participants, see also <https://www.era-learn.eu/network-information/networks/m-era-net-2/overview-participants>

2. Structure of the M-ERA.NET Call 2017

The objective of the M-ERA.NET Call 2017 is to enable transnational R&D projects between partners receiving funding from regional/national programmes.

Fig. 2 shows the schematic workflow of the Call 2017. Benefits are combined in one approach: On the one hand the regional/national funding organisations apply their own well-established funding rules and procedures known to their applicants, and on the other hand the M-ERA.NET provides transnational coordination expertise:

- The announcement and dissemination activities of the call are performed by the M-ERA.NET network.
- The eligibility of funding applications will be checked by national/regional funding organisations according to the rules defined by their respective funding programmes, targeting a reasonable balance of requested and available national/regional budgets.
- There will be a centralised evaluation performed by independent international evaluators that provide a ranking list.
- The final funding decision will be made by the national funding organisations.
- The coordination of the evaluation and funding decisions is performed by the M-ERA.NET Steering Board at the Selection Meeting.

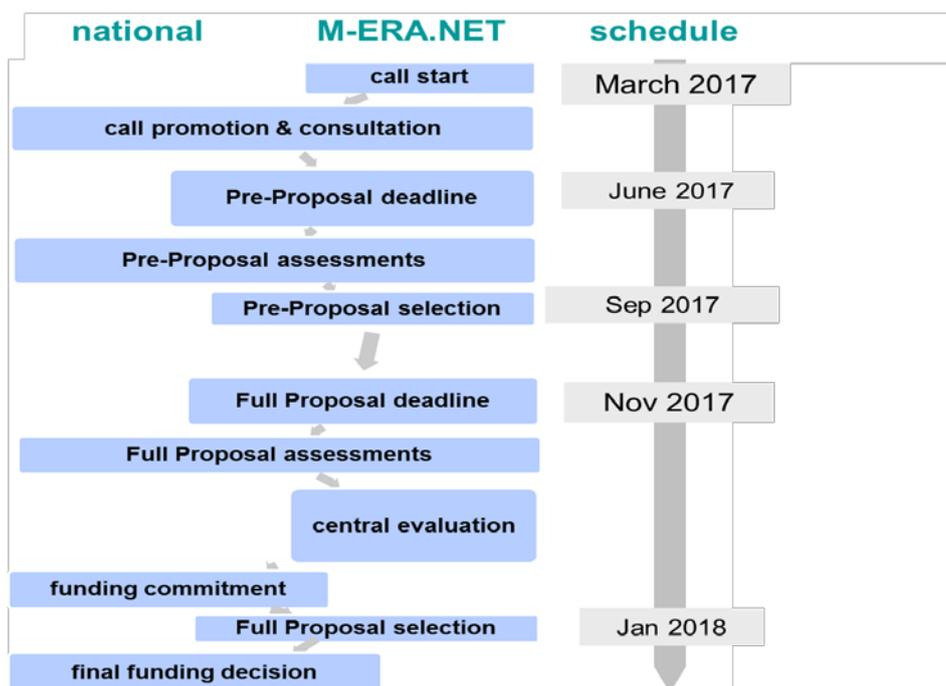


Figure 2: Workflow of the call 2017

3. Call Announcement

3.1. Objectives and Topics

The aim is to fund ambitious transnational RTD projects addressing materials research and innovation including materials for low carbon energy technologies and related production technologies.

This call supports the following topics:

Topic 1: Integrated computational materials engineering (ICME)

Topic 2: Innovative surfaces, coatings and interfaces

Topic 3: High performance composites

Topic 4: Multifunctional materials

Topic 5: New strategies for advanced material-based technologies in health applications

Topic 6: Materials for additive manufacturing

M-ERA.NET will support the research and innovation chain described through the Technology Readiness Levels (TRL). A more detailed description of the topics and TRLs is available in Annex 2.

The individual national/regional thematic programme focus and funding rules (3.2.) must be taken into account.

3.2. Funding rules

Each project partner has to apply individually for regional/national funding. For each project partner the funding rules of the respective regional/national programmes apply. **This means that depending on the respective national/regional funding rules some project partners have to submit additional national/regional proposals or information on national/regional level.**

To obtain detailed information about the specific funding rules and programme priorities we strongly recommend contacting the respective national/regional funding organisations (see Annex 3 for details).

3.3. Eligible project structure

- Project consortia consisting of a minimum of 3 partners (all requesting funding) from at least 2 different countries (at least 1 EU member states or associated country¹) participating in the M-ERA.NET Call 2017 can apply. Partners not asking for funding can participate in addition to the minimum consortium of 3 partners from 2 different countries. The consortia may involve as many partners as necessary.
- Coordinator belongs to a country/region participating in the M-ERA.NET Call 2017.
- Proposal addresses appropriate TRLs for selected M-ERA.NET Call 2017 topics
- Proposal is recommended for Full-Proposal submission by M-ERA.NET after Pre-Proposal stage.
- SMEs, large companies, academic research groups, universities, public research organisations or other research organisations may also participate according to their national/regional financing regulations.

Small to medium sized projects (4 or 5 partners on average) are expected. The roles of each partner within the consortium should clearly add value to the objectives of the proposed project. Depending on the nature of the project each partner in the consortium must demonstrate how it will exploit the expected results.

National/regional funding rules apply. Therefore in some cases only certain topics, TRLs or types of organisations are eligible (e.g. some national/regional programmes fund only industrial but no academic partners, low/high TRLs). It is highly recommended to contact the respective national/regional funding organisation before proposal submission (see Annex 3 for details).

A consortium agreement between the project partners is required for funding (after the final funding decision), although the principles of the agreement should be clear in the application form. The purpose of the consortium agreement is to clarify:

- the responsibilities of the partners;
- decision processes inside the project;
- management of any change of partners;
- how to exploit and/or commercialise the results (for each partner);

¹ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf

- IPR issues.

