EUROSENSORS 2015

European Sensor Systems Cluster Meeting

"Sensor Systems in H2020 Research and Innovation Programmes"

"Clustering a Mean to Increase Impact: The ESSC Case"

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Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing
Freiburg, Germany, 9 September 2015

Research and Innovation

EC Clustering initiative – why clustering?

Current NMBP Clusters and the ESSC

ESSC & H2020 Funding Opportunities

Final Remarks

Research and
Innovation

Benefits of Clustering

- *Maintain an **overview** of the activities in a given field is important both to the NMBP Programme and the beneficiaries*

- *Increase the **visibility and impact** of EC activities and the cluster participants!*

- *Efficient and effective **dissemination** actions by a group with similar views!*

- *Stronger **feed-back** on (national and international level) policy making and research programme definitions!*

- *Better tackling of **horizontal issues** - like standards, regulation, safety, training and education.*

- *Increased understanding of **commercialisation issues!***

- *Maximise the **overall benefits** of the EC programme activities for industry and society in a given field!*

EC Support to Clustering and Clusters

Dedicated Expert Support – continuous and ad hoc:

Starting clusters: Identify cluster participants within and outside of the EC projects (e.g. 15 running sensor projects); synergies; opportunities; technology outlook; future priorities.

Ongoing cluster activities support: Building vision, road map, business plan, action plan, etc.

Ad hoc training and support: F.ex. when clusters address planning and commercialisation issues in industrial applications and products; or have common issues concerning standards, regulation, safety, training or education.

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Nanotechnology and nanofabrication clusters

Nano for photovoltaic www.eupvclusters.eu

Nano for thermoelectrics

Nano4water

Nanomedicine

Sensors (ESSC) www.cluster-essc.eu

Energy technologies

Engineering and upscaling (PILOT Cluster)

Characterization Tools (ECTC) www.characterizationcluster.eu

Nanosafety www.nanosafetycluster.eu

Advanced Materials clusters

Creative industries

Joining dissimilar materials

Materials modelling Council (EMMC)

Raw materials

Advanced materials for high temperature power generation

Battery Materials

Biomaterials (cluster with 12 sub-clusters)

Carbon fibres

Catalysis

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The Multiannual Financial Framework 2014-2020:

European Council conclusions, 8 February 2013

Key challenge: stabilise the financial and economic system while taking measures to create economic opportunities

1. **Smart & inclusive growth (€451 billion)**

| Education, Youth, Sport | Connecting Europe | Cohesion | Competitive Business SMEs | HORIZON 2020 |

2. **Sustainable growth, natural resources (€373 billion)**
3. **Security and citizenship (€16 billion)**
4. **Global Europe (€58 billion)**
5. **Administration (€61.6 billion)**

TOTAL €960 billion

European Commission

Three priorities

- *Excellent science*

- *Industrial leadership*

- *Societal challenges*

European Commission

Excellent science
Proposed funding (€ million, 2014-2020)*

European Research Council (ERC) Frontier research by the best individual teams	**13 095**
Future and Emerging Technologies Collaborative research to open new fields of innovation	**2 696**
Marie Skłodowska-Curie actions (MSCA) Opportunities for training and career development	**6 162**
Research infrastructures (including e-infrastructure) Ensuring access to world-class facilities	**2 488**

* All funding figures in this presentation are subject to the pending Multiannual Financial Framework Regulation by the EP and the Council

European Commission

Industrial leadership
Proposed funding (€ million, 2014-2020)

Leadership in enabling and industrial technologies (LEITs) (ICT, nanotechnologies, materials, biotechnology, manufacturing, space)	**13 557**
Access to risk finance Leveraging private finance and venture capital for research and innovation	**2 842**
Innovation in SMEs Fostering all forms of innovation in all types of SMEs	**616** + complemented by expected 20% of budget of societal challenges + LEITs and ***'Access to risk finance'*** with strong SME focus

European Commission

Societal challenges
Proposed funding (€ million, 2014-2020)

Health, demographic change and wellbeing	**7 472**
Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the Bioeconomy	**3 851**
Secure, clean and efficient energy *	**5 931**
Smart, green and integrated transport	**6 339**
Climate action, environment, resource efficiency and raw materials	**3 081**
Inclusive, innovative and reflective societies	**1 310**
Secure societies	**1 695**
Science with and for society	*462*
Spreading excellence and widening participation	*816*

