Heat Risk in London Group Meeting
Monday 5th February 2018, TfL, The International Quarter, London

ONGOING AND FUTURE WORK

Mapping heat vulnerability in London

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Presentation outline

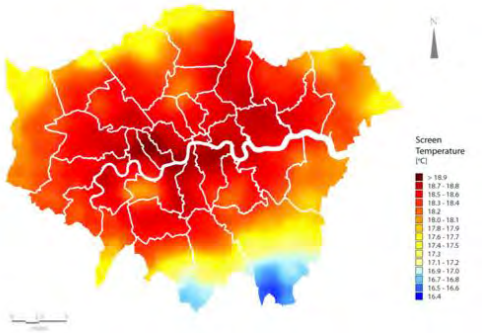
1. Mapping climate disadvantage for London's care provision using **Climate Just**
2. Triple Heat Jeopardy Mapping pilot project in **Hounslow**

Mapping climate disadvantage for London's care provision

Background

Relaunch event: 16 February, City Hall, London

Background



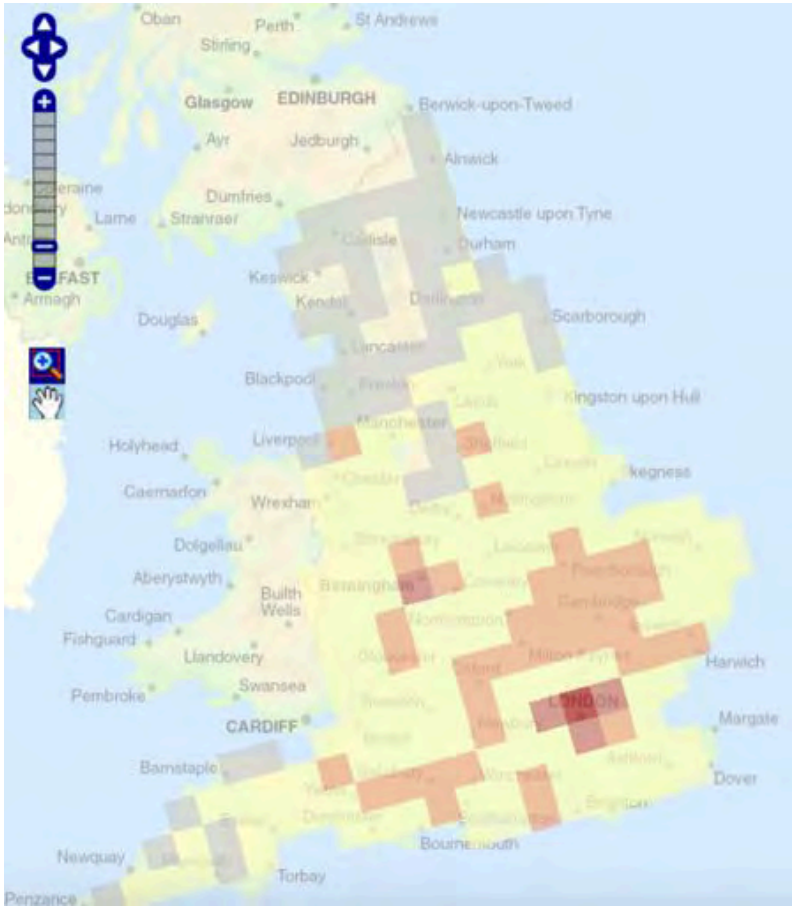
Exposure to climate hazard
+ social vulnerability
= climate disadvantage

Climate change has the potential to increase inequalities and disadvantage in the UK. The Climate Just Map Tool shows which places may be most disadvantaged through climate impacts. It aims to raise awareness about how **social vulnerability** combined with **exposure to hazards**, like flooding and heat, may lead to uneven impacts in different neighbourhoods, causing climate disadvantage.

There are maps on:

- **Flooding**
  (river/coastal flooding, surface water flooding)
- **Heat**
- **Fuel poverty**

Background



1. It highlights which people and places are likely to be most vulnerable to the **impacts of extreme weather**, and the areas which might be most affected.
2. It examines **fuel poverty and inequities** in energy policy.
3. It helps identify the issues in a local area and find guidance, case studies and resources on **actions** to help build local resilience.

Heat disadvantage (2011), population weighted vulnerability and mean summer maximum temperature 2050s, Medium emissions scenario, central estimate (50th percentile)

Background

Rajat et al. (2016) **Care Provision for a Future Climate** report for JRF reviewed existing evidence and presented primary research in four case study care settings (two residential and two extra care) in England to assess the risks of summertime overheating, and investigate the preparedness of the care settings, both now and in the future.

Background

Rajat et al. (2016) main findings:

- Summertime overheating is both a **current and future risk** in care schemes, yet there is currently little awareness or preparedness at all levels.
- There is a **perception** that older people 'feel the cold', but less recognition that heat can also present a significant health risk.
- There is **low prioritisation** of overheating and future climate change in briefing and design.
- There is a lack of effective **heat management** across the case studies due to a number of design and management issues.
- **Collaboration** among government departments and professional institutions is necessary to harmonise and standardise health-related and building thermal comfort-related overheating thresholds, with particular consideration for care settings.

Mapping climate disadvantage for London's care homes

Interdisciplinary pilot research project funded by a **Bartlett Synergy Grant**

Team: Anna Mavrogianni, Rokia Raslan, Adam Dennett, Eleni Oikonomou

Aim: To accelerate the development of equitable responses to climate change for care provision in urban environments, with a focus on overheating risk using the Greater London Area as a case study.

