Open Call Collection OC-2019-1

Proposal Reference OC-2019-1-23678

Title: **Open European Network for ENTerprise InnOVation in High Value Manufacturing**

Acronym: **ENTOV-HVM**

Summary

Competitive advantage in high value manufacturing (HVM) industries, like aerospace and pharmaceuticals, is created by diffusing new ideas to market saturation as rapidly as possible. Examples are super-alloys and metal printing. Unfortunately the primary (in-) dependent variables and their dependencies affecting the speed of such remain unclear.

ENTOV-HVM aims to explore the factors affecting the speed of diffusion of innovation in high value manufacturing by using living systems based research methods. A multidisciplinary network of experienced innovation stakeholders, partnering with early career researchers and young innovators from COST Inclusiveness Target Countries (ITCs), will co-create and collaborate through techniques such as training, joint research-industry workshops, and Living Labs to help unravel the dynamics, drivers and game-changing events of innovation diffusion. Learning will be disseminated through these techniques, conference contributions, journal papers, and mini-conferences to inform policy developments and practice.

The Action will establish seven ITC-led workgroups (1) Success Stories: Mapping the innovation diffusion of successful historical HVM innovations, (2) Living Networks: Creating a reference-architecture and its simulation for game-changing exchanges in HVM innovation diffusion, (3) Disruptive Technology: Understanding how technology disruptively accelerates HVM innovation diffusion, (4) Disruptive Relationships: Understanding how human relationships disruptively accelerate HVM innovation diffusion, (5) Designing for Rapid Diffusion: Defining the optimal design of HVM ideas to diffuse in a “heart-beat”, (6) Innovation Automation: Establishing an online platform for simulating HVM innovation diffusion and (7) Event / Mission coordination.

The Action will be followed by a wider research project for expanding and applying insights gained.

Key Expertise needed for evaluation

Mechanical engineering
Mechanical and manufacturing engineering (shaping, mounting, joining, separation)
Economics and business
Management of Technology and Innovation
Economics and business
Organization studies
Media and communications
Media and communications, social aspects of information science and surveillance, socio-cultural communication

Keywords

High value manufacturing

Advanced manufacturing

Innovation speed

Living systems

Diffusion of innovation

TECHNICAL ANNEX

1 S&T EXCELLENCE

1.1 SOUNDNESS OF THE CHALLENGE

1.1.1 DESCRIPTION OF THE STATE-OF-THE-ART

The state-of-the-art approaches in respect to reducing the time for the diffusion of innovation in high value manufacturing represent a highly fragmented picture, which differ significantly not only from region to region, but also in relation to the type of innovations and research efforts involved. From a high value manufacturing perspective the state-of-the-art might be best reflected in partnership structures between industry manufacturers, machine / supply chain partners and universities in the form of advanced manufacturing centres with associated technology parks as implemented by leading global manufacturers especially in the aerospace and pharmaceutical industries. Publicly funded projects in this context play a significant role. Within the state-of-the-art a plethora of transition support and guidance mechanisms for early career researchers and young innovators are available.

Early career researchers and young innovators typically seek individual guidance from supporting academics, dedicated research institute offices and / or relevant service providers within the technology support infrastructure. They are then provided with high level insights into a large number of potential support mechanisms whereby it is often unclear which is most suited for the idea in question. Additionally these support mechanisms are usually focused on individual stages of the diffusion of innovation curve (i.e. initial networking). Early career researchers and young innovators then face significant challenges in identifying suitable innovation processes and shaping / management of their opportunities for relevant consumption on the path to adoption and market saturation.

Based on a review of the state-of-the-art it is evident that while many formal structures exist to support the early career researcher and young innovator, the actual progression through the diffusion of innovation curve remains a (lonely) mystery for many (if not most) of the involved stakeholders so that personal relationships become critical enablers and progress in itself becomes an emergent phenomenon. In particular since the (in-) dependent variables and their dependency affecting the speed of innovation remain largely unknown in this industry, it becomes impossible to design ideas for rapid diffusion of innovation at the outset of the innovation journey.

1.1.2 DESCRIPTION OF THE CHALLENGE (MAIN AIM)

In practice, while provided with a plethora of pathways to master the diffusion of innovation curve, the actual capability to innovate rapidly is stifled by industrial paradigms which suffer from ineffective policies, a perma-frost of bureaucracy, overemphasis of technical solutions and lack of trustful social collaboration. Furthermore, the concept of innovation is itself often reduced to that of technical readiness levels versus the extended diffusion to market saturation, which characterizes the value an innovation can create and which is its purpose. Especially in manufacturing industries the diffusion of innovation process (including the value generated by the innovations) is not transparent and thus the speed of its value creation not measurable.

The state-of-the-art, fragmented, supposedly supporting, ecosystem of different innovation diffusion paths hence often thwarts the industrialization of innovative ideas by early career researchers and

young innovators since it means a lack of effective access to relevant enterprise innovation networks (especially related to capacity acquisition and capability development) used by research and industry participants and know-how for their feasibility assessments and later induction into their whole product lifecycles.

The challenge of navigating the labyrinth of the ecosystem(s) available to early career researchers and young innovators is a formidable one; it is also a challenge that many fail to master, thus ending up "eaten by the shadows" and not contributing the value they could to research, industry and society as a whole. Fundamental to the challenge is the lack of visibility regarding why different ideas demonstrate differing speeds in mastering the diffusion of innovation curve.

1.2 PROGRESS BEYOND THE STATE-OF-THE-ART

1.2.1 APPROACH TO THE CHALLENGE AND PROGRESS BEYOND THE STATE-OF-THE-ART

The Action approaches the challenge by exploring the patterns of innovation across the diffusion of innovation space from ideation to market saturation bottom-up as they actually happen. The approach is beyond state-of-the-art because it applies a living systems perspective based on the principle that innovation is the flow of knowledge from its place of origin to the place of highest need. The approach is furthermore beyond state-of-the art because it looks at the complete diffusion of innovation curve versus only segments of it. Knowledge is understood as the capacity to act effectively in context. The results of the exploration will be compared and contrasted to public policy supporting innovation and relevant improvement recommendations made.

The living systems perspective applied consists of a series of collaboration archetypes that describe the evolution of ideas to market saturation. The archetypes describe the patterns of exchanges of (in-) tangible deliverables between roles assumed by participants, the aggregation of which are termed "innovation webs". Innovation webs are specific forms of Value Networks. These archetypes are classified as focusing on:

- **Research**: Focused on research and idea exploration.
- **Socialization**: Evolves out of the research web archetype as the idea crystalizes and begins reaching early stage practitioners / evangelists in organizations. The research web archetype continues to "operate".
- **Market Validation**: Evolves when the product or the result evolving from the socialization web is clear, and the goal of the network is to test and validate market or beneficiary readiness. The research web and the socialization archetypes continue to "operate".
- **Commercialization**: Brings the product or result to the market and (ideally) market saturation through production and distribution. The research, socialization, and market validation web archetypes continue to "operate". The commercialization web archetype represents a nested system of innovation webs best understood as a living / complex adaptive system.

