



The European Sensor Systems Cluster (ESSC)

European Sensor Systems Cluster - ESSC

Vision, Objectives, Strategies, Priorities, Challenges and Roadmap

Cluster sponsored and observed by EC DG Research and Innovation

ESSC Meeting at EUROSENSORS 2015

XXIX European Conference on Solid-State Transducers

Concert Hall, Freiburg (Germany), 9 September 2015

Towards the ESSC Roadmap

Andreas Schütze – WG2 Indoor Air Quality

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The European Sensor-Systems Cluster (ESSC)

AGENDA of the **ESSC Session**

Wednesday 9 September 2015 – 14.00 - 16.00

European Sensor Systems Cluster (ESSC) Session

Wednesday - 9 September 2015, 14.00 - 16.00

Location: Runder Saal

Session Chairs: *Dr. Michele Penza*, Chairman of ESSC, ENEA, Italy

Prof. Andreas Schuetze, Steering Committee Member, Saarland University, Germany

14.00 - 14.05	Welcome Address <i>Dr. Michele Penza</i> , Chairman of ESSC, ENEA, Italy
14.05 - 14.25	Sensor Systems and the H2020 Research and Innovation Programme - Clustering as a Mean to Increase Impact: The Case-Study ESSC <i>Dr. Hans-Hartmann Pedersen</i> , EC Research Programme Officer
14.25 - 14.35	Vision, Objectives and Position Paper of ESSC <i>Dr. Michele Penza</i> , Chairman of ESSC, ENEA, Italy
14.35 - 14.45	Governance and Membership of ESSC <i>Dr. Rudolf Frycek</i> , Coach of ESSC, Amires, Switzerland
14.45 - 15.00	Towards the Roadmap of ESSC <i>Prof. Andreas Schuetze</i> , Steering Committee Member, Saarland Un
15.00 - 15.10	Key Notes from ESSC Steering Committee Members

