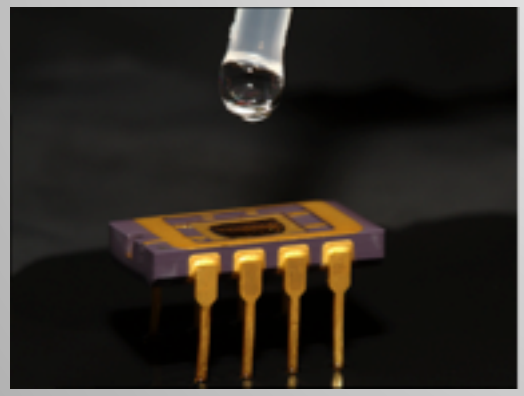
European Commission

Towards to a Characterisation cluster

Sensors



November 2014

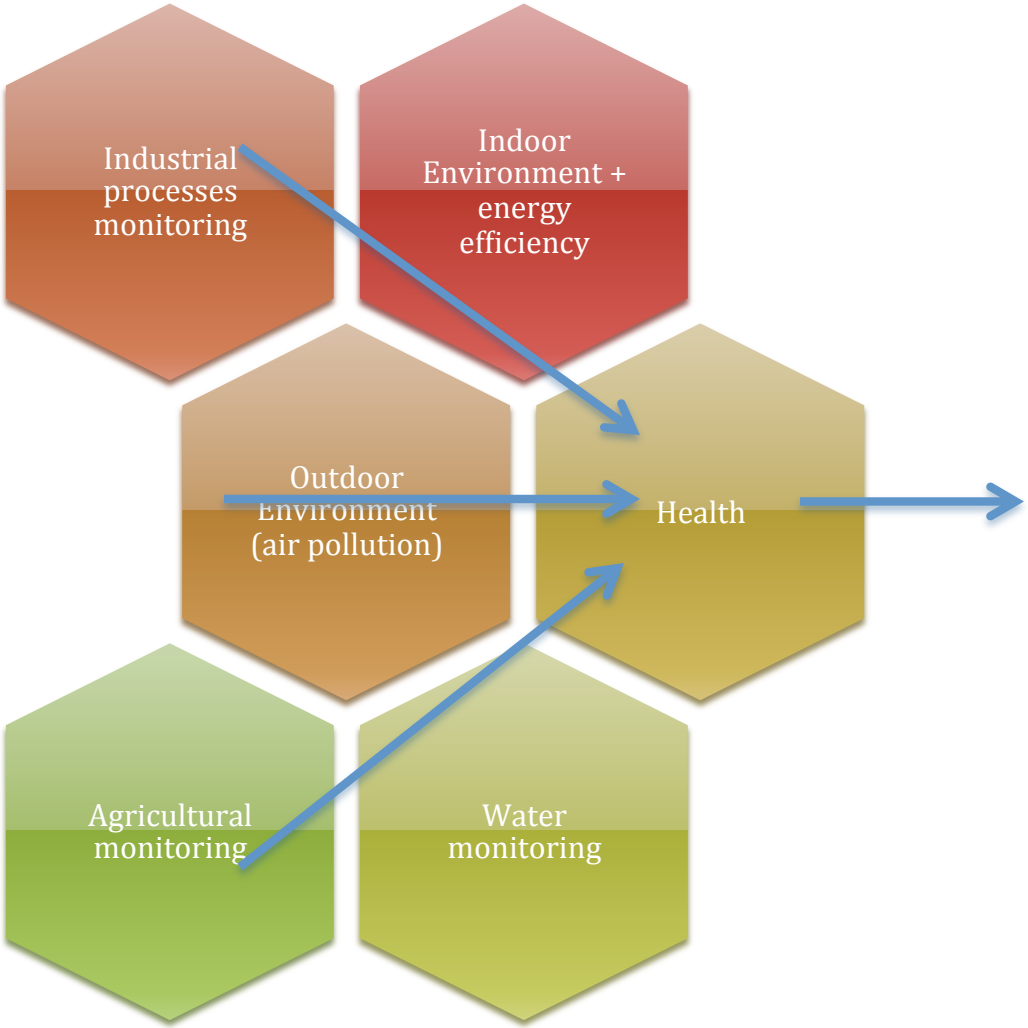
OUTLINE

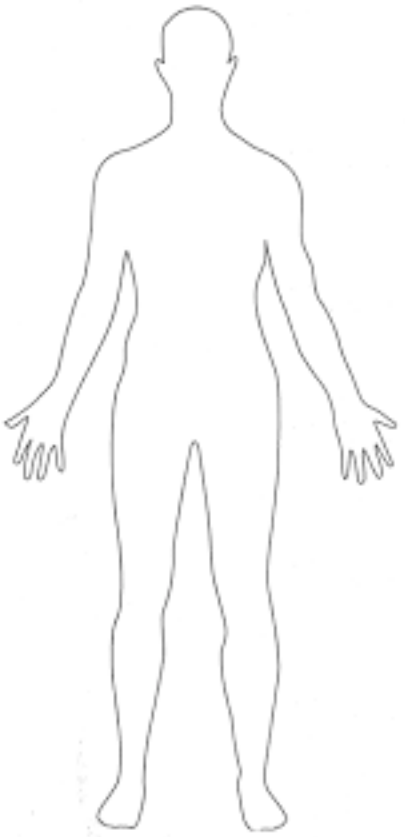
- Trends
- Applications
- EU funded projects
- Cluster positioning
- Objectives
- Challenges
- Agenda

Current trends in sensors

- ✓ Improved 3S
  - ✓ Sensitivity,
  - ✓ Specificity
  - ✓ Stability
- ✓ Miniaturization and integration
  - ✓ Filters, catalysts,
- ✓ Integration to systems
  - ✓ Energy consumption
  - ✓ Data acquisition and filtering
  - ✓ User interaction