Collaboration between two UCL Bartlett departments:

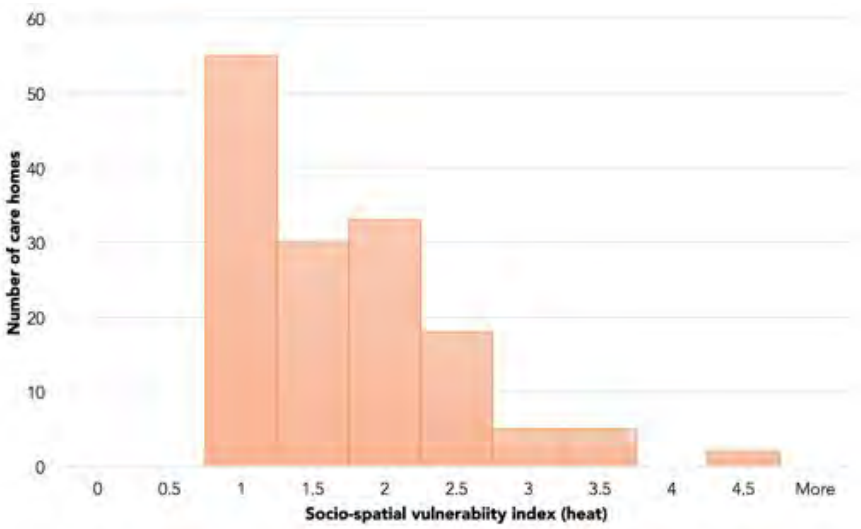
- Institute for Environmental Design and Engineering **(IEDE)**
- Centre for Advanced Spatial Analysis **(CASA)**

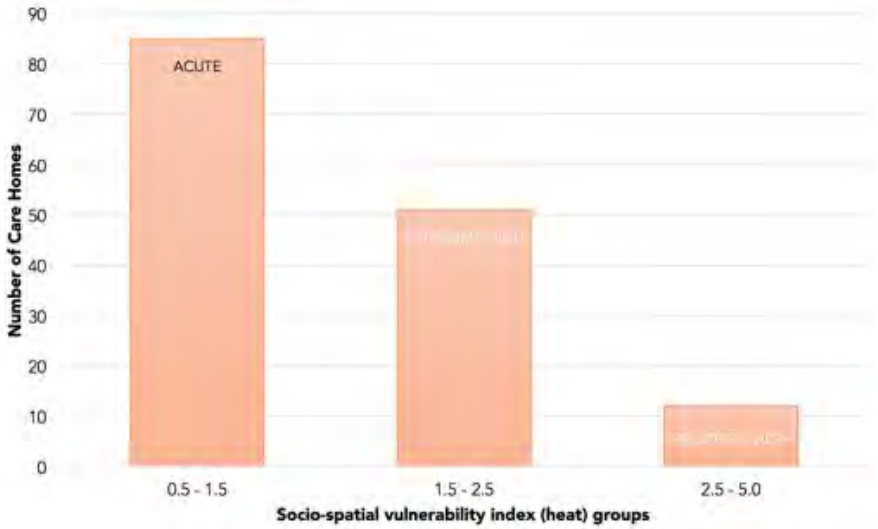
Pilot project objectives

1. To build a **database** of care home locations across London
2. To quantify the impact of building form and physical properties on the climate resilience of London care homes (building vulnerability) based on the meta-analysis of outputs of existing housing research undertaken at IEDE using **building physics-based models** but specifically focusing, for the first time, on care settings
3. To analyse the socio-spatial vulnerability of climate disadvantage in these areas by using CASA's spatial analysis expertise and publicly available resources, such as the **Climate Just** initiative and
4. To co-create a **new research proposal** by engaging with public health and planning policymakers.

Mapping London's care provision

Distribution of care home **socio-spatial vulnerability index** in relation to **heat**