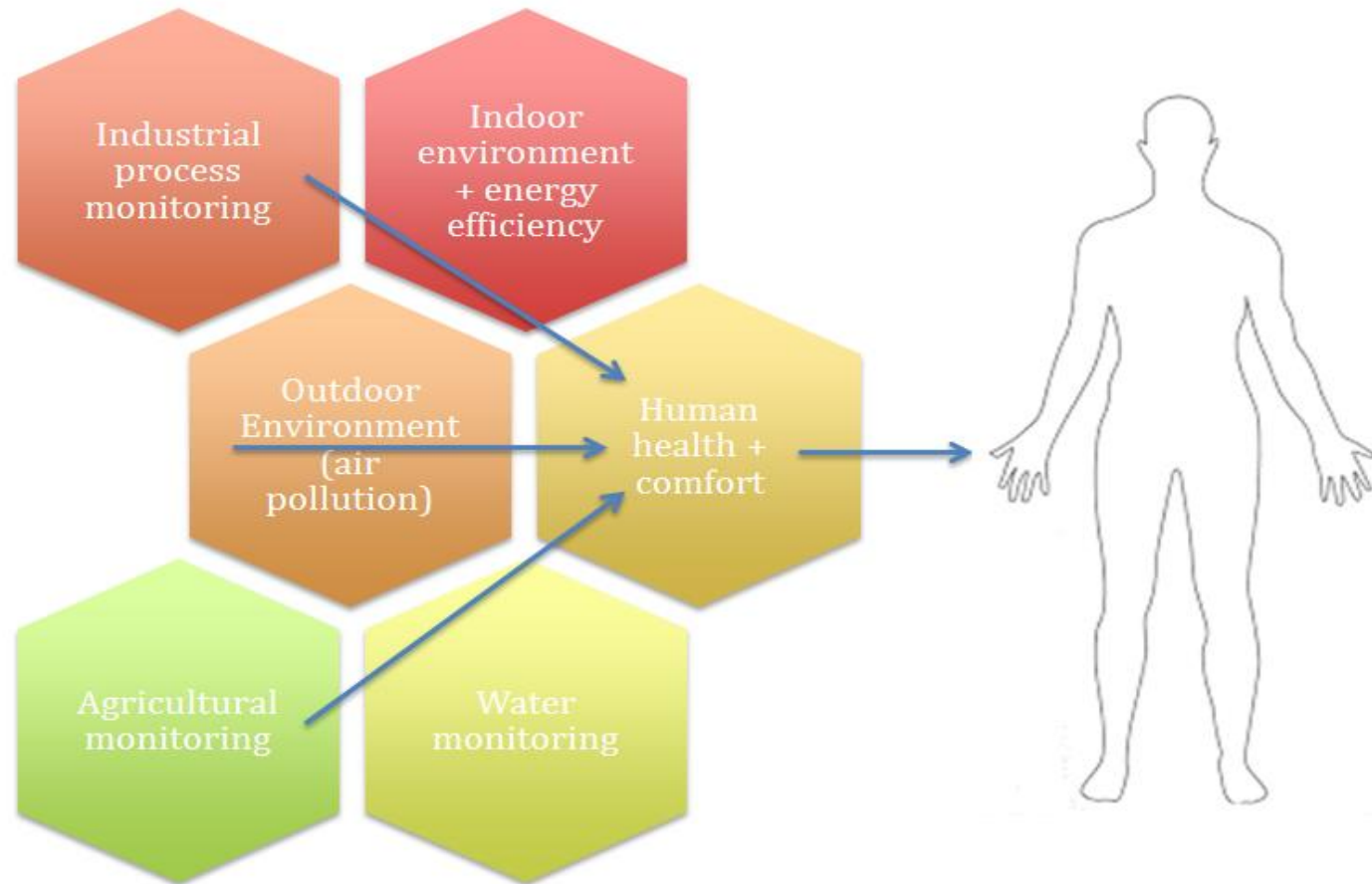


The European Sensor Systems Cluster (ESSC)

VISION OF ESSC

ESSC Key Areas:

- Environmental Sustainability
- Energy Efficiency
- Health Monitoring
- Comfort
- Industrial Applications



Roadmap approach – example WG2

Background: define scope and goals relating to sensor systems

- Scope of Indoor Air Quality
 - Health
 - Comfort
 - Productivity
 - Building integrity and value
- Indoor air quality covers a great variety of application scenarios
- Indoor air quality in buildings is closely connected to energy consumption
- Sensor systems measuring IAQ can have several purposes
 - Purely informative, i.e. indoor weather station
 - Prove compliance with regulations on long term average exposure
 - Give active feedback and advise to people (“open the window to ventilate”)
 - Actively control IAQ as part of a complex system to control dilution with outdoor air and possibly also active air treatment

→ Define priority topics and R&D requirements

Structure: ESSC Working Groups

- **Chairman of ESSC:** Michele Penza, ENEA, Italy
- **Coach of ESSC:** Rudolf Frycek, Amires, Switzerland
- **EC Observer:** Hans Hartmann Pedersen (*EC Officer*), DG R&I, Belgium

Environmental Sensors

- D. Diamond

Indoor Air Quality

- A. Schütze

Health Monitoring and Comfort Sensors

- P. Galvin

Monitoring of Industrial Processes

- T. Mayr

Sensor Integration and Commercialization

- O. Martimort

Dissemination and Outreach

- T. Simmons

R&D topics – WG1 Environmental Sensors – prelim.

Cross Cutting Topics

- Driving Down Costs of Analysis
- Understanding and Controlling Biofouling
- Harnessing the Power of Cloud Informatics
- Air Quality Joint-Exercises
 - Sensors Performance Compared to Reference Analyzers
- Material-based Solutions for Living Sensors Eco-Innovation
 - combining natural species (e.g., lichens, moss, higher species) with traditional transducers (e.g., optical, electrical, capacitive, gravimetric, etc.)

