

# European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

## COST Action TD1105

### INTERNATIONAL WG1-WG4 MEETING on

*New Sensing Technologies and Methods for Air-Pollution Monitoring*

European Environment Agency - EEA

Copenhagen, Denmark, 3 - 4 October 2013

**OVERVIEW AND PLANS**

Action Start date: 01/07/2012 - Action End date: 30/06/2016 - Year 2: 2013-2014 (*Ongoing Action*)

## ***EuNetAir* EEA MEETING**

 **cost**  
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY




**Michele Penza**

Function in the Action: Action Chair

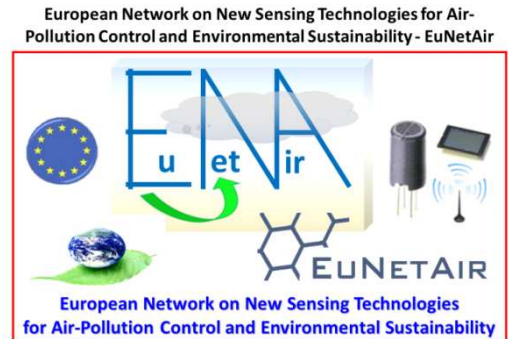
**ENEA - Brindisi, Italy**



 COST is supported by the EU Framework Programme

 ESF provides the COST Office through a European Commission contract

# Outline



- **Background / Problem Statement:**
  - ✓ *Scientific context*
  - ✓ *Challenges addressed by the Action*
- **MoU Action's Objectives: *Main and Secondary***
- **Action Research Directions:**
  - ✓ *Methodology and Innovation*
- **Working Groups**
- **Future Plans and Challenges: *Expected Impact***
- **Concluding Remarks**

# Air-pollution: An International problem



Chernobyl, Ukraine



Yamuna-River, New-Delhi, India



Wastes in the Pacific Ocean are Equivalent to Texas-Area



Linfen, China

Polluted Cities, Europe



River-Riachuelo, Buenos-Aires, Argentina



# Scientific context: Air Quality Control (1/2)

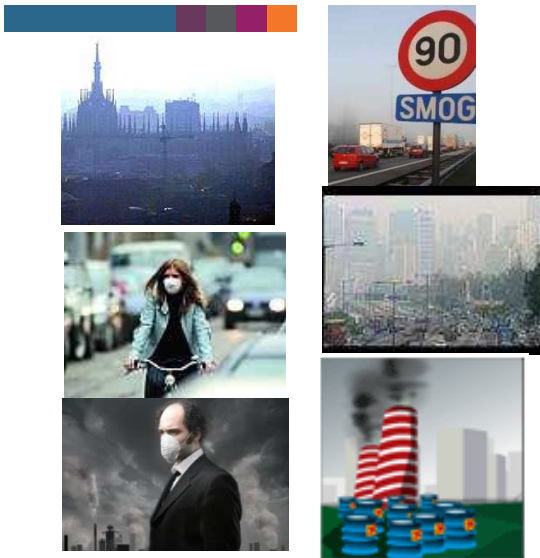
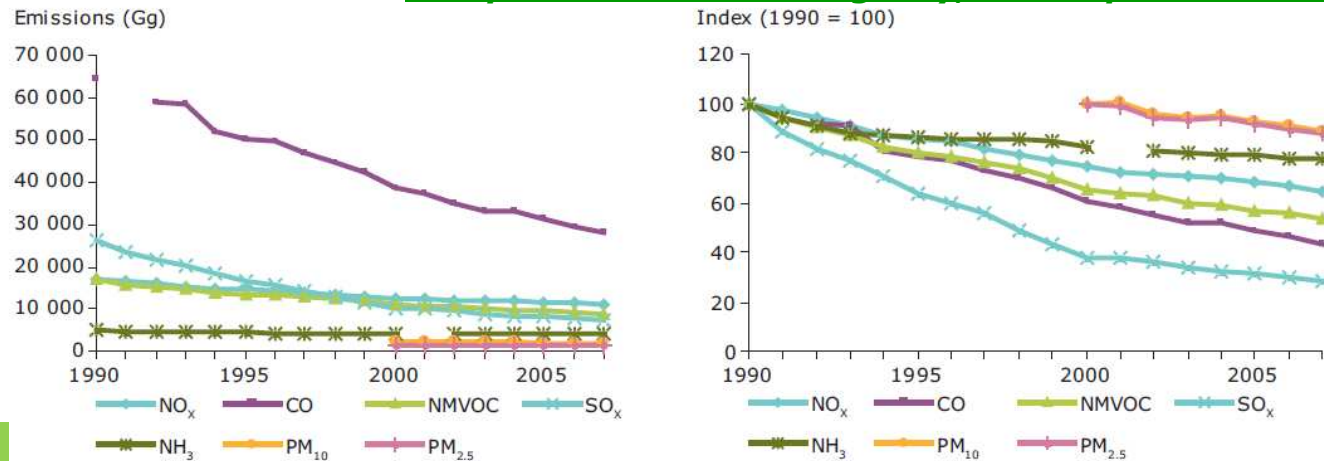


Figure ES1 EU-27 emission trends in absolute (Gg) and relative terms for NO<sub>x</sub>, CO, NMVOCs, SO<sub>x</sub> and NH<sub>3</sub> between 1990 and 2007 (index year 1990 = 100), and for PM<sub>10</sub> and PM<sub>2.5</sub> between 2000–2007 (index year 2000 = 100)

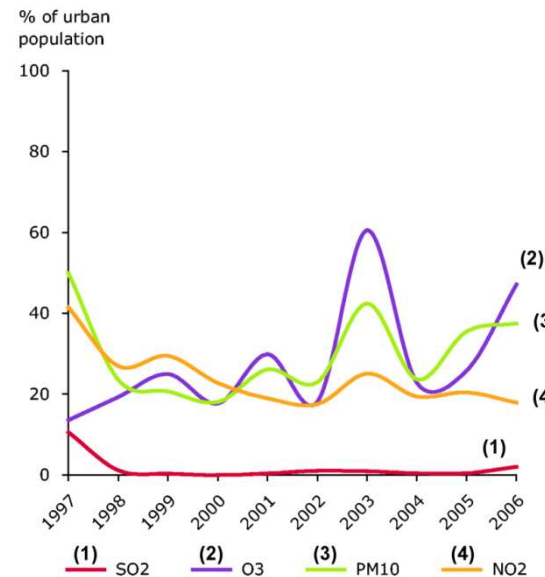
European Environment Agency, EEA Report 8/2009



## Some Environmental Emergencies:

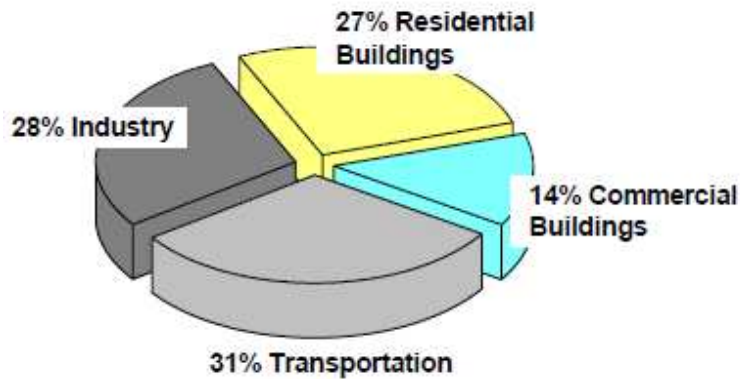
- 1930 - Meuse Valley (Belgium)
- 1952 - Great London Smog (UK)
- 1954 - Los Angeles (USA)
- 1984 - Bhopal (India)
- 2005 - Teheran (Iran)
- 2006 - Hong Kong (China)
- 2008 - Shanghai, Peking (China)
- 2012 - Taranto (Italy)

**AMBIENT AIR QUALITY**  
**EU DIRECTIVE 2008/50/EC and Daughters**



Pollutant	Limit Level
NO <sub>x</sub>	100, 200 ppb
CO	8 ppm
SO <sub>2</sub>	130, 190 ppb
O <sub>3</sub>	120 µg/m <sup>3</sup>
PM <sub>10</sub>	50 µg/m <sup>3</sup>
BTEX	6 µg/m <sup>3</sup>
PAH (BaP)	1 ng/m <sup>3</sup>
PM <sub>2.5</sub>	-

# Scientific context: Indoor/Outdoor Energy Efficiency (2/2)



Primary energy consumption in the EU<sup>1</sup>

<sup>1</sup> O. Seppanen,

11<sup>th</sup> Conference on Indoor Air Quality  
2008, Copenhagen, Denmark

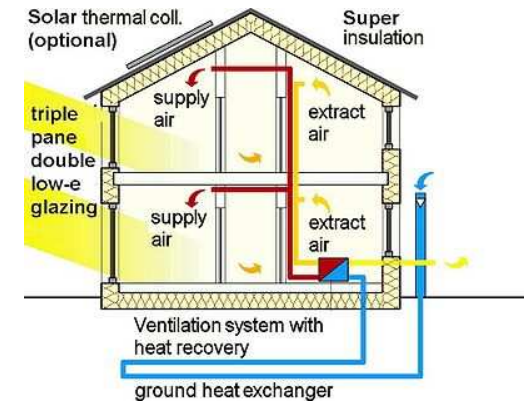
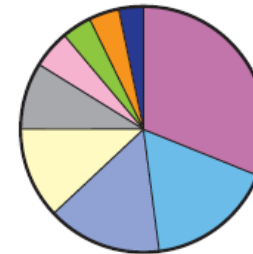
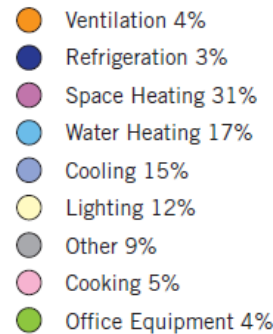
41% Primary Energy consumed in Buildings:

- 2/3 in Residential Buildings
- 1/3 in Commercial Buildings

Energy Performance of Buildings EU Directive

EPBD 2010/31/EC

Figure 2 – Total Energy Consumption by End Use  
Adapted from E Source, 2006



Source: Environmental Protection Agency's National Action Plan for Energy Efficiency Sector Collaborative on Energy Efficiency Hotel Energy Use Profile

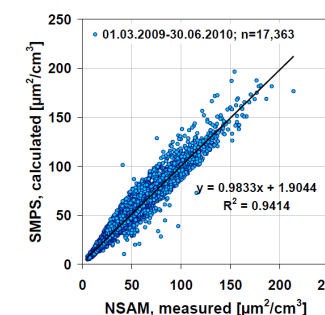
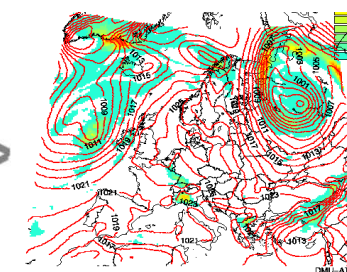
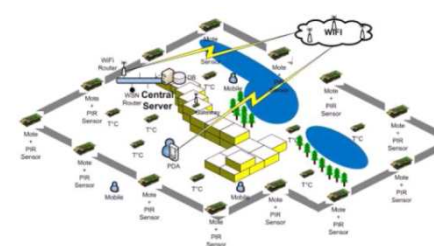
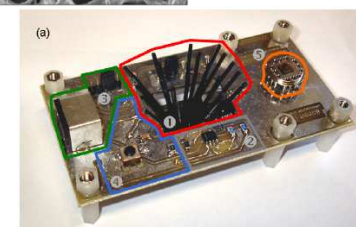
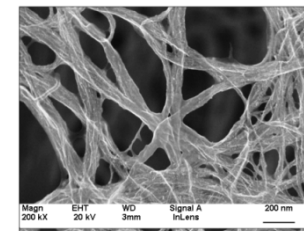
## IAQ by WORLD HEALTH ORGANIZATION

Indoor Air		Typical Substances		Cure
Contamination Source	Emission Source	VOCs	Others	
• Human Being	• Breath	Acetone, Ethanol, Isoprene	demand controlled ventilation	
		CO <sub>2</sub>		
	• Skin Respiration & Transpiration	Humidity		
		Nonanal, Decanal, α-Pinene		
	• Flatus	Humidity		
	• Cosmetics	Methane, Hydrogen		
	• Household Supplies	Limonene, Eucalyptol		
Alcohols, Esters, Limonene				
Unburnt Hydrocarbons				
• Combustion (Engines, Appliances, Tobacco Smoke)	CO			
	CO <sub>2</sub>			
	Humidity			
	• Building Material • Furniture • Office Equipment • Consumer Products	• Paints, Adhesives, Solvents, Carpets	Formaldehyde, Alkanes, Alcohols, Aldehydes, Ketones, Siloxanes	permanent 5-10% ventilation
• PVC		Toluene, Xylene, Decane		
• Printers, Copiers, Computers		Benzene, Styrene, Phenole		

Table 1 – Typical Indoor Air Contaminants (VOCs and others)

# Challenges addressed by Action TD1105 (1/1)

- **Nanomaterials for AQC sensors**
- **Low-cost Gas Sensors**
- **Low-power Sensor-Systems**
- **Wireless Technology (*Environmental Sensors Network*)**
- **Air Quality Modelling**
- **Environmental Measurements**
- **Standards and Protocols**



European Network on New Sensing Technologies for Air-Pollution Control and Environmental Sustainability - EuNetAir





# Action's Objectives (1/3)

## MoU Main Objectives of COST Action TD1105:

- To establish a **Pan-European multidisciplinary R&D platform** on new sensing paradigm for Air Quality Control (AQC) contributing to sustainable development, green-economy and social welfare.
- To create **collaborative research teams** in the **ERA** on the new sensing technologies for AQC in an integrated approach to avoid fragmentation of the research efforts.
- To train **Early Stage Researchers (ESRs)** and new young scientists in the field for supporting competitiveness of European industry by qualified human potential.
- To promote **gender balance** and involvement of ESRs in AQC.
- To disseminate **R&D results on AQC** towards **industry community** and policy makers as well as general public and high schools.