Innovation web discovery and facilitation is based on principles of systemic and inductive inquiry which accepts the messiness of living systems. The underlying philosophy has its roots in Exchange Theory which explains change and stability as a process of negotiated exchanges between parties. The innovation web approach departs from mainstream exchange theory by linking the network to both financial and non-financial performance and asset generation for the overall network, at the level of individual roles and both tangible and intangible transactions. Key roles are:

- **Buyer(s)**: Interested in achieving the value proposition expected by the Funder.
- **Commercializer(s)**: Interested in putting the required commercial and legal agreements in place along with ensuring their compliant operation.
- **Funder(s)**: Interested in defining the value proposition of the investment.
- **Innovator(s)**: The originator of the "idea".
- **Marketeer(s)**: Interested in creating a "coalition of the willing" with relevant self-organizational behaviour along a shared purpose.
- **Product Packager(s)**: Converts the "idea" into a product for the User.
- **User(s)**: Applies the "idea" to a challenge in order to achieve the value proposition.
- **Web Weaver(s)**: Serves the (overall) web in order to help achieve the shared purpose.

The innovation webs each form a unique archetypal pattern of roles and interactions. More detailed descriptions of each of the archetypes then reveal exact sequences of (in-) tangible deliverables being exchanged within and between the participants assuming the roles. Each transaction generates a specific pattern of value in the form of structural, relational and competence assets plus financial capital at individual, (sub-) group, enterprise, regional, intra- and international levels.. Typically each tangible transaction is enabled by parallel intangible transactions and triggers a response once a certain threshold value is created (which may result in times delays as value accrues towards relevant threshold levels).

Figure 1 illustrates a high level architecture of the innovation web archetypes and their interdependence. Key webs and roles are shown in the circular shapes and (in-) tangible value is transacted through deliverables between roles and webs across the open (green) solid and (blue) dotted boundaries of such. Important to note is that no single web on its own covers the complete diffusion of innovation process from ideation through market saturation – this is achieved by all acting in harmony. Ideation is an unmapped web-form giving rise to the research web through experimentation which will transition to the socialization web upon achieving a specific set of threshold values, the socialization web transitions to the market validation web upon reaching its own specific set of threshold values, and the commercialization web is the aggregation of the three webs acting as nested complex adaptive systems in a harmonic balance. It is then the commercialization web that carries the idea through to market saturation.

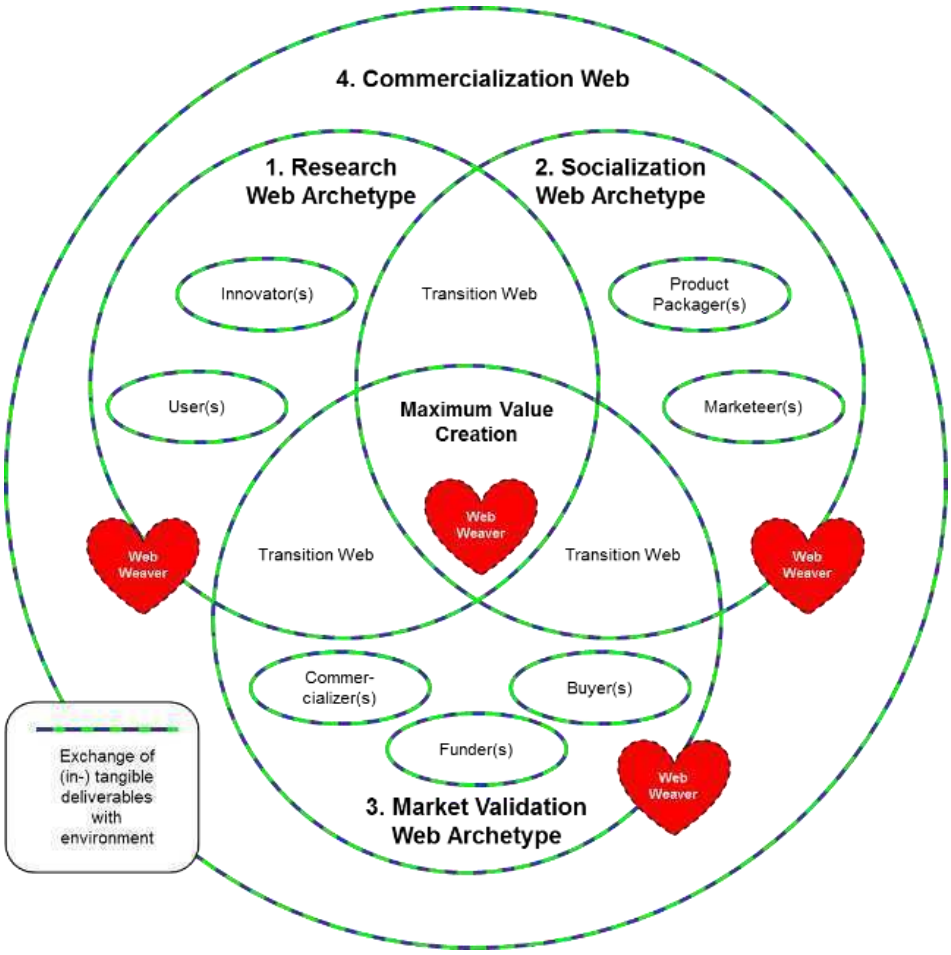

Figure 1. Innovation web architecture (triggering ideation web not shown)

Since the high value manufacturing industry involves multiple stakeholders with different motivations and exchanges throughout the whole extended life cycle of its products, introducing change into this complex multi-system context can create a ripple effect of secondary and tertiary impacts, which can be difficult to anticipate using current innovation management theory and techniques. Independent

systemic variables immune to this problem and describing the speed of value creation from ideation to market saturation are derived from a blend of principles stemming from Value Network Analysis, Process Analysis, Social and Organizational Network Analysis and Complex Adaptive Systems.

The application of living systems perspectives in the form of Value Networks however provides a promising technique to not only describe the innovation webs, but also to understand and anticipate the effect of change based on a series of systemic variables. The key systemic variables for initial investigation are shown in Table 1.

Table 1: Key systemic variables of innovation webs

Variable	Nature	Definition
Resilience	Quantitative	The ability to return to an archetype after an incident.
Reciprocity	Quantitative	The extent of "return" transactions between roles.
Agility	Quantitative	The ability to adapt to changing external conditions.
Structural Integrity	Quantitative	The number of alternate paths for value creation.
Structural Dependency	Quantitative	The intensity / density of exchanges.
Complexity	Quantitative	The number of relationships between roles.
Emergence	Quantitative	The probability of unexpected self-organization.
Maturity	Quantitative	The average length of relationships of participants.
Perceived Value	Qualitative	The benefits participants attribute to deliverables.
Value Creation	Qualitative	The intellectual and financial capital created by roles.
Value Consumption	Qualitative	The intellectual / financial capital consumed by roles.
Cost Benefit	Qualitative	The delta between value creation and consumption.
Sequence	Qualitative	The speed of transfer for deliverables.

Once ENTOV-HVM has determined the key variables relevant for rapid diffusion of innovation in the specific context of high value manufacturing an assessment of these with the performance variables will indicate the capability of the innovation webs currently underlying the high value manufacturing industry (de-) celerates the diffusion of innovation. The assessment is performed using the visualization of the variable scores from the co-variate analysis as a dependency model in the form of a radial polar force field. The radial polar force field is a probability field represented as a vector space where all vectors originate at the same point and are radially arranged with a constant degree of separation. All vectors are added head to tail in order to create an aggregated vector. If data from a specific time period is used then that time period is termed a "state space" in contrast to a "dynamic space" which could be considered to describe the change over time between two state spaces. Figure 2 visualizes exemplary data.