WG Specific Topics

- Studying Gases in the Environment
- Improved platforms for Characterizing the Marine Environment
- Autonomous Analyzers for Freshwater/Waste Water Analysis
- Migrating Analytical Instruments from the Lab to the Field
- Improved Sensing Platforms for Urban Air Quality Monitoring
- Chemical Weather Forecasting and Environmental Sensors Informatics

R&D topics – WG2 Indoor Air Quality – prelim.

Cross Cutting Topics

- Development of a Comprehensive Air Quality Index – [WG1](#)
- Odor Nuisance Monitoring for Comprehensive (I)AQ Assessment
- Integrate Mobile Sensor Systems into (I)AQ Networks – [cf. WG1](#)
→ primarily smartphones and wearables

WG Specific Topics

- IAQ User Interface allowing easy understanding and individual tailoring
- Connect Outdoor and Indoor Air Quality for Demand Controlled Ventilation – [WG1](#)
- Bio-chemical Sensor Systems for Mold Detection – [WG1](#)
- Detection & quantification of volatile organic compounds
→ benzene, formaldehyde, naphthalene at ppb levels (WHO limits!)

R&D topics – WG3 Health Monitoring & Comfort – prelim.

Cross Cutting Topics

- Multiparameter sensing
- Internet of things / Internet of everything – cf. WG1/2
- Energy management / Energy harvesting
- Sensor system design

WG Specific Topics

- Data management and integration into EMRs (Electronic Medical Records)
- Biocompatibility (wearable and implantable sensor systems)
- Detection & quantification of specific disease related VOCs (breath analysis)
- Detection of single cells in complex media
- Sensors for tissue identification and characterization
- Non-contact sensing platforms for physiological monitoring
- Integration of sensors into organ-on-chip systems
- Development of disposable imaging system

R&D topics – WG4 Industrial Process Monitoring – prelim.

Cross Cutting Topics

- Driving Down Costs of Analysis – cf. WG1
- Robust and selective sensor materials
- Understanding and Controlling Biofouling – cf. WG1
- Harnessing the Power of Cloud Informatics – cf. WG1

WG Specific Topics

- On- or inline control of process parameters complementary to physical sensors: enable measurement of additional chemical parameters beyond pH and oxygen
- Sensors showing compatibility with GMP and PAT
- Miniaturized and cheap measurement systems for widespread deployment in industrial processes
- Smart and intelligent process control system based on chemical sensor data
- Process intensification and optimization using new sensors and data
- Facilitating and accelerating upscaling and downscaling using sensor data
- Capability of cleaning in place (CIP) and sterilization (steam, γ -rays, e-beam, ...)

R&D topics – WG5 Integration & Commercialization – prelim.

Integration

- Sensor SMD package standardization
→ pin-to-pin compatibility
- Generic sensor and sensor system ASIC
→ data acquisition and processing, store sensor specific calibration data and further information (cf. IEEE 1451, TEDS: transducer electronic data sheet)

Commercialization

- Upscaling calibration from laboratory to mass production
- Cost and size reduction
- Modularity and flexibility
→ also see integration topics
- Quality of measures
→ allowing users to understand and compare sensor system performance
- Interoperability

Towards a consolidated ESSC roadmap

Compilation and condensation

- Rudolf Frycek
- Cluster topics, identify cross-cutting themes and their focus WG

First internal feedback

- All steering committee members
- Feedback on topics off all WGs
- Timetable and priorities within WG by WG leader

First external feedback (ongoing!)

- Registered members contacted by WG leaders
- Active invitation of stakeholders per WG
- Focus on industry and innovative SMEs

R&D topics – WG1 Environmental Sensors – 1st draft

	WG1 - Environmental Sensors
ST1	Improved platforms for Characterising the Marine Environment
ST2	Autonomous Analysers for Freshwater/Waste Water Analysis
ST3	Migrating Analytical Instruments from the Lab to the Field
ST4	Improved Sensing Platforms for Urban Air Quality Monitoring
ST5	Chemical Weather Forecasting and Environmental Sensors Informatics
HT5	Understanding and controlling Biofouling
HT13	Material-based Solutions for Living Sensors Eco-Innovation (living sensors)