# Action's Objectives (2/3)

## MoU Secondary Objectives of COST Action TD1105:

- To provide a **platform between scientists** in the field of materials, nanotechnology and sensor-systems and other scientists such as environmental protection engineers, public agencies managers, stakeholders, decision-makers, aiming to improve best practices in AQC and explore the potential role of new generation of low-cost sensing devices.
- To investigate **sensing mechanisms** of functional nano-materials for gas measurement and identification of the best available nano-materials, providing concepts and harmonising pre-standardised methods; based on available datasets from partners.
- To assess **degradation rates and lifetime** of sensor elements in defined environmental conditions and evaluate interactions of sensitive materials with outdoor/indoor pollutants; based on datasets from ongoing and historical field deployments of low-cost sensors.
- To investigate **the best available technology** for sensor deployment, communication, power supply and data storage, analysis and display.





# Action's Objectives (3/3)

## MoU Secondary Objectives of COST Action TD1105:

- To monitor real-world environmental conditions with *experimental campaigns* to assess composition of *indoor air* (buildings: house and office) and *outdoor air* (urban areas and industrial sites) and to investigate how such data can be utilised in air pollution modelling.
- To approach *standardisation of methods* for air quality measurements, e.g. harmonisation of test procedures, chemical analysers, post processing, protocols, etc..
- To disseminate *knowledge* on functional materials and sensor-systems for AQC; to aid better focusing of Europe's resources by coordinated efforts in AQC and environmental sustainability to strengthen Europe's competitiveness and scientific excellence improving capacity building and networking to tackle global challenges in a big market in the mid-long term.

# ***COST Action EuNetAir: Some National Research Projects***

Nat. Res. Project:  
NDIR-GAS SENSORS  
Sector: ENV TECH, ICT  
Lead Partner: CCMOS  
Ltd  
Country: UK

Nat. Res. Project: SMART-GAS  
Sector: ENV TECH  
Lead Partner: SenseAir  
Country: Sweden

Nat. Res. Projects: SMS-Nase, DFG  
Sector: MATERIALS, AQG SENSORS  
Lead Partner: ...

Nat. Res. Project: NANOSENSORS  
Sector: MATERIALS, GAS SENSORS  
Lead Partner: CN Academy of Science  
Country: China

Nat. Res. Project: SNAQ-Heard  
Sector: ...  
Lead Partner: Cambridge  
Country: UK

Nat. Res. Project: ... EFFICIENCY  
Sector: ...  
Lead Partner: ...  
Country: Germany

Nat. Res. Projects: RF-SENS, INTEGROSENS  
Sector: ENV, GAS SENSORS, CONTROL  
Lead Partner: University of Bayreuth  
Country: Germany

Nat. Res. Project: SMART SENSOR  
Sector: MATERIALS, GAS SENSOR  
Lead Partner: NRC - Kurchatov Institute  
Country: Russian Federation

Nat. Res. Project: HTS&M  
Sector: Materials, NanoDev  
Lead Partner: IMEC  
Country: Netherlands

Nat. Res. Projects: VOC-IDS (EraNet), IG  
Sector: ENV, SECURITY, ICT  
Lead Partner: LMT-Saarland University  
Country: Germany

Nat. Res. Project: CAPBTX  
Sector: GAS SENSORS, ENV  
Lead Partner: ...  
Univ. of ...  
Country: ...

Nat. Res. Project: CABTURES  
Sector: NANO, SENSORS  
Lead Partner: EPFL  
Country: Switzerland

Nat. Res. Projects:  
IDEA, MOBILE SENSING  
Sector: ENV, ICT  
Lead Partner: VITO  
Country: Belgium

Nat. Res. Project: SMART NANOSENSORS  
Sectors: CNT NANOSENSORS FOR SPACE,  
COMMERCIAL/INDUSTRIAL APPLICATIONS  
Lead Partner: NASA Ames Research Center  
Center for Nanotechnology  
Country: USA

Nat. Res. Project: NAVACS  
Sector: NANO, GAS SENSORS  
Lead Partner: IREC  
Country: Spain

Nat. Res. Project: VALTEC, TEC  
Sector: NANO, GAS SENSORS  
Lead Partner: UB, IREC  
Country: ...

Nat. Res. Projects: FC Aeth, Air Pollution  
Sector: ENV TECHNOLOGY  
Lead Partner: Aerosol ...  
Country: Slovenia

Nat. Res. Project: InTechFun  
Sector: MATERIALS, SENSORS  
Lead Partner: SUT  
Country: Poland

Nat. Res. Projects:  
VAMOS, CARIATI  
Sector: ENV  
Lead Partner: CSIC  
Country: Spain

Nat. Res. Projects:  
VOC&ODOR, SIMPA  
Sector: ENV  
Lead Partner: UNIBA  
Country: Italy

Nat. Res. Projects:  
SIMS, RECO  
Sector: ICT, Materials, ENV  
Lead Partner: ENEA  
Country: Italy

Nat. Res. Projects:  
...  
Lead Partner: ...  
Country: Italy

Nat. Res. Projects: NOVANA, ARCTIC  
Sector: AQG, ENV, AQ-MODELLING  
Lead Partner: Aarhus University  
Country: Denmark

Nat. Res. Projects: FIRB, NANOTHER, CARIPLO  
Sector: NANOMATERIALS, GAS SENSORS, ENERGY  
Lead Partner: UNIBS; Country: Italy

Nat. Res. Projects: EXOTHERMO  
Sector: MATERIALS, GAS SENSORS, ENERGY  
Lead Partner: FORTH; Country: Greece

Nat. Res. Projects: CWFIS, SFO  
Sector: ENV, AQ Modelling  
Lead Partner: NIMH  
Country: Bulgaria

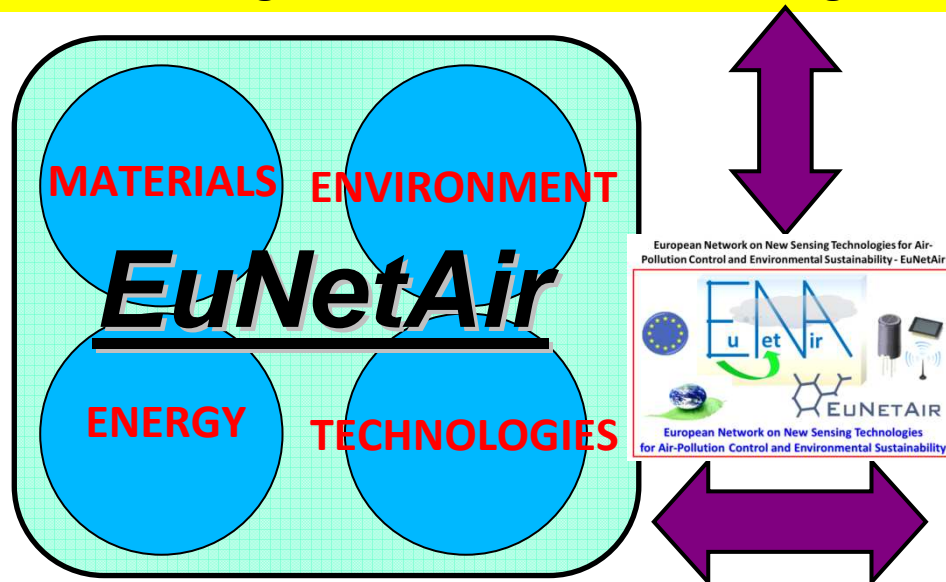
**COST Action EuNetAir**

**COST Action EuNetAir**

# COST Action EuNetAir: **INNOVATION** (1/2)

## Complementarity with other COST Actions:

- ES0602 Chemical Weather Forecasting and Information Systems
- ES1004 European Framework for Online Integrated Air Quality and Meteorology Modelling
- MP0701 Composites with Novel Functional and Structural Properties by Nanoscale Materials
- MP0901 Designing Novel Materials for Nanodevices: From Theory to Practice
- TU0902 Integrated Assessment Technologies to Support the Sustainable Development of Urban Areas



## RELATED FP6-FP7 PROJECTS:

- NANOS4, NMP
- S3, EU-RUSSIA COOPERATION
- ORAMA, NMP
- NANO2HYBRIDS, NMP
- AIRMONTECH, ENV
- AQUILA, ENV
- OFFICAIR, ENV
- CITI-SENSE, ENV
- GOSPEL, Network of Excellence in Artificial Olfaction
- FLEXSMELL, PEOPLE Marie-Curie Action

## INNOVATION of ACTION:

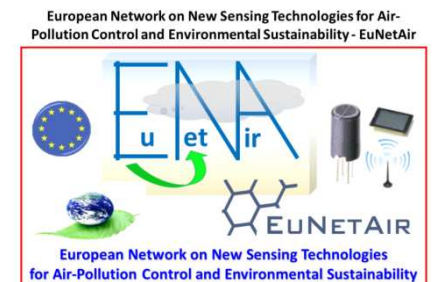
Integrated approach on AQC for environmental sustainability by cooperative networking of multidisciplinary research on nanomaterials, gas sensing technologies, wireless sensor technologies and networks, environmental measurements, ambient intelligence, air quality modelling, chemical weather forecasting, harmonisation of measurements, protocols, methods, standards and procedures for commercialisation of low-cost AQC sensors.

# Action Research Directions: *Innovation* (2/2)

## Innovation Highlights of COST Action TD1105 *EuNetAir*:

The Working Program includes multidisciplinary Research at integrated approach and trans-domain multi-scale level:

- Nanomaterials for low-cost AQC sensors
- Improved gas sensor systems and low-power sensing microdevices
- Wireless sensor networks and distributed intelligence
- Air-quality modelling and chemical weather forecasting
- New protocols, standards and methods for AQC sensors
- Harmonisation of environmental measurements
- Guidelines for AQC systems and transducers
- Environmental sustainability and energy efficiency



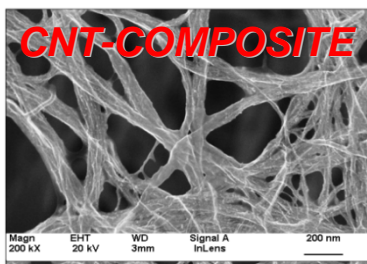
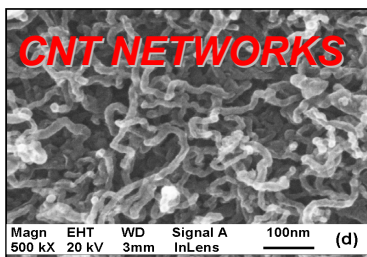
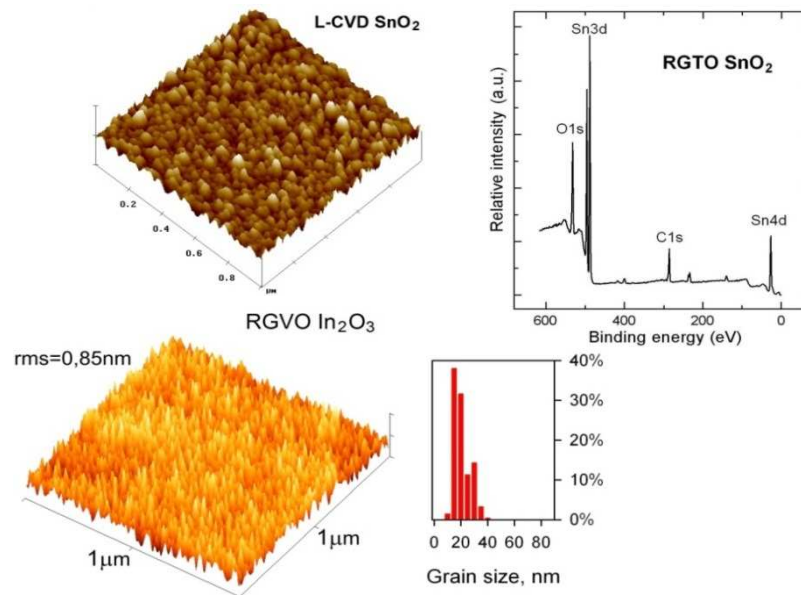
# EuNetAir SOLUTIONS: NANOMATERIALS AND NANOTECHNOLOGIES

*Metal Oxides Nanostructures by University of Brescia,*



**The increasing scientific interest in 1-D systems (nanowires, nanobelts, nanorods, nanotubes) and single-crystalline 1-D nanostructures ( $\text{SnO}_2$ ,  $\text{ZnO}$ ,  $\text{WO}_3$ ,  $\text{In}_2\text{O}_3$ ,  $\text{MoO}_3$ ,  $\text{TiO}_2$ , etc.) are nowadays emerging as building blocks for a new generation of electronic, and optoelectronic nanometer-scaled devices with superior performances for gas sensing and energy applications.**

**RGTO (RGVO)  $\text{SnO}_2$  and  $\text{In}_2\text{O}_3$  nanolayers by Silesian University of Technology, Poland**



**Carbon nanotubes (CNT) in the form of networks and composite as filler in an organic matrix by ENEA, Italy.**

PROPERTY OF CNTs	VALUE
High surface area	100 - 1800 $\text{m}^2/\text{g}$
Hollow structure	1 - 5 nm diameter
Nanosized morphology	10 - 1000 Aspect ratio
High electron mobility	up to 10000 $\text{cm}^2\text{Vs}^{-1}$ , at 300K
High structural/chemical reactivity	Bending at high angle ( $< 40^\circ$ )
High thermal stability	1800 - 6000 $\text{Wm}^{-1}\text{K}^{-1}$ therm. cond.
Electrical Resistivity	1 - 100 $\text{k}\Omega$ (p-type Semiconductor)

# EuNetAir SOLUTIONS: WIRELESS TECHNOLOGY



Production version of the mote technology from EPSRC MESSAGE.