A template for the consortium agreement can be found at: www.iprhelphdesk.eu

3.4. Project budget

No overall limits have been defined on M-ERA.NET level but national/regional limits regarding the available funding will apply.

3.5. Project duration

The maximum project duration cannot exceed 36 months. National/regional limits regarding the duration of projects will apply.

3.6. Draft dates and deadlines

Date	Step	Place
14 March 2017	Publication of the M-ERA.NET Call 2017	
13 June 2017 12:00 noon Brussels time	Deadline for submission of Pre-Proposals a) Pre-Proposals and b) National/regional Funding Applications, if necessary*	a) Online (via IT tool) b) National/Regional funding organisations
Mid-September 2017	Feedback to applicants	
9 November 2017 12:00 noon Brussels time	Deadline for submission of: a) Full-Proposals and b) National/regional Funding Applications, if necessary*	a) Online (via IT tool) b) National/Regional funding organisation
February 2018	M-ERA.NET feedback to applicants	
March 2018	Contract negotiations for selected proposals on national/regional level	National/Regional funding organisations
Spring 2018	Start of funded projects	

* *contact your national/regional funding organisation*

4. Application process

The M-ERA.NET application process will be a 2-step procedure: Pre-Proposal and Full-Proposal.

1. Before submitting a proposal, all project partners must contact their respective national/regional programme funding organisations in order to discuss the project line-up and the funding conditions.
2. **A Pre-Proposal is mandatory.** It has to be submitted by the coordinator through an online application form available at www.m-era.net. At the same time national/regional funding applications must be submitted to each of the involved funding organisation according to their specific rules (if applicable).
3. National/regional funding organisations will carry out assessments of Pre-Proposals and respective national/regional funding applications. The Pre-Proposal stage will be used to ensure that only high quality proposals which are in line with national requirements are invited to the Full-Proposal stage. Applicants will be provided with feedback after the review of their Pre-Proposal, including a recommendation to submit (or not) a Full-Proposal.
4. A proposal has to be recommended for Full-Proposal submission by M-ERA.NET after Pre-Proposal stage to be eligible.
5. A Full-Proposal (including Annex 1) must be submitted by the project coordinator through an online application form available at www.m-era.net. At the same time national/regional funding applications must be submitted to each of the involved funding organisation according to their specific rules.
6. In the second stage Full-Proposals will be subject to a central evaluation performed by independent international evaluators which will result in a ranking list. At the M-ERA.NET selection meeting parties will agree on the projects that are going to be financed based on the ranking list and the available nation/regional finance resources.
7. M-ERA.NET recommends the funding of projects to the respective funding organisations. The regional/national funding organisations make the final funding decision.

4.1. Stage 1: M-ERA.NET Pre-Proposal

The Pre-Proposal gives an overview on the whole project. It is mandatory and has to be submitted in English by the project coordinator through an online application form available at www.m-era.net. In addition to the Pre-Proposal (online submission) the corresponding national/regional funding application form may be requested by the respective funding organisation according to their respective programme rules.

After eligibility check and evaluation of Pre-Proposals M-ERA.NET gives advice to the project coordinators and recommends/does not recommend the submission of Full-Proposals.

4.2. Stage 2: M-ERA.NET Full-Proposal (and national/regional funding applications)

The Full-Proposal gives an overview of the whole project and describes all national project parts. To receive funding, the national parts of the project must fulfil their national/regional criteria. This will create different submission and financing situations for partners from different countries.

- ▶ *Project objectives stated in the Pre-Proposal cannot be changed.*
- ▶ *Other changes from Pre- to Full-Proposal should be avoided. In any case, changes from Pre- to Full-Proposal stage have to be coordinated with all involved funding organisations by the consortium leader! It is not possible to add new countries to the consortium, i.e. only new partners from countries already participating in the proposal can be added after the Pre-Proposal stage-*

This means that changes regarding partners, content, costs, funding or consortium have to be communicated to all involved funding organisations. The consortium leader is responsible to coordinate and ensure the acceptance of these changes by the involved funding organisations.

4.3. Confidentiality

Proposals and any information relating to them (including the names of the evaluators) will be kept confidential and only be accessible to the organisations involved in the funding. Proposals will not be used for any purpose other than the evaluation of the applications, making funding decisions and monitoring of the project. International experts are required to sign a confidentiality agreement prior to evaluating proposals.

5. Evaluation

M-ERA.NET aims at providing a transparent, fast and straight forward assessment of the submitted project proposals.

5.1. Pre-Proposal:

5.1.1 Eligibility check and evaluation criteria:

At M-ERA.NET level:

- Pre-Proposal submitted on or before deadline.
- Presence of requested M-ERA.NET Pre-Proposal form in English.
 - Minimum of 3 partners (all requesting funding) from at least 2 different countries (at least 1 EU member states or associated country²) participating in the M-ERA.NET Call 2017.
 - Partners not asking for funding can participate in addition to the minimum consortium of 3 partners from 2 different countries.
- Coordinator belongs to a country/region participating in the M-ERA.NET Call 2017.
- TRLs are in line with the call topic.
- Maximum project duration of 3 years.
- Pre-Proposal is recommended for submission for a Full-Proposal by at least 2 funding organisations from the countries/regions involved.

At national/regional level:

- Presence of requested national/regional Pre-Proposal forms (if applicable).
- Minimum number of eligible, independent partners (if applicable, criteria of involved funding programmes apply).
- Relevance to funding programme (if applicable, criteria of involved funding programmes apply).
- Financial status of applicants, especially industrial applicants.

² http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf

5.1.2. Result of Pre-Proposal assessment:

At national/ regional level the assessment of Pre-Proposal results in one of the recommendations, to be communicated to the applicants:

- *Recommended for submitting the Full-Proposal (including requirements and/or potential comments for improvement).*
- *Not recommended (motivated - mandatory comments).*

5.2. Full-Proposal:

5.2.1 Eligibility check:

Eligibility checks of the Full-Proposal are done before the central evaluation.