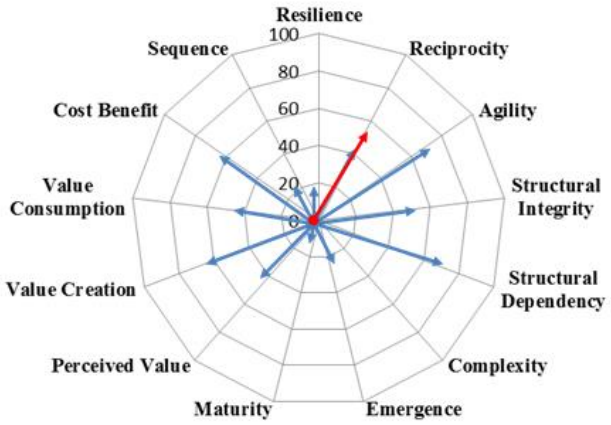

Figure 2. Exemplary radial polar force field.

The key metrics for interpreting the radial polar force field are (a) overall symmetry as an indicator of speed of value creation (b) the aggregated vector magnitude as a pointer to the probability of emergence and (c) its radial angle suggesting the potential source of that emergence. The higher the symmetry score the closer the space enclosed by the perimeter of the vector space is to the maximum space it could enclose (therefore if all side lengths / vector magnitudes were the same). The larger that space, the greater the information entropy and the faster the diffusion of information can be assumed to be. The faster the diffusion of information the faster value creation can occur. The larger the magnitude of the aggregated vector magnitude the more likely the vector space will exhibit emergent behaviour. The angle of the aggregated vector magnitude points to the variable which potentially has the highest sensitivity to emergent changes. Each metric has an uncertainty range associated with it based on the highest and lowest values generated when considering all permutations of the radial sequence for the variables.

This framework thus provides a high level assessment of the capability of an existing innovation web evolution process to rapidly nurture an idea across the diffusion of innovation curve to market saturation. The framework then provides indications of relevant actions to increase that speed in that it is primarily the symmetry of the innovation web which should be increased in order to increase the probability of purposeful emergent behaviour. Symmetry will increase as the value of the independent component variables becomes more equal while the underlying dependency model will describe its propagation over time. Actions to balance out the scoring of the variables can be derived through the facilitation of relevant innovation web archetypes through the population of roles and the creation / hardening of their relevant (in-) tangible exchanges.

This approach is beyond state-of-the-art since it examines actual success stories from a living systems perspective to then arrive at policy recommendations that accelerate the “true” way of working. These recommendations will help increase the speed with which this occurs. This will then help lead to more new concepts, services and products and thereby contribute to bridging the research and innovation divide and participation gaps in Europe. This also strengthens European research and innovation capacities at individual, (sub-) group, enterprise, regional, intra- and international levels.

1.2.2 OBJECTIVES

1.2.2.1 Research Coordination Objectives

The research coordination objectives (RCO) are focused on the distribution of tasks, sharing of knowledge and know-how, and the creation of synergies within and between the working groups to achieve the intended deliverables. They are:

- **RCO-1 Create a Common Understanding of Action Context**: The goal is to develop a shared reality among all participants of the Action regarding the scope of the diffusion of innovation from ideation through market saturation in the specific context of high value manufacturing. The goal will be achieved by ensuring all participants of the Action participate in a training school in the first three months of the Action. Since participants will also be required to engage in the continuous delivery and refinement of events this common understanding will also be maintained / grow accordingly.
- **RCO-2 Create a Marketing Plan for Action and its Events**: The goal is to develop and implement an actionable and pragmatic set of continuous activities to market the Action activities to further proposal participants and potential participants of training sessions, joint research-industry workshops and Living Labs. The goal will be achieved in the first three months of the Action through a series of dedicated sessions of the working group “Event / Mission Marketing and Coordination” to design the plan, with a specific set of guidelines to be issued to all participants to make the needed joint-efforts transparent.
- **RCO-3 Enable Participation of Working Group Members**: The goal is to ensure that deliverables of participants aligned to Working Groups are integrated into their own research activities to enable leverage for achieving Action deliverables. Achieving the goal will be an integrated activity for all working group meetings in that the integration of upcoming deliverables

with ongoing research activities of participants will be discussed. Achievement of the objective will be measured by the ability of the Action to create its deliverables as part of other deliverables.

- **RCO-4: Share Best Practice**: The goal is to ensure that Action activities benefit from the experiences of experienced researchers while being led by early career researchers and young innovators. This goal will be achieved by ensuring all activities are performed in teams of early career researchers and young innovators with an experienced researcher mentoring, guiding and supporting. In addition best practice will be clearly documented and revised in relevant work protocols.
- **RCO-5 Disseminate Action Results**: The goal is to ensure that planned dissemination deliverables from Working Groups are developed in a form easing final submission for publication or reviews (reports). The goal will be to minimize the amount of work needed for appropriate shaping of deliverables by using standard templates.

1.2.2.2 Capacity-Building Objectives

The capacity-building objectives (CBO) are focused on creating dynamic knowledge exchange among the Action participants in order to achieve the intended objectives and deliverables. They ensure that all participants can:

- **CBO-1 Describe the diffusion of innovation process using innovation webs**: The goal is to ensure that participants are able to apply basic principles of Value Network Analysis, Process Analysis, Social and Organizational Network Analysis and Complex Adaptive Systems in order to create, visualize and analyse innovation webs. The goal will initially be achieved by ensuring all participants of the Action participate in a training school in the first three months of the Action. Since participants will also be required to engage in the continuous delivery and refinement of events this common understanding will also be maintained / grow accordingly. In addition the continuous participation in events and the creation of deliverables will develop these skills further.
- **CBO-2 Identify the variables of success governing the diffusion of innovation process**: The goal is to ensure that participants are able to use the radial polar force field approach to understand (in-) dependent variables of diffusion speed and to identify / simulate actions to accelerate these. The goal will be achieved through in- and deductive inquiry into the innovation webs via events and deliverable generation, in particular through semi-structured interviews and learning experiences during training schools, article research and joint research-industry workshops.
- **CBO-3 Identify game changing exchanges in innovation webs**: The goal is to ensure participants are able to apply a detailed evaluation process to the innovation webs identified so that they can determine not only existing exchanges that have the potential for significant acceleration of the diffusion of innovation, but also to identify new or changes exchanges that could achieve this. The goal will be achieved through growing competence in the use of the innovation web technique in combination with qualitative learning experiences and application of the simulation.
- **CBO-4 Translate innovation webs into business process reference-architectures**: The goal is to ensure that participants are able to convert the notation of innovation webs (i.e. roles and exchanges) into standard business process notation that is suited as a reference-architecture for simulation and assessment. The goal will be achieved through training schools and collaboration with the working groups creating the simulation.
- **CBO-5 Simulate the performance of reference-architectures for various scenarios**: The goal is to enable participants to use the reference-architecture in standard business process notation to simulate the performance of a variety of use cases for ideas traveling through the diffusion of innovation process. The goal will be achieved through the ongoing work of the simulation working group and creation of training school and publication research materials.
- **CBO-6 Identify disruptive technologies**: The goal is to enable participants to determine which technologies could be applied within an innovation web in order to massively accelerate its performance. Technologies could hereby be used to augment / replace participants / exchanges / deliverables or even reconfigure the innovation webs in an adaptive manner.
- **CBO-7 Identify disruptive relationships between participants**: The goal is to enable participants to determine which personal relationships between participants of the innovation webs could be applied within an innovation web in order to massively accelerate its performance. Relationships could hereby be used to augment / replace participants / exchanges / deliverables or even reconfigure the innovation webs in an adaptive manner.

- **CBO-8 Design ideas for rapid diffusion through the innovation process**: The goal is to enable participants to apply all learning related to accelerating the diffusion of innovation from ideation through market saturation in order to design ideas starting the process in a manner suited for rapidly diffusing to market saturation. The goal will be achieved by development and application of a series of design principles.
- **CBO-9 Implement properly designed ideas in a Living Labs context**: The goal is to enable participants to implement ideas in an industrial context with the intent to deploy widely in a short period of time. The goal will be achieved through short-term scientific missions to industry participants to apply Living Labs principles for such implementation.

