# Indoor/Outdoor Bioaerosols Interface and Relationships Network

Frederic Coulon and Zaheer Nasar

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### Who we are?



Prof Frederic Coulon (PI, Cranfield University)



Dr Gill Drew (Co-I, Cranfield University)



Prof Sean Tyrrel (Co-I, Cranfield University)



Prof Ian Colbeck (Co-I, University of Essex)



Prof Kamaldeep Bhui (CBE) (Co-I, University of Oxford)



Dr Zaheer Ahmad Nasar (Researcher Co-I and Network Manager, Cranfield University)



Prof Rob Kinnersley (Environment Agency)



Dr Corinne Whitby (Co-I, University of Essex)



Prof Simon Jackson (Co-I, Plymouth University)



Prof Mark Lemon
(Co-I, De Montfort University)



Dr Philippa Douglas (Co-I, Public Health England)



Dr Emma Marczylo Public Health England



Dr Simon Parker (dstl)

















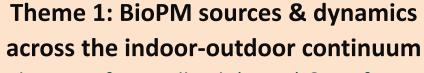








### Four interconnected themes



Chairs Prof Ian Colbeck (Essex) & Prof Sean
Tyrrel (Cranfield)

## Theme 2 BioPM sampling & characterisation

Chairs Dr Corinne Whitby (Essex)
& Prof Frederic Coulon (Cranfield)



#### Theme 4: Policy & Public Engagement

Chairs: Dr Gill Drew (Cranfield) & Prof Mark Lemon (De Montfort)

## Theme 3: Human Health, behaviour & wellbeing

Chairs: Dr Philippa Douglas & Dr Emma Marczylo) (PHE), Prof Kamaldeep Bhui (Oxford) & Prof Simon Jackson (Plymouth)





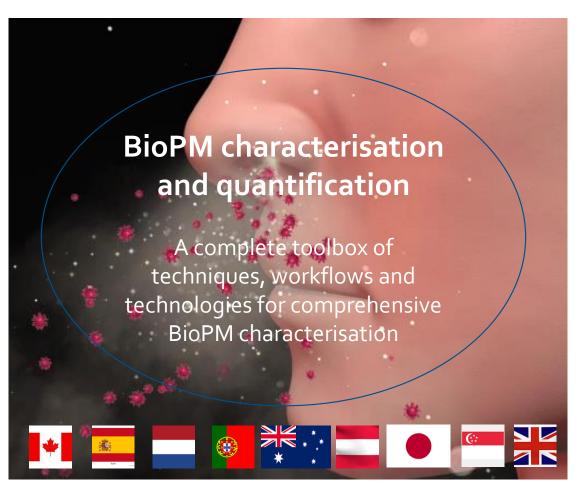
# Where are we up to and what insights did we gain?

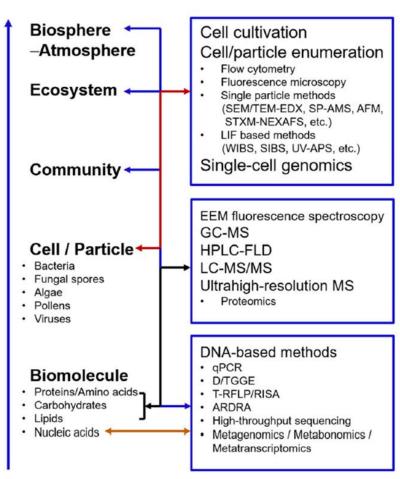
- Thematic workshops
- Key research gap analysis
- Outputs Infographics, Compendium, white paper, educational materials
- Outreach activities
- Cross-Network engagement

## Theme 1 - Gap analysis on the future change scenarios in sources and emissions of BioPM due to change in climate, land use and buildings regulations

Source characterisation	Source apportionment	Emission processes	Post-emission transformations	Transport & penetration	Modelling	Control
Comparison of indoor and outdoor source characteristics  Impact of climate change and energy-efficient buildings on source characteristics	Protocols for concurrent indoor and outdoor measurements  Distinguishing anthropogenic and natural exposures	How to include natural emissions within the concept of clean air  Emissions data for dispersion modelling validation	Process understanding of transformation & fate of BioPM Interaction with other particulate and gaseous pollutants  ndoor-Outdoo Continuum	Understanding the biological air quality trade-off between ventilation and energy efficiency  Particle size, aggregation & rafting impact on particle penetration into buildings	Integrating indoor and outdoor models Incorporating human behaviour and human space interaction in modelling studies	Quality of evidence base on emerging and existing air cleaning technologies & devices  Comparison of different controls for biological quality of indoor air (building design, ventilation, human behaviour, air cleaning)
ir					<b>\$</b>	Met Office