At M-ERA.NET level:

- Full Proposal submitted on or before deadline.
- Presence of requested M-ERA.NET Full-Proposal form and Annex 1 to the Full-Proposal form in English.
- Minimum of 3 partners (all requesting funding) from at least 2 different countries (at least 1 EU member states or associated country³) participating in the M-ERA.NET Call 2017.
- Partners not asking for funding can participate in addition to the minimum consortium of 3 partners from 2 different countries.
- Coordinator belongs to a country/region participating in the M-ERA.NET Call 2017.
- TRLs are in line with the call topic.
- Maximum project duration of 3 years.
- Only in exceptional cases changes from Pre-Proposal to Full-Proposal are allowed.
- Proposal is recommended for funding by at least 2 funding organisations from the countries/regions involved after the Pre-Proposal assessment.

At National/regional level:

- Recommendations given in the Pre-Proposal stage are fulfilled.

³ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf

5.2.2. Result of Full-Proposal eligibility check:

At national/regional level the eligibility check of Full-Proposals results in a preliminary commitment to the Full-Proposal, depending the outcome of the central evaluation.

5.2.3. Evaluation of Full-Proposal:

The Full-Proposal evaluation is carried out as a central evaluation by independent experts.

The M-ERA.NET Call 2017 Evaluation Procedure:

- *Individual written assessments: 3 individual and independent written assessments including scoring for each Full-Proposal provided by selected and agreed experts.*
- *Compilation of individual assessments: 3 individual assessments are compiled by one of the 3 experts (= rapporteur). The compilation consists of peer review report and scoring. All experts who provided individual written assessments confirm the compilation and consistency of peer review report and scoring.*
- *A ranking list of recommended projects is based on the scoring.*
- *All of the involved funding organisations meet for a selection meeting to assemble and commit themselves to the final list of selected proposals (selection list). The selection is based on the M-ERA.NET ranking list and the available national/regional finance resources..*
- *If there are big differences in the Full-Proposal compared to the recommended Pre-Proposal and/or the eligibility criteria are not fulfilled the Full-Proposal may be rejected without evaluation.*
- *The names of the independent experts will be kept confidential.*

The M-ERA.NET Call 2017 Evaluation Criteria for Full-Proposal:

The Full-Proposals will be evaluated according to the following criteria:

- Excellence
- Impact
- Quality and efficiency of the implementation

Evaluation criteria, scoring and thresholds are described in **Annex 4**.

6. Decision

6.1. Decision process

The M-ERA.NET selection meeting results in the M-ERA.NET recommendation for funding decisions at national/regional level. The recommended selection list will be forwarded to the involved programme owners who will be in charge of the final funding decisions.

6.2. Funding

6.2.1. Contract

Funding contracts are signed directly between the project partners and their national/regional funding organisations.

6.2.2. Payments and Start of projects

Depending on the national/regional regulations, a pre-condition for transferring the first funding instalments might be the existence of a consortium agreement that also includes IPR related issues.

It is highly recommended that the project starting and finishing dates are the same for all project parties. As the national funding contracts may not all become effective at the same time, the project parties:

- Usually do not receive the instalments at the same time,
- Usually are not reviewed/monitored on national/regional level at exactly the same time however, the M-ERA.NET consortium will help to minimise these gaps.

7. Monitoring

7.1. National/regional project review

The progress of each individual contract will be monitored by the respective national/regional funding organisation through specific project review processes.

7.2. M-ERA.NET reporting

Apart from the national/regional project review, the transnational cooperation aspects will be monitored on M-ERA.NET level, e.g. by using online questionnaires.

7.3. Change in active projects

Any substantial change in an on-going project must be reported immediately to the involved funding organisations. The project partners should be aware that changes may affect their funding.

8. Dissemination

A reference to M-ERA.NET is requested in publications, exhibitions, lectures and press information concerning results of the projects.

9. Support

Frequently Asked Questions (FAQ) are listed in the website (www.m-era.net). In addition, all Funding Organisations participating in the call will provide assistance to project proposers in the case of any questions.

Annex 1: Thematic priorities for the M-ERA.NET Call 2017

1. Integrated computational materials engineering (ICME)
2. Innovative surfaces, coatings and interfaces
3. High performance composites
4. Multifunctional materials
5. New strategies for advanced material-based technologies in health applications
6. Materials for additive manufacturing

1. Topic 1: Integrated computational materials engineering (ICME)

Technical content/scope

Current developments in combinatorial synthesis and multi-scale modelling together with high throughput or multi-scale experimentation allow for a faster development of materials targeted to both enhanced performance and processing. Knowing the influence of manufacturing routes in final material properties, process modelling will be considered as well. Thus, modelling of interfaces between components should be addressed. Moreover, better input data identification will be targeted in order to improve predictive models. A skilful combination of these approaches in terms of Integrated Computational Materials Engineering will lead to significant improvements in our ability to design new materials or to assess materials performance already in the product development stage.

The proposals should focus on either of the following model-driven schemes:

- a) Design of new materials with properties targeted for engineering applications, *or*
- b) Tailoring microstructural changes of known materials to obtain new or improved properties, *or*
- c) Creating or improving tools to advance virtual design, virtual testing or virtual manufacturing.

Objectives

The proposals should address one or several the following items:

- 1) **Material constitutive modelling:** Use of materials physics-based design principles in a computational environment, bridging the gap between different time and/or length scales.
- 2) **Modelling of interfaces between components:** part and tooling in process manufacturing, adhesive bonding, etc.
- 3) **Identification of input parameters** (mechanical, thermal, electrical...) for modelling and their integration into models.
- 4) **Computational simulation of material behaviour including material processing**
- 5) **Experimental validation of model results across multiple length scales.** The proposals should clearly present the approach taken for relating the above items.
- 6) **Target properties:** Definition of specific goals to be reached, by defining criteria. For schemes
 - a) and b) the criteria need to be quantitative target properties.