Priorities and timing **not** shown

For full information, comments and input, please contact:
Dermot Diamond (mail: dermot.diamond@dcu.ie)
Dublin City University, Ireland

R&D topics – WG2 Indoor Air Quality – 1st draft

	WG2 - Indoor air quality
ST6	IAQ User Interface allowing easy understanding and individual tailoring
ST7	Connect Outdoor Air Quality and Indoor Air Quality for development of demand controlled ventilation
ST8	Bio-chemical sensor systems for mold detection
HT1	Development of a comprehensive Air Quality Index & Odor nuisance monitoring for comprehensive IAQ assessment, Wide awareness raising and sensibilization for standardization in IAQ and environmental monitoring (e.g. data format, air quality index and legal and regulatory framework)
HT7	Air Quality Joint-Exercises: Sensors Performance Compared to Reference Analyzers & Quality of measures - standardized measurements
HT11	Integrate mobile sensor systems (primarily smartphones and wearables) into IAQ networks

Priorities and timing **not** shown

For full information, comments and input, please contact:
Andreas Schütze (mail: schuetze@LMT.uni-saarland.de)
Saarland University, Saarbrücken, Germany

R&D topics – WG3 Health Monit. & Comfort – 1st draft

	WG3 - Health Monitoring and Comfort Sensors
ST9	Sensors for detection and quantification of volatile organic compounds
ST10	Detection of single cells in complex media
ST11	Non-contact sensing platforms for physiological monitoring
ST12	Integration of sensors into organ-on-chip systems
ST13	Development of disposable imaging systems
HT6	Robust, selective and safe sensor materials for new and established parameters & Biocompatibility of contrast agents
HT15	Energy management / Energy harvesting

Priorities and timing **not** shown

For full information, comments and input, please contact:
Paul Galvin (mail: paul.galvin@tyndall.ie)
Tyndall National Institute, Ireland

	WG4 - Industrial Monitoring
ST14	Sensor platform for multiparametric process control
ST15	Smart and intelligent process control systems
ST16	Process-intensification and Optimisation using sensors
ST17	Sensor for single use reactors
HT8	Harnessing the Power of Data Analysis and Modelling

Priorities and timing **not** shown

For full information, comments and input, please contact:

Torsten Mayr (mail: torsten.mayr@tugraz.at)

Technische Universität Graz, Austria

	WG5 - Integration & commercialization
HT2	Calibration & Ease of use
HT3	Cost and size reduction
HT9	Generic ASIC & modularity and flexibility
HT12	Interoperability of sensors / communication standards

Priorities and timing **not** shown

For full information, comments and input, please contact:
Olivier Martimort (mail: martimort@nano-sense.com)
NanoSense SARL, France

WG6 Dissemination & outreach – 1st draft

WG6 - Dissemination and Outreach	
HT4	Wide regional, national and European dissemination of ESSC roadmap - suggestions for future calls
HT10	Organization of focused technical workshops (e.g. on biofouling in fluid-operated sensors, IAQ in Energy Efficient buildings, emerging technologies for sensors systems, HMI and big data for sensors systems). Could serve as networking event for future calls.
HT14	Event for higher engagement of industry and investors sector (e.g. technology pitches for private and corporate investors)
HT16	Electronic catalogue / webpage of ongoing projects in the field of ESSC and their profiles, contacts and impact study (e.g. environmental or economical) - Catalogue (printed or electronic) of ESSC members (for higher and better quality cooperation)

Priorities and timing **not** shown

For full information, comments and input, please contact:

Thomas Simmons (mail: simmons@ama-sensorik.de)

AMA Association for Sensors and Measurement, Germany

Timing WG2 – Indoor air quality (A. Schütze)