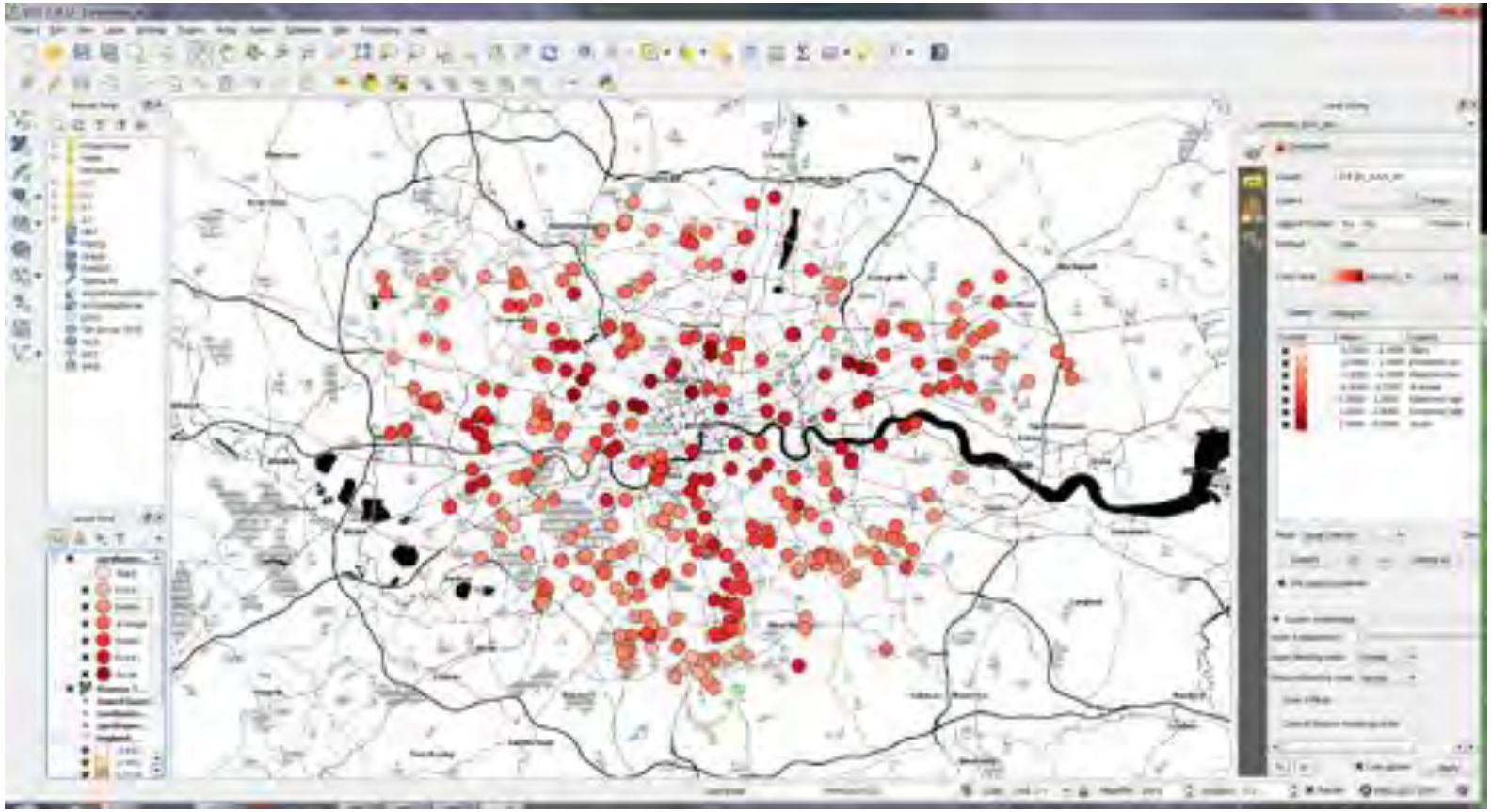
Mapping London's care provision

Heat socio-spatial vulnerability refers to mapped social vulnerability with respect to heat-related hazard. It shows where negative social impacts are more likely.

The heat socio-spatial vulnerability map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within each of the five dimensions of socio-spatial vulnerability for each neighbourhood:

1. Sensitivity
2. Enhanced Exposure
3. (In)ability to Prepare
4. (In)ability to Respond
5. (In)ability to Recover

Identifying heat risk hotspots



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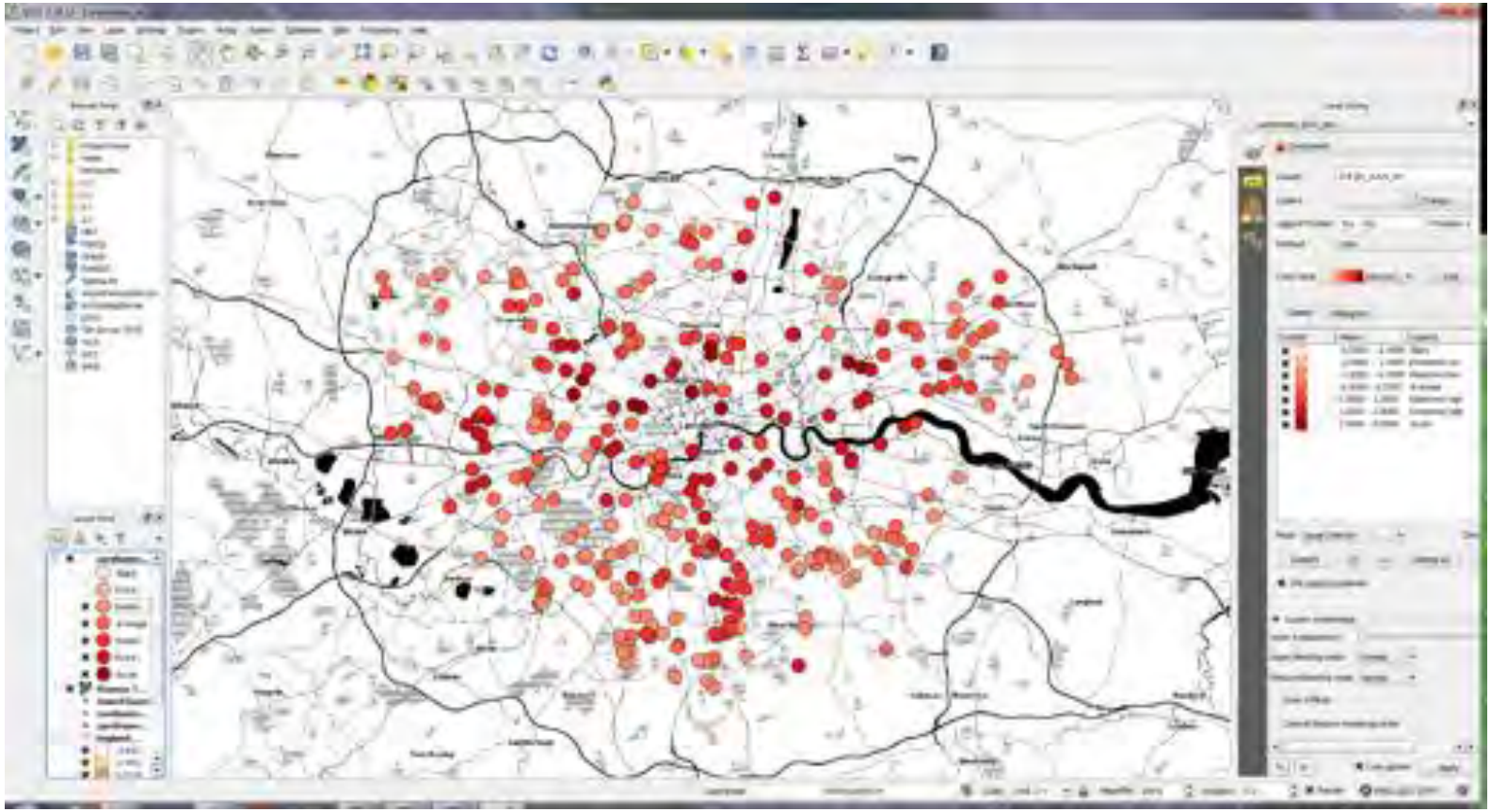