Expected impact

The proposal should address how it will contribute to the expected impact of the topic, defined as follows:

- Improved predictive power of Integrated Computational Materials Engineering by the use of improved input data, leading edge methodology, and considering interfaces between components and the manufacturing process.
- Establishment of well-targeted materials design and process definition.
- Building and strengthening a common European research community in the area of Integrated Computational Materials Engineering.
- Increased competitiveness of the European industry, allowing cost saving in materials design and processing, as well as a shortened time-to-market for materials with advanced properties.
- Better predictive modelling of material behaviour and its processing through the use of improved data.
- Improvement of material performance through modelling innovative material processing.
- Proposals should clearly demonstrate credible benefits in engineering applications areas for the materials/processes/properties developed through ICME.
- Projects within this topic could be basic or applied research (TRL target for project deliverables within levels 2-5).

All proposals should clearly state the Technology Readiness Level (TRL) at the project start and at the project end (see 1.3.). In order to increase the potential for new business opportunities and commercial exploitation of the results, proposals aiming at TRL 4 and below should include a plan for the transition to higher TRLs at a later stage (i.e. beyond the project end) and demonstrate industrial involvement, for example by establishing an industrial advisory board or by the participation of one or more companies in the project consortium. For proposals aiming above TRL 4, industrial partners should be involved in the project consortium.

Target groups

This topic is targeted at all groups in the innovation chain: basic research, applied research, industrial R&D. The topic is particularly suitable for the establishment of a strong collaboration between research entities, SMEs and large industry.

Keywords

ICME, constitutive modelling, computational simulation, experimental validation, multiple length scales, input parameter identification, manufacturing processes.

Indicative targeted TRL: 2-5

2. Topic 2: Innovative surfaces, coatings and interfaces

Technical content/scope

Surface and coating technology is a key enabler for new solutions in numerous industrial sectors in Europe. This call will stimulate application driven development of innovative surfaces, multifunctional coatings and understanding of interfaces and related processes such as joining. As an example, proposals may address the important challenge of extreme operating conditions which include, but are not limited to: temperature, mechanical load, corrosion, chemical environment, bacteriological agents and radiation.

The target properties addressed in this call include but are not limited to: tribological, mechanical, corrosion resistance, anti-bacterial, optical, electromagnetic, (anti-) adhesive, catalytic characteristics, self-responsiveness and multifunctionality, taking into account both processing and final products.

In particular, energy-related coating properties are encouraged to be addressed in the sector of wind, PV, concentrated solar cells (CSC), geothermal energy, bioenergy, fossil fuel energies, nuclear energy, energy harvesting, energy efficient materials (EEM) for buildings and energy storage. The proposals should also consider the processing aspect of the new technology aiming for flexible and energy-efficient approaches in production with smart use of materials (saving resources and tailoring applications) in an environmentally friendly manner.

Objectives

The objective of the call is:

- To develop innovative or significantly improved coatings, interfaces and process solutions by chemical and/or physical surface modification.
- To generate new insights in surface modification, manufacturing, and tailoring of (multi-) functional coatings by a holistic understanding of the relationship of materials - processes - applications. Enabling a new generation of engineered surfaces with improved and combined characteristics.

Project proposals should:

- Address innovative surface modification and coating solutions, consider innovative processing routes or new concepts for coating and surface treatment.
- Focus on one or several of the following points:
 - Interdisciplinary process combinations,
 - Innovative surfaces and coating materials and processes to join them,
 - Nanomaterials,
 - Surfaces with sensor capabilities,
 - Structured surfaces,
 - Composite coatings or multilayers.

- Consider addressing aspects such as: basic understanding of the mechanisms, experimental assessment, prototyping, up-scaling, manufacturing and validation with a view to final customer applications.

In order to ensure relevance for different partners in the value chain, the proposal should state clear concepts for application(s) and targeted industrial sector(s).

Expected impact

- Innovative components/products with tailored properties or functionalities by tuned surfaces and coatings for extreme operation conditions.
- A positive ecological and energy impact in terms of avoidance of hazardous materials and compounds by developing processes, coating materials, technology and product life cycles following a circular economy strategy.
- The proposals should address innovative products or technologies based on functionalised surfaces and coatings that might have strong societal impact, on e.g. safety, economics, employment and life quality, and is encouraged to result in synergies between industry and academia.

All proposals should clearly state the Technology Readiness Level (TRL) at the project start and at the project end (see 1.3.). In order to increase the potential for new business opportunities and commercial exploitation of the results, proposals aiming at TRL 4 and below should include a plan for the transition to higher TRLs at a later stage (i.e. beyond the project end) and demonstrate industrial involvement, for example by establishing an industrial advisory board or by the participation of one or more companies in the project consortium. For proposals aiming above TRL 4, industrial partners should be involved in the project consortium.

Target groups

This topic is targeted at all groups in the innovation chain: basic research, applied research and industrial R&D. The topic is particularly suitable for the establishment of a strong collaboration between research entities and SMEs. Participation of large industry is encouraged e.g. as potential end user of the technology proposed.

Interdisciplinary projects are encouraged and should enable a broader cross-sectorial use.

Keywords

Functionalised surfaces, (multi)functional coatings, innovative surfaces, coating materials and processes to join them, nanomaterials, anti-bacterial coatings, self-responsive coatings, surfaces with sensor capabilities, structured surfaces, (nano)composite coatings and multilayers, extreme temperature, extreme pressure, extreme mechanical load conditions, corrosive media, bacterial media, high friction, environments with radiation.

Indicative targeted TRL: 2-6

3. Topic 3: High performance composites

Technical content/scope

Within the scope of this call, composites are defined as engineered materials, including hybrids, composed of two or more constituents, for example, a polymer matrix reinforced by a fibre or filler that meets the requirements which cannot be otherwise fulfilled by one component alone. The matrix, fibres and fillers can be synthetic or bio-based.