IAQ user interface for easy understanding and tailoring

Indoor AQ vs. outdoor AQ in demand-controlled ventilation

Bio-chemical sensor systems for mold detection

2016

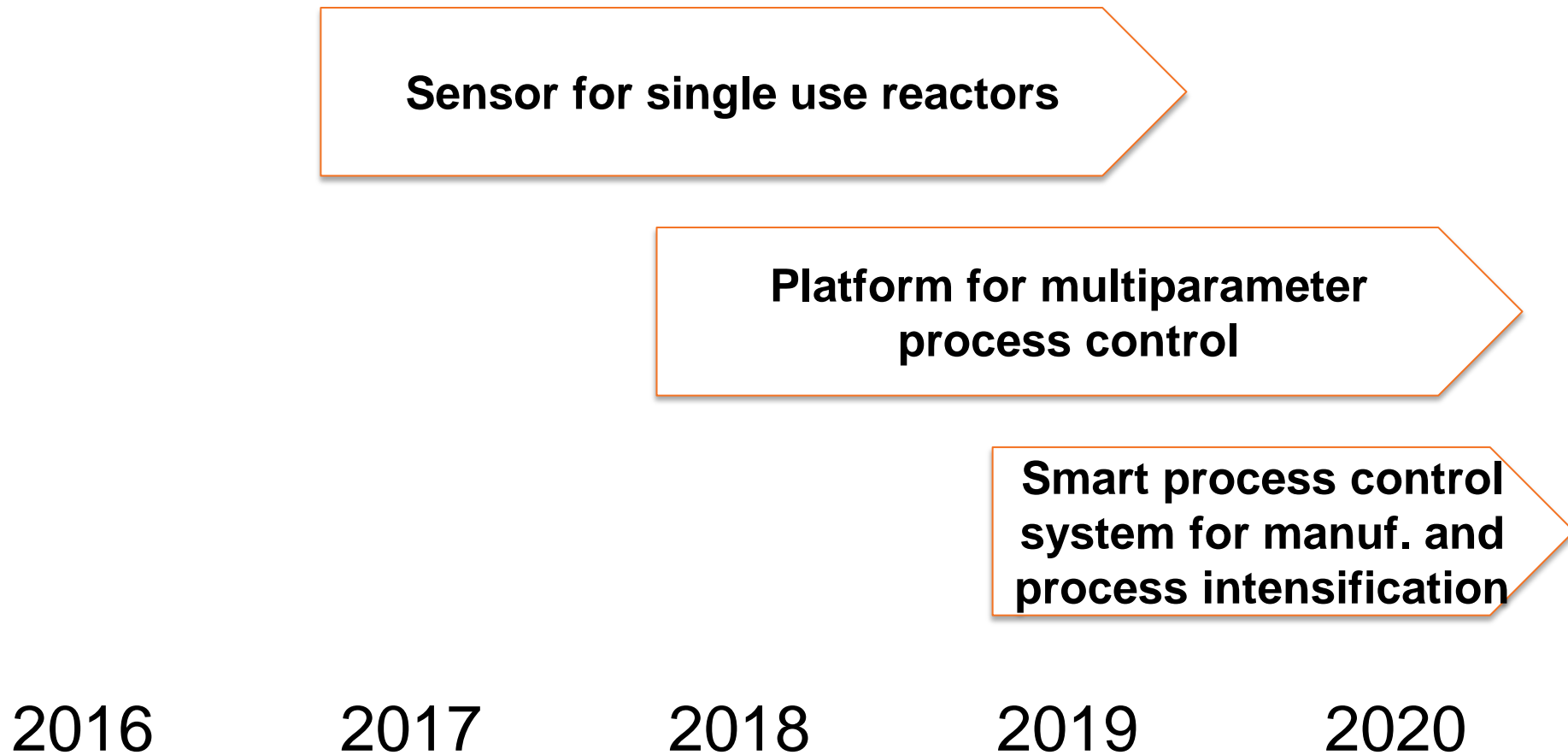
2017

2018

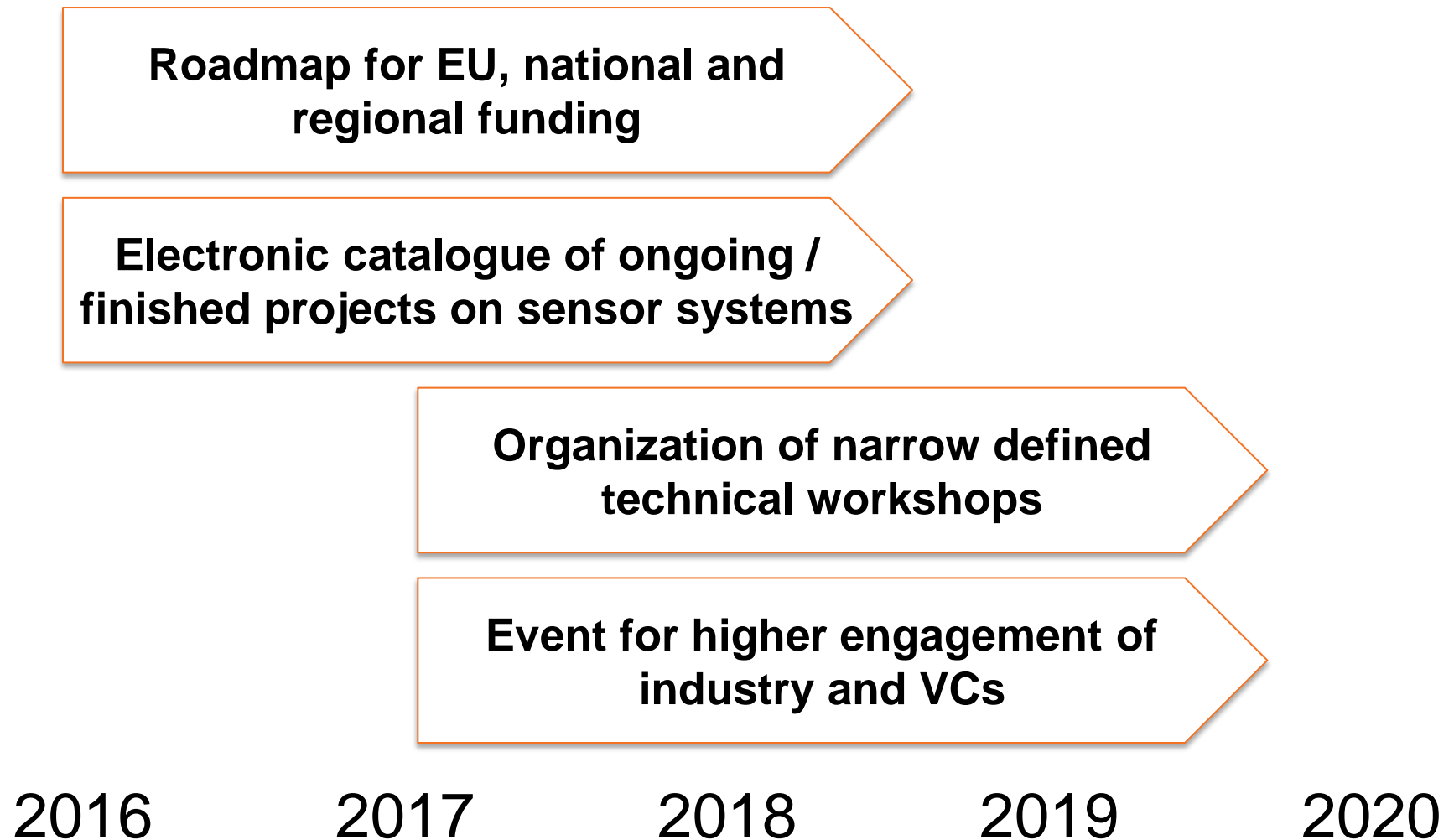
2019

2020

Timing WG4 – Industrial monitoring (T. Mayr)