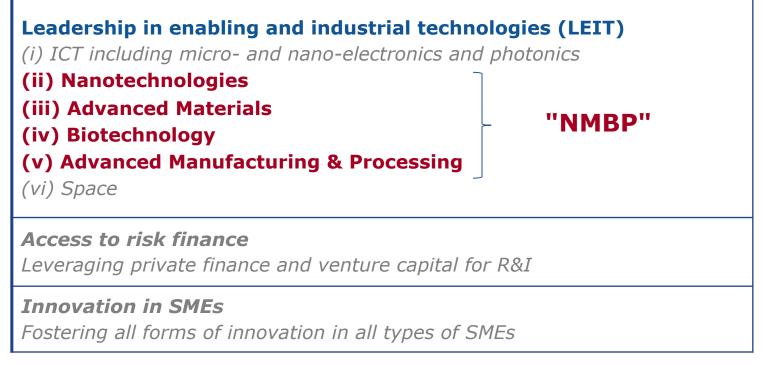* Additional funding for nuclear safety and security from the Euratom Treaty activities (2014-2018)

European Commission

Leadership in Enabling and Industrial Technologies (LEIT)

Priority 1: Excellent Science

Priority 2: Industrial Leadership

Leadership in enabling and industrial technologies (LEIT)
(i) ICT including micro- and nano-electronics and photonics
(ii) Nanotechnologies
(iii) Advanced Materials
(iv) Biotechnology
(v) Advanced Manufacturing & Processing
(vi) Space

"NMBP"

Access to risk finance
Leveraging private finance and venture capital for R&I

Innovation in SMEs
Fostering all forms of innovation in all types of SMEs

Priority 3: Societal Challenges

Research and
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EEB-07-2017: Integration of <u>energy harvesting</u> at building and district level

*Cost effective harvesting of renewable energy (for heating, cooling, electricity, domestic hot water, etc.) , involving **<u>sensors and actuators</u>** cost-effectively distributed throughout the envelope.*

NMBP-04-2017: Architectured /Advanced material concepts for <u>intelligent bulk material structures</u>

*Development, processing and integration of smart materials with new functionalities, as e.g. for **<u>advanced sensors (nanosensor technologies),</u>** damage detection, self-repair, self-actuation, self-sensing etc…. For applications in transport, consumer goods and ICT, and other industrial sectors such as e.g. oil & gas and petrochemicals.*

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Research and Innovation

PILOT LINES: Generic requirements for real time characterisation:

*Development, upscaling and demonstration in relevant industrial environments. Using existing pilot lines for development, incorporating new materials and methods and/or instrumentation with **real time characterization for measurement, analysis and monitoring** at the nanoscale to characterise relevant materials, process properties and product features.*

PILOTS-01-2016: Pilot lines for manufacturing of materials with customized thermal/ electrical conductivity properties

*Applications include multifunctional composites and polymeric materials for **applications such as sensors,** integrated electronics, lighting protection, thermal layers, thermoelectric components etc….. and providing anti-pollution, noise, thermal or anti-scratch properties and/or sensing, health assessment and self-healing functions, etc……….*

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Research and
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PILOTS-04-2017: Pilot Lines for 3D printed and/or injection moulded polymeric or ceramic microfluidic MEMS

*Applications may include MEMS for nozzles or filters, <u>**sensor applications**</u>, lab-on-chip systems, printed biochemical materials, soft substrates etc., and open for new applications, ... Should contribute to an improved quality of life from the resulting products (e.g. lab-on-chip, filters and <u>**sensors for medical or other applications**</u>).....*

PILOTS-05-2017: Paper-based electronics

*Paper-based electronics shows promising technical, economic, and environmental advantages which will allow new recyclable electronics devices like paper displays, smart labels, smart packaging, bio-and medical applications, PoC devices, RFID tags, <u>**disposable electrochemical sensors**</u> among others.*

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FOF-02-2016: Machinery and robot systems in dynamic shop floor environments using novel embedded cognitive functions

Scope: Research activities should address at least three of the following 6 areas:

*Perception as an integrated cognitive capability, considering collaborative perception (counting not only with **on-board sensors, but also with the sensing capabilities available in the whole shop floor**), scene understanding, reasoning and acting (active perception).*