Objectives

The call is aimed at high performance composites having functional properties that meet the target applications in transportation, construction, packaging and medical devices as well as other engineering applications with a particular emphasis on energy (consumption reduction, storage and production).

The new developed composites should combine some of the following properties:

- High strength and stiffness to weight-ratio
- Durability (e.g. good resistance to creep, fatigue, humidity, etc.)
- Tailored thermal and electrical properties
- Self-healing properties
- Biocompatible and/or anti-bacterial
- Biodegradable and compostable
- Fire retardant properties with environmentally friendly additives

The research proposals could also address the following material design and manufacturing issues:

- Novel and unique knowledge in molecular design, functionalization and characterization of a wide range of fibre or filler (nano or micro) reinforced composite materials for composites with improved reinforcement/matrix interaction
- Development of new biobased resins and/or biobased fibres or fillers
- Methodology and tools for design-optimisation
- Scalable and rapid manufacturing, for example material innovations could encompass fast curing, low viscosity resins, stampable thermoplastic composite sheets.
- Automation and robotisation
- Modelling and simulation of processing including multi-scale approaches
- Joining, assembly and repair including joining of dissimilar materials (hybrid structures)
- Structural health monitoring
- Composite end-of-life technologies.

To strengthen the whole innovation chain it is strongly recommended that the project proposal covers materials, processing and application development of composites. Such integration could be further enhanced by fostering collaboration between universities and industry, and by a consortium covering the whole value chain.

Expected impact

- More competitive industrial products and processes using the advanced materials design and manufacturing concepts.
- Socio-ecological benefits provided by products with higher integration level of functionality, lighter products to transport, lighter dynamic applications to decrease energy consumption, and by using materials that will result in a lower environmental impact.
- Because the composites industry is characterised by a large number of scattered players, including SME manufacturers and equipment suppliers, the projects should improve the sharing of knowledge and reinforcing both technological and scientific platforms.

All proposals should clearly state the Technology Readiness Level (TRL) at the project start and at the project end (see 1.3.). In order to increase the potential for new business opportunities and commercial exploitation of the results, proposals aiming at TRL 4 and below should include a plan for the transition to higher TRLs at a later stage (i.e. beyond the project end) and demonstrate industrial involvement, for example by establishing an industrial advisory board or by the participation of one or more companies in the project consortium. For proposals aiming above TRL 4, industrial partners should be involved in the project consortium.

Target groups

This topic is targeted at all groups in the innovation chain: basic research, applied research, industrial R&D. The topic is particularly suitable for the establishment of a strong collaboration between research entities, SMEs and large industry.

Keywords

Biobased composites, synthetic composites, hybrid material systems, functional properties, in-service behaviour, design methodology, process technology, process modelling, material behaviour modelling.

Indicative targeted TRL: 2-6

4. Topic 4: Multifunctional materials

Technical content/scope

Advanced functional materials are, and should remain, an important economic and employment generator in Europe. Multifunctional materials, as opposed to structural materials, are the bottleneck for almost all technologies. Designing of materials and microstructures with tailored properties is needed to achieve high performance in industrial applications, especially when considering long term stability. Special attention must be paid to the requirements for application conditions referred to energy technologies. Currently over 80 % of Europe's energy use is based on oil, gas and coal. The European Strategic Energy Technology Plan (SET Plan) recognises this situation and emphasises the growing need for cost-competitive low carbon energy and energy efficiency technologies. The SET Plan Materials Road Map emphasises the pivotal enabling role of advanced materials and clearly outlines the medium to long term strategy for the coming years.

Objectives

The scope of this call is to develop advanced multi-functional materials or material systems with improved physical, chemical and/or mechanical properties leading to advances in the following areas:

- Materials for ICT and industrial sensing and actuation: smart materials/metamaterials with controlled electrical, magnetic, thermal, optical, and mechanical properties enabling low power (towards zero power) device/systems in ICT, industrial sensing and actuation applications. Critical raw materials (e.g. rare-earths in permanent magnets, Pt group materials, others) replacement where needed should be addressed.
- Construction materials, building environments: advanced/smart thermal insulation materials, advanced/smart window concepts, active paints, advanced illumination concepts, efficient heat radiation solutions.
- Intensive industrial sectors (chemicals, cement, glass, pulp and paper, others): materials based energy-conversion solutions for plant by-products and residues. Materials recycling solutions. Thermoelectric conversion.
- Electrochemical energy storage: new materials for use in rechargeable ion batteries, alternatives to graphite electrodes, new non-carbon based nanomaterials for supercapacitors, ionic and electronic conductors for new electrochemical storage concepts.
- Flexible energy storage devices: solid state batteries and capacitors that can integrate with wearable electronics
- Energy harvesting materials and solutions: new energy harvesting solutions based on advanced thermoelectric, piezoelectric, magnetostrictive or chemical concepts. New architectures for increased energy efficiency.

- **Photovoltaics:** improved architectures for thin film solar cells, including micro concentrators, passivation layers, controlled composition gradients, others. Replacement of toxic, or critical materials where possible. Novel solar cell materials (nano based concepts, others).

The research proposals should give sufficient attention to mid- or long term industrial feasibility, reliability, durability and environmental compatibility. The materials development should aim to a clear and quantified improvement in performance, cost reduction and sustainability towards critical raw materials use.

A proposal must consider, demonstrate and clarify its added value and impact, and where appropriate, its alignment with the SET Plan materials Roadmap. For lower TRL, radically new concepts should be proposed and demonstrated with respect to the state of the art. In case the research proposal intends to make use of critical and potentially scarce raw materials -see critical raw materials for EU⁴ - the applicants are requested to present a justification for this choice. Projects may also address substitution or recycling of such critical or scarce materials.