Field of application of sensors

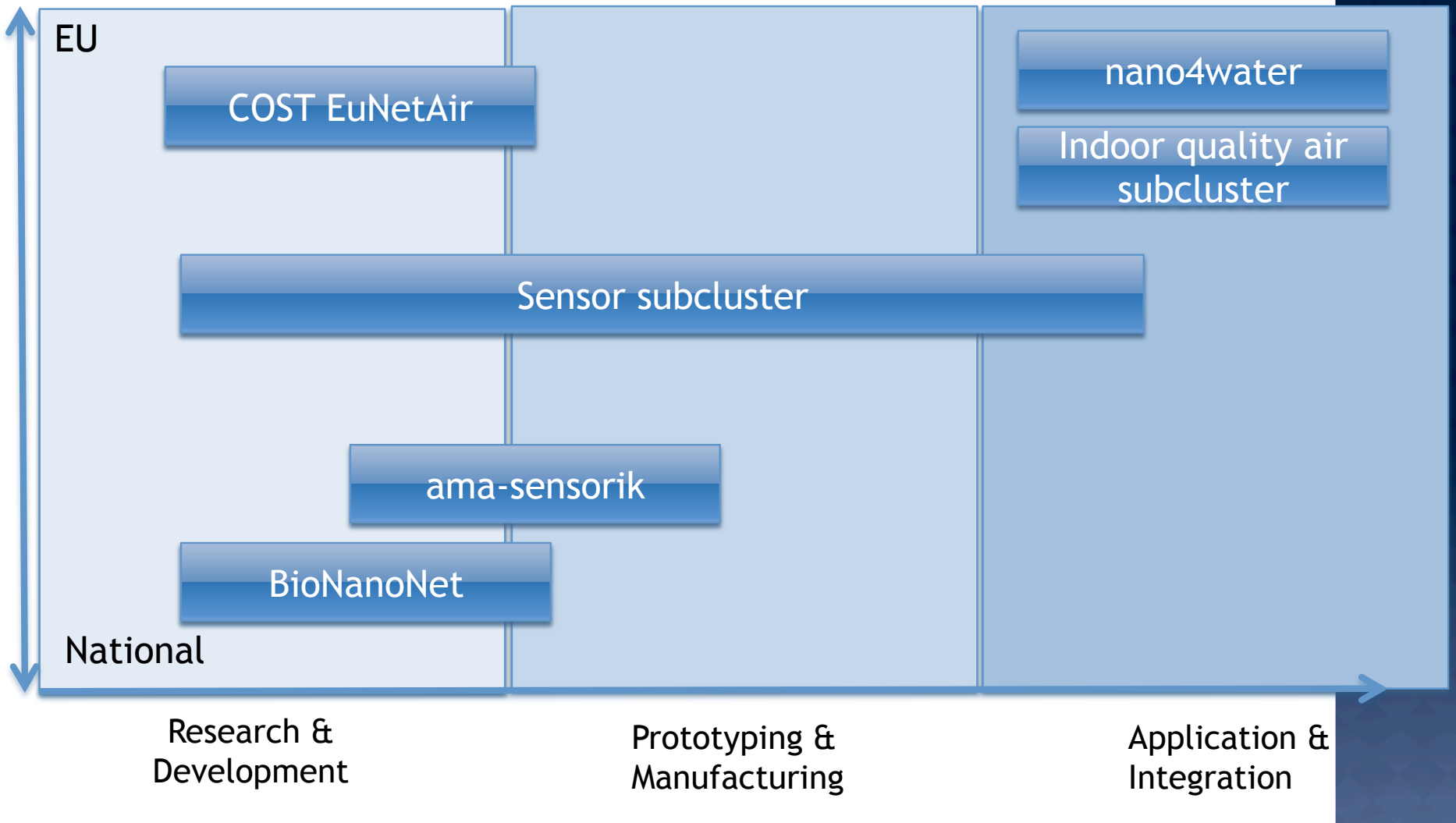




EU FUNDED PROJECTS

Application/ technology	Water pollution	Air pollution/ security	Bio and health	Agriculture	Industrial applications
Organic Electronic		TANOGAPPS (People), E-GAMES (ERC)	**iONE-FP7 (NMP)** TANOGAPPS (People) LASERMICROFAB (People)		**SMARTRONICS (NMP)**
Fluorescence and imaging			G ETIC NANO OBES ople), Na hero ( ), C OPHOS (NM NO		
Lipid membranes/ cells/biomarkers	**AQUAVIR (NMP)**	**NORO ENSOR (NM**	SMART IRBS NI **NOI**	Water4crops (KBBE)	
Plasmonics and nanophotonics (e.g. CMOS, QD)	ACTI RES	RC)	ACT C ERC), NANODEM		EDISON-GA (People), MERMIG (Space), WIROX (People)
MEMS (e.g MIR by QCLs, light sources AFM)			PROMISI (EI FA (ICT-la e)	BIOSENSORS–AGRICULT (People)	
Chemical (covalent) bonding and responsive polymers	SMOND (People **NAPES (NMP**		SMONDEP (Peop le)		
Existing application clusters (incl. end-users)	WSSTP, nano4watter	EuN tAir, E2B, ama-sensorik, NanoBioNet	ETPN, MNBS		

SUB-CLUSTER POSITIONING



AGENDA (EXPERTS PRESENTATIONS)

- **Prof. Andreas Schütze (University of Saarland)** – Sensor systems for environment and health: challenges and opportunities
- **Prof. Dermot Diamond (Dublin City University)** - Challenges in autonomous environmental sensing
- **Prof. Vladimir M. Mirsky (Brandenburg University of Technology Cottbus)** – Change of the paradigm: smart chemical sensors with additional integrated functions
- **Dr. Adriele Prina Mello (IMM/AMBER/CRANN-TCD)** - Challenges in sensors for health applications: the future of cancer diagnostics.
- **Dr. Michele Penza (ENEA)** – New Sensing Technologies for Environmental Sustainability in Smart Cities (COST EuNetAir) – TBC
- **Olivier Martimort (NanoSense)** - Challenges for IAQ sensor industrialisation – TBC

AGENDA (AFTERNOON)

Other inputs, sorting and planning:

- Purpose of the session (RF) – 5 min
- Introduction of short interventions (e.g. IAQ, BioNanoNet + others) - 15 min
- Synergy with other groups/network – 10 min
- Prioritization of most urgent actions/events (4 each) - 15 min
- Governance of cluster (Working groups and leaders) - 10 min
- Sub-cluster representative(s) - 5 min

