



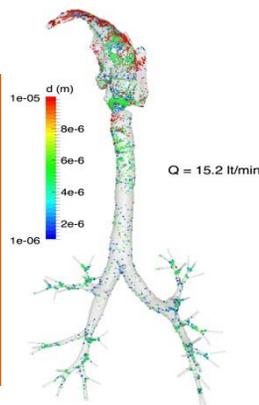
# HEXACOMM

Human Exposure to Aerosol Contaminants  
in Modern Microenvironments

Newsletter  
[www.hexacomm.nilu.no](http://www.hexacomm.nilu.no)

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[www.safetytrainingservices.net](http://www.safetytrainingservices.net)

## What is HEXACOMM?

HEXACOMM is a Europe-wide Horizon 2020 project funded by the EU. The main research goal of HEXACOMM is to apply scientifically based modeling and experimental methods to relate concentrations of aerosols in the indoor environment to their sources and human exposure implications. The second research objective is to determine the human exposure arising in these environments at both individual and collective scales. In today's society, we spend much of our time in modern microenvironments, such as in the home, at work in the office or industry, and while commuting. The HEXACOMM project aims to investigate and characterize the aerosols we are regularly exposed to



## Who are we?

A consortium of 10 research institutes/laboratories across Europe providing a place of learning to 14 young international researchers with a common goal: to further our understanding of human exposure to aerosols in modern microenvironments. Through regular communication and cross border collaboration, we hope to expand our knowledge of aerosols and human health and impart our findings to the scientific community and epidemiologists

According to Public Health England, around 29,000 people die prematurely each year in the UK alone as a result of exposure to air pollution. Indeed, the European environment watchdog (European Environmental Agency) has warned that hundreds of thousands of Europeans will die prematurely in the next two decades if governments continue to fail to address the issue.

Air pollution is a mixture of solid particles (Particulate Matter; PM) and gases in the atmosphere, both from natural sources and man-made pollution. Atmospheric aerosols is a term to describe the solid and liquid particles suspended in air as pollution. The manner in which we are exposed to air pollution will depend largely on where we spend most of our time. In modern society, we spend the majority of our time indoors at home and at work, and moving between the two, and thus our routine exposure will mainly occur in these places. Furthermore, the types of aerosols we are exposed to will vary greatly depending on a number of factors, not least outdoor air quality, indoor sources, domestic activities, manufacturing etc. However, the direct relationship between exposure and health is still largely unknown.



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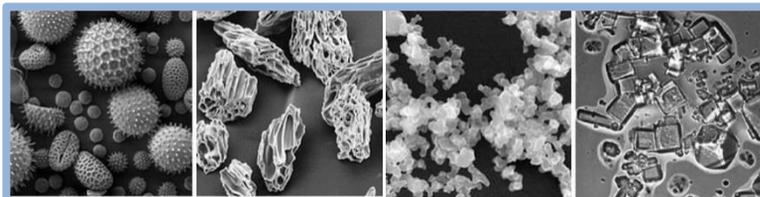
The HEXACOMM project aims to fill this knowledge gap through thorough investigation of physical and chemical aerosol properties in a number of modern microenvironments. So far research has been conducted in domestic homes, offices and industries, and metro underground stations across Europe. Research conducted to date has involved short and intense measurement campaigns, and continuous measurements in different microenvironments.

## Accomplishments so far

12 early stage researchers (ESRs) and 2 experienced researchers (ERs) have been working on individual research projects since HEXACOMM commenced in January 2013. These projects are being carried out within world class research institutes across Europe, under supervisors who are leaders in their fields. So far, completed research has resulted in:

- 8 articles in SCI journals, with many more on the way
- Over 60 presentations at diverse international conferences such as the European Aerosol Conference and the 8<sup>th</sup> Asian Aerosol Conference in Sydney
- Various outreach activities to disseminate our research to the non-scientific community, such as school and university open days, blogs, social media and newsletters

For a full breakdown of all achievements related to the HEXACOMM project, please see the project website



Pollen

Volcanic Ash

Soot

Sea Salt

earthobservatory.nasa.gov

Below is a brief synopsis of the type of research conducted so far:

- For the domestic environment, the influence of outdoor air quality on the indoor environment has been investigated, and how these aerosols transform from outdoors to indoors. Sources which affect the indoor air quality have been identified, such as cooking, cleaning and smoking. Polycyclic Aromatic Hydrocarbons, many of which are known carcinogens, have been sampled from homes across Europe.
- In the office environment, ventilation systems play an important role in air quality, as well as human activities and office appliances (printers, photocopiers etc.). Indeed, one project has focused on ventilation systems in hospitals which is essential for maintaining sanitary conditions and control of airborne pathogens. Occupational exposure studies were also performed in a florists.



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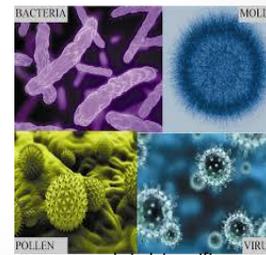


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- Bioaerosols, which are associated with many infectious and respiratory diseases, are also under study with samples taken from a broad range of different indoor sites.
- Common to all the measurements made in the different microenvironments is the focus on human exposure and effects on human health. Studies on lung dose and emission rates in the workplace are ongoing, including modeling of aerosol deposition in the human respiratory system (see top left image on pg. 1) and the effectiveness of face masks and filters in removing particles from inhaled air.



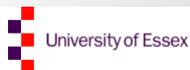
## International Cooperation

An essential component of the HEXACOMM project is the international cooperation and regular communication between the young researchers. To achieve this, training courses, regular reviews and meetings are organised in different host institutes on a regular basis. Furthermore, each researcher must do a secondment in a fellow researcher's institute, ensuring project overlap and transfer of expertise and knowledge. These secondments have resulted in a number of pan European campaigns, such as:

- Metro air quality measurements in Barcelona, Prague, Oporto and Athens, providing important information for passengers and commuters
- Intercomparison of impactors for ultrafine particle sampling, to test their performance and to chemically characterise ultrafine particles which are considered to be the most harmful
- Nanoparticle release mechanisms and occupational exposure scenarios in workplaces in a factory in Helsinki and Zaragoza. Many modern industrial activities both intentionally and unintentionally produce nano-particles which can be harmful to employees who are regularly exposed.



## Participating Institutions



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