2 NETWORKING EXCELLENCE

2.1 ADDED VALUE OF NETWORKING IN S&T EXCELLENCE

2.1.1 ADDED VALUE IN RELATION TO EXISTING EFFORTS AT EUROPEAN AND/OR INTERNATIONAL LEVEL

Multiple current European programmes provide a diverse range of support for projects for accelerating technology transfer in advanced manufacturing across a broad spectrum of maturity levels and industries. Examples are: COST, Horizon 2020 INNOSUP, European Institute of Innovation and Technology (EIT) – Manufacturing, European Network of Living Labs (ENoLL), the Public-Private Partnership (PPP) for Factories of the Future (FoF), the Eurostars effort and the European Regions Research and Innovation Network (ERRIN). In order to add value to these efforts, ENTOV-HVM seeks to pro-actively partner / “sister” with such in order to share the insights generated, especially due to its novel living systems perspective. These collaboration activities will additionally improve the impact ENTOV-HVM has to science, society and competitiveness.

2.2 ADDED VALUE OF NETWORKING IN IMPACT

2.2.1 SECURING THE CRITICAL MASS AND EXPERTISE

The required critical mass and expertise are based on the need to populate the working groups with a suitable number of appropriately skilled individuals who are active across the diffusion of innovation curve. The current proposer network is deemed as meeting these minimum requirements, whereby active solicitation of further members will be pursued to extend beyond this minimum requirement. While a diverse set of expertise is desired in order to create a wide view of the diffusion of innovation process the focus on high value manufacturing places a specific focus on expertise at all levels from the following disciplines:

- Economics and Business
- Civil / Mechanical Engineering
- Educational Sciences
- Innovation Policy Design and Deployment
- Innovation Acceleration and Deployment

The experience in these disciplines will also need to derive from different organizational contexts such as Higher Education, Business Enterprises, (Private) Non-Profits, and Government and Intergovernmental Organizations across the proposer countries.

2.2.2 INVOLVEMENT OF STAKEHOLDERS

A clear distinction must be made between the participants of the Action and those parties that are stakeholders in that they have a vested interest in the outcomes of the Action. Stakeholders will typically be peripheral to the Action and need to be actively informed in order to advise the Action and carry the results generated by the Action to a wider community.

Important stakeholders are defined by their roles in the innovation web process: Innovators, Users, Marketeers, Buyers, Funders and Product Packagers. In addition individuals representing organizations focused on policy development at all levels are important stakeholders in that the Action seeks to influence such policies with what is learned during the Action.

Stakeholders will be involved by their participation in all events and solicitation of their input to all policy relevant elements of deliverables, i.e. the policy recommendations in papers.

2.2.3 MUTUAL BENEFITS OF THE INVOLVEMENT OF SECONDARY PROPOSERS FROM NEAR NEIGHBOUR OR INTERNATIONAL PARTNER COUNTRIES OR INTERNATIONAL ORGANISATIONS

This proposal includes secondary proposers from COST Near Neighbour Countries and International Partner Countries. The inclusion of secondary proposers from COST Near Neighbour Countries is intended to further diversify the participants in the effort and to diffuse the benefits provided to COST Target Inclusiveness Countries even further. Participants from Cost Near Neighbour Countries will receive the same level of support as those from COST Target Inclusiveness Countries. The inclusion of International Partner Countries is intended to ease access of all secondary proposers to global collaboration opportunities in recognition that innovation is not a regionally bound phenomenon and indeed innovation webs are by default of global nature. Furthermore, since ENTOV-HVM is intended to support the development of European competitive advantage in global markets, such need to be included in order to ensure the creation of relative advantage.

3 IMPACT

3.1 IMPACT TO SCIENCE, SOCIETY AND COMPETITIVENESS, AND POTENTIAL FOR INNOVATION/BREAK-THROUGHS

3.1.1 SCIENTIFIC, TECHNOLOGICAL, AND/OR SOCIOECONOMIC IMPACTS (INCLUDING POTENTIAL INNOVATIONS AND/OR BREAKTHROUGHS)

The impact of the Action to science, society and competitiveness will be given by (primarily ITC) participants:

- Co-creating the training school, joint research-industry workshops and Living Labs.
- Successfully completing a training school.
- Teaching at least one module of a training school.
- Capturing and analysing research data gathered as the basis for publications.
- Capturing lessons learned from an event.
- Revising event collateral based on lessons learned.
- Assuming primary authorship of a publication.
- Assuming co-authorship of a publication.
- Revising event collateral based on a (co-) authored publication.
- Soliciting new participants for events.
- Using events for primary qualitative research as part of (co-) authoring publications.
- Presenting publications at events.
- Orchestrating co-authors in a publication.
- Creating funding proposals for further research recommended by publications.
- Creating a policy recommendation at institutional level.

3.2 MEASURES TO MAXIMISE IMPACT

3.2.1 KNOWLEDGE CREATION, TRANSFER OF KNOWLEDGE AND CAREER DEVELOPMENT

In order to maximise the scientific, technological and socioeconomic impact of the activities a set of design principles will be employed:

- Training offerings will be:
    - Free of charge.
    - Classified as public domain knowledge.
    - Part of offering joint-certified by secondary proposer institutions.
    - Offered in face-to-face, online and hybrid formats.
    - Additionally provided as podcasts and streaming media.
- Events will be:

- Free of charge for participants.
- Sponsored by and held at well-known local high value manufacturing organizations.
- Include a shop floor tour at the hosting organization.
- Commenced with a short speech from a regionally well-known entrepreneur.
- Concluded with a panel discussion consisting of regional stakeholders from industry, research and government.
- Marketed via the hosting institution, the sponsoring organization and local, regional and national Chambers of Commerce.
- Announced in local print, radio and television media.
- Visited by reporters from leading local news media.
- Followed by sponsorship requests for full-time research positions.

- Publications will be:
  - Written in multiple official EU languages (side by side in the same publication(s) to avoid self-plagiarism concerns)
  - Co-authored with at least three Action participants.
  - Aimed at peer-reviewed international journals recommended by academic proposer institutions and in the top 5% of ranked publications.
  - Peer-reviewed by other Action participants prior to submission.

3.2.2 PLAN FOR DISSEMINATION AND/OR EXPLOITATION AND DIALOGUE WITH THE GENERAL PUBLIC OR POLICY

ENTOV-HVM events (training schools and joint research-industry workshops) are open to the public, hosted by local organizations and consciously integrate local stakeholders of the diffusion of innovation process. While these events will be accompanied by a variety of publications and other media distributions channels, ENTOV-HVM will make a special effort to engage with policy makers at all levels since their influence on the diffusion of innovation process is significant and the (ineffective) implementation of their policies one of the major challenges being tackled by ENTOV-HVM. This engagement will consist of including a policy recommendation in every publication, ensuring that individuals accountable for policy development and implementation are present at every event and culminate in a final recommendation paper at the end of the project. Further dissemination at larger conferences and events will be encouraged at all times.