SUMMARY OF THE SENSOR SUB-CLUSTER

- Sensor sub-cluster attracted 16 participants, mainly from ongoing or recently finished EU projects
- Concept of characterization cluster and sensor sub-cluster beneficial and its development should continue
- Sub-cluster has its unique position in Europe, forming policy actions from research, towards manufacturing and applications
- The cluster has potential and capacity to provide necessary support towards efficient public funding (e.g. analysis, topic proposition, evaluations, reviews)

Sensor sub-cluster: Objectives

- **maximize** the cooperation between projects (avoid duplicating work and improve efficiency)
- identify common interests **in on-going research and development (e.g. open calls, training)**
- provide a forum for discussion, problem solving and **analytical planning R&D activities in Europe**
- establish the EU-wide meeting platform for researchers and mainly for **involved industries and end-users**
- **remove commercialization** barriers to ensure the **EU leadership in Sensor technologies**
- **Integrate inputs and recommendations from existing clusters**
- promote the connection **with external bodies** (EC – RTD, Connect, standardization and regulatory bodies, journals and scientific boards) – advisory board
- disseminate the sensor-related issues/findings to informed public (e.g. on the invisible environmental problems)

Challenges in sensors

- **Indoor sensing**
  - ✓ Cross-sensitivity with *specific gases (fatty acids)*
  - ✓ Accurate VOC *quantification*
  - ✓ *Long term exposure* quantification
  - ✓ *Stability and life* expectancy
  - ✓ Miniaturization, low consumption, controlling and data processing
  - ✓ Integration to air treatment systems and HVAC (incl. occupancy)
  - ✓ Human machine interface for comfort
- **Standardization and regulation**
  - ✓ *Standards and data protocols for Data Benchmarking* (open access)
  - ✓ *validation* and *standardization* of measurement procedures
  - ✓ Advanced study of *VOC impact on health/productivity*
  - ✓ *Harmonization/Regulation/Public* information of *measured sites/ households*
  - ✓ *Regulation/Public* info on *industrial products – e.g. real time styrene monitoring*
- **Modeling and Simulation**
  - ✓ *Multi-physics model* : analyte flow, material layer, transduction, data processing, integration