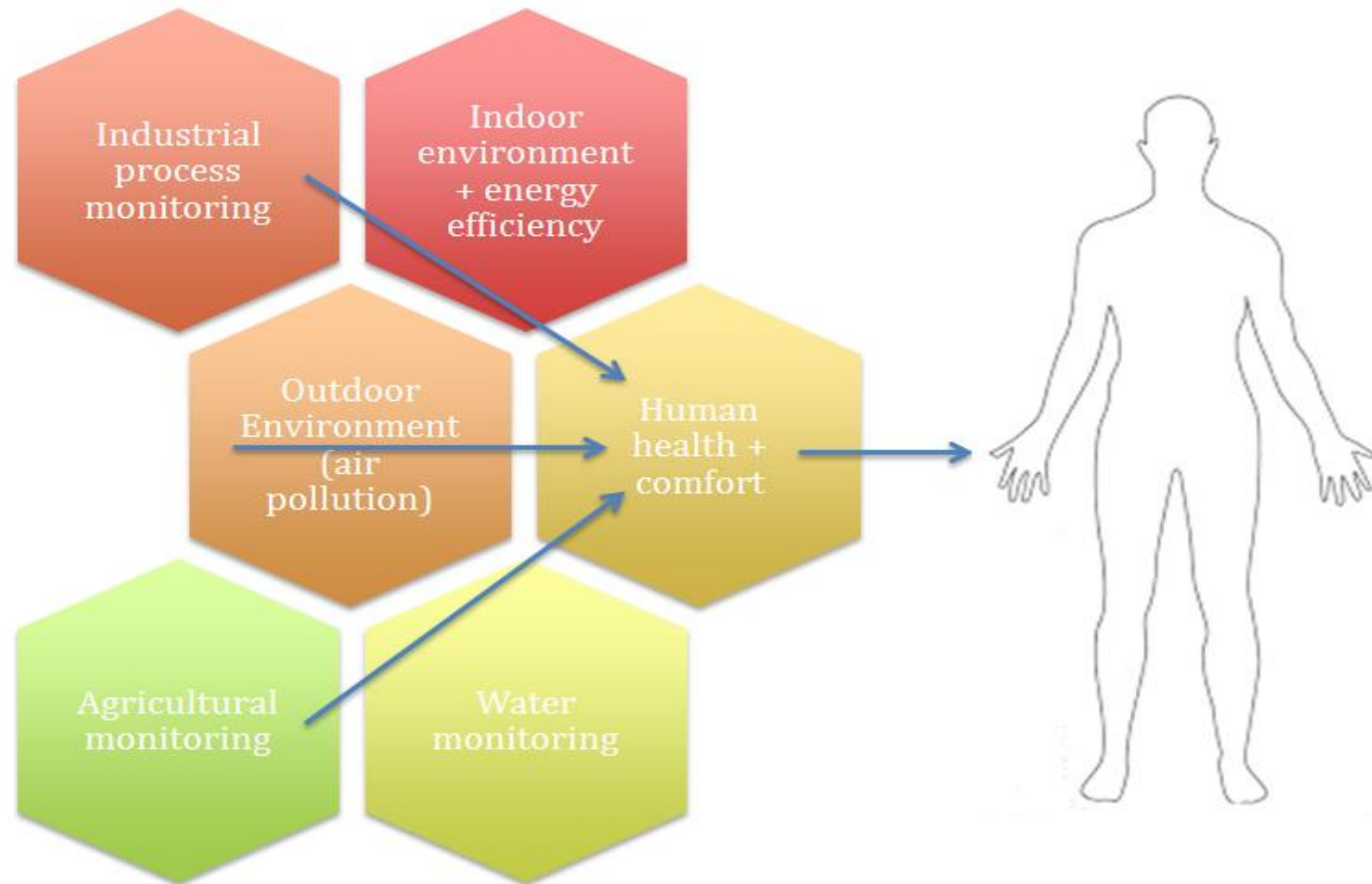
Timing WG6 – Dissem. & outreach (T. Simmons)



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Register with ESSC & provide your input!

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**ESSC roadmap to be finalized
by mid-November 2015**