4 IMPLEMENTATION

4.1 COHERENCE AND EFFECTIVENESS OF THE WORK PLAN

4.1.1 DESCRIPTION OF WORKING GROUPS, TASKS AND ACTIVITIES

The Action will establish seven ITC-led workgroups which will meet in conjunction with training schools held at alternating ITC proposer institutions. With the exception of the working group “1. Event / Mission Marketing and Coordination”, each workgroup will be led by an early career researcher from an ITC proposer institution and supported by an experienced mentor from the same ITC proposer institution in addition to an experienced mentor from a non-ITC proposer institution. The working group “1. Event / Mission Marketing and Coordination” will be led by the member of the Management Committee with the greatest experience in conducting the tasks and activities since they are deemed critical to the success of the effort as a whole, whereby support will be provided by early career researchers and young innovators from each of the ITC participants. The working groups and their tasks and activities are shown in Table 2.

Table 2. Working groups and their tasks and activities.

Working Group	Tasks and Activities
1. Event / Mission Marketing and Coordination	Organize all training schools, joint research-industry events and living labs, including intensive marketing before and knowledge dissemination after.
2. Success Stories: Mapping the diffusion of innovation of successful	Create case studies describing the diffusion of historically significant HVM innovations from an innovation web perspective. Special emphasis will be placed on identifying game-changing exchanges and the

Working Group	Tasks and Activities
historical HVM innovations.	perspective of responsible innovation. Disseminate these case studies bi-monthly during the course of the action.
3. Living Networks: Creating a reference-architecture and its simulation for game-changing exchanges in HVM diffusion of innovation.	Based upon the success stories determine the archetypal innovation web evolution stages, translate these into a reference-architecture in business process notation and visualise that reference-architecture in a simulation tool supported by a robust (documented) mathematical model. The reference-architecture will serve as the process model for the (automated) innovation platform. Place special emphasis on integrating the intangible and game-changing exchanges. Submit the reference architecture and simulation tool description for publishing consideration to an international journal. Refine the model throughout the Action.
4. Disruptive Technology: Understanding how technology can disruptively accelerate HVM diffusion of innovation.	Based upon the reference-architecture of the innovations webs and their business process notation translation, identify technologies suited for significantly reducing the time for diffusion and simulate their impact to identify potential dependencies and make recommendations for piloting in applied contexts. Assess and rank simulated technology solutions based on their capability to accelerate the diffusion of ideas. Submit the results of the simulation / scenario discovery for publishing consideration to an international journal. Refine the model throughout the Action.
5. Disruptive Relationships: Understanding how intangible exchanges can disruptively accelerate HVM diffusion of innovation.	Based upon the reference-architecture of the innovations webs and their business process notation translation, explore and simulate the attributes and impacts of (potential) intangible exchanges. Submit the results of the simulation / scenario discovery exercises for publishing consideration to an international journal. Refine the model throughout the Action.
6. Designing for Rapid Diffusion: Defining the optimal design of HVM ideas to diffuse in a “heart-beat”.	Based upon the reference-architecture of the innovations webs and their business process notation identify and simulate the ideal design of an idea for disruptively rapid diffusion. Submit the results of the simulation / scenario discovery exercises for publishing consideration to an international journal.
7. Innovation Automation: Establishing an online platform for automating exchanges in HVM diffusion of innovation.	Based upon the reference-architecture of the innovations webs, their business process notation translation and the created simulation model create an online simulator for exploring the impact of automation for a variety of scenarios and make such publicly available.

4.1.2 DESCRIPTION OF DELIVERABLES AND TIMEFRAME

The intended deliverables are broken down by workgroup. The deliverables training school, joint research industry workshop and living labs are described in further detail in Table 3.

Table 3. Working groups and their deliverables

Working Group	Deliverables
Management Committee	• Meet COST obligations. • Prepare regular progress reports. • Submission of journal paper making policy recommendations based on the Action findings.
1. Event / Mission Marketing and Coordination	• Organization and management of three mini-conferences hosted by three different proposer institutions from ITC countries. • Organization and management of six training schools and six joint research-industry events hosted by six different proposer institutions from ITC countries. • Organization and management of six living labs hosted by six different proposer institutions from non-ITC countries. • Performance of intensive marketing before and knowledge dissemination after events.

Working Group	Deliverables
	• Consolidation of lessons-learned and revision of all processes and materials supporting the delivery of the above.
2. Success Stories: Mapping the diffusion of innovation of successful historical HVM innovations.	• Creation of 16 individual historical case studies. • Self-publication of 16 individual historical cases studies. • Submission of journal paper aggregating (self-published) historical case studies and insights thereof.
3. Living Networks: Creating a reference-architecture and its simulation for game-changing exchanges in HVM diffusion of innovation.	• Determine the archetypal innovation web evolution stages. • Translation of stages into a reference-architecture in business process notation. • Visualisation of reference-architecture in a simulation tool. • Documentation of mathematical model underpinning the simulation tool. • Submission of journal paper presenting the reference architecture and simulation tool description.
4. Disruptive Technology: Understanding how technology can disruptively accelerate HVM diffusion of innovation.	• Assessment of acceleration technologies. • Determination of key acceleration technologies. • Simulation of impact of key acceleration technologies. • Recommendations for piloting key acceleration technologies. • Submission of journal paper presenting the key acceleration technologies and selection process.
5. Disruptive Relationships: Understanding how intangible exchanges can disruptively accelerate HVM diffusion of innovations.	• Assessment of the attributes and impacts of (potential) intangible exchanges. • Simulation of changes to the innovation webs. • Submission of journal paper presenting the key (potential) intangible exchanges.
6. Designing for Rapid Diffusion: Defining the optimal design of HVM ideas to diffuse in a “heart-beat”.	• Identification of the ideal design of an idea for disruptively rapid diffusion. • Simulation of the design to identify optimal calibration (scenarios). • Submission of journal paper discussing the results of the simulation / scenario discovery exercises.
7. Innovation Automation: Establishing an online platform for automating exchanges in HVM diffusion of innovation.	• Creation of an online simulator for exploring the impact of automation for a variety of scenarios. • Make online simulator publicly available.

The training schools, joint research industry workshops and living labs are the primary techniques of the Action to engage with a wider audience and the public in general.

- Training Schools: These training events provide an introduction to the Action methods and provide participants with the opportunity to launch their own innovation project using such. Participants will be solicited from the hosting institution and the public at large in its regional area. The training school modules are:

Module 1: Foundations

The Foundation module introduces participants to the paradigm of diffusion of innovation, how this is achieved and the role which innovation webs play to make the diffusion journey transparent.

Table 4. Training sessions for Foundations

Session	Description
Introduction to “The Innovation Journey”	The story of innovation presented as an interactive drama event.
Success stories in innovation	A visit of historical success stories in innovation to understand the principle dynamics.
Impact of policy making	Understanding the consequences of the relationships

Session	Description
	between the public and private sectors on (the speed of) economic development.
Principles of responsible innovation	Identifying differences between responsible and irresponsible innovation (including innovation in illicit industries).
Designing for market saturation	Understanding the diffusion of innovation curve and concept of market saturation.
Principles of ideation	How to create viable ideas and share their aspiration.
The minimum viable idea	Using design thinking to turn the aspiration of an idea into a clear value proposition.
Designing for diffusion	Exploring the principles needed for designing diffusion success.
The innovation web archetypes	Describing the diffusion of innovation process as a sequence of innovation webs.
<Research support>	A session dedicated to supporting ongoing research efforts for Action deliverables, i.e. semi-structured interviews.

Module 2: Techniques

The technique module focuses on enabling participants to apply a spectrum of approaches for creating a living systems view of the diffusion of innovation, including how to analyse its dynamics, simulate the effect of changes on it, and identify (potential) tipping points affecting its performance.