# Theme 2 - Compendium of analytical methods for characterisation and quantification of bioaerosols





#### Public health effects

#### Pathogens and allergens

- Immune reactions (Immunology)
- Infectious diseases (Epidemiology)
- Exposure risk (Toxicology)

#### Antibiotic resistance genes

Superbacteria (qPCR)

#### Climatic effects

#### Atmospheric chemistry

- Aerosol chemistry
- Cloud chemistry

#### Atmospheric physics

- Hygroscopicity
- CCN / IN activities
- Bioprecipitation

#### **Ecological effects**

#### Plants and Animals

- · Crops frost damages
- Pathogens
- Microbial dispersal

#### Waters

- Pathogens
- Microbial response

Microbiogeography





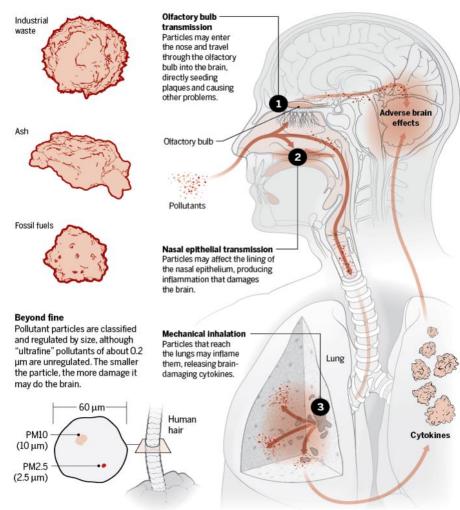


# Theme 3 – White paper on Air Quality, Bioaerosols and Mental health: Challenges and future directions

- 1. Review the existing evidence on air quality (indoor/outdoor) and mental health
- 2. Elucidate the potential mechanisms and factors increasing the vulnerability of humans (youth) to mental illness
- 3. Discuss the prevention measures for reducing bioaerosols exposure to enhance wellbeing and mental health
- 4. Identify the key research gaps and future direction for Health Conditions and Causal Models research



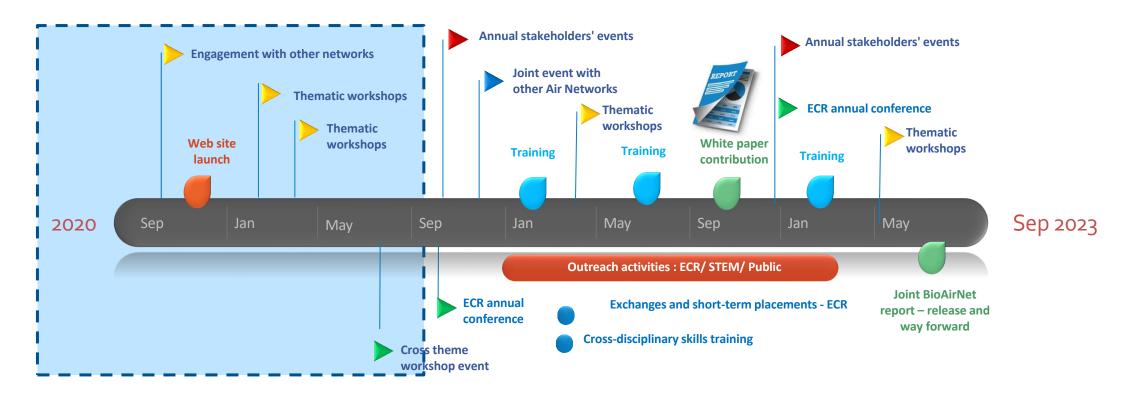
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# Theme 4 – Setting up a road map for stakeholder engagement – school, public, industry and policy



- Focused workshops with a particular stakeholder group
- 2. Open workshop
- 3. Schools and citizen science activities
- 4. Expert videos with perception questions





# Theme 4 – Outreach materials and engagement with other networks



Free to download are the Article, Activity sheet and an Animation at: <a href="https://futurumcareers.com/take-a-deep-breath-investigating-air-quality">https://futurumcareers.com/take-a-deep-breath-investigating-air-quality</a>





#### Two on-going pilot projects

- Modular Relaxed Eddy Covariance sensor for Air Quality: MOREC-AQ
- Exploring how sources, behaviour and mitigation strategies influence Indoor Air Quality: A Pilot Study



**BioSkyNet** - the first global network of bioaerosols researchers







Joint stakeholder-led workshop, Jan 2022 Future mobility beyond COVID-19: two

steps forward, one step back for clean air and public health







## **Contact details**



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