Research and Innovation

H2020 NMBP 2016-2017
Sensor Systems Opportunities

Internet of Things - Large Scale Pilots *(deploying sensors and –systems more than developing new!):*

*Pilot 2: Smart Farming and Food Security (Precision Agriculture possible thanks to the development of **sophisticated sensors**, sensor networks…)*

*Pilot 5: Autonomous vehicles in a connected environment (Core technologies include reliable and real-time platforms managing mixed criticality car services, **advanced sensors**, efficient navigation and improved decision-making technology…)*

*Pilot 6: Water management for resilient cities (The integrated solutions should enable real-time interconnection of **heterogeneous sensors and actuators**, geo-localisation and data fusion including data from meteorological forecast*

*IoT-03-2017: R&I on IoT integration and platforms (general technology development … **including sensors and –systems** …)*

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Access to risk finance
Leveraging private finance and venture capital for R&I

Innovation in SMEs
Fostering all forms of innovation in all types of SMEs

Priority 3: Societal Challenges

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HORIZON 2020

Research and Innovation

European Commission

A new generation of components and systems

ICT-03-2016:   SSI - Smart System Integration (Develop and manufacture smart objects and systems that closely integrate sensors, actuators, innovative MEMS, processing power…

ICT-04-2017:   Smart Anything Everywhere Initiative (Area 3: Advanced micro-electronics components and Smart System Integration: The goal is to support electronic components, sensors, smart objects and systems   (i) access to advanced design and manufacturing for academia, research institutes and SMEs, and (ii) rapid prototyping targeting SMEs.

Robotics and Autonomous Systems

ICT-26-2016:   System abilities, development and pilot installations (Robotics and autonomous systems (RAS) based on Multiple-actor systems.. These actors may be autonomous entities, people, or static systems, including embedded sensor networks and cloud services….

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ICT Key Enabling Technologies

ICT-29-2016:   Photonics KET 2016

iii.   Pervasive high-specificity and high-sensitivity sensing for a safer environment: Pervasive (i.e. large area coverage) near- and mid-infrared sensing applications (spectral range of 2 to 12 μm) for a safer environment, such as monitoring of water or air quality at large scale.

ICT-30-2017:   Photonics KET 2017

ii. Application driven core photonic devices integrated in systems:
2. Sensing for process and product monitoring and analysis: The prototyping and testing of new process analytical instrumentation for on-line/in-line control, targeting the food and pharmaceutical industry, based on novel, compact and miniaturized photonics sensors.

Research and
Innovation

H2020 ICT 2016-2017
Sensor Systems Opportunities

EUB-02-2017 (Brazil):   IoT Pilots

•   _Environmental monitoring_ (A pilot combining a system approach to integrate a large number of sensors across a large set of variables will test the acceptability and scalability of the selected IoT platform …

•   _Utilities: smart water management_ (Smart water management … A pilot focusing on integrated solutions enabling real-time interconnection of heterogeneous sensors and actuators, geo-localisation and data fusion including data from meteorological forecast will test the acceptability and scalability of the selected IoT platform…

•   _Smart assisted living and wellbeing_ (A group of IoT use cases which use intelligent devices (e.g. wearables, sensors, smartphones, and intelligent home appliances) to autonomously generate reports on an individual's physical activity, overall vital signs and well-being…

European Commission

Funded projects will be outcome oriented.

LEIT projects aim to develop key technology buidling blocks and bring them closer to applications and market to pave way for industrial and commercial implementation.

Proposal should describe

- Exploitation and/or business plans
- Engagement of partners along the industrial value chain
- Standardisation
- IPR
- Dissemination of know-how
- Support for education and training
- Expected impact

Research and Innovation

Useful links:

H2020:

www.ec.europa.eu/research/horizon2020

Participant Portal :

http://ec.europa.eu/research/participants/portal/desktop/en/home.html

• Calls for proposals

• Horizon 2020 documents

• Support services (incl. National Contact Points)

• Evaluation experts

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- *H2020 / NMBP very innovation oriented!*
- *Commercialisation barriers an issue in all RTD projects!*
- *Network and cluster activities when adding value!*
- *To be completed !!!!!!!!!*

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Thank you for your attention!