3 electrochemical gas sensors, temperature, humidity & noise.

IEEE 802.15.4 wireless mesh networking of up to 100 motes (up to 100 m between motes).

Custom network protocols for routing and power management.

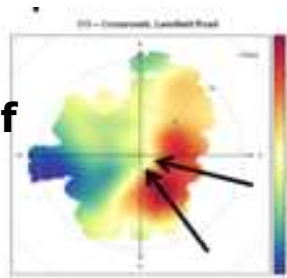
Solar rechargeable battery + Lithium D cell backup.

Designed for easy deployment on lighting columns etc.

Low cost, rapid deployment and high spatial resolution.

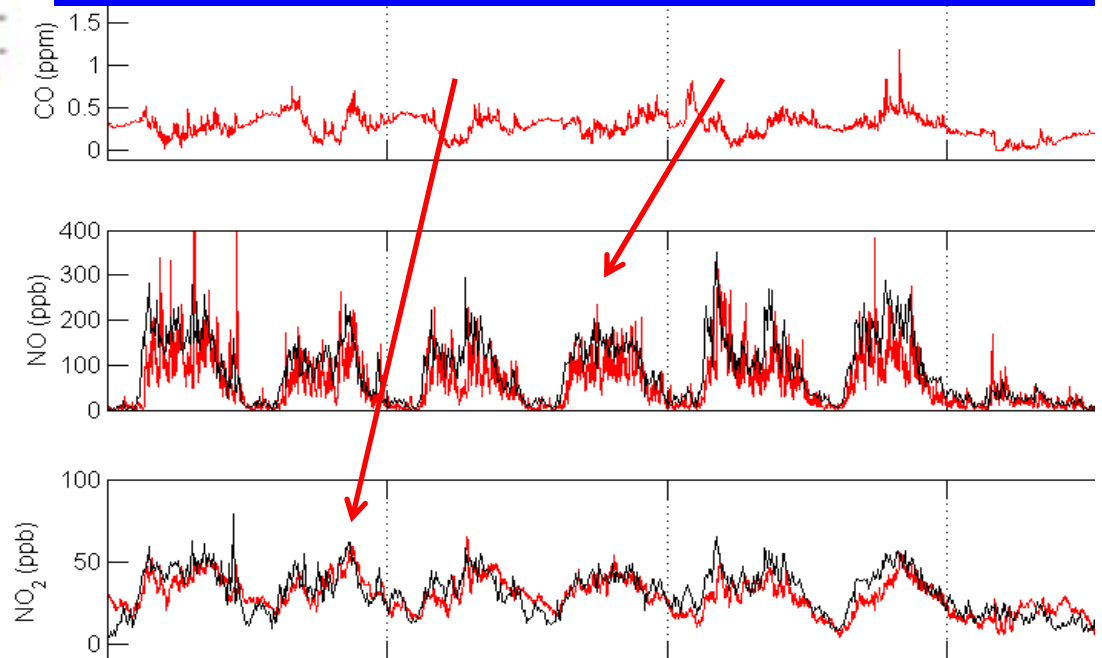
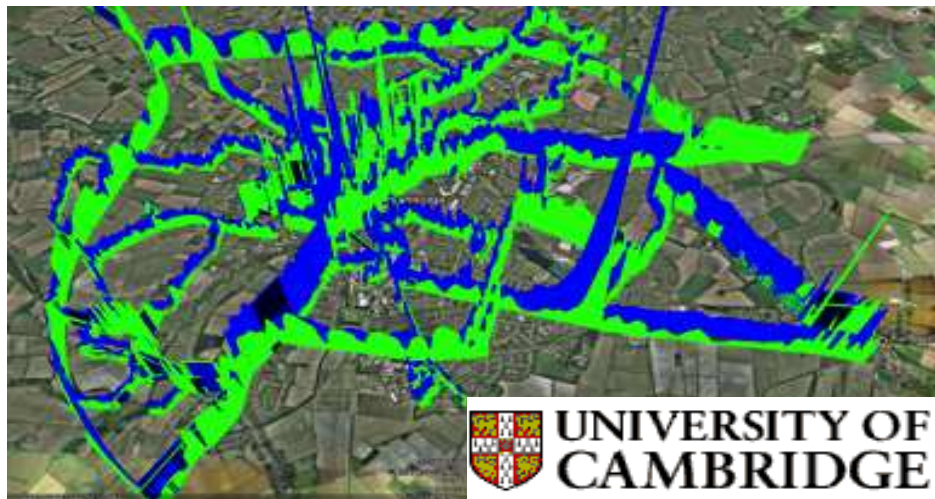
## The Envirowatch mote

High granularity evaluation of air quality (e.g.  $\text{NO}_x$ , below), source attribution (right).



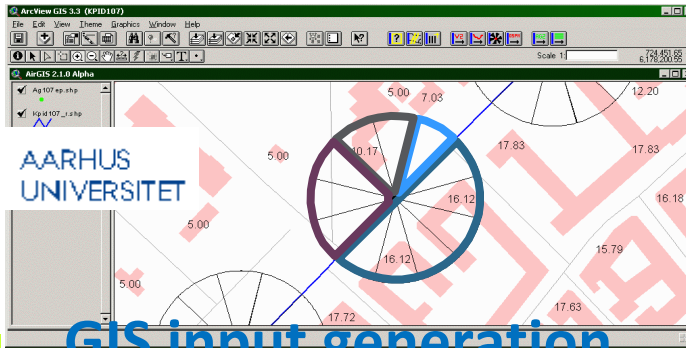
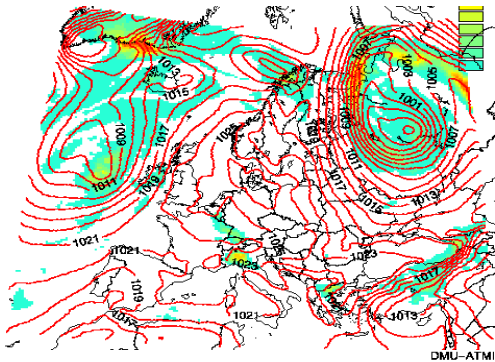
Automatically corrects mote electrochemical sensor data for temp and humidity (red) to achieve excellent agreement with precision instruments (black)

## WIRELESS SENSORS NETWORK for AQC



# EuNetAir SOLUTIONS: AIR QUALITY MODELLING

## Chemical weather

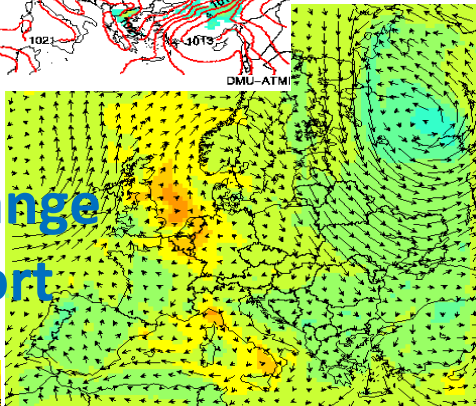


## GIS input generation

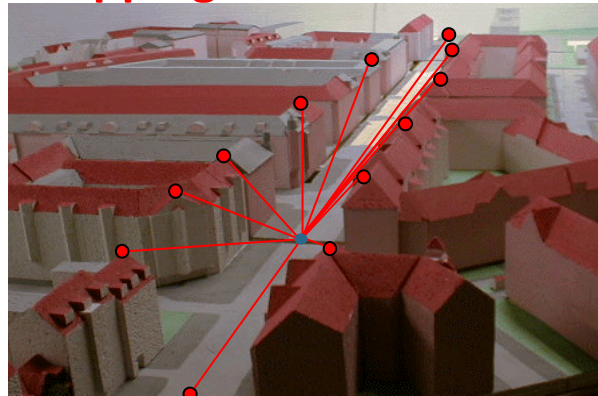
**AirTHESS:** operational AQ management and information system for Thessaloniki, Greece, employing Computational Intelligence for AQ forecasting and mobile phone technology for early warning messages.

*By Aristotle University, Greece.*

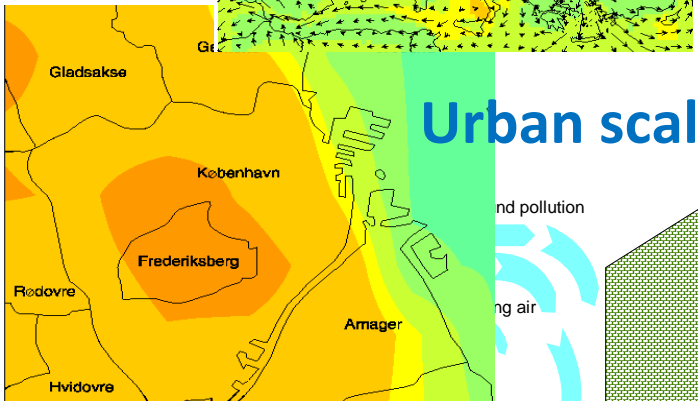
## Long-range transport



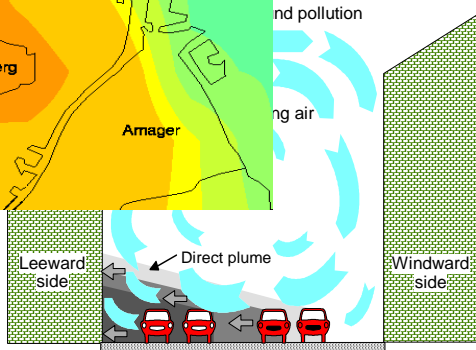
## Mapping addresses



## Urban scale



## Street scale

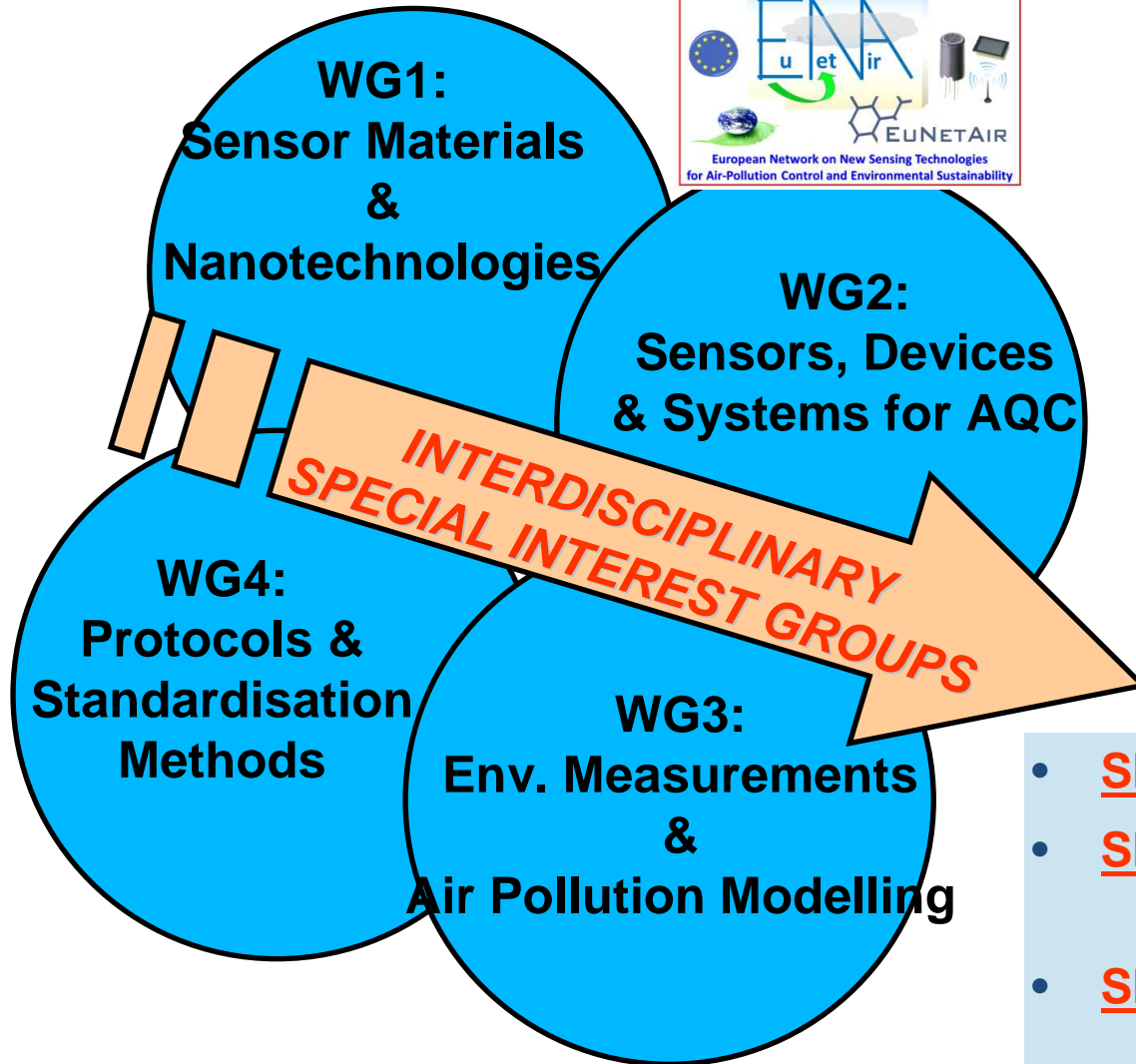


## Tracking routes



ArcView script for visualisation

# Action TD1105 *EuNetAir*: Working Groups (1/5)



## MANAGEMENT COMMITTEE:

### CORE-GROUP & STEERING COMMITTEE

- *Editorial Board*
- *Dissemination*
- *Training Schools*
- *Gender Balance*
- *Early Stage Researchers (ESR)*
- *Short-Term Scientific Mission (STSM)*
- *Intellectual Property Rights (IPR)*
- *Local Organizing Committee (LOC)*