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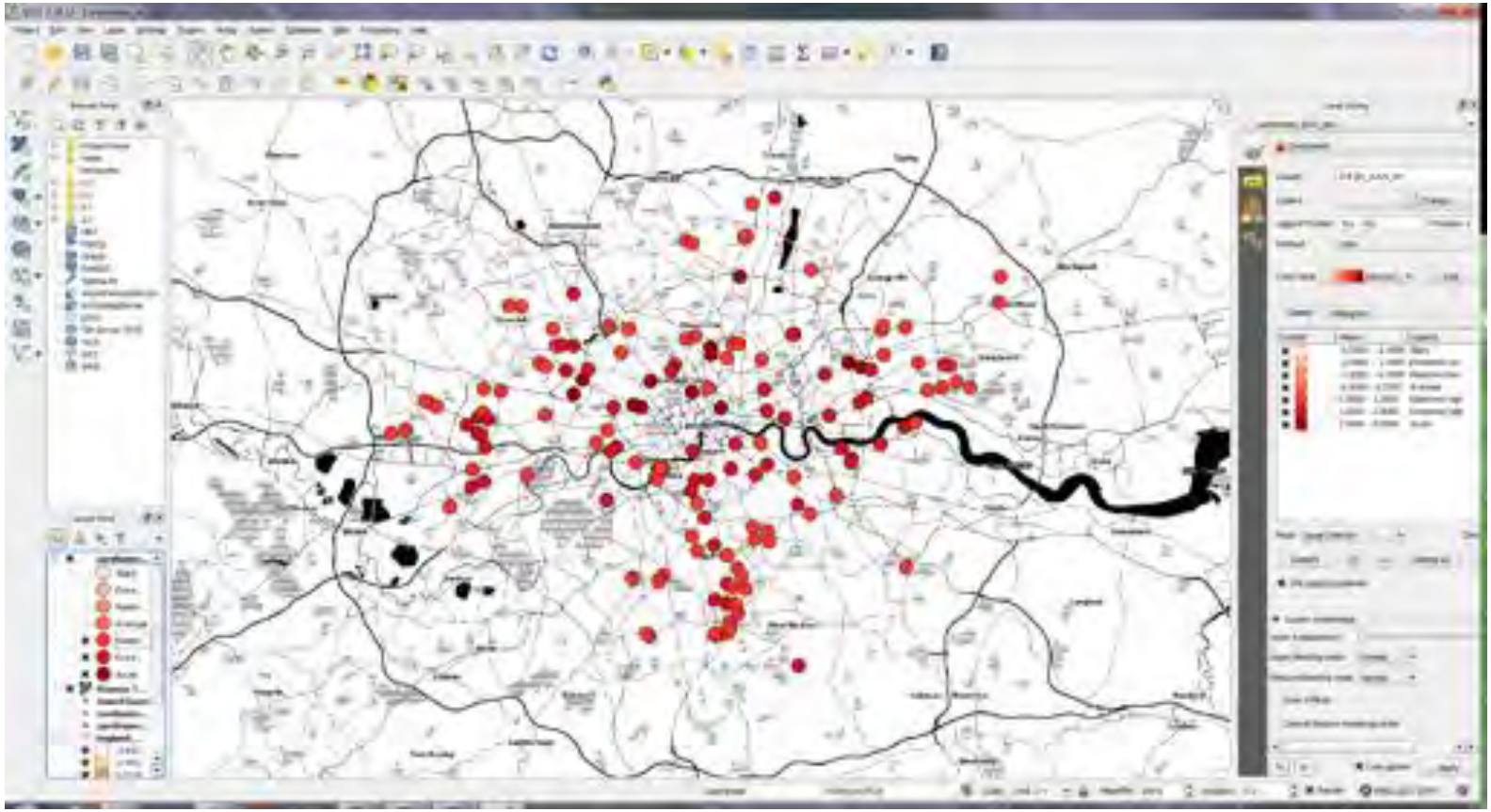