Expected impact

- Ensure the future European energy supply through technological development based on novel multifunctional materials
- Support the European strategic policy targets in terms of greenhouse gas emission reduction and developing affordable sustainable energy sources and usage.
- Improved competitiveness and strengthened industrial leadership.
- Strengthened innovation excellence of the European academia and research institutes.

All proposals should clearly state the Technology Readiness Level (TRL) at the project start and at the project end (see 1.3.). In order to increase the potential for new business opportunities and commercial exploitation of the results, proposals aiming at TRL 4 and below should include a plan for the transition to higher TRLs at a later stage (i.e. beyond the project end) and demonstrate industrial involvement, for example by establishing an industrial advisory board or by the participation of one or more companies in the project consortium. For proposals aiming above TRL 4, industrial partners should be involved in the project consortium.

Target groups

This topic is targeted at all groups in the innovation chain: basic research, applied research, industrial R&D. The topic is particularly suitable for the establishment of a strong collaboration

⁴ http://www.catalysiscluster.eu/wp/wp-content/uploads/2015/05/2014_Critical-raw-materials-for-the-EU-2014.pdf

between research entities, SMEs and large industry. Consortia focusing only on basic research or industrial R&D are also eligible.

Keywords

Advanced functional or multifunctional materials, improved properties (electrical, magnetic, optical, chemical, thermal, mechanical), nano/microstructured materials, energy efficiency).

Indicative targeted TRL: 3-6

5. Topic 5: New strategies for advanced material-based technologies in health applications

Technical content/scope

Wellness and healthy ageing of the European population require new or improved solutions to health-related issues. Many of these solutions will come from the development of new advanced materials as key components of therapeutics (drug delivery systems, implants, tissue regeneration strategies, cell and gene therapies, etc.), diagnostics (contrast agents, implantable devices) and theranostics. These materials will be in contact with the human body at different levels.

The purpose of this call topic is to provide opportunities to advance material-based technologies towards the market. This action is aligned with societal challenges regarding “Health, Demographic Change and Wellbeing” as defined in the H2020 framework. It is also in agreement with the recognition of advanced materials as a Key Enabling Technology for strengthening the competitiveness of the European industry.

Objectives

The main objective is to obtain a better understanding of the functionality of biomaterials and interactions with their biological hosts (e.g. organs, body tissues, cells and human bio-fluids). Materials investigated should target at least one clinically relevant application.

Proposals must address one or more of the following:

- Interactions between biomaterials and biological hosts with specific focus on hierarchical structures and/or multiple time scales.
- Aspects such as biofilm formation and biodegradation.
- The crossing of biological barriers such as blood brain barrier, digestive system, skin barrier or cell membranes.
- Understanding of the impact of the sterilisation process on biomaterials.
- Impacts of the preservation processes on biological entities (e.g. organs, body tissues, cells and human bio-fluids) on *in vitro* and *ex vivo* investigations.

Successful proposals are expected to take into account the following:

- The potential market and exploitation routes including scalability.
- A report on relevant regulatory issues.

Moreover, the proposals are strongly encouraged to consider the following issues:

- Where appropriate the *in vitro* testing and/or assays in small animals should be conducted following the bio-ethical committee rules of each centre.
- Cross-collaboration between materials scientists, biologists, medical doctors and industrial partners.

Expected impact

- Understanding the complexity of biomaterials' interfaces at hierarchical structures and/or multiple time scales going far beyond the current state of the art.
- Achievement of new or improved materials' performance for health applications.
- Higher competitiveness of the European health industry through more reliable products and processes.
- Improved market access through increased awareness of the regulatory protocols.
- Increased collaborations between materials science RTD performers, industrial and medical stakeholders in the health sector.
- At the end of the project the technology being addressed is expected to reach TRL 4 (see 1.3.).

All proposals should clearly state the Technology Readiness Level (TRL) at the project start and at the project end (see 1.3.). In order to increase the potential for new business opportunities and commercial exploitation of the results, proposals aiming at TRL 4 and below should include a plan for the transition to higher TRLs at a later stage (i.e. beyond the project end) and demonstrate industrial involvement, for example by establishing an industrial advisory board or by the participation of one or more companies in the project consortium. For proposals aiming above TRL 4, industrial partners should be involved in the project consortium.

Target group

This topic is targeted at all groups in the innovation chain: basic research, applied research, industrial RTD. Collaboration between research entities, SMEs and large industry is encouraged.

Keywords: Biomaterials, bio-interfaces, biofilms, biodegradation, nanotechnology, implants, scaffolds, sterilisation, cell or organ preservation, additive manufacturing, therapeutics, diagnostics, theranostics.

Indicative targeted TRL: 2-5

6. Topic 6: Materials for additive manufacturing

Technical content/scope

Additive Manufacturing (AM) is a process of directly building 3D parts and components based on a digital model usually by adding material layer by layer. AM is a rapidly developing industrial sector and, potentially, a disruptive technology. This is because, in principle, it is material and energy effective and sustainable compared to subtractive technologies. However, the full exploitation of 3D AM processes is currently limited due to the in-service performance of the available materials' sets. Within this call, proposals should focus on the development of materials specifically for use in AM processes and leading to required performance, reliability and economics of manufactured components.

Objectives

The objective is to develop innovative metallic, ceramic, polymeric and composite materials designed for use in AM processes (e.g. tuning composition, structure, morphology, powder-processing parameters etc.) and advanced production systems in order to confer improved or modified properties for manufactured products. . The final goal of proposed projects should be to demonstrate the ability of new materials and processes to achieve finished components exhibiting improved performance, preferably with reduced life cycle costs.

Project proposals should address materials and production processes for final part production. This could include e.g. mechanical and corrosion properties, surface finishing, internal stress reduction, electrical and thermal conductivity, and materials specifically designed to exploit the potential of AM systems. Proposals should also discuss energy related aspects of the research.