- **SIG 1**: *Network of Spin-offs*
- **SIG 2**: *Smart Sensors for Urban Air Monitoring in Cities*
- **SIG 3**: *Guidelines for Best Coupling Air Pollutant-Transducer*
- **SIG 4**: *Expert comments for the Revision of the Air Quality EU Directive*



# TD1105 *EuNetAir* **WG1**: Sensor Materials & Nanotechnologies (2/5)

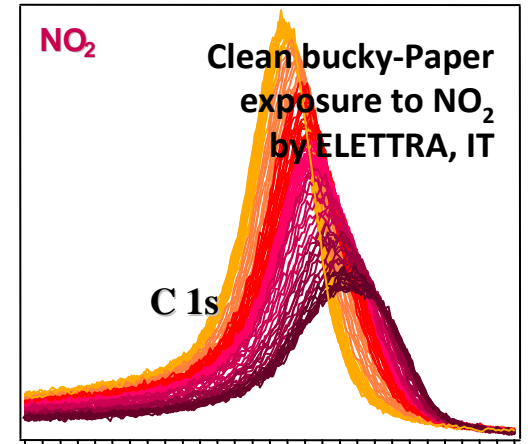
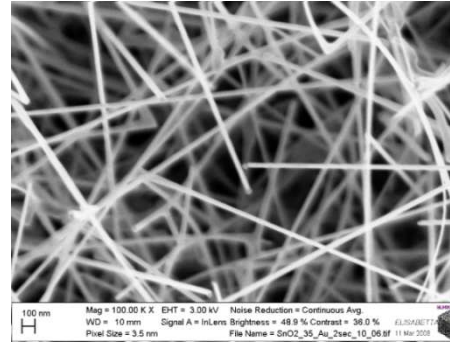
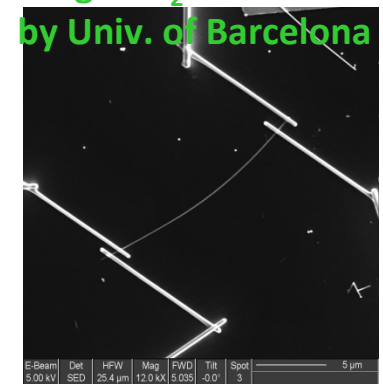
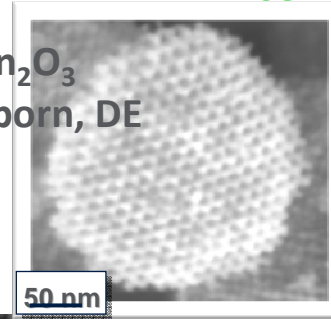
WG1 Chair: Prof. Juan Ramon Morante, IREC, Spain

Self-heating SnO<sub>2</sub> Nanowires  
by Univ. of Barcelona

- **Sub-Working Group 1.1:**  
Metal oxides nanostructures for AQC gas sensors.
- **Sub-Working Group 1.2:**  
Carbon nanomaterials for AQC gas sensors.
- **Sub-Working Group 1.3:**  
Emerging sensor materials (organic/inorganic, hybrid, nanocomposites, polymers, functional, etc.).

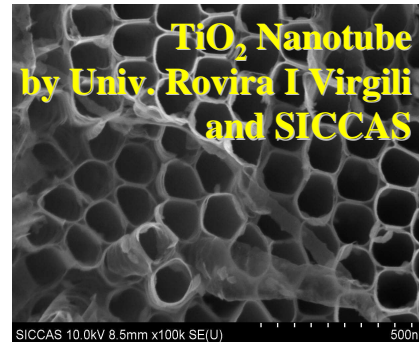
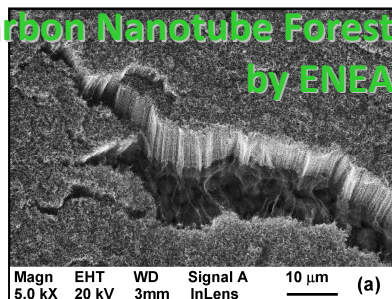
Mesoporous In<sub>2</sub>O<sub>3</sub>  
by Univ. of Paderborn, DE

Metal oxide (SnO<sub>2</sub>)  
Nanowires nets  
by Univ. of Brescia, IT



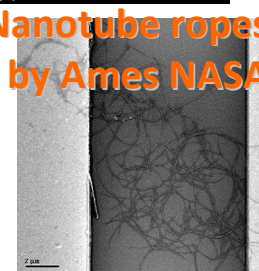
Clean bucky-Paper  
exposure to NO<sub>2</sub>  
by ELETTRA, IT

Carbon Nanotube Forest  
by ENEA

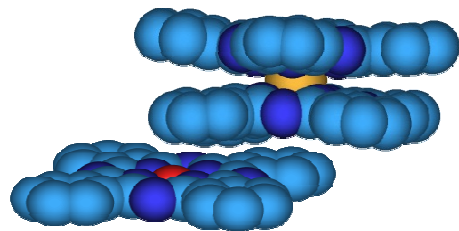
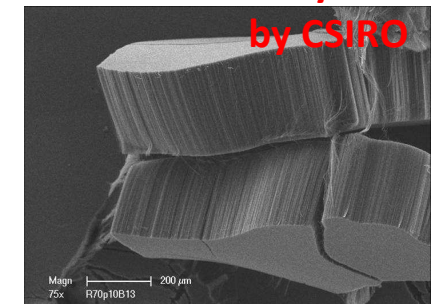


TiO<sub>2</sub> Nanotube  
by Univ. Rovira I Virgili  
and SICCAS

Carbon Nanotube ropes  
by Ames NASA



Carbon Nanotube yarns  
by CSIRO



New molecular materials of polymer-macrocycles as transducers for polluting gas sensing by University of Bourgogne

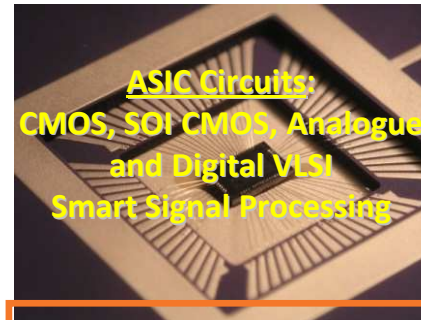
# TD1105 *EuNetAir* **WG2**: Sensors, Devices and Systems for AQC (3/5)

WG2 Chair: Prof. Andreas Schuetze, Saarland University, Germany

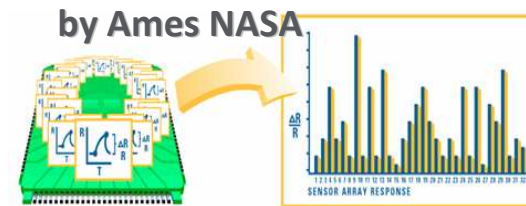
IT PATENT ENEA

Carbon Nanotube Gas Sensors

- **Sub-Working Group 2.1:**  
Gas sensors and new transducers.
- **Sub-Working Group 2.2:**  
Portable gas sensor-systems.
- **Sub-Working Group 2.3:**  
Wireless technology and AQC sensors network.
- **Sub-Working Group 2.4:**  
Intelligence algorithms and distributed computing for networked AQC gas sensors.



Warwick University in collaboration with Cambridge University, EPFL, PennState.

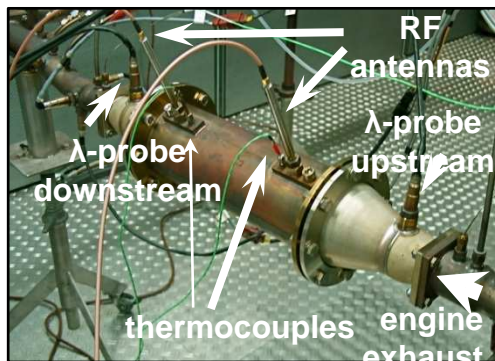


Using pattern matching algorithms, the data is converted into a unique response pattern

A versatile platform for the efficient development of gas detection systems based on automatic device adaptation by University of Saarland.



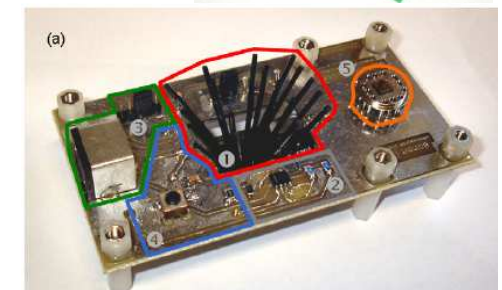
EnviroWatch mote by Newcastle University



Direct status measurement of automotive catalysts by radio-frequency technique by University of Bayreuth, DE.



Low-ppb sensitivity for NO<sub>2</sub> GaN-based sensor concept



Autonomous Gas Sensor System by IREC and Univ. of Barcelona

# TD1105 **WG3**: Environmental Measurements and Air-Pollution Modelling (4/5)

WG3 Chair: Prof. Ole Hertel, Aarhus University, Denmark

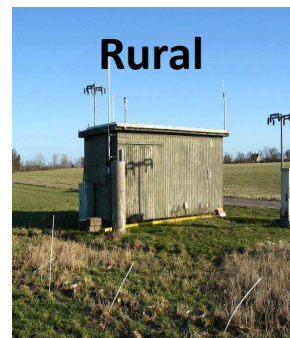
- **Sub-Working Group 3.1:**  
Environmental measurements at laboratory and in field air-quality stations.
- **Sub-Working Group 3.2:**  
Air-quality modelling and chemical weather forecasting.
- **Sub-Working Group 3.3:**  
Harmonisation of environmental measurements.



Environmental measurements of PM and air pollution by CSIC, ES



AQ monitoring station by ARPA-PUGLIA, IT



AQ monitoring station by Aarhus University, DK



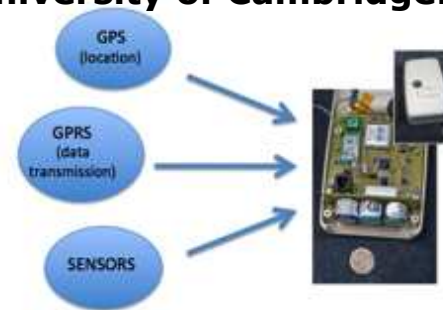
AQ monitoring station by Lithuanian EPA

by Aristotle University, EL

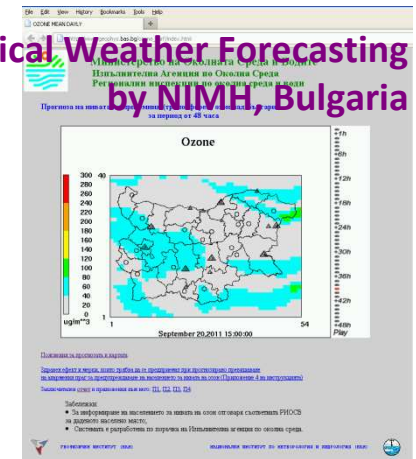


**AirMerge system for Chemical Weather Models**

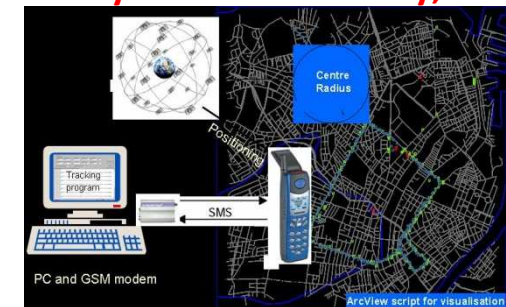
Mobile and static sensor network configurations by University of Cambridge.



Chemical Weather Forecasting by NIMH, Bulgaria



AQ Modeling: Tracking routes by Aarhus University, DK



# TD1105 *EuNetAir* **WG4**: Protocols and Standardisation Methods (5/5)

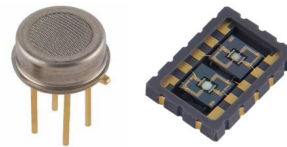
*WG4 Chair: Prof. Ingrid Bryntse, SenseAir AB, Sweden*

- **Sub-Working Group 4.1:**  
Protocols, standards and methods for AQC by analyzers/instruments (no-sensors) technologies.
- **Sub-Working Group 4.2:**  
Protocols, standards and methods for AQC by sensors (no-analyzers) technologies.
- **Sub-Working Group 4.3:**  
Benchmarking of new products and market of commercial AQC sensors.