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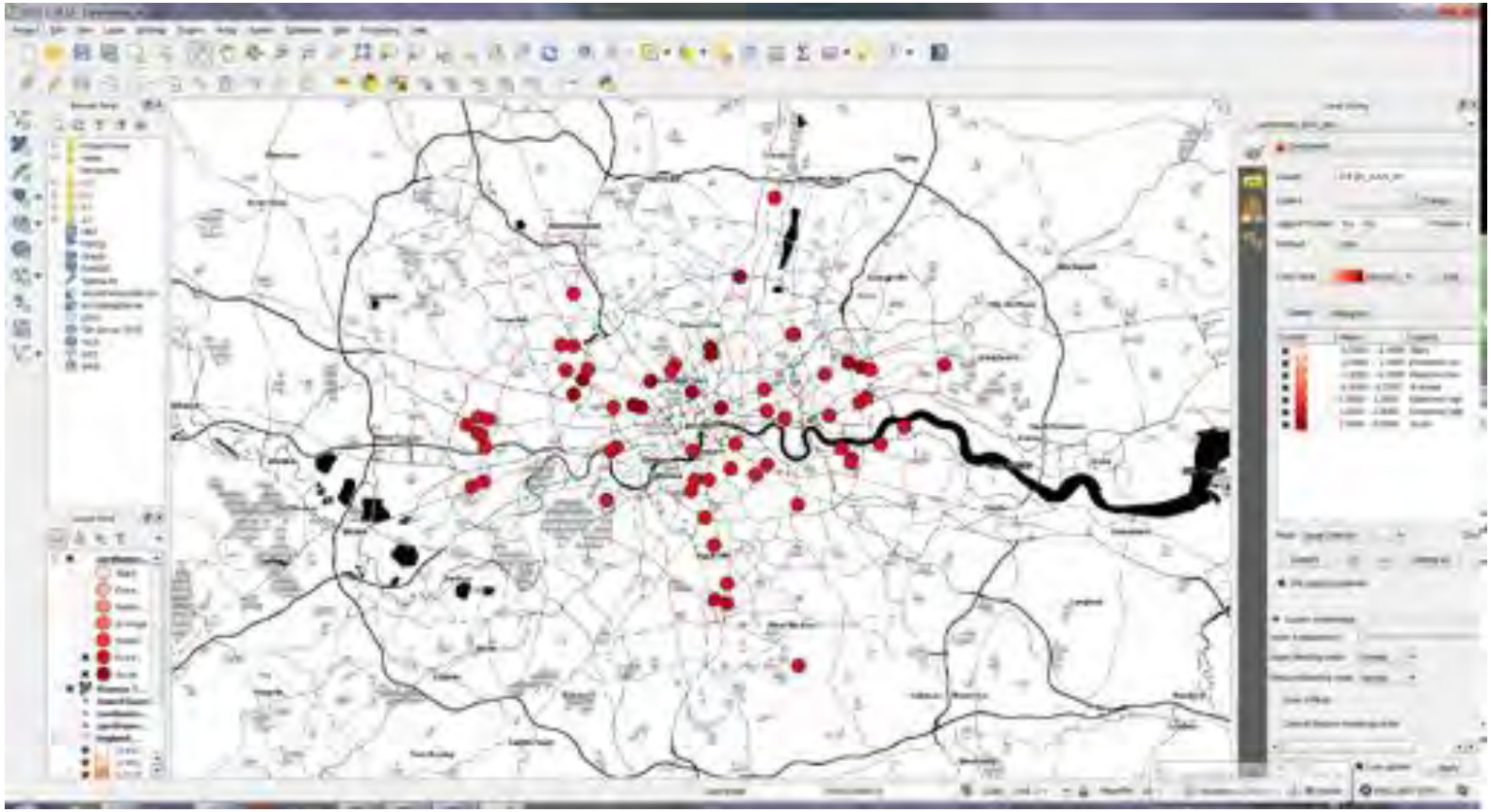

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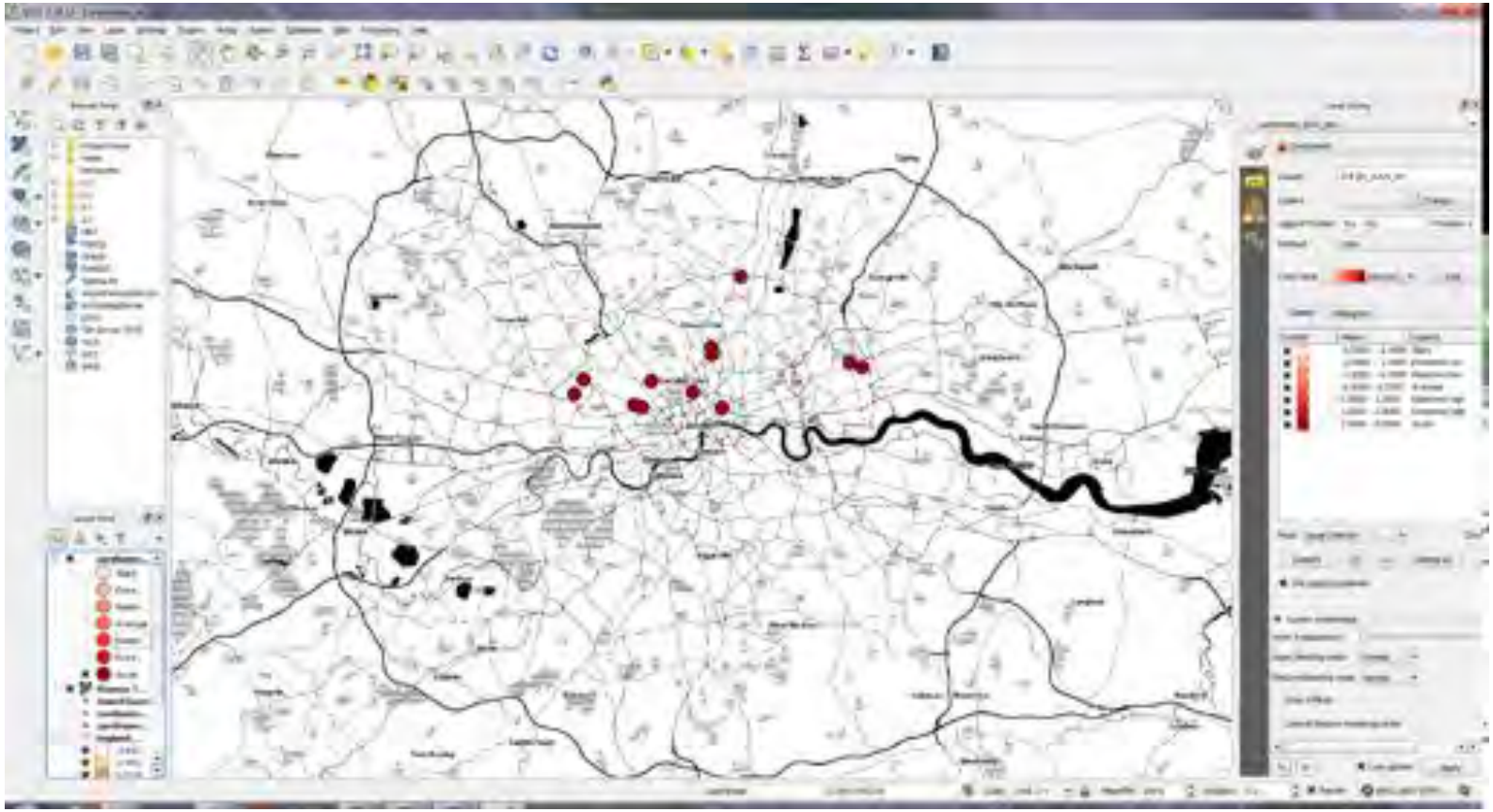