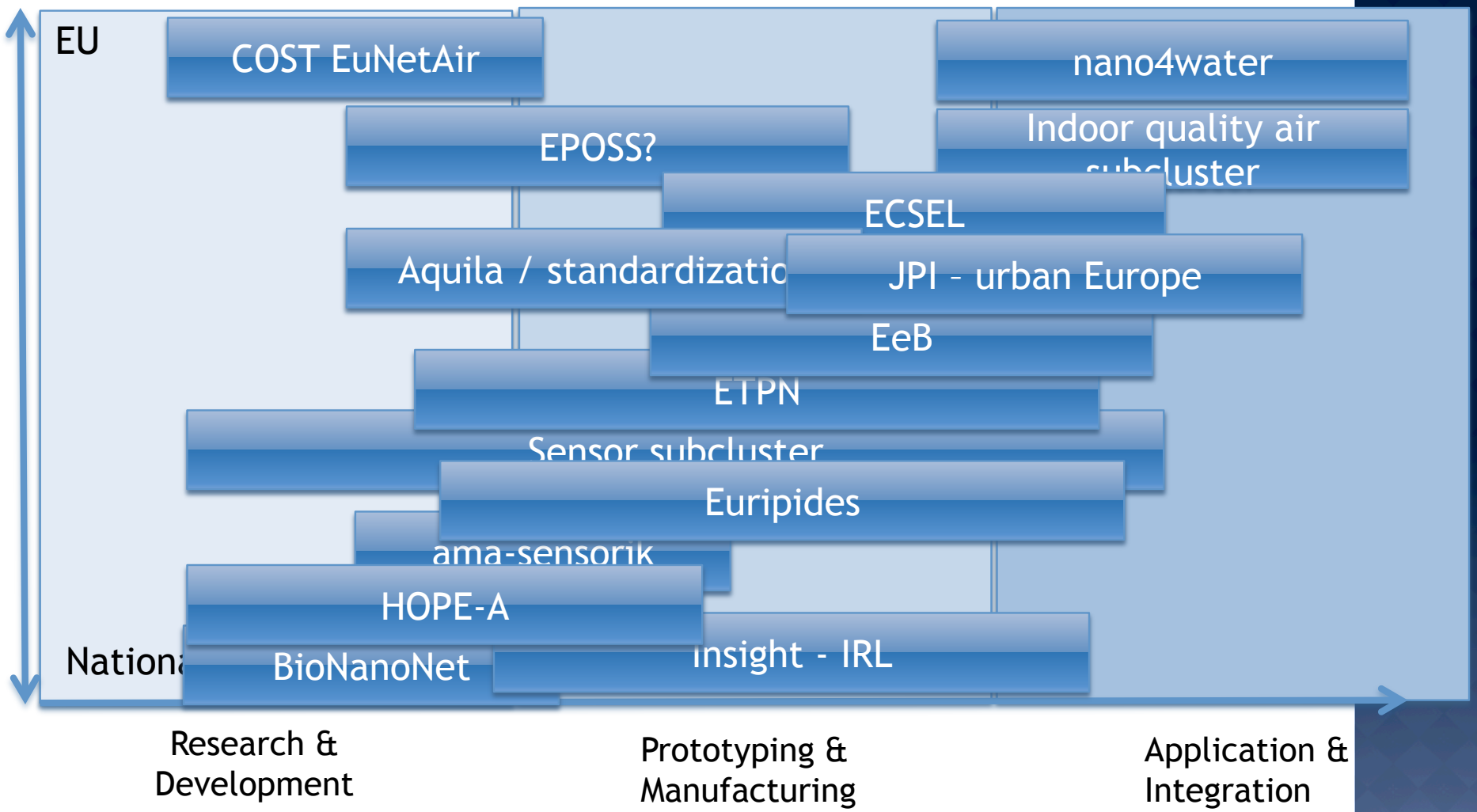
Challenges in sensors

- **Environmental sensing**
  - ✓ Sensors complementary to existing tools (larger devices)
  - ✓ Integration to *mobile devices*
  - ✓ Low cost, wireless sensors to form *networks (e.g. sensing cities*)
  - ✓ Targeted *information to habitants* and mitigation
  - ✓ *Nanoparticle detection* for dust and aerosols
- **Biosensors**
  - ✓ Disposables vs. *continuous/automatic* monitoring
  - ✓ High throughput
  - ✓ *Regulatory framework* not fully adapted to personalization
  - ✓ Towards *point of care* diagnostics, incl. telemonitoring
  - ✓ Data integratability in *health system*
- **Chemo/bio sensors for liquids**
  - ✓ High potential, *but low progress*
- **Business model**
  - ✓ Total cost of ownership vs. savings in comfort environment
  - ✓ Food quality monitoring and price adaptation (realtime S/D)
  - ✓ Health system rewarding for early testing and monitoring
- **Analytical tools/metrology**
  - ✓ Validation

SCOPE

- Sensors should not be part of characterizations cluster – cluster itself – impact, visibility, different problems
- Sensors activities largely fragmented