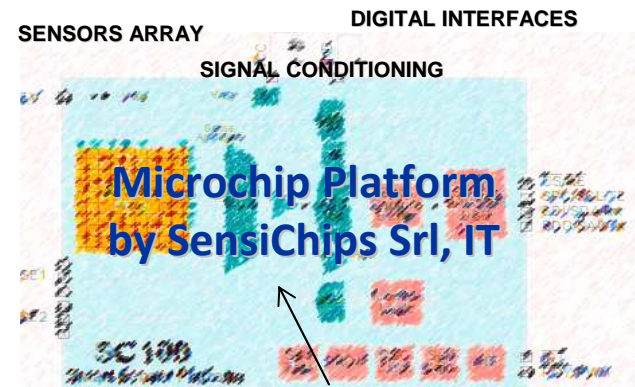
European Directive 2008/50/EC: Ambient Air Quality  
EU standard EN 13725/2003: Dynamic Olfactometry

Protocols and Standardised Methods for Gas Sensors  
Guidelines of Best Transducers applied to specific gases

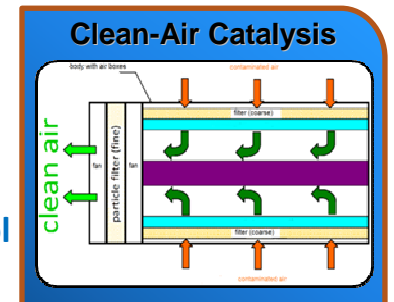
Dynamic olfactometry EN13725  
by Univ. of Liege, Odometric SA,  
Univ. of Bari, Lenviros srl.



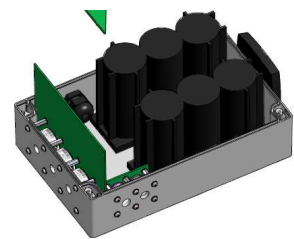
**Packaged Sensors**  
by **SGX-Sensortech, CH**



**New precision multi-parametric analytical tool**



**Becker Gruppe, DE**

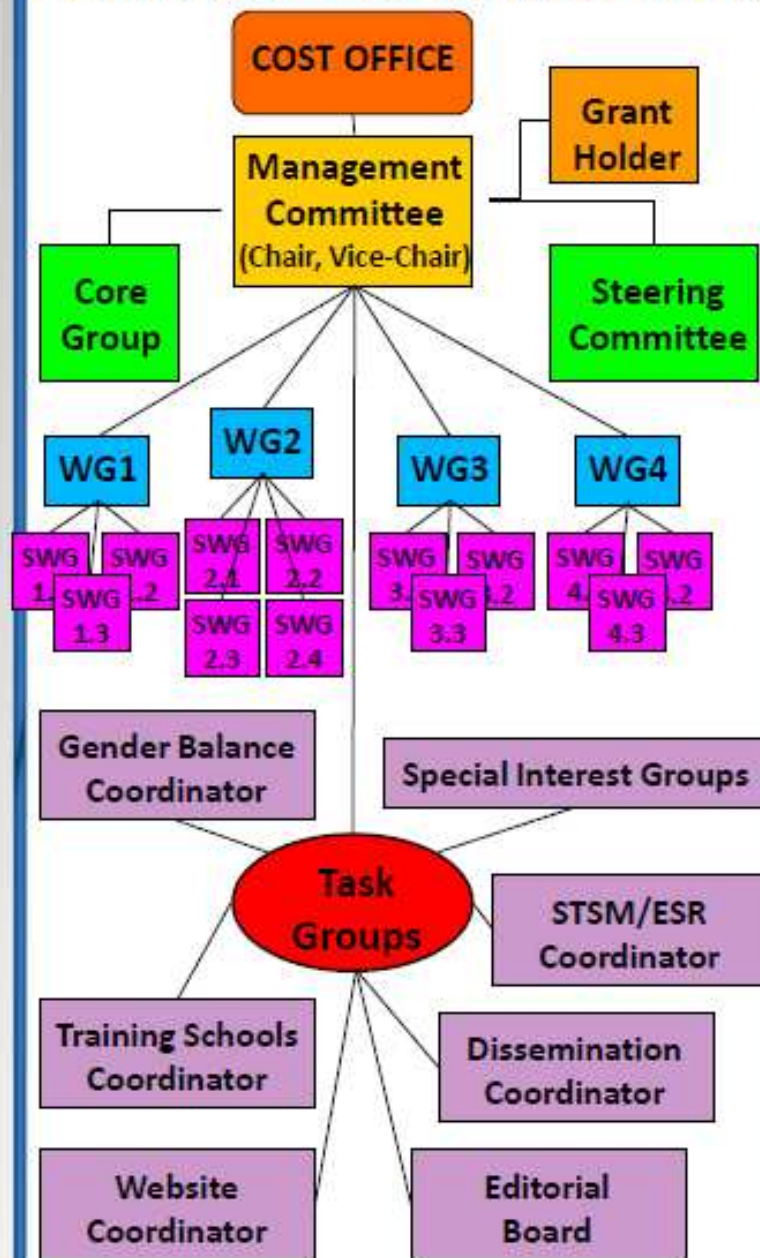


**Battery-Powered Sensors by Alphasense Ltd, UK**



**CO<sub>2</sub> IR sensor for alarm System by SenseAir AB, Sweden**

# COST Action EuNetAir: COORDINATION AND ORGANIZATION



## MANAGEMENT COMMITTEE

**2 Representatives of participating Countries**

### Steering Committee:

- ✓ Action Monitoring
- ✓ Milestones settings
- ✓ Prepare MC meetings
- ✓ Management of IPR issues

### Core Group:

- ✓ Prepare Documents for MC
- ✓ Prepare MC meetings
- ✓ Executive tasks in Action

- Meet every 6 months
- S&T exchange
- Cooperation
- Researcher mobility (STSM)
- Budget management
- Report to COST Office
- Organize Workshops/Conferences
- Organize Training Schools
- Promote Gender Balance
- Action Results Dissemination
- Evaluation plans

## CORE GROUP

**Action Chair**  
**Action Vice Chair**  
**Secretary**

### WGs Coordinator

- Organize WG meetings
- Coordination
- Monitoring
- Promote joint-activities
- Report to MC and SG

### STSM/ESR Coordinator

- STSM/ESR agenda
- Training agenda

### Gender Coordinator

- Gender agenda
- Care for gender balance

### Dissemination Coordinator

- Dissemination activities
- Action Website
- Local Organizing Committee

### NETWORKING

- Special Interest Groups (SIGs)
- Network of spin-offs
- International Experts
- Keynote Speakers

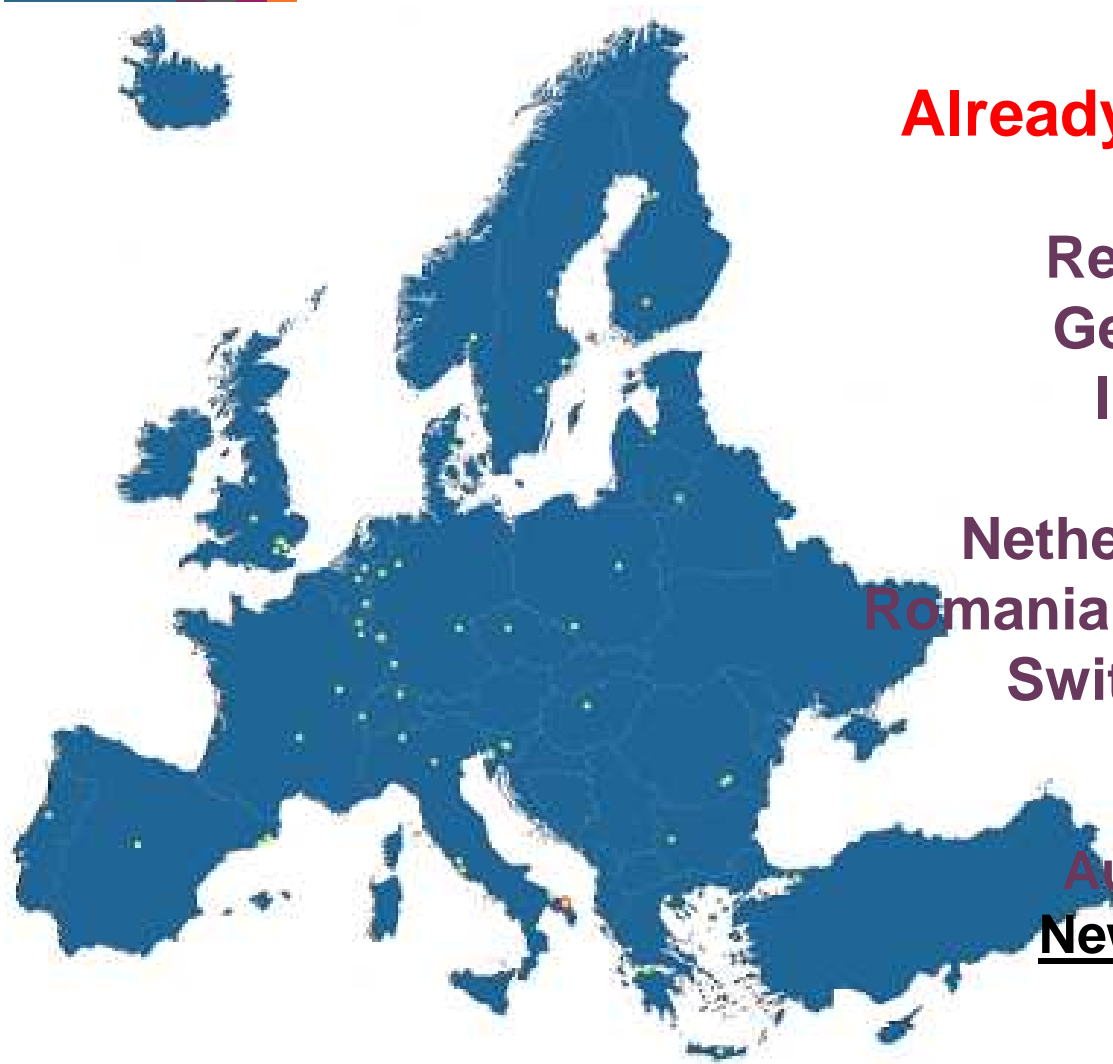
## COST Action TD1105 ROADMAP (2012-2016)

YEAR	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1	<p><b><u>M</u>: Kick-Off Meeting. MC Meeting 1.</b></p> <p><b><u>D</u></b>: MC setup and Action Workplan established</p>	<p><b><u>M</u></b>: Editorial Board for Leaflet, Brochure, Newsletter. Action website setup.</p> <p><b><u>D</u></b>: Definition of WGs and WGs Workplans</p>	<p><b><u>M</u>: MC Meeting 2. WGs Meeting 1.</b></p> <p><b><u>D</u></b>: Scientific activities, ESR/STSM program, Dissemination</p>	<p><b><u>M</u>: Workshop 1. Training School 1.</b></p> <p>State-of-Art on AQC.</p> <p><b><u>D</u></b>: Evaluation and Activity Report.</p>
2	<p><b><u>M</u>: MC Meeting 3. WGs Meeting 2.</b> Update Action website.</p> <p><b><u>D</u></b>: Scientific activities. Liason with EU Programs</p>	<p><b><u>M</u></b>: Editorial Board meeting. ESR/STSM.</p> <p><b><u>D</u></b>: Dissemination. Newsletter. Reporting</p>	<p><b><u>M</u>: MC Meeting 4. WGs Meeting 3. Workshop 2. Training School 2.</b></p> <p><b><u>D</u></b>: S&amp;T strategies</p>	<p><b><u>M</u>: International Conference 1.</b> Edit. Board. ESR/STSM.</p> <p><b><u>D</u></b>: Dissemination. Reporting</p>
3	<p><b><u>M</u>: MC Meeting 5. WGs Meeting 4.</b></p> <p><b><u>D</u></b>: Dissemination. Strategies &amp; Activities</p>	<p><b><u>M</u></b>: Edit. Board: State-of-art AQC. ESR/STSM</p> <p><b><u>D</u></b>: Dissemination. Strategies. Reporting</p>	<p><b><u>M</u>: MC Meeting 6. WGs Meeting 5. Workshop 3. Training School 3.</b></p> <p><b><u>D</u></b>: S&amp;T strategies</p>	<p><b><u>M</u></b>: Edit. Board: Newsletter. ESR/STSM</p> <p><b><u>D</u></b>: Dissemination. Reporting</p>
4	<p><b><u>M</u>: . MC Meeting 7. WGs Meeting 6.</b></p> <p><b><u>D</u></b>: S&amp;T strategies. Link to EU programs, Industry</p>	<p><b><u>M</u>: Workshop 4. Training School 4.</b></p> <p><b><u>D</u></b>: Dissemination. ESR/STSM. S&amp;T strategic activity.</p>	<p><b><u>M</u></b>: WGs Meeting 7.</p> <p><b><u>D</u></b>: S&amp;T strategies and activities. ESR/STSM. Dissemination</p>	<p><b><u>M</u>: International Conference 2. MC Meeting 8.</b></p> <p><b><u>D</u></b>: Final Evaluation. Reporting</p>

**M: Milestones**    **D: Deliverables**



# COST Action TD1105 *EuNetAir*: Dimension



## PARTIES

**Already accepted MoU: 27 Countries**

**Austria**, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Former Yugoslav Republic of Macedonia, Netherlands, Norway, Poland, Portugal, **Romania**, Serbia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom.