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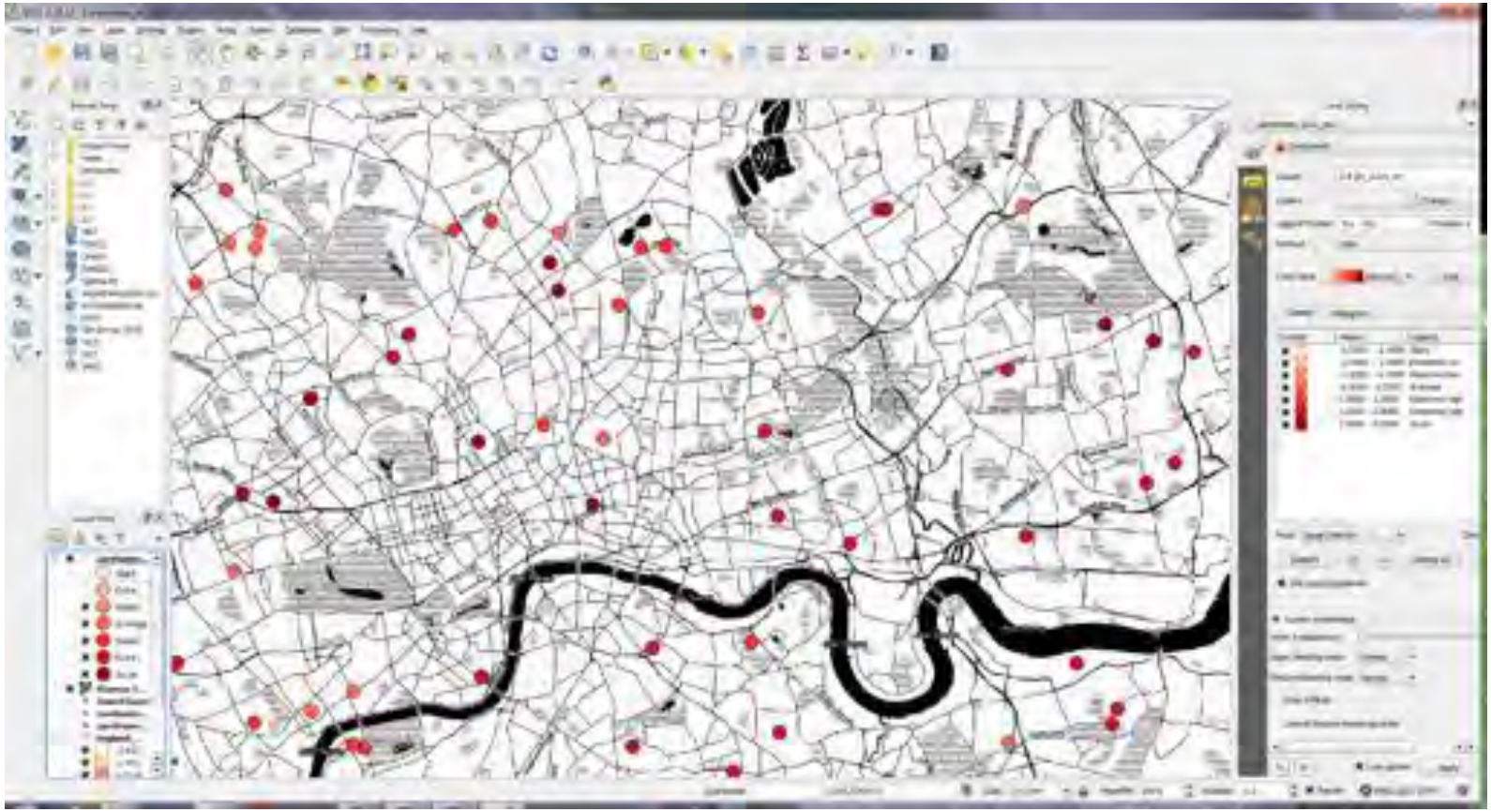