Examples of proposals that could be considered eligible under this call include, but are not exclusively confined to:

- Development of materials and processes designed to overcome problems relating to cracks or internal stress in AM parts.
- Development of materials for the AM production of components for use in extreme environments.
- Materials for use in the production of improved scaffolds used in medical applications.
- Development of materials and processes that enable effective re-use of feedstock materials.
- Development of novel materials and processes to enable innovative applications for AM parts, which could include functionally graded or composite materials.
- New materials for energy efficiency AM applications, such as heat exchangers with complex geometry.
- Development of fibre-reinforced polymeric materials for lightweight structural AM applications.

Expected impact

- Development of materials for the production of reliable AM parts/components suitable for specific application classes.
- New feedstocks (e.g. powder, wire, filament) specifically developed to enhance functionality, reliability and performance.
- New process technology for the production of AM parts with novel materials.
- New process technology adapted to the production of new AM-specific feedstock materials.
- All proposals should address any environmental, social or ethical impacts where relevant.
- Projects within this call could be basic or applied research (TRL target for project within levels 3-7).

All proposals should clearly state the Technology Readiness Level (TRL) at the project start and at the project end (see 1.3.). In order to increase the potential for new business opportunities and commercial exploitation of the results, proposals aiming at TRL 4 and below should include a plan for the transition to higher TRLs at a later stage (i.e. beyond the project end) and demonstrate industrial involvement, for example by establishing an industrial advisory board or by the participation of one or more companies in the project consortium. For proposals aiming above TRL 4, industrial partners should be involved in the project consortium.

The use of living biological materials as part of the AM process is not covered by this call.

Target group

This topic is targeted at all groups in the innovation chain: basic research, applied research, industrial R&D. Collaboration between research entities, SMEs and large industry is encouraged as is participation in project consortia by international organisations.

Keywords

Materials development; 3D printing; Additive Manufacturing; Component properties; Production; Polymers; Metals; Ceramics; Composites; Feedstock; Applications; Life cycle costs; Materials efficiency; Recycling.

Indicative targeted TRL: 3-6

Annex 2: Technology Readiness Level

All proposals should clearly state and motivate at what level on the Technology Readiness Level (TRL) scale the project is situated at the beginning and after the project is finished. In order to increase the potential for new business opportunities and commercial exploitation of the results, proposals aiming at TRL below 4 should include a plan for the transition to higher TRL's at a later stage (i.e. beyond the project end date) and demonstrate industrial involvement. This can be realised by establishing an industrial advisory board (or alternatively by the participation of one or more companies in the project consortium when feasible). For proposals aiming at TRL above 4, industrial partners should be involved in the project consortium.

Where the topic description refers to the concept of "Technology Readiness Level" (TRL), the following definition in accordance with H2020⁵ applies:

- TRL 1 - basic principles observed
- TRL 2 - technology concept formulated
- TRL 3 - experimental proof of concept
- TRL 4 - technology validated in lab
- TRL 5- technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 6 - technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 7 - system prototype demonstration in operational environment
- TRL 8 - system complete and qualified
- TRL 9 - actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

In the project proposal, it should be indicated what is the TRL position in the beginning of the project and after the project is finished.

Topic	TRL 1	TRL 2	TRL 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9
Integrated Computational Materials Engineering									
Innovative Surfaces, Coatings and Interfaces									
High performance composites									
Multifunctional Materials									
New strategies for advanced material-based technologies in health applications									
Materials for additive manufacturing									

⁵ See p. 29 http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2016-2017/annexes/h2020-wp1617-annex-ga_en.pdf

Annex 3: Funding organisations participating in the M-ERA.NET Call 2017

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	PTKA Projekttr�ager Karlsruhe	Name: Stefan SCHERR Phone +49 721 608 25286 e-mail: stefan.scherr@kit.edu
Hungary	NKFIH National Office for Research, Development, and Innovation	Name: Elod NEMERKENYI Phone: + 36-1-896-3987 e-mail: elod.nemerkenyi@nkfi.gov.hu
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Country/Region	Funding organisation	Contact person:
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		Name: Malwina Gębalska Phone: +48 12 341 9017 e-mail: malwina.gebalska@ncn.gov.pl
Russian Federation	FASIE Foundation for Assistance to Small Innovative Enterprises	Name: Olga Levchenko Phone: +7 (495) 231-3851 e-mail: levchenko@fasie.ru

Country/Region	Funding organisation	Contact person:
Slovakia	SAS Slovak Academy of Sciences	Name: Jan BARANCIK Phone: +421 2 577510 137 e-mail: barancik@up.upsav.sk
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Spain	Asturias: IDEPA Instituto de Desarrollo Económico del Principado de Asturias	Name: Ana E. Fernández Monzón Phone: + 34. 985 98 00 20 e-mail: anae@idepa.
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Switzerland	SERI State Secretariat for Education, Research and Innovation	Name: Roland BÜHLER, Phone: +41 31 324 71 41, e-mail: roland.buehler@sbfi.admin.ch
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Taiwan	MOST Ministry of Science and Technology	Name: Dr. Louis (Yu-Ming) CHEN Phone: +886-2-2737-7959 e-mail: ymchen@most.gov.tw

Country/Region	Funding organisation	Contact person:
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Commitment per funding organisation 2017:

	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	
	Integrated Computational Materials Engineering (ICME)	Innovative surfaces, coatings and interfaces	High performance composites	Multi-functional materials	New strategies for advanced material-based technologies in health applications	Materials for Additive Manufacturing	Indicative call budget (MEUR)
Austria: FFG-BP		x		x	x		1.0
Austria: FFG-TP	x		x			x	1.0
Belgium Flanders: VLAIO	x	x	x	x	x	x	1.0
Belgium Wallonia: DGo6	x	x	x	x	x	x	1.0
Bulgaria: BNSF	x	x	x	x	x	x	0.3
Brazil Sao Paulo: FAPESP	x	x	x	x	x	x	0.4
Cyprus: RPF	x	x	x	x	x	x	0.4
Estonia: ETAg	x	x	x	x	x	x	0.3
Finland: Tekes	x	x	x	x	x	x	2.0
France: Nouvelle-Aquitaine	x	x	x	x	x	x	0.5
Germany: PTJ/PTKA		x	x	x		x	5.0
Hungary: NKFIH	x	x	x	x	x	x	0.3
Iceland: RANNIS	x	x	x	x	x	x	0.25
Israel: MOST	x	x	x	x	x	x	0.4
Italy: Regione Calabria	x	x	x	x	x	x	0.5