**Non-COST Countries: 5**

**Australia, Canada, China, Russia, USA**

**New Candidates NNC: Morocco, Ukraine**



























**Number of Participants: > 150**

**N.r of Research Teams including Academia, Research, Industry, Agencies: > 80**



## COST Action: EuNetAir PARTICIPANTS



 <b>BE - Belgium</b>	VITO, Université de Liège, Odometric S.A.	
 <b>BG - Bulgaria</b>	National Institute of Meteorology and Hydrology - BAS; Institute of Electronics - BAS	
 <b>CH - Switzerland</b>	Ecole Polytechnique Fédérale de Lausanne; e2v Microsensors S.A.; EnvEve S.A.; EMPA	
 <b>CZ - Czech Republic</b>	Academy of Sciences of the Czech Republic	
 <b>DE - Germany</b>	Institute of Energy and Environmental Technology; Saarland University; MPI for Biogeochemistry Univ. of Bayreuth; Univ. of Paderborn; Univ. Applied Sci. Ostwestfalen-Lippe; UST; Alfred Becker; 3S	
 <b>DK - Denmark</b>	Aarhus University; Technical University of Denmark - DTU	
 <b>EL - Greece</b>	Aristotle University; FORTH; Athena/ISI; University of Piraeus	
 <b>ES - Spain</b>	Catalonia Institute for Energy Research - IREC; Spanish National Research Council - CSIC; University Rovira i Virgili; University of Barcelona, Worldsensing S.L.	
 <b>FI - Finland</b>	University of Oulu; University of Helsinki; Tampere University of Technology	
 <b>FR - France</b>	University of Bourgogne; University Blaise Pascal; Ecole des Mines de Douai; CEA-CNRS; ETHERA	
 <b>HU - Hungary</b>	Hungarian Meteorological Service	
 <b>IS - Iceland</b>	Agricultural University of Iceland	 <b>MK - Republic of Macedonia</b> Ministry of Environment and Physical Planning
 <b>IE - Ireland</b>	Trinity College Dublin	 <b>RS- Serbia</b> Institute of Public Health of Belgrade
 <b>IL - Israel</b>	AirBase Systems	
 <b>IT - Italy</b>	ENEA; ELETTRA; Univ. of Bari; Univ. of Brescia; Univ. of Trieste; Lenviros; Sensichips, ARPA-Puglia	
 <b>LV - Latvia</b>	University of Latvia	
 <b>NL - Netherlands</b>	IMEC - Holst Centre; ECN	
 <b>NO - Norway</b>	NILU - Norwegian Institute for Air Research	
 <b>PL - Poland</b>	Silesian University of Technology; Warsaw University of Life Science	
 <b>PT - Portugal</b>	Univ of Coimbra; Instit. of Environment & Development; National Health Institute; Univ of Lisbon	
 <b>RO - Romania</b>	National R&D Institute for Nonferrous and Rare Metals; SC IPA SA - Research & Development	
 <b>SE - Sweden</b>	Linkoping University; Chalmers University of Technology; SenSiC AB; SenseAir AB	
 <b>SI - Slovenia</b>	University of Ljubljana; Aerosol d.o.o.	
 <b>UK - United Kingdom</b>	Imperial College London; Newcastle University; University of Manchester; Cambridge; University of Warwick; University of Edinburgh; Cambridge CMOS Sensors; Alphasense	
 <b>TR - Turkey</b>	GEBZE Institute of Technology; Middle East Technical University of Ankara	

# COST Action TD1105 *EuNetAir*: 27 COST Countries (Parties) have already signed Memorandum of Understanding (MoU)

## PARTIES

already accepted  
MoU: 27 Countries

Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, The Former Yugoslav Republic of Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom.

**COST Action *EuNetAir* PARTICIPANTS**

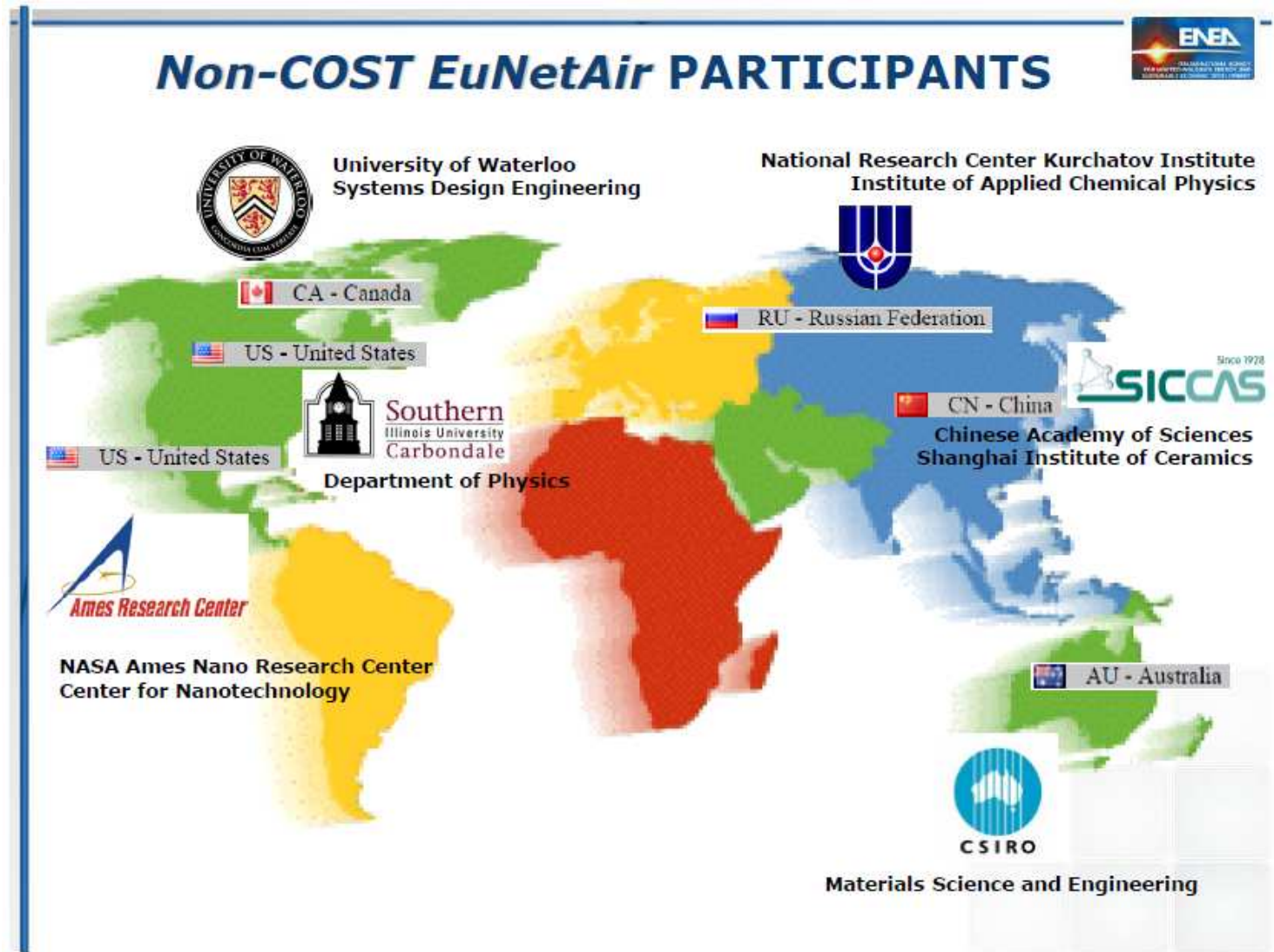
Logos of participating organizations and institutions include: vito, Université de Liège, Ailon campus, ODOMETRIC, CAMBRIDGE CMOS SENSORS, TRINITY COLLEGE DUBLIN, MPI-BGC, ENEA, TAMPERE UNIVERSITY OF TECHNOLOGY, ECN, NILU, idad, AirBase, LATVIJAS UNIVERSITĀTE, IFA SA, IMNR, METU, GYTE, CSIC, UNIVERSITAT DE BARCELONA, world sensing, UNIVERSITY OF OULU, UB, HMS, imec, ENEA, elettra, Dipartimento di Scienze Chimiche e Farmaceutiche, lenviros, sensichips, Univerza v Ljubljani, CHALMERS, SenseAir, SenSiC AB, Aerosol, Linköpings universitet, Imperial College London, Newcastle University, UNIVERSITY OF CAMBRIDGE, WARWICK, MANCHESTER 1824.

# COST Action TD1105 *EuNetAir*: 5 Non-COST Countries and 7 Non-COST Institutions

**Non-COST Countries:**  
Australia, Canada,  
China, Russia, USA

**Non-COST Institutions:**  
CSIRO (Australia \*);  
University of Waterloo  
(Canada); Chinese Academy  
of Sciences, Shanghai  
Institute of Ceramics  
(China); National Research  
Center Kurchatov Institute  
(Russia); Southern Illinois  
University Carbondale,  
NASA Ames Research  
Center (USA).

\* *Past Reciprocal Agreement  
Country.*



# COST Action EuNetAir: List of Experts

150 EXPERTS from 27 COST Countries  
and 5 Non-COST Countries

## BE - Belgium

Prof. Anne-Claude ROMAIN  
Dr. Jan THEUNIS  
Dr. Julien DELVA

## BG - Bulgaria

Dr. Dimiter SYRAKOV  
Dr. Ivan NEDKOV

## CH - Switzerland

Dr. Danick BRIAND  
Dr. Marco BRINI  
Dr. Christine ALEPEE  
Dr. Nicolas MOSER  
Dr. Christoph HUEGLIN

## CZ - Czech Republic

Dr. Vera KURKOVA  
Dr. Roman NERUDA  
Dr. Zdenek ZELINGER

## DE - Germany

Dr. Thomas A. J. KUHNBUSCH  
Dr. Ulrich QUASS  
Prof. Andreas SCHUETZE  
Dr. Tilman SAUERWALD  
Prof. Ralf MOOS  
Dr. Daniela SCHONAUER-KAMIN  
Dr. Thorsten WAGNER  
Dr. Olaf KIESEWETTER  
Dr. Thorsten CONRAD  
Dr. Thomas BECKER  
Prof. Wrenger Burkhard  
Dr. Jost Valentin Lavric

## DK - Denmark

Prof. Ole HERTEL  
Dr. Lise Lotte SORENSEN  
Prof. Anja BOISEN  
Dr. Silvan SCHMID

## EL - Greece

Prof. Kostas KARATZAS  
Prof. George KIRIAKIDIS  
Dr. Christos KOULAMAS  
Prof. George PAPAPOPOULOS  
Prof. Tatiana TAMBOURATZIS

## ES - Spain

Prof. Juan Ramon MORANTE  
Dr. Francisco HERNANDEZ  
Dr. Xavier QUEROL  
Dr. Mar VIANA

Prof. Eduard LLOBET


Dr. Radu IONESCU  
Prof. Albert ROMANO  
Dr. Juan Daniel PRADES  
Dr. Jordi LLOSA

## FI - Finland

Prof. Heli JANTUNEN  
Prof. Jyrki LAPPALAINEN  
Dr. Jari JUUTI  
Prof. Kaarle HAMERI  
Prof. Jorma KESKINEN

## FR - France

Prof. Marcel BOUVET  
Prof. Jerome BRUNET  
Prof. Alain PAULY  
Dr. Jean SUISSE  
Dr. Amadou NDYAE  
Dr. Thu-Hoa THRAN-THI  
Dr. Philippe KARPE  
Prof. Jerome ROSSIGNOL  
Prof. Nadine LOCOGE

 HU - Hungary  
Dr. Zita FERENCZI  
Dr. Krisztina LABANCZ

 IS - Iceland  
Dr. Arngrimur THORLACIUS

 IE - Ireland  
Dr. Francesco PILLA

 IL - Israel  
Dr. Liad ORTAR


## IT - Italy

Dr. Michele PENZA  
Dr. Marco ALVISI  
Dr. Saverio DE VITO  
Dr. Andrea GOLDONI  
Dr. Magda BRATTOLI  
Dr. Annamaria DEMARINIS  
Dr. Gianluigi DE GENNARO  
Dr. Luigi BARBIERI  
Prof. Giorgio ASSENNATO  
Dr. Roberto SIMMARANO  
Prof. Giorgio SBERVEGLIERI

 LV - Latvia  
Prof. Iveta STEINBERGA

## MK - Rep. of Macedonia

Dr. Igor ATANASOV  
Dr. Ljupcho GROZDANOSVKI

 NL - Netherlands  
Dr. Sywert BRONGERSMA  
Dr. Ernie WEIJERS

## PL - Poland

Dr. Monika KWOKA  
Prof. Stanislaw GAWRONSKI  
Prof. Jacek SZUBER

## PT - Portugal

Prof. Bernadete RIBEIRO  
Prof. Carlos BORREGO  
Dr. Joao Paulo TEIXEIRA  
Prof. Cristina MAGUAS  
Dr. Miguel COUTINHO  
Dr. Ana Margarida COSTA

## SE - Sweden

Prof. Anita LLOYD SPETZ  
Dr. Marina VOINOVA  
Dr. Mike ANDERSSON  
Dr. Donatella PUGLISI  
Dr. Ulf THOLE  
Prof. Ingrid BRYNTSE

## SI - Slovenia

Rahela ZABKAR  
Grisa MOCNIK  
Branko STER

## RS - Serbia

Anka CVETKOVIC

## UK - United Kingdom

Prof. Julian GARDNER  
Prof. Roderic JONES  
Prof. Krishna PERSAUD  
Prof. John POLAK  
Dr. Robin NORTH  
Dr. Jeff NEASHAM  
Dr. Fabio GALATIOTO  
Prof. Florin UDREA  
Dr. John SAFFELL  
Prof. John LEE