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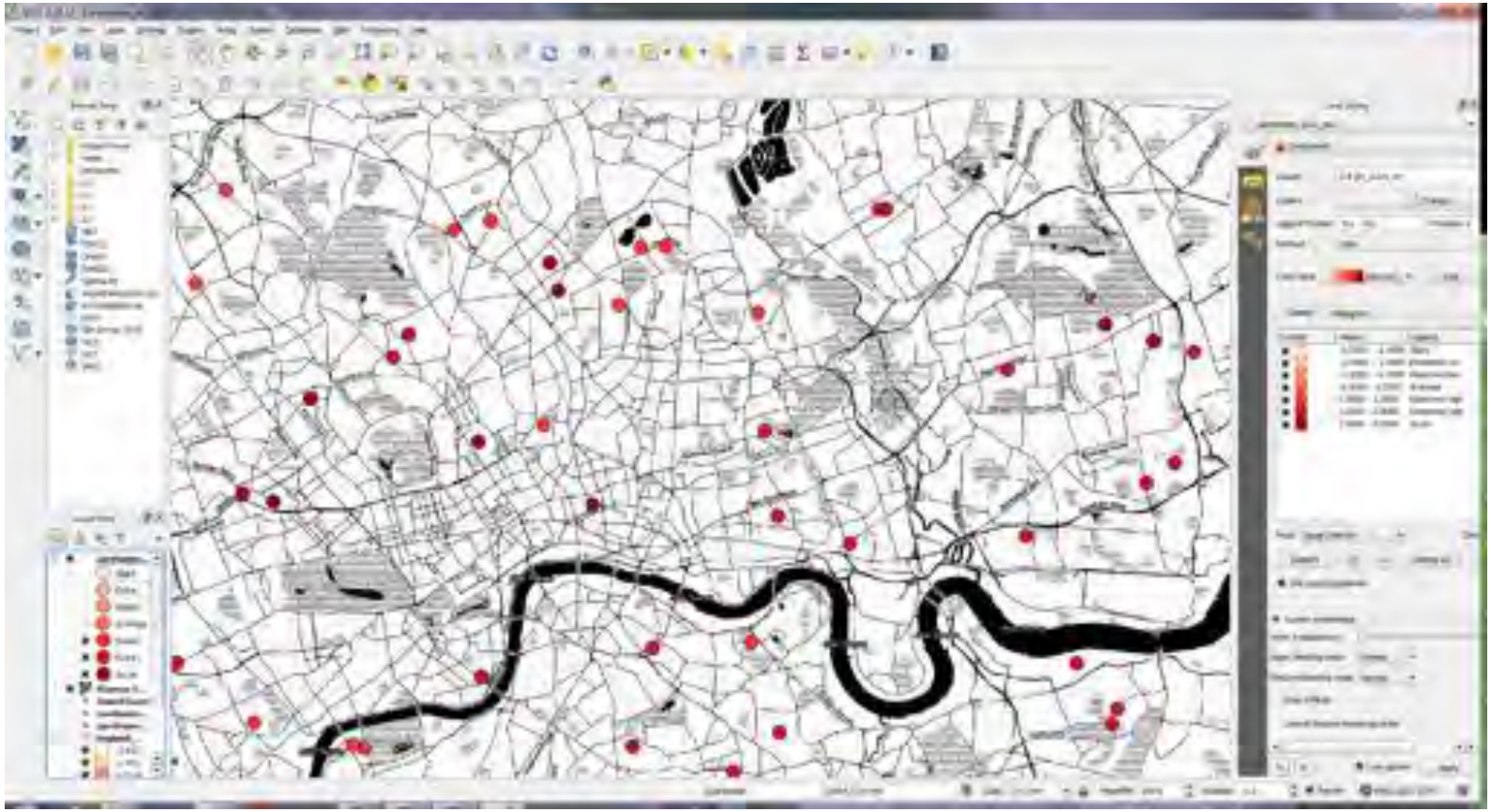

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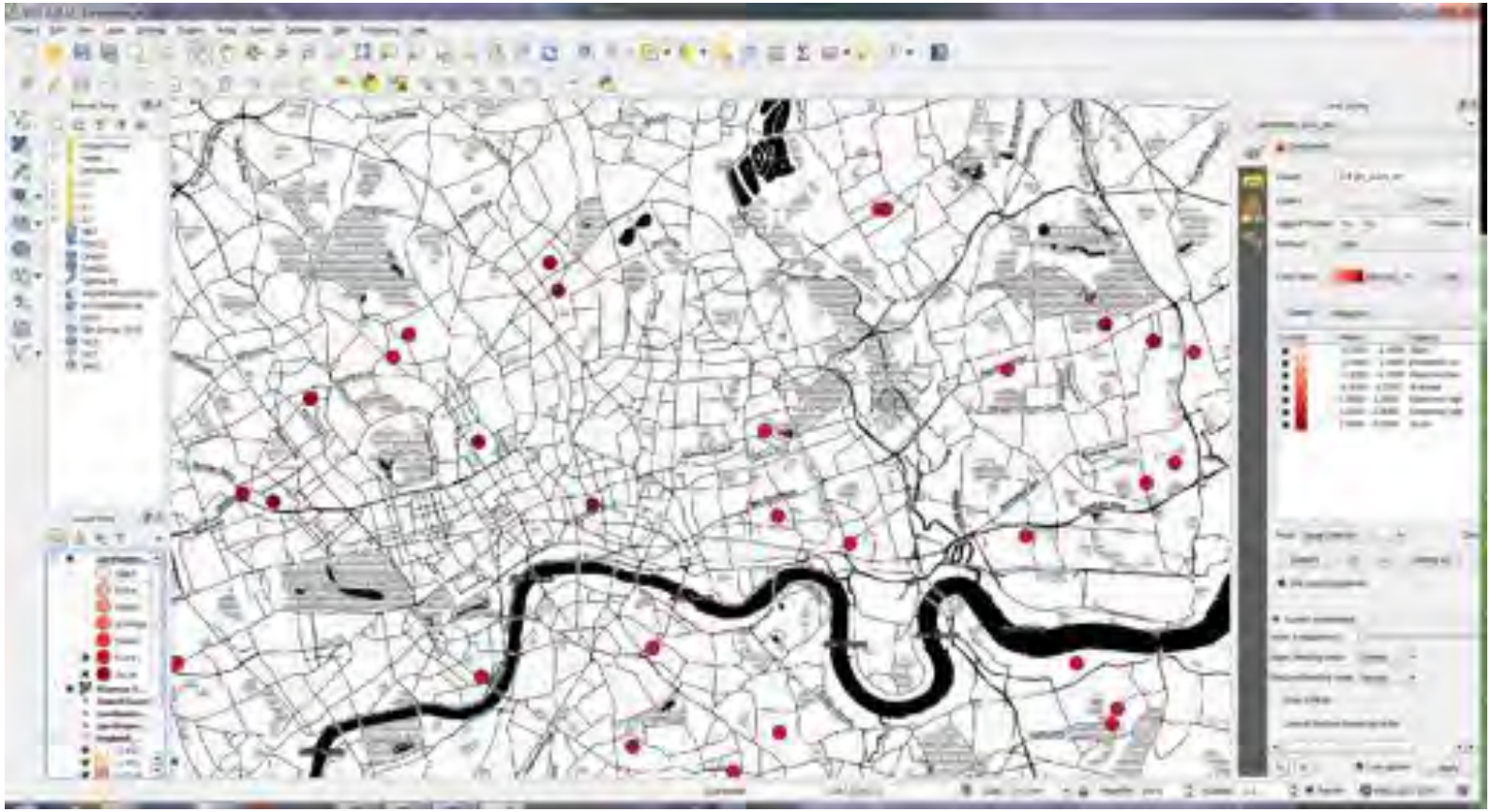


