Minutes

MAGIC Partners Meeting		
3.21.2018	1100-1630	Imperial College London
Attendees	Alan Fogarty, Alan Jones, Alan Robins, Andrea Carvajal, Andy Acred, Bill Legassick, Carina Corada, Carolanne Vowiot, Chris Pain, Christine McHugh, David Carruthers, David Parker, Davide Marucci, Dimitrii Shepilov, Dimitrios Pavlidis, Dunhui Xiao, Elsa Aristodemou, Espen Akervik, Helen ApSimon, Henry Burridge, Huw Woodward, Ieuan Jones, Jake Hacker, James Dracott, Janet Barlow, Jim Mills, Jimmy Lirvat, Jiyun Song, Kathryn Woolley, Laetitia Mottet, Lara Beaton, Maarten van Reeuwijk, Malcolm Cook, Mark Cichy, Matteo Carpentieri, Matthew Johnson, Michael Herzog, Michela Gurau, Moji Moatamedi, Nick Hayes, Owen Connick, Paul Ajiboye, Paul Linden, Philip Cunningham, Rod Jones, Rossella Arcucci, Sani Dimitroulopoulou, Shaun Fitzgerald, Shiwei Fan, Stephen Inch, Tania Sharmin, Tom Grylls, William Lin	

Welcome & Introduction to the day	
	Paul Linden – See presentation attached

Monitoring	
	Shiwei Fan – MAGIC Monitoring Update (See presentation attached)
Questions/Discussion	- Monitoring of CO_2 and temperature, internally and externally, took place over summer/early Autumn 2017 at the LSBU site in Elephant and Castle. - Results as per the presentation - Noted that the exchange rate through the internal doorway has to assumed - the door was open in these experiments. And in the last case the doorway was sealed, so the doorway was isolated. When it was open, they couldn't associate any transport as people walked through. - Noted that the typical temperature difference between indoor and out was about 5-degrees. You see more stratification in the CO_2 than in the temperature inside the building. - Noted that in relation to external CO_2, spatial variation in concentration - what's coming in the windows isn't necessarily the same as at the monitoring point. - Shiwei clarified that the data is believed to be correct but there may be some corrections still to be made.

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	Matthew Johnson, Philip Cunningham– Airlabs Monitoring Update (See Presentation Attached)
Questions/Discussion	- Airlabs conducted PM Monitoring to complement what was done by Shiwei at the LSBU site - They used independent battery powered monitors. - They do not have continuous data measurement at all sites (battery issues) - Monitors co-located with the MAGIC Monitors - Monitor location 4 has a lot of bus stops (Elsa) - They aim to do some modelling with the results that is similar to MAGIC but open source using OpenFoam, out of the box. - Airlabs are developing a product to clean the air where PM pollution is high - The device being proposed can be used to clean 2 cubic metres of space - Airlabs an envisage these being used in an open plan office environment, and at key pollution 'hot-spots' - Airlabs do not foresee that their monitors will deteriorate over time in terms of calibration – this is technology dependent. - In terms of whether it is responsible to make a product to clean polluted air, Airlabs don't believe this is at odds with reducing air pollution generally. There is too much air for them to clean overall, but they can have a positive impact where human exposure to pollutants is high (e.g. waiting for a bus, inside a car) and the health risks are significant.
	Jim Mills– Air Monitors (See Presentation Attached)
Questions/Discussion	- To manage temperature in buildings you must bring in air from outside, which can also bring in pollutants - Air Monitors are trying to understand if you can use latest monitoring tech (electrochemical sensors, lasers etc.) to monitor inside and out to understand transfer into a building in real time. - Example presented was at a South Kensington site - The building is well managed and ventilated in respect to CO_2 and Temp. But not necessarily in relation to its external surroundings. - NO - see the highest peaks inside, when the air vent unit is drawing air into the building - NO_2 increases in line with external pollution. Once ventilation system is running they correlate well. - To avoid external pollution entering the building need to enhance the building management control systems. - Backing off during the day and flushing the building at night could improve potential for energy saving and financial benefit. As could using natural ventilation when the outdoor air quality allows it.

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Modelling	
	Laetitia Mottet – Update on Fluidity and other modelling activities (See presentation attached)
Questions/Discussion	- We are building the model to make it as realistic as possible. - Key areas include physics, traffic modelling, green-spaces, roof shapes etc. (see presentation). - Noted that there is not yet any stratification in the boundary conditions - Noted that the model takes around two weeks for one hour or real time, depending on the resolution required - Laetitia explained that the full model is used to train the reduced order model. You run two or three simulations on the LES and give that to the NIROM, which can then learn and predict. - Noted that flat roof structures are often used in the modelling but our work so far shows that the reality is much more complicated and you have to think of that not just in street canyon but in relation to the full urban context. - Suggested that for more realistic modelling, it may also be worth looking at the height of buildings. A few tall buildings completely alter the flow pattern, so you need to be able to characterise the flow field in that instance? - Noted that, regarding the traffic modelling, each vehicle is captured explicitly and modelled as a second fluid with its own turbulent wake. - Noted that Janet Barlow will be doing real time wind measurements at the LSBU site from April onwards, and would like to hear from anyone doing modelling of the site.