## NO - Norway

Dr. Nuria Castell-BALAGUER  
Dr. Philippe SCHNEIDER

## RO - Romania

Dr. Roxana Mioara PITICESCU  
Dr. Marcel IONICA  
Dr. Cristina RUSTI  
Dr. Radu Adrian IONICA

## TR - Turkey

Prof. Zafer Ziya OZTURK  
Prof. Mehmet Fatih DANISMAN

## AU - Australia

\* Dr. Phil MARTIN  
(\* Reciprocal Agreement)

## CA - Canada

Prof. John YEOW

## CN - China

Dr. Yongxiang LI  
Dr. Zhifu LIU

## RU - Russian Federation

Dr. Alexey VASILIEV

## US - United States

Prof. Andrei KOLMAKOV  
Dr. Meyya MEYAPPAN

## Country

## MC Members (50): Male (73%) - Female (27%)

Belgium	Dr Jan THEUNIS; Dr Anne-Claude ROMAIN
Bulgaria	Dr Dimiter SYRAKOV; Dr Ivan NEDKOV
Czech Republic	Dr. Vera KURKOVA; Dr. Zdenek ZELINGER
Denmark	Prof. Ole HERTEL
Finland	Prof. Kaarle HAMERI; Prof. Jyrki LAPPALAINEN
France	Prof. Marcel BOUVET; Prof. Jerome BRUNET
Germany	Prof. Andreas SCHUETZE; Dr Corinna HAHN
Greece	Prof. George PAPADOPOULOS; Prof. Kostas KARATZAS
Hungary	Ms Krisztina LABANCZ; Dr Zita FERENCZI
Iceland	Dr Arngrimur THORLACIUS
Ireland	Dr. Francesco PILLA
Israel	Dr. Liad ORTAR; Prof. Hossam HAICK
Italy	Dr Michele PENZA; Prof. G. SBERVEGLIERI; Dr. G. DE GENNARO
Latvia	Dr Iveta STEINBERGA
Macedonia Rep.	Dr. Igor ATASANOV; Dr. Ljupcho GROZDANOVSKI
Netherlands	Dr Sywert BRONGERSMA; Dr. Ernie WEIJERS
Norway	Dr Nuria CASTELL BALAGUER; Dr. Philipp SCHENEIDER
Poland	Dr Monika KWOKA; Prof. Janislaw GAWRONSKI
Portugal	Prof. Bernadete RIBEIRO; Prof. Carlos BORREGO
Romania	Dr Marcel IONICA; Dr Roxana Mioara PITICESCU
Serbia	Dr. Anka CVETKOVIC
Slovenia	Dr Grisa MOCNIK; Dr Rahela ZABKAR
Spain	Prof. Juan Ramon MORANTE; Prof. Eduard LLOBET VALERO
Sweden	Prof. Anita LLOYD SPETZ; Prof. Ingrid BRYNTSE
Switzerland	Dr Danick BRIAND; Dr. Nicolas MOSER
United Kingdom	Dr John SAFFELL; Prof. Roderic JONES
Turkey	Prof. Zafer ZIYA OZTURK; Prof. Mehmet Fatih DANISMAN

**MC Chair:** Michele Penza, ENEA, IT

**MC Vice Chair:** Anita Lloyd Spetz, Linkoping University, SE

**Grant Holder:** Eurice GmbH, Saarbrucken, DE

## Country

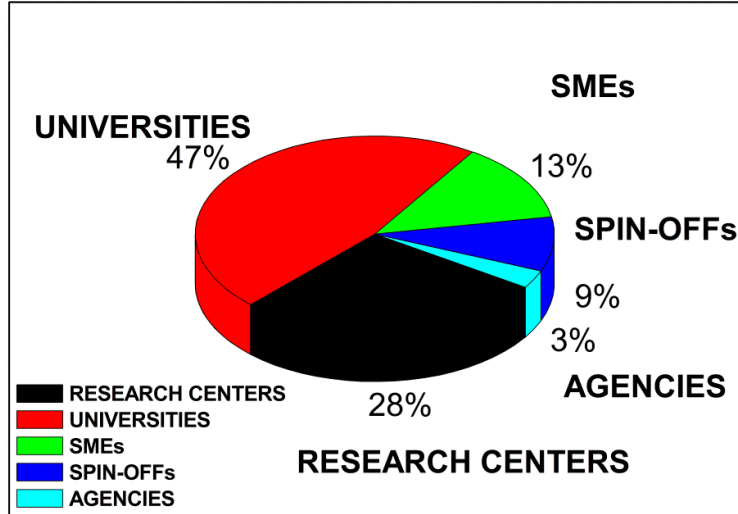
## MC Substitutes (26)

Belgium	Dr Julien DELVA
Czech Republic	Dr. Roman NERUDA
Denmark	Dr. Lise Lotte SORENSEN
Finland	Prof. Jorma PESKINEN
France	Dr Jean SUISSE Prof. Alain PAULY
Germany	Dr. Daniela SCHONAUER-KAMIN Dr. Thomas KUHLBUSCH
Greece	Prof. George KIRIKIADIS
Italy	Dr. Roberto SIMMARANO Dr. Marco ALVISI Dr. Saverio DE VITO
Netherlands	Dr. Rene OTJES
Poland	Prof. Jacek SZUBER
Portugal	Dr. Joao Paulo TEIXEIRA
Romania	Dr. Cristina RUSTI Dr. Marcel Adrian IONICA
Slovenia	Prof. Andrej DOBNIKAR
Spain	Prof. Albert ROMANO-RODRIGUEZ Dr. Jordi LLOSA
Sweden	Dr Ulf THOLE Dr. Marina VOINOVA
Switzerland	Dr Christoph HUEGLIN
UK	Prof. Julian GARDNER Dr Robin NORTH Prof. Florin UDREA

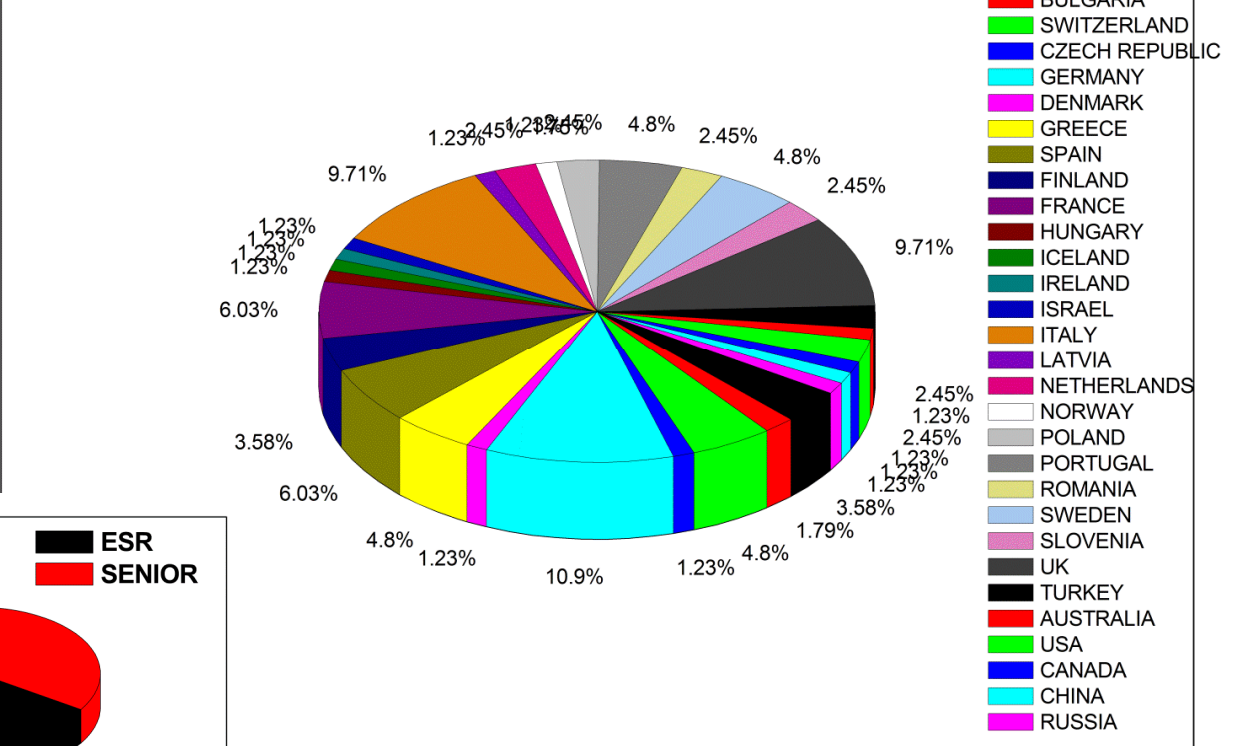
**MANAGEMENT COMMITTEE**  
**Kick-off Meeting at Brussels on 16 May 2012**

# COST Action TD1105 *EuNetAir*: STATISTICS

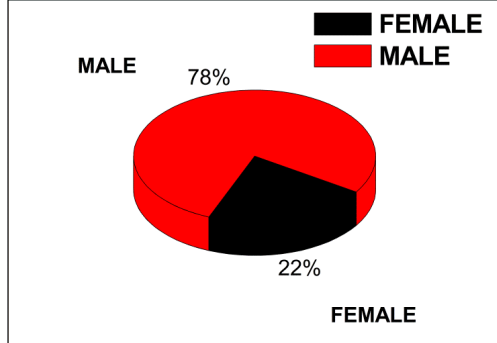
## PARTNERSHIP



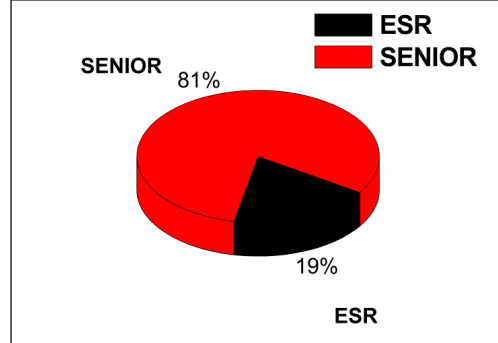
## COUNTRY PARTNER DISTRIBUTION BALANCE



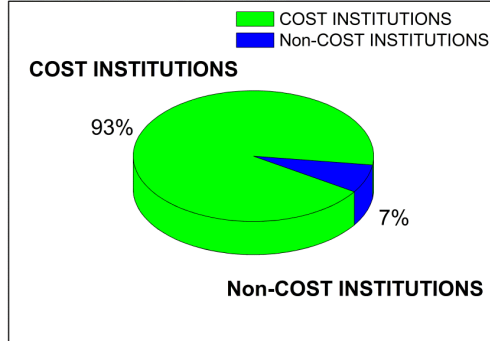
## GENDER BALANCE



## ESR BALANCE



## INTERNATIONAL BALANCE



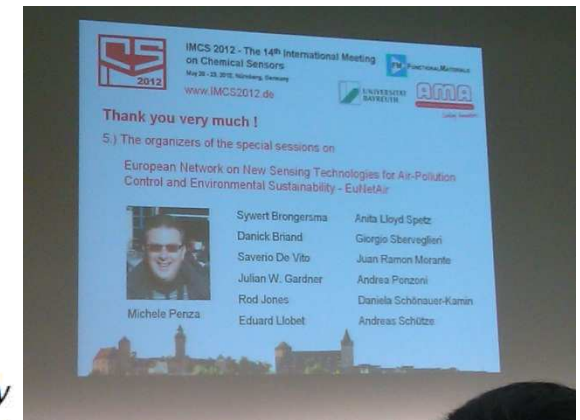
**PARTIES: 27**  
**Action Coordinating Partner: IT (ENEA)**  
**Grant Holder: DE (Eurice GmbH)**



# COST ACTION TD1105 DISSEMINATION EVENTS: 2012 - 2013



**IMCS 2012**  
**The 14<sup>th</sup> International Meeting on Chemical Sensors**  
 May 20 - 23, 2012, Nürnberg/Nuremberg



**Special Session: Chemical Sensors and New Technologies for Air-Pollution Control**

**COST Action TD1105 EuNetAir**

*European Network on New Sensing Technologies for Air-Pollution Control and Environmental Sustainability*

IMCS 2012 - The 14<sup>th</sup> International Meeting on Chemical Sensors, May 20-23, 2012 - Nuremberg, Germany



**SGS 2012**

**VIII International Workshop on Semiconductor Gas Sensors**  
 September 11 - 15, 2012, Cracow, Poland



**3<sup>th</sup> Intelligent Systems for Quality of Life information Services Workshop (ISQL 2012)**  
**8<sup>th</sup> AIAI Conference, September 27- 30, 2012, Halkidiki, Greece**



**TCM 2012**

**The 4<sup>th</sup> International Symposium on Transparent Conductive Materials**  
 October 21- 26, 2012, Hersonissos, Crete, Greece



EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

# COST ACTION TD1105 MEETINGS (1/2)

## 1 July 2012 - 30 June 2013 (Year 1)



**COST ACTION TD1105 *EuNetAir***  
**Kick-off Meeting of Action Management Committee**  
COST Office, 16 May 2012, Brussels (BE)



**COST ACTION TD1105 *EuNetAir***  
**First Meeting and 2<sup>nd</sup> Management Committee and Working Groups**  
ENEA Headquarters  
4-6 December 2012, Rome (IT)



**COST ACTION TD1105 *EuNetAir***  
**WG3-WG4 Meeting joined to AirMonTech project**  
Fraunhofer Inhaus Zentrum  
4-6 March 2013, Duisburg (DE)