Table 5. Training sessions for Techniques

Session	Description
Value Network Analysis	How to use the concepts of roles, (in-) tangible deliverables and exchanges to describe a living system.
Mapping innovation webs	Using the innovation web archetypes as a map of the diffusion territory and how to calibrate it for context.
Analysing innovation webs	How to apply methods and techniques for examining innovation web performance in detail (includes network analysis).
Simulating innovation webs	How to simulate the effect of changes to innovation webs (including principles of scenario analysis).
Translating innovation webs to processes	How to convert the network view of the diffusion of innovation process to standard business process notation for enterprise integration.
Identifying game changers in innovation webs	How to identify current, future and potential game changing structures in innovation webs.
<Research support>	A session dedicated to supporting ongoing research efforts for Action deliverables, i.e. semi-structured interviews.

Module 3: Game changers

This module builds on the concept of tipping points in living systems as applied to innovation webs and gives participants the opportunity to explore how these might be nurtured and / or created. Based on the insights generated participants learn to create a business process notation of innovation webs in order to accelerate adoption in enterprises and then calibrate ideas for rapid diffusion.

Table 6. Training sessions for game changers

Session	Description
The concept of innovation in a “heart-beat”	Exploring principles for traversing the diffusion of innovation curve in disruptively short time frames.
Using technology to change the game	Understanding the role technology can play in disruptively accelerating the diffusion of innovation curve.
Using human relationships to change the game	Understanding the role human relationships can play in disruptively accelerating the diffusion of innovation curve.

Session	Description
Simulating game changers	How to applying technology and human relationship game changers to the innovation webs and simulate their impact on the speed of diffusion.
Translating innovation webs to processes	How to convert the notation of innovation webs to standard business process language.
Identifying game changers in innovation webs	Applying living systems principles to identify game changers in innovation case studies.
Re-inventing the idea to master the diffusion	How to refine an idea for disruptively fast diffusion.
Letting go of an idea	How to create shared ownership of an idea to let it diffuse disruptively fast.
<Research support>	A session dedicated to supporting ongoing research efforts for Action deliverables, i.e. semi-structured interviews.

Module 4: Innovation through experimentation

The final module builds on the now created ability of participants to apply living systems, innovation web and diffusion of innovation principles in order to apply them to creating their own innovation project.

Table 7. Training sessions for innovation through experimentation

Session	Description
Introduction to the course project	Setting the stage for the (optional) innovation project.
The horizon of ideas	Defining the creative space and mental maps.
The store of facts	How to align aspirations, facts and requirements.
The well of knowledge	The importance of differentiating the experimenter from the expert.
In the competition field	How to create collaborative advantage to define the market space.
The wayfarers	How to chart the diffusion of innovation path and scenarios of travel.
Building the tribe	Principles for populating innovation webs with the most suitable participants.
Launching the experiment	Consolidating, presenting and commencing the journey.
<Research Support>	A session dedicated to supporting ongoing research efforts for Action deliverables, i.e. semi-structured interviews.

- Joint Research-Industry Workshops: These one-day events bring together the participants in the training school and the wider public to explore collaboration opportunities. Agenda items include:
    - A local industry keynote speaker from a high value manufacturing organization discussing the role of innovation in their business / industry.
    - A world café exploring the influencers of innovation speed in high value manufacturing.
    - An introduction to and discussion of the innovation web evolution process.
    - A speed dating session allowing research and industry to share and explore collaboration opportunities.
    - A presentation of project progress.
- Living Labs: These are short term scientific missions of members of members of proposer institutions in ITC countries to industry participants in non-ITC countries in order to engage in action-research on previously agreed ideas. The default length of the mission is three days and the agenda is customized based on the ideas to be explored and the industry member resources available. Living Labs are organized on a bi-annual basis.
- Mini-Conferences: These are one day events aligned to a training school and / or joint research-industry workshop where research results presentations with short papers will be presented by participants of the Action. Short papers will be published in relevant journals.

4.1.3 RISK ANALYSIS AND CONTINGENCY PLANS

The following table list the three primary risks requiring attention before and during the Action. The common challenge is ensuring resourcing of sufficient time by participants for Action efforts. The needed level of resourcing can only be achieved if the Action deliverables are closely aligned and / or integrated with currently funded work by participants. While the design of deliverables as minimum viable products delivered in short intensive time periods (sprints) will assist, it will be critical to continuously grow the number of participants who are interested in and willing to support Action deliverables since they align with their own funded activities.

Table 8. Risks and treatment

Risk and / or possible issues	Probability	Impact	Potential Treatment
The minimum resource allocation from individual proposer institution for working groups is not achieved.	Small	Medium	Continuously increase the number of participants / proposer institutions and focus on collaboration with those institutions who make resources available.
The minimum required work effort to meet the scheduled intended deliverables by working groups is not provided by participants.	Small	Medium	Ensure that deliverables are minimum viable products and achieved within short periods of time (sprints). Align the deliverables more effectively with the individual research efforts of the participants.
Sufficient participation in training schools, joint research-industry workshops and living labs is not achieved.	Small	Medium	Increase activities of working group #1, improve schedule flexibility and time alignment better with other events occurring at the hosting institution.

4.1.4 GANTT DIAGRAM

The GANTT diagram presents the most important phases and activities of the Action. For exemplary purpose the start date has been set to January 1st, 2021 with duration of three years. Training schools and joint research-industry workshops will last one day each, may be consolidated into one event, will be conducted on a bi-annual basis and hosted by different (groups of) in ITC proposer countries. Living labs are constructed as short-term scientific missions, will last 3 days each and be hosted by different industry organizations in non-ITC proposer countries. Management Committee Meetings and Working group Meetings will be held in conjunction with the training school events. A shaded box indicates that the relevant activity is performed in the month relevant for that box. A “P” in the box indicates that a publication (blog, conference presentation / paper, journal paper) will be made / submitted in the month relevant for the box. A “R” indicates that a formal project report will be completed. A “M” indicates a period of intensive marketing in support of upcoming training schools, joint research-industry workshops and living labs. A “MC” indicates a mini-conference.

Table 9. GANTT chart

Task	Jan 21	Feb 21	Mrz 21	Apr 21	Mai 21	Jun 21	Jul 21	Aug 21	Sep 21	Okt 21	Nov 21	Dez 21	Jan 22	Feb 22	Mrz 22	Apr 22	Mai 22	Jun 22	Jul 22	Aug 22	Sep 22	Okt 22	Nov 22	Dez 22	Jan 23	Feb 23	Mrz 23	Apr 23	Mai 23	Jun 23	Jul 23	Aug 23	Sep 23	Okt 23	Nov 23	Dez 23	Jan 24
Management Committee Meetings	R		R						R												R												R				R/P
Working Groups Meetings	R		R						R												R												R				R/P
Mini-Conference									MC												MC												MC				R/P
Working Group #1: Marketing and Coordination																																					
Working Group #2: Success Stories			P		P		P		P		P		P		P		P		P		P		P		P		P		P		P		P		P		
Working Group #3: Living Networks																				P																	
Working Group #4: Disruptive Technology																								P													
Working Group #5: Disruptive Relationships																								P													
Working Group #6: Designing for Rapid Diffusion																															P						
Working Group #7: Innovation Automation																																		P			
Training School #1		M																																		
Joint Research-Industry Workshop #1		M	M																																		
Living Lab #1			M	M																																	
Consolidation & Revision								P																													
Training School #2							M	M																													
Joint Research-Industry Workshop #2								M	M																												
Living Lab #2											P																										
Consolidation & Revision														P																							
Training School #3													M	M																							
Joint Research-Industry Workshop #3														M	M																						
Living Lab #3															M	M																					
Consolidation & Revision																				P																	
Training School #4																			M	M																	
Joint Research-Industry Workshop #4																				M	M																
Living Lab #4																					M	M															
Consolidation & Revision																										P											
Training School #5																									M	M											
Joint Research-Industry Workshop #5																										M	M										
Living Lab #5																											M	M									
Consolidation & Revision																																P					
Training School #6																														M	M						
Joint Research-Industry Workshop #6																															M	M					
Living Lab #6																																M	M				
Consolidation & Revision																																					P
Project Wrap-Up																																					P