	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	
	Integrated Computational Materials Engineering (ICME)	Innovative surfaces, coatings and interfaces	High performance composites	Multi-functional materials	New strategies for advanced material-based technologies in health applications	Materials for Additive Manufacturing	Indicative call budget (MEUR)
Korea: KIAT	x	x	x	x	x	x	1.0
Latvia: VIAA	x	x	x	x	x	x	0.4
Lithuania: RCL	x	x	x	x	x	x	0.2
Luxembourg: FNR	x	x	x	x	x	x	0.5
Netherlands: M2i	x	x	x	x	x	x	1.0
Poland: NCBR	x	x	x	x	x	x	0.5
Poland: NCN	x	x	x	x	x	x	0.5
Russia: FASIE	x	x	x	x	x	x	0.5
Slovakia: SAS	x	x	x	x	x	x	0.2
South Africa: DST	x	x	x	x	x	x	0.3
Spain Andalucía: IDEA	x	x	x	x	x	x	0.5
Spain Asturias: IDEPA	x	x	x	x	x	x	0.4
Spain Castile-Leon: ADE	x	x	x	x	x	x	0.5
Switzerland: SBFJ	x	x	x	x	x	x	0.9
Taiwan: MOST	x	x	x	x	x	x	0.5
Turkey: TÜBİTAK	x	x	x	x	x	x	2.0

Annex 4: M-ERA.NET Full-Proposal Evaluation Criteria

- **1. Excellence (max. 5.0 points)**
 - 1.1 Clarity and pertinence of the objectives (max. 1.5 points)
 - 1.2 Credibility of the proposed approach and soundness of the concept (max. 2.0 points)
 - 1.3 Extent that proposed work is ambitious, has innovation potential, and is beyond the state of the art (e.g. ground-breaking objectives, novel concepts and approaches (max. 1.5 points)

- **2. Impact (max. 5.0 points)**
 - 2.1 Contribution at the European or international level to the expected impacts listed in the work programme under the relevant topic (max. 2.5 points)
 - 2.2 Enhancing innovation capacity and integration of new knowledge; Strengthening the competitiveness and growth of companies by developing innovations meeting the needs of European and global markets; and, where relevant, by delivering such innovations to the markets; Any other environmental and socially important impacts (not already covered above); (max. 1.0 points)
 - 2.3 Effectiveness of the proposed measures to exploit and disseminate the project results (including management of IPR), to communicate the project, and to manage research data where relevant (max. 1.5 points)

- **3. Quality and efficiency of the implementation (max. 5.0 points)**
 - 3.1 Appropriateness of the management structures and procedures (max. 1.0 points)
 - 3.2 Quality and relevant experience of the individual participants (max. 1.0 points)
 - 3.3 Quality of the consortium as a whole (including complementarity, balance) (max. 1.0 points)
 - 3.4 Appropriate allocation and justification of the resources to be committed (budget, staff, equipment) (max. 2.0 points)

- **Ethical issues:** Full-Proposal include H2020 „Ethicas issues Table“. In case ethical issues apply (applicants mark respective issues in the table) M-ERA.NET recommends that the national/regional organisations observe these issues (e.g. post-evaluation review) for their respective funded projects.

Additional Information

Individual assessment report: Each criterion will be scored between 0.0 and 5.0 representing the sum of the scoring of the individual sub criteria.

Sub-criteria have individual maximum scores with a resolution of 0.1 points. There are no thresholds for sub-criteria. The awarded scores for each sub-criterion have to be justified with written statements by the evaluators.

Peer review report: the rapporteur will compile a peer review report, to be accepted by all 3 evaluators. The final scoring of the main criteria will take into consideration the scores from the individual assessments. Each criterion will be scored between 0.0 and 5.0 in multiples of half (0.5) points.

The threshold for individual criteria will be 3.0; the overall threshold, applying to the sum of the individual scores will be 10.0.

In case of equal scoring of proposals the scores of the individual criteria and sub-criteria can be compared as follows for the elaboration of M-ERA.NET ranking list: compare scores of impact criterion, if still equal compare scores of excellence criterion, if still equal compare scores of implementation criterion, if still equal compare sub-criteria.

Annex 5: Checklist for Proposers

The proposal conforms to the call guidelines.	<input type="checkbox"/>
Every project partner has been in direct contact with his/her national or regional funding organisation and has checked that their collaboration and their project contribution is eligible for funding.	<input type="checkbox"/>
All partners who are not eligible for 100% funding are able to provide financial resources for their own contribution.	<input type="checkbox"/>
The consortium is aware of the necessity to have a consortium agreement, including amongst others the agreements on intellectual property rights (IPR) and publication rules for a funded project (to be signed before the first payment)	<input type="checkbox"/>
All project partners have checked the national/regional programme procedures and regulations. All project partners are aware of documents requested by the national/regional funding organisations. <i>IMPORTANT REMINDER: All consortium partners must check if applications (at Pre-Proposal and/or Full-Proposal stage) have to be submitted also to their national/regional funding organisations.</i>	<input type="checkbox"/>

Please go to <https://www.m-era.net/joint-call-2017> to submit the:

1. Pre-Proposal form online.
Deadline for submission: 13 June 2017, 12:00 noon Brussels time
2. Full-Proposal form + Annex 1 to the Full-Proposal form online.
Deadline for submission: 9 November 2017, 12:00 noon Brussels time

For further information on M-ERA.NET please go to: <http://www.m-era.net>