# COST ACTION TD1105 MEETINGS (2/2)

## 1 July 2012 - 30 June 2013 (Year 1)



**COST ACTION TD1105 *EuNetAir***  
**Third Meeting of Action Management Committee**  
**IREC, 21 June 2013, Barcelona (ES)**



**COST ACTION TD1105 *EuNetAir***  
**Action Workshop - Open Satellite Event to**  
***Transducers 2013 - Eurosensors XXVII***  
**Barcelona International Convention Centre**  
**20 June 2013, Barcelona (ES)**



**COST ACTION TD1105 *EuNetAir***  
**1st Training School of COST Action EuNetAir**  
**University of Barcelona**  
***13-15 June 2013, Barcelona (ES)***



# 1<sup>ST</sup> TRAINING SCHOOL OF COST ACTION TD1105

Green Week 2013  
satellite event



## Training school on Environmental Technologies and Air-Quality Monitoring

13-15 June 2013

Barcelona

08:30 - 18:30

Spain



European Network on New Sensing Technologies for Air-Pollution Control and Environmental Sustainability - EuNetAir



[ec.europa.eu/environment/greenweek](http://ec.europa.eu/environment/greenweek)



CSIC

In collaboration with the



EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

Training school on Environmental  
Technologies and Air-Quality Monitoring

Green Week 2013  
satellite event



### ORGANIZED BY

Universitat de Barcelona (UB)  
MIND-IN2UB Department of Electronics

### In collaboration with

Institute of Environmental Assessment and Water Research (IDAEA-CSIC)

### Within the framework of

COST Action TD1105 European Network on New Sensing Technologies for Air-Pollution Control and Environmental Sustainability (EuNetAir)

### VENUE

Universitat de Barcelona (UB)  
Faculty of Physics  
C/ Martí i Franquès, 1, 08028 Barcelona, Spain



### MORE INFORMATION

- Michele Penza, MC Chair/Proposer of COST Action TD1105 EuNetAir  
ENEA, Brindisi, Italy. [michele.penza@enea.it](mailto:michele.penza@enea.it)
- Albert Romano-Rodríguez, Coordinator of Action Training School Committee  
U. Barcelona, Barcelona, Spain. [aromano@el.ub.es](mailto:aromano@el.ub.es)

### Statistics

Received Trainees Applications: 39. Participating Trainees: 36. Assigned Trainees Grants: 20  
Involved Trainers: 14  
COST Countries involved from Action partnership: 15

### Training School Programme Committee

Albert Romano-Rodríguez, U. Barcelona, Spain  
Juan Daniel Prades, U. Barcelona, Spain  
Mar Viana, CSIC-IDAEA, Spain  
María Cruz Minguiñón, CSIC-IDAEA, Spain  
Eduard Llobet, U. Rovira i Virgili, Spain  
Annamaria Demarinis Loiotile, U. Bari, Italy  
Michele Penza, ENEA, Italy

### Training School Action Committee

Albert Romano-Rodríguez, U. Barcelona, Spain  
Juan Daniel Prades, U. Barcelona, Spain  
Mar Viana, CSIC-IDAEA, Spain  
María Cruz Minguiñón, CSIC-IDAEA, Spain  
George Kiriakidis, FORTH, Greece  
Philippe Schneider, NILU, Norway  
Monika Kwoka, Silesian U. Technology, Poland  
Rahela Zabkar, U. Ljubljana, Slovenia  
Francisco Hernandez-Ramirez, IREC, Spain  
Zafer Ziya Ozturk, Gebze Institute of Technology, Turkey  
Julian Gardner, U. Warwick, United Kingdom



## **Short Term Scientific Missions (STSMs): A tool for networking**

**“COST Strategy towards increased support for Early Stage Researchers” - COST 295/09 giving ESRs support and measures like STSMs, Training Schools, Action Think Thank, Conference Grants, inclusion of ESR in WGs, ESRs as national MC delegates.**

***In order to increase visibility of ESRs in this COST Action:***

- **11 STSMs have been funded in the First Year (1 July 2012 - 30 June 2013)**
- Workshop participation of ESRs
- Selection of **best independent ideas** from ESRs are awarded with ***grants for participation in S&T events***
- ***Invitation*** of high schools and University students to the ***training sessions and training schools***
- ***Social Scientific Network services*** (***LinkedIn***) based on free web software to promote cohesion in the ESRs community to outline needs
- Proposals to ***European Research Council - Starting Independent Research Grant*** and ***Marie-Curie Fellowships*** from Action ESRs are encouraged.

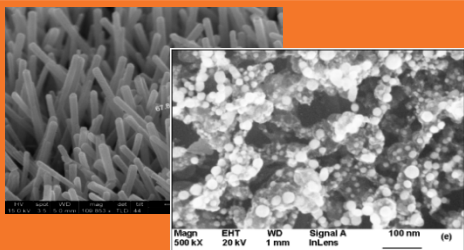
# *Expected Impact by Action TD1105*



- **European Leadership on AQC Science & Technology**
- **Development of Green-Economy**
- **Support to Sustainable Development**
- **Support to Monitoring System of Clean Air for Europe**
- **Fostering Research & Innovation on New Sensing Technologies for Environmental Monitoring**

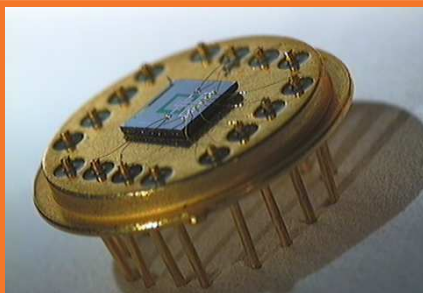
# COST Action EuNetAir: CHALLENGES

## MATERIALS & GAS SENSORS



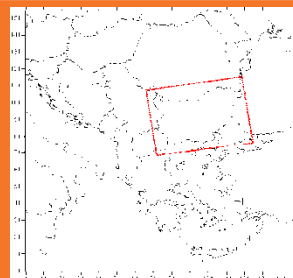
MOX by UNIBS IREC UB SICCAS  
CNT by ENEA NASA URV CSIRO

## AQC SENSORS & SYSTEMS



GasFET by EPFL, Switzerland

## AQ MODELLING

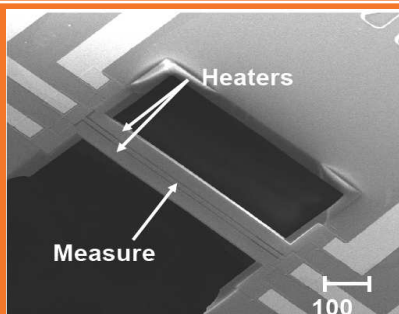


CMAQ Calculations  
by NIMH, BG

## STANDARDS & PROTOCOLS



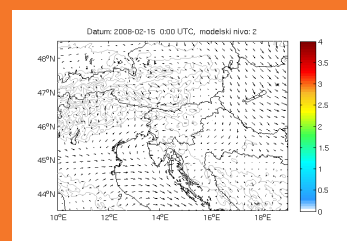
Dynamic Olfactometry (EN 13725/2003) by Univ. of Bari and Lenviros srl, IT



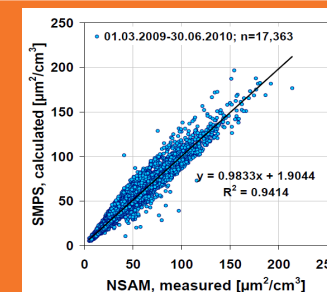
Cantilever Sensor by DTU, DK



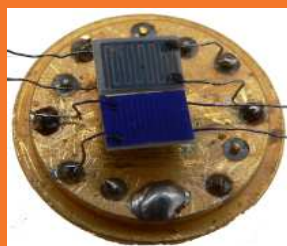
ASIC Circuit: CMOS SOI  
by WARWICK & CCMOS Ltd, UK



AQ Modelling dispersion in meteorological mesoscale by University of Ljubljana, SL



Particle Surface Area Measurements by IUTA eV, DE



Phtalocyanine Gas Sensors  
by CNRS UBP-LASMEA, FR



WIRELESS SENSORS NETWORK  
by ISI, Greece



Chemical Weather Forecasting and Information System  
by Hungarian Meteo Service

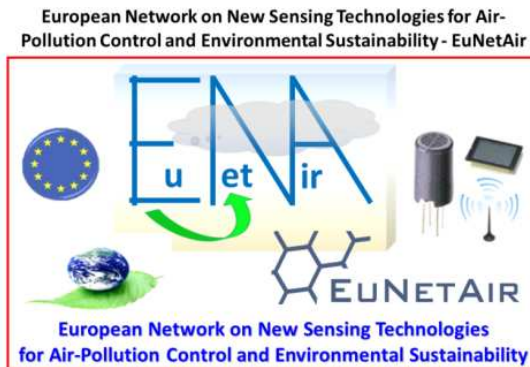


**HARMONISATION:**  
Definition of protocols and standards for gas sensing measurements and gas sensors

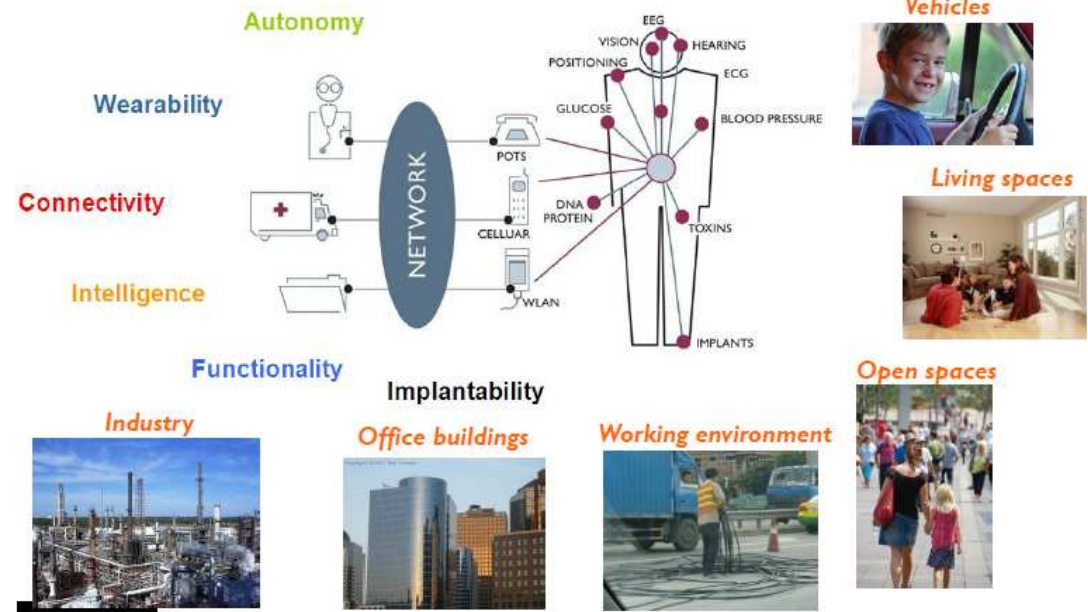
# CONCLUSIONS

**COST Action TD1105 *EuNetAir* is proposed to solve problems in the area of:**

- Air Quality Control
- Environmental Sustainability
- Indoor/Outdoor Energy Efficiency
- Climate Change Monitoring
- Health Effects of Air-Pollution



## From *Body Area Network* to *Personal Area Network*



# UPDATING AND BREAKING NEWS from Action TD1105



Action website:  
[www.cost.eunetair.it](http://www.cost.eunetair.it)

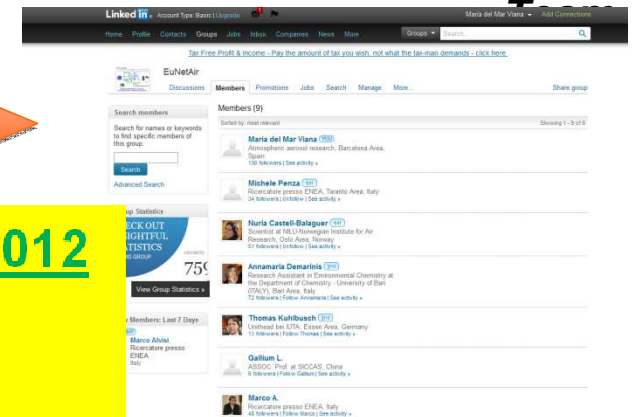
hosted by ENEA

Dr. Marco Alvisi, *Webmaster Coordinator*

Sebastiano Dipinto, Valerio Pfister, Gianfranco Zingarelli, *Webmaster*

Social Scientific ESRs Network (SSEN) by LinkedIn

Moderator(s): Mar Viana, Mariacruz Minguillon



**CALL for Short Exchange Visits launched on 20 Nov. 2012**  
**(STSM - Short Term Scientific Mission)**

Dr. Jan Theunis, STSM Coordinator EuNetAir

Issue 1: published on Dec. 2012 ✓

Issue 2: published on June 2013 ✓

Prof. Ralf Moos, *Editor-in-Chief*

Dr. Daniela Schonauer-Kamin, *Editorial Board Manager*



NOLOGY

# ACKNOWLEDGEMENTS

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***KICK-OFF MEETING of Action TD1105  
at Brussels on 16 May 2012***

## TD1105 MANAGEMENT COMMITTEE



Link of COST Action TD1105 EuNetAir:



# COST Action TD1105: WG1-WG4 Meeting at EEA

3-4 October 2013



**THANK YOU VERY MUCH FOR YOUR KIND ATTENTION !**



European Environment Agency