SUB-CLUSTER POSITIONING

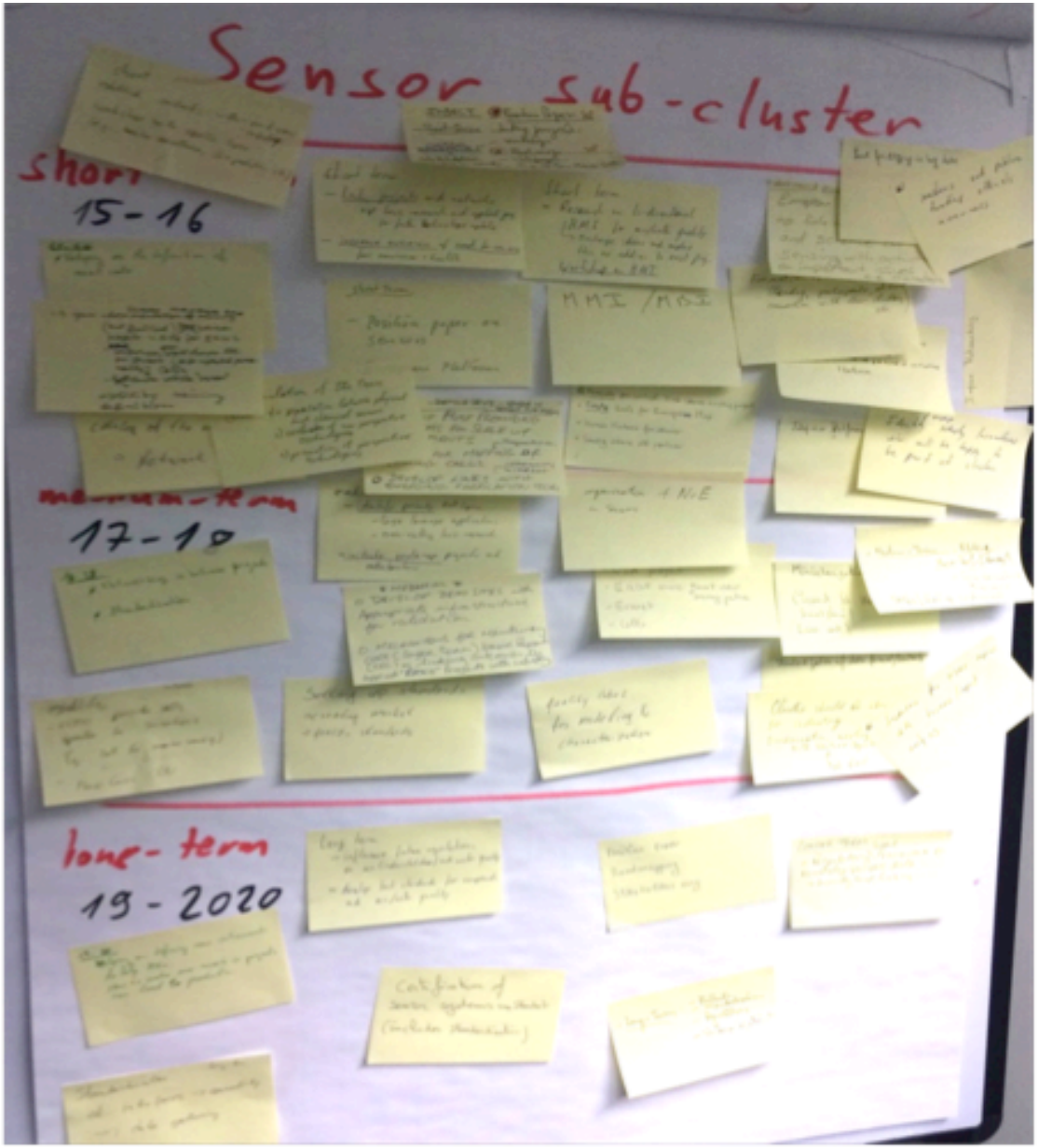


PRIORITY SCOPE

- Position paper on sensors - roadmap
- Definition of chemical sensor
- Meeting with investors – public funding managers – exhibition – narrow gap to meet between investors and sensors experts
- Competitions for technology solutions
- Selection of projects based on prototypes working
- Selection for funding on sensors – advisory role
- Shorter evaluations
- Drive strategic value chain
- High value initiatives
- Translation hub – nanomedicine – clearance house
- Link to ERDF regional findings – act regionally
- Start with CSA as ETP nanomed
- Common protocols on multiple sensor measurements –European standardized deployment
- Network of start-ups
- Bring expertise to selection and evaluations
- Regulation of short /long term exposure health / productivity
- Felt temperature is not standardized
- Fabless chip production opportunities – for small scale – network with producers - emerging fabrication

SUB-CLUSTER GOVERNANCE

	leaders
	Michele Penza
Working Group 1: Environmental Sensor Technologies	Dermot Diamond
Working Group 2: Sensor Technologies for Energy Efficiency	A. Schuetze, O. Martimort
Working Group 3: Sensor Technologies for Health Monitoring	A. Prina Mello, P. Galvin
Working Group 4: Industrial Applications & Commercialization	O. Martimort, R. Frycek
Working Group 5: Dissemination & Outreach *Webpages; Joint-Workshops; Open Advisory Board*	T. Simmons – ama + eurice
Proccess monitoring	Torsten Mayr


Sensor sub-cluster
short
15-16
MMI /HCI
17-19
long-term
19-2020