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MAGIC Scenarios	
	Tania Sharmin– MAGIC Scenarios (See presentation attached)
Questions/Discussion	- The aim of developing the MAGIC scenarios is to set out the key issues the final MAGIC tool will need to be able to address in order to be a useful tool for end-users making decisions on natural ventilation - We think the final tool will need to be able to take into account the impact of blue/green spaces, urban form and traffic in relation to natural ventilation. - We hope that the final MAGIC tool will enable an end-user to understand the interaction between these factors and external pollution and flow conditions, and how that will, in turn, impact the potential of using natural ventilation in a building. - It was suggested that we might want to use the National Landuse Database to distinguish types of urban form as it is already used by many organisations and could be more easily transferable. - Noted that some of the urban form in Cambridge may be too unique and not easily replicable in other cities – e.g. little high rise in Cambridge, but that is the focus in other cities like London. Consider a potential fourth scenario covering high rise/building height, and consider looking at other locations outside Cambridge. - In terms of useful timeframe for monitoring, it was suggested that you need to leave monitors in one place for longer periods of time to get interesting microclimatic information. Preferably a whole summer (the period when you would be using natural ventilation). - It was proposed that the sites should remain the same over this time period, so the external region is as consistent as possible. - Suggested that, when looking at traffic or greenspace, a before and after urban study would be useful, if you knew that an area was going to be developed in some way. There are many initiatives to pedestrianize and create 'healthy streets' in London planned in next year or so. We could liaise with Stephen Inch on this. - We would like input on how accurate we need to make the model to be workable. For example, if we were able to calculate pollution around a specific building site, how much more accurate do we need to be compared to current methods? - We will be following up with participants to get their further input on these questions.

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The London Plan and Ideas Emerging from Air Quality Positive	
	Stephen Inch, GLA (See presentation attached)
Questions/Discussion	- The Mayor's overall aim is to drastically reduce air pollution in London and roll out initiatives like 'Healthy Streets' to support this, as part of the Transport Plan. - This potentially has strong synergies with increasing the uptake of natural ventilation in buildings. - The Mayor's office is aiming to integrate Air Quality into the design of all new developments, this has often only been an 'add-on' before, and not done well. - This is an interesting challenge for modellers. Any model/tool for end-users needs to be flexible so you can quickly understand the impact of lots of different options and therefore influence the design process at an early stage. - It was noted that other countries internationally are also looking at planning and urban form - Singapore, for example, has opened up passageways to prevailing winds so they are not blocked off by continuous buildings. - It was noted that there are often synergies between good design (in general) of new buildings and designs which are more amendable to natural ventilation. - It was noted that pure electric vehicles are excluded as being 'sustainable' in the Mayor's Transport Plan. This is because of considerations around healthy streets and car dependency – i.e. pollution is not the only consideration, it's also about getting people to be more active and developing the infrastructure that is needed to enable people to travel more easily without cars. - The change in the way that developments have to take place is only guidance at the moment, under development. There is only so much stick that can be used!

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Lessons Learnt from the Bloomberg Building	
	Brett Ormrod, Foster and Partners (See presentation attached)
Questions/Discussion	- The Bloomberg building was recently completed in London - The design team approached the NV challenge in a similar way to the MAGIC project - modelling pollution and building a scale model of the offices to test pollution flows etc. - Management of the building has been handed back to the client, but Foster and Partners will stay involved, at least in the short-term, monitoring the natural ventilation system and pollution levels. - Noted that it is a large roof and a small percentage is allocated to PV panels. The roof is atrial and has a daylight function, so it wasn't possible to integrate any more - Noted that the building opened in November, and the NV system is not up and running yet as it did not operate over the winter. Hoping to do post start experiments once it starts working later in the Spring - Noted that there are monitors at different levels of the building, including on the roof. - Noted that the team are not concerned about condensation as that was investigated fully with the full scale mock up. They believe that 35% of operating hours can be naturally ventilated -pollution dependent. - Noted that the BREAM rating for the building was 98, the highest ever. Bret is not sure where it lost 2%! - Brett highlighted that looking back, it would have been great if they'd had a better way to model air pollution. Brett did a desk top study on London air quality. Would be great to have a real-time tool that could really model what's happening outside. - Retrofitting the NV into the design was a big challenge. The control study for ventilation system was the most difficult part of the design process. Having more to inform this, better model would have been really useful. - Noted that Foster and Partners had carte balance from the client, but it's difficult to isolate the cost of the NV system within this, as everything was done to the highest specification. When looking at the cost, the lifetime savings on run-cost of the building, and the improved performance of workers would need to be taken into account. - This building is not a 'plug and play' solution but there will be knowledge and learnings that will filter down.
Final remarks	
	Paul Linden, MAGIC
	- We will be following up with people to get their input on the scenarios. We want you to help us to shape this as a tool that works for End-Users. - Bill Legassick, from Southwark Council, will join the Steering Committee