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COST Mission and Policies

The Open European Network for **ENT**erprise Inn**OV**ation in **H**igh **V**alue **M**anufacturing (ENTOV-HVM) is a nascent inclusive interdisciplinary bottom-up and open European knowledge alliance exploring the (in-) dependent variables and their dependency affecting the speed of innovation diffusion from ideation to market saturation in high value manufacturing. As it matures this alliance will allow more and more diverse researchers and innovators across existing, emergent and potential research-intensive spaces to identify and leverage living systems concepts to enable an increasing number of breakthrough scientific developments in high value manufacturing. This will lead to new concepts, services and products and thus contribute to bridging the research and innovation divide and participation gaps in Europe.

ENTOV-HVM contributes to strengthening European research and innovation capacities at individual, (sub-) group, enterprise, regional, intra- and international level by working together to identify archetypal patterns of collaboration, “game changing” activities and the interdependent variables which affect the speed of innovation, that together allow ideas to progress rapidly and successfully through the diffusion of innovation curve to market saturation. These archetypal patterns of collaboration are termed “innovation webs”.

High value manufacturing is the application of leading edge technical knowledge and expertise to the creation of products, production processes, and associated services, which have strong potential to bring sustainable growth and high economic value. Such products are characterised by a combination of high research and development intensity and high growth.

Innovation is understood as the flow of knowledge from its place of origin to the place of highest need for that knowledge. Knowledge is understood to represent the capacity to act effectively in context.

Living systems are aggregations of life forms such as humans, fish, birds etc. which are open, self-organizing and exhibit, among others, emergent behaviour.

Innovations webs are a series of collaboration archetypes that describe the evolution of ideas to market saturation which are visualised in the form of Value Networks. Value Networks consist of roles assumed by participants exchanging tangible and intangible deliverables in sequenced manners. Value Networks are purposeful collaborations that as a whole exhibit living systems characteristics.

With an emphasis on the high value manufacturing space ENTOV-HVM aims to:

- create a European-based scientific and technology network exploring the dynamics of the diffusion of innovation from a living systems perspective,
- solicit the participation of an as diverse as possible set of participants and stakeholders from research and industry to enable new perspectives on a challenging question,
- leverage an increased understanding of the dynamics of the diffusion of innovation for policy input to improve the amount and speed of exploitation of research outcomes, and
- tightly integrate with a wide range of European research networks, thereby accelerating the dissemination of its knowledge to increase overall efficiency and impact at all levels.

In search of the high degree of diversity needed to address the challenge addressed, ENTOV-HVM purposefully places emphasis on integrating diverse participants from ITCs with major industrial organizations across Europe in order to:

- counterbalance the research communities’ unequal access to critical relationships, knowledge, infrastructures, funding and resources,
- increase the visibility and integration of researchers to the leading knowledge hubs of Europe, as well as to acquire their necessary leadership skills, regardless of their location, age or gender through positive discrimination,
- contribute to trigger structural changes in the national research systems of member countries, and
- support identifying excellence across Europe by building on the rich history of innovation dynamics across the globe to contribute to Horizon 2020 and Horizon Europe widening objectives.

In order to achieve its aims ENTOV-HVM sets objectives to:

- map the diffusion of innovation of successful historical high value manufacturing innovations,
- create a reference-architecture and its simulation for game-changing exchanges in the diffusion of innovation for high value manufacturing,
- understand how technology can disruptively accelerate the diffusion of innovation in high value manufacturing,
- understand how human relationships can disruptively accelerate the diffusion of innovation in high value manufacturing,
- define the optimal design of high value manufacturing ideas to diffuse in a “heart-beat”, and
- establish an online platform for simulating exchanges in the diffusion of innovation for high value manufacturing.

In order to achieve these objectives ENTOV-HVM will:

- establish working groups aligned with the objectives,
- create and conduct training schools and joint research-industry workshops,
- establish and conduct Living Labs integrating all stakeholders in industrial contexts,
- present results through conferences and publications, and
- provide input to policy at all levels.

Network of Proposers - Features

COST Inclusiveness target countries
61.54 %

Number of Proposers
30

Geographic Distribution of Proposers

Country	ITC/ non ITC/ other	Number of institutions from that country	Number of researchers from that country	Percentage of the proposing network
Belgium	other	1	1	3.33 %
Canada	other	1	1	3.33 %
Germany	non ITC	7	7	23.33 %
Ireland	non ITC	1	1	3.33 %
Israel	non ITC	1	1	3.33 %
Italy	non ITC	1	1	3.33 %
Latvia	ITC	2	2	6.67 %
Lithuania	ITC	3	3	10 %
Luxembourg	ITC	2	2	6.67 %
Poland	ITC	1	1	3.33 %
Portugal	ITC	3	3	10 %
Slovakia	ITC	2	2	6.67 %
Slovenia	ITC	2	2	6.67 %
Turkey	ITC	1	1	3.33 %
United Kingdom	non ITC	1	1	3.33 %
United States	other	1	1	3.33 %

Gender Distribution of Proposers
63.3% Males
36.7% Females

Average Number of years elapsed since PhD graduation of Proposers with a doctoral degree
10.7

Number of Early Career Investigators
12

Core Expertise of Proposers: Distribution by Sub-Field of Science
30.0% Mechanical engineering
26.7% Economics and business
6.7% Civil engineering
6.7% Electrical engineering, electronic engineering, Information engineering
6.7% Languages and literature
16.5% Other
6.7% Unspecified

Institutional distribution of Network of Proposers

66.7% Higher Education & Associated Organisations
16.7% Business enterprise
10.0% Private Non-Profit without market revenues, NGO
6.7% Government/Intergovernmental Organisations except Higher Education

Business enterprise:5

- Number by Market sector of unit of affiliation
  Professional, Scientific And Technical Activities:3
  Other Service Activities:1
  Information And Communication:1
- Number by Type
  Private enterprises:5
- Number by Ownership and International Status
  Independent Enterprise:5
- Number by Size
  SME (EU Definition provided underneath after selection):5

Private Non-Profit without market revenues, NGO:3

- Number by Type
  Other:2
  Advocacy/Membership Organization:1
- Number by Level
  International or European:1
  National:2

Higher Education & Associated Organisations:20

- Number by Field of Science of Department/Faculty of Affiliation
  Other engineering and technologies:2
  Mechanical engineering:8
  Other social sciences:3
  Civil engineering:1
  Economics and business:3
  Languages and literature:1
  Educational sciences:1
  Electrical engineering, electronic engineering, Information engineering:1
- Number by Type
  Education Oriented:7
  Research Oriented:13
- Number by Ownership
  Fully or mostly public:18
  Fully or mostly private:1
  50-50 Public and Private:1

Government/Intergovernmental Organisations except Higher Education:2

- Number by Level
  International:1
  Central and Federal Government:1
- Number by Type
  R&D Funding and/or R&D Performing bodies:2

COST Country Institutions(13) : Germany , Ireland , Israel , Italy , Latvia , Lithuania , Luxembourg , Poland , Portugal , Slovakia , Slovenia , Turkey , United Kingdom