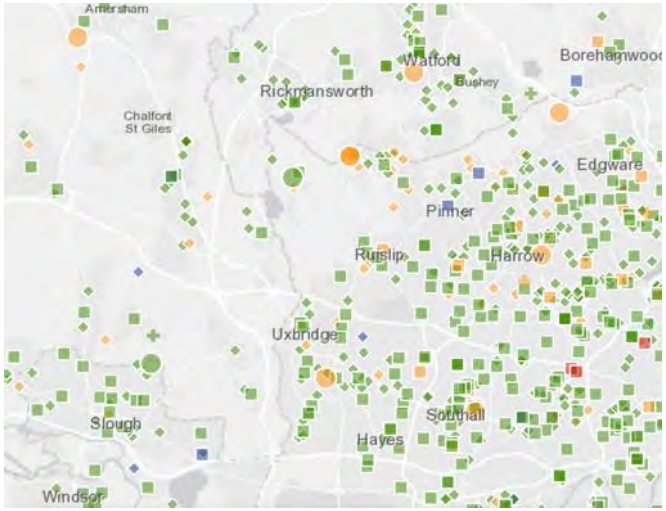
Identifying heat risk hotspots

Project deliverables

1. Meta-analysis of existing climate resilience modelled data produced for representative London care home typologies.
Key Milestone: A summary matrix of the climate resilience of common London care home typologies, with a focus on indoor overheating risk.

Project deliverables

2. Mapping of care homes locations using a combination of databases, such as Care Quality Commission (CQC) ratings, Strategic Health Asset Planning and Evaluation application (SHAPE), Census, Neighbourhood Statistics, OpenPopGrid etc.
Key Milestone: Maps, infographics and other visualisations of climate risks and climate disadvantage of care settings across London, including mapping of social, economic and environmental vulnerability.



Map of care service ratings
Care Quality Commission (CQC)

Project deliverables

3. Planning of a co-creation workshop (in May 2018, date and venue TBC) that encourages a two-way communication between the research team and policymakers from the areas of public health and emergency care, planning, energy, environment and sustainability, local governance, other academics and community stakeholders.
Key Milestone: A larger scale research proposal.

If interested in joining the workshop please email:

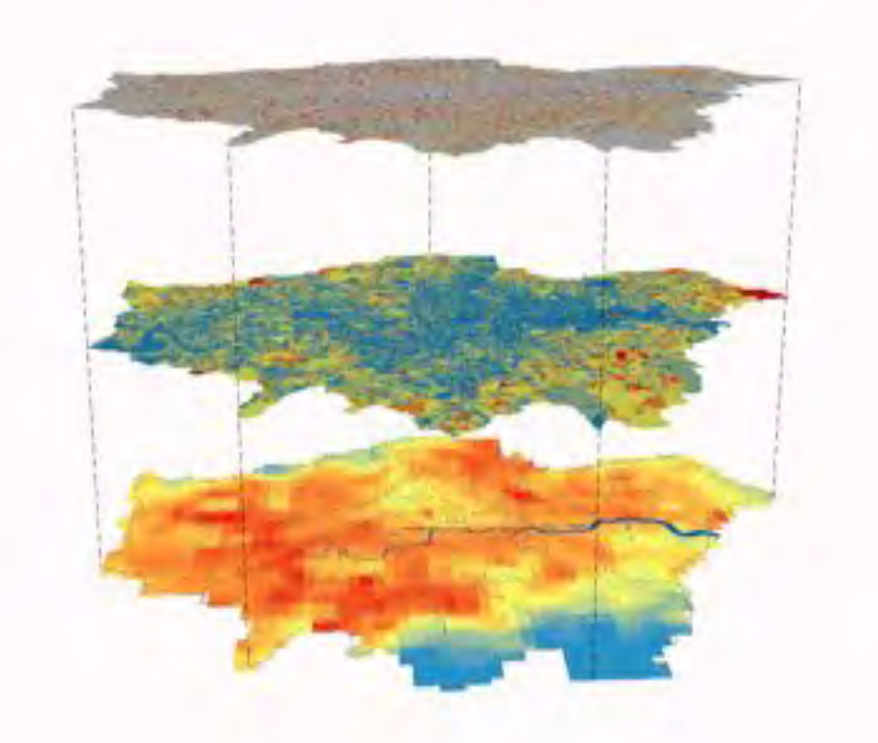
Eleni Oikonomou <**e.oikonomou@ucl.ac.uk**>

Thank you! Any questions?

Triple Heat Jeopardy Mapping project in Hounslow

Background

Triple Heat Jeopardy framework



Building characteristics

Population age

Urban heat island

Hounslow project

Early Career Researcher Placement funded by the **ARCC Network** and supported by the **GLA** and **PHE**

Team: Jonathon Taylor, Clive Shrubsole, Anna Mavrogianni

Aim: To disseminate overheating research outcomes to external organisations and policymakers, and to cooperate with the London Borough of Hounslow to provide modelