**Minutes: MAGIC Partners Meeting**

**October 24th 2019**

**Paul Linden (MAGIC)**

***Introduction & Update on MAGIC***

* Welcome from Paul
* Presentation of the Agenda
* Presentation of the last 6 months of work
* Interested in the impact of tall building (importance of the size of the roof and their shapes)
* Difference in a wind tunnel between flat and non-flat roof (Will presentation)
* Impact on the wake behind a building
* Lidar Update:
  + Measuring the velocity field
  + Looking at the impact of tall buildings
  + Lidar based above K2 building
  + Wake of the tall building is significant
  + Drop of the velocity close to the building
* See the consequences in Fluidity modelling
* Street level pollution in wind tunnel study
* Field studies:
  + In Cambridge: Mill road has been closed and the traffic has been reduced, put monitors to look at the impact of the closure, internal and external monitors
  + In process of looking at the data
  + London Field study: from lidar we can look at the wind speed and direction during the campaign.
* Ventilation modelling:
  + Single side ventilation (Rajesh)
* New team member Dr Jinxi Li
* Puff ventilation (presentation of Huw in the afternoon)
* Planning advice developing

**Anna Schroeder (MAGIC):**

* Talk on the field campaign in London (LSBU field study)
* TfL junction study:
  + Update existing model
  + Get new junction counts
  + Test signal change
* Cambustion and sensors
  + Provide GPS data and tailpipe emissions with their car.
* Need cameras to capture number plates
* Map of sensors and cameras
* Cambustion GPS data and tailpipe emissions
* 2 weeks study
* Next steps:
  + Data analysis
  + Wind tunnel experiments to replicate the behaviour hand the things occurring on the road
  + Look at the signal timing effects
  + Analyse video footage
  + Combine traffic data with Fluidity

**Monica von Schmalensee (White Arkitekter)**

***Improvement of the Living Environment: Lessons from Sweden***

* Share the trailer (push the film)
* How architects are working in Sweden
* How it is important to find solutions for the future
* White, is an architects company own by themselves, so can put money where they want (put a lot of money in research)
  + This has been a good asset to work differently
* Previous CEO of White and now works for the Swedish gov - help them to develop the new architecture policy.
* City Vasteras: She lived there, in the 70’s. people were going to work by bike (fresh air and healthy people), but today there is the third largest shopping mall in Sweden and you need a car to go from one store to another. But what will happen with this shopping mall when people buy everything on internet?
* And today the city centre is empty because of the shopping mall. New lease of life? What type of life in the future? Now people are taking the car and not walking anymore, less healthy.
* Cities will always be a dream of better life and the number of people living in cities will continue to increase.
* Problem of the density of people in cities.
* London is less dense than Cairo
* Create public transport to reduce the traffic and the jams.
* The gap between rich and poor is getting wider and we need to think about the aspect of social integration when designing cities.
* Need of day light in the building in Sweden, need to use the space between the building in a good way.
* Need to take into account sustainability (circle of sustainability: economics, politics, ecology and culture)
* Need to use the sustainable development goals (15 goals, FIND ON INTERNET)
* Policy for designed living environment:
  + Passed 2 years ago by the gov.
  + Challenged: climate segregation, housing storage, health, equity…
  + State architect: lead and coordinate the work, national board of housing, building and planning
* Council for sustainable cities:
  + 13 national agencies from Sweden
  + Need of communication between the agencies
* Important point: what can architecture MAKE (and not do)
* Architecture is a process, on how to plan, how to build and how to manage
* We need to engage with each other to improve the quality of the building, need of interdisciplinary work. In Sweden they have “Grupparbeite”
* There is a lack of affordable housing, to be able to improve the quality of life in the city we need to find a new kind of housing
* It has to be more inclusive, accessible and well designed
* Need to design “a city for all. A city that leaves no one behind”
* Sustainable Development Goals:
  + 1. No poverty: need new kind how houses
  + 2. Zero hunger: how can cities be more productive for farming and more green - preserve the farming outside the cities and be more supportive
  + 3. Good health and well-being: importance of day light, to improve quality of living
  + 4. Quality education: how professors organise schools and material for good fresh air. Results will improve if the school design is better
  + 5. Gender Equality: by improving parks (more accessible and better furniture) reduced the level of crime
  + 6. Affordable and clean energy: community energy programs
  + 12. Responsible and consumption and production: how we use and how to reuse materials
  + 13. Climate action: we need to improve the tools to make the decisions better
  + 15. Life on land
  + 17. Partnership
* Town of Kiruna: big project there. Asked the citizen: what is your future dream?
  + Moved the city centre step by step by using the space between the building (public squares…) and reused the materials from the buildings. Used the wood from the old buildings for the new ones
  + Found a good solution for Kiruna city
* Need to increase the number of girls in public space, research is being done to plan the future to support girls in the public space
* Modify the type of road, with cycling path next to road for cars and add trees.
* Make public spaces more liveable
* Need clean air and that people spend time in public space (culture and democracy)
* Need a long-term plan and not just short-term. We need a long-term ambition to solve future problems and to work together.

**Q&A/Discussion**

* What about electric vehicles and their place in the city (the talk was presenting car as the enemy); - cars are taking a lot of space, electric cars will improve the air quality but there has to be an investment in public transport (to solve the space problem). Need to densify the suburb outside e.g. London and to have public transport hubs. Public transport is the solution for the future
* - Are you going to see a reduction in air pollution, do you have the data to share? The data is held by another organisation. There are fewer cars and better air quality and people are going more often to the public space. Need to better define how you measure air pollution...
* Talk of the development for suburbs. How to you take into consideration the repartition of people in the city? There has to be new business model to improve and provide different kind of housing (affordable, social, public...)

**Paul Linden (MAGIC)**

***Using MAGIC for Planning Guidance***

* After talking with Bill Legassick (London Borough of Southwark)
* How to take the work done so far and use it to solve practical problems? How to provide a scientific background for problems faced in day job? In what form do you need the information?
* Residential:
  + Location of ventilation intakes?
  + Conflict noise?
  + Single vs dual housing
  + Seasonal / daily openings
* Mixed uses: office, bar…
  + Location of exhaust in relation of surroundings
  + Heat removal
* Current modelling constraints
  + What the CFD cannot address
* Try to provide rules of thumbs for different questions:
  + Pollution levels decreases with height
* What is the most useful form of advice?
* How do you see MAGIC producing it?

**Breaking groups feedback**

* Group 1: Generate compilation of case history and knowledge of what we learned (examples, diagrams, …) designed to keep moving. MAGIC would be dealing with specific problems Link with the APRIL (air pollution in London) group
* Group 2: MAGIC is a tool where you should be able to give the conditions of the building. We want it to create practical tools and also produce technical notes (what if we put some trees…)
* Group 3: Who are we trying to influence? What have we learned that would be useful for the world? For transport engineers for example (traffic lights timing). What people working in wind tunnels could be learning from MAGIC work? How to keep the data? Provide advice (if access to sensor data) on controlling the air flow within buildings. There are 2 aspects: accessing raw data and then interpreting the data. Need to store all the data in a platform (like a weather forecast) to give access to more people. Giving a continuous access to the data (day to day data) Sometimes sensors are useful and sometimes useless (depending on wind)
* Group 4: Way to simplify complicated problems to avoid CFD time consuming models? Create rules of thumbs if no tall building, and then with tall building. So, divide the cities in two areas if near or away from tall buildings. Process of including rules of thumbs in regulations. MAGIC to come up with field studies to improve the natural ventilation of buildings even if the air outside is bad? Focus on indoor air quality, rules of thumb in case you are e.g. cooking in the kitchen for the ventilation and want to open a window.
* Group 5: Can we say something about outdoor air quality with the traffic data from camera? Data set can be used by policy makers, researchers... can we make our data user-friendly? Can we make public aware of our results can we publish our video and results to the public?

**Nabeel Shaikh (electronic SCIENCE) & Fabio Galatioto (SATE)**

***Taking MAGIC forward: PARK: accelerating the Process of Accessing and Research outputs and Knowledge***

* Examples of research outputs into usable products:
* Lighting and thermal LT method:
  + LT-method is a practical tool to predict building energy demand
  + Help to improve knowledge about building design and ventilation
  + Creation of a software: LT-Portabul software
  + The research on paper is going into an interface
* ClimateLite:
  + Created a software for design teams that works to integrate carbon emission
* Total Obsolescence Management Capability Assessment Tool (TOMCAT)
  + How to manage obsolescence in the industry
  + Created a web assessment platform.
  + Created a product that the industry can use to solve their problem
  + Different methodology can be used in different scenarios for the industry to use the results of research
* MAIA Project: Models and methods for Accidents prediction and Impact Assessment
  + Development and test new techniques and tools to improve the way road collisions are predicted and related impacts estimated
  + Creation of a proof of concept as a web-platform
  + Different accident prediction models
  + Creation of models easy to create and input in a platform and accurate enough for the client
  + Define the conditions that may affect the causalities
  + Could also look at the economics benefits
* Currently MAGIC has an expert users’ interface, in the future could help to create an interface that everyone could use
  + Provide early access to non-expert users to new and innovative research
* Want to help us to make people to use MAGIC results. In which format? for who?
* Want to permit to MAGIC tools and results to have an impact and not only to be a tool

**Alan Robins (University of Surrey)**

***Taking MAGIC forward – the Funding space for air pollution research***

* What opportunities will appear in the future?
* It is an incomplete picture of the situation
* NERC Call: UK urban outdoor air quality modelling
* Pre-announcement: Networks to build interdisciplinary communities to address air quality challenges across the indoor/outdoor ventilation
* Smart Cube – draft specialisation
  + Lots of temperature and pressure channels
* Most of the proposals are related to the external environment and very a few look at indoor/outdoor exchange
* Please send Alan an email if there are other projects he can add to the ones he presented, a full list can be put on the website
* Paul Linden: There is an increasing interest in indoor pollution and pollutants (such as cooking…). There are opportunities for collaboration in this area.

**Huw Woodward (Imperial) and Martin Seaton (CERC)**

***Comparing Fluidity and ADMS***

* Objectives of study:
  + To review the strengths and limitations of Gaussian modelling for use at short time and length scales
  + To assess the performance of LES for the modelling of puff releases
* Models used: Fluidity, ADMS wind tunnel
* Single building downwind of a release:
  + 2 release points used
  + Continuous release and 60-second puff release
* Comparison between fluidity and wind tunnel
* Using ADMS as a plume air dispersion model used to model the air quality impact of existing and proposed industrial installations
* Generally used to calculate annual statistics for comparison to air quality limits and guidelines
* Applicable to around 60km downwind of the source
* Treatment of buildings in ADMS:
  + The buildings effects module is activated if a source is located next to the building
  + Different regions of flow behind the building
* ADMS-STAR
  + Used on a much larger sale
* Fluctuations models:
  + Produces statistics of fluctuations in concentration for short time periods
  + Calculates a probability of concentration
  + Account for both turbulence and changes in wind direction
* This was an introduction of ADMS modules and what they can do
* The measurements show a significant increase in turbulence not modelled by ADMS
* Uncertainties and sensitivities:
  + Building at 30°
  + Building at 45° with pitched roof
  + Upwind building
* With Fluidity you have less puffs than with ADMS
* Fluidity did not capture the variation in doses seen in the wind tunnel
* Fluidity smooths the puff concentration & leads to lower maximum concentrations and smaller ranges in puff dose
  + How to fix this problem?
  + Refine the mesh? or use mesh adaptivity?
* Road peak concentrations:
  + What time scales are relevant for exposure analysis
    - Using roadside NO2 measurements at 1s time resolution
* Fluidity is better for mean dose
* The agreement between Fluidity and ADMS improves with distance downwind
* AMDS-Urban would be used for urban scenario
* Next steps:
  + Use fluidity mesh adaptivity to improve modelling of puff release?
  + Possible to extend the ADMS fluctuations and puff modules to cases with buildings?
  + What is the limit of applicability of Gaussian plume models?

**Paul Linden (MAGIC)**

***Final Remarks***

* Thank you all for an interesting day
* Focusing on the future since we are coming in the last year of the project
* Thank to all the speakers
* All the presentation will be on the website
* There will be a further partners meeting in six months.