Near-Neighbour Country Institutions(0)
COST International Partners(2) : Canada, United States
European Commission and EU Agencies(0)
European RTD Organisations(0)
International Organisations(1)

Network of Proposers - Details

Main Proposer's Details

Title:	Dr		
First Name:	Oliver	**Gender:**	M
Last Name:	Schwabe	**Years from PhD:**	1
Institution:	Eurofocus International Consultants Ltd.	**Type of Institution:**	Business enterprise
Sub-field of Science of Department:		**Core Area of Expertise:**	Mechanical engineering (Aerospace engineering)

Secondary Proposers' Details

Belgium

Mr Sait Mentes Birlik (EUREKA Network)

Participating as Secondary Proposer
Core Expertise: Economics and business: Development, economic growth, competitiveness
Gender: M
Years from PhD: No PhD

Canada

Mr Joel Alleyne (Alleyne Inc)

Participating as Secondary Proposer
Core Expertise: Computer and Information Sciences: Information and Knowledge Management
Gender: M
Years from PhD: No PhD

Germany

Prof Bettina Reuter (ed-media e.V. - ed-media e.V. Institute at the University of Applied Science Kaiserslautern)

Participating as Secondary Proposer
Core Expertise:
Gender: F
Years from PhD: 25

Prof Christian Thurnes (HS Kaiserslautern [Opinnometh])

Participating as Secondary Proposer
Core Expertise: Other engineering and technologies: Innovation, Innovationmanagement, Lean, Operational Excellence
Gender: M
Years from PhD: 16

Prof Franz Dietrich (TU Berlin [Institute of Machine Tools and Factory Management IWF])

Participating as Secondary Proposer
Core Expertise: Mechanical engineering: Mechanical and manufacturing engineering (shaping, mounting, joining, separation)
Gender: M
Years from PhD: 6

Prof LORETA ULVYDIENE (EureCons Förderagentur GmbH)

Participating as Secondary Proposer
Core Expertise: Languages and literature: History and philosophy of languages and literature
Gender: F
Years from PhD: 15

Dr Pinar Bilge (TU Berlin)

Participating as Secondary Proposer
Core Expertise:
Gender: F
Years from PhD: 3

Dr Andreas Huber (EureCons Förderagentur GmbH [Strategic Development])

Participating as Secondary Proposer
Core Expertise: Economics and business: Organization studies
Gender: M
Years from PhD: 15

Ireland

Prof PIERO FORMICA (MAYNOOTH UNIVERSITY - INNOVATION VALUE INSTITUTE)

Participating as Secondary Proposer
Core Expertise: Economics and business: Management of Technology and Innovation
Gender: M
Years from PhD: 2

Israel

Ms Mor Harir (Israel Smart Cities Institute)

Participating as Secondary Proposer
Core Expertise: Media and communications: Media and communications, social aspects of information science and surveillance, socio-cultural communication
Gender: F
Years from PhD: No PhD

Italy

Prof Fabrizio Dughiero (University of Padova [Department of Industrial Engineering])

Participating as Secondary Proposer
Core Expertise: Electrical engineering, electronic engineering, Information engineering: Energy aspects of electrical and electronic engineering
Gender: M
Years from PhD: No PhD

Latvia

Dr Janis Stabulnieks (Latvian Technological Center)

Participating as Secondary Proposer
Core Expertise: Electrical engineering, electronic engineering, Information engineering: Networking
Gender: M
Years from PhD: 26

Dr Atis Kapenieks (Riga Technical University)

Participating as Secondary Proposer
Core Expertise: Educational sciences: Databases, data mining, data curation, computational modelling
Gender: M
Years from PhD: 36

Lithuania

Dr Raminta Pucetaite (Vilnius University [Kaunas Faculty])

Participating as Secondary Proposer
Core Expertise: Economics and business: Business ethics
Gender: F
Years from PhD: 12

Dr Dainora Maumevičienė (Kaunas University of Technology [Faculty of Social Sciences, Arts and Humanities])

Participating as Secondary Proposer
Core Expertise: Languages and literature: Translation and interpretation
Gender: F
Years from PhD: 7

Ms Raimonda Agne Medeisiene (Vilnius University - Vilnius University Kaunas Faculty [Institute of Social Sciences and Applied Informatic])

Participating as Secondary Proposer
Core Expertise: Economics and business: Strategy and management
Gender: F

Years from PhD: No PhD

Luxembourg

Prof Peter Plapper (University of Luxembourg)

Participating as Secondary Proposer
Core Expertise: Mechanical engineering: Mechanical and manufacturing engineering (shaping, mounting, joining, separation)
Gender: M
Years from PhD: 27

Dr Meysam Minoufekr (Luxembourg University)

Participating as Secondary Proposer
Core Expertise: Mechanical engineering: Databases, data mining, data curation, computational modelling
Gender: M
Years from PhD: 5

Poland

Dr Roman Wdowik (Ignacy Łukasiewicz Rzeszów University of Technology)

Participating as Secondary Proposer
Core Expertise: Mechanical engineering: Mechanical and manufacturing engineering (shaping, mounting, joining, separation)
Gender: M
Years from PhD: 4

Portugal

Dr Nuno Almeida (University of Lisbon - Instituto Superior Técnico [Civil Engineering, Architecture and Georresources])

Participating as Secondary Proposer
Core Expertise: Civil engineering: Civil engineering
Gender: M
Years from PhD: 8

Dr Paulo Bento (Centre of Studies on Migrations and Intercultural Relations - CEMRI [Migrations and Intercultural Diversity])

Participating as Secondary Proposer
Core Expertise: Economics and business: Sustainability
Gender: M
Years from PhD: 3

Dr Filipa Salvado (LNEC - Laboratório Nacional de Engenharia Civil [Buildings Department, Building Economy, Management and Technology Unit])

Participating as Secondary Proposer
Core Expertise: Civil engineering: Civil engineering
Gender: F
Years from PhD: 0

Slovakia

Prof Hana Pacaiova (Technical University of Kosice)

Participating as Secondary Proposer
Core Expertise: Mechanical engineering: Mechanical and manufacturing engineering (shaping, mounting, joining, separation)
Gender: F
Years from PhD: 9

Ms Anna Nagyova (Technical university of Kosice)

Participating as Secondary Proposer

Core Expertise: Mechanical engineering: Quality management
Gender: F
Years from PhD: 9

Slovenia

Mr Damjan Maletic (University of Maribor - University of Maribor, Faculty of Organizational Sciences)

Participating as Secondary Proposer
Core Expertise: Other social sciences: Asset, Quality and Maintenance Management
Gender: M
Years from PhD: 4

Dr Matjaž Maletič (University of Maribor [Faculty of Organizational Sciences])

Participating as Secondary Proposer
Core Expertise: Economics and business: Sustainability
Gender: M
Years from PhD: 5

Turkey

Dr Taner Tunc (Sabanci University - http://myweb.sabanciuniv.edu/ttunc/ [Faculty of Engineering and Natural Sciences])

Participating as Secondary Proposer
Core Expertise: Mechanical engineering: Mechanical and manufacturing engineering (shaping, mounting, joining, separation)
Gender: M
Years from PhD: 9

United Kingdom

Dr John Erkoyuncu (Cranfield University [School of Aerospace, Transport and Manufacturing])

Participating as Secondary Proposer
Core Expertise: Mechanical engineering: Aerospace engineering
Gender: M
Years from PhD: 9

United States

Ms Lynne Schneider (Entovation International)

Participating as Secondary Proposer
Core Expertise: Economics and business: Development, economic growth, competitiveness
Gender: F
Years from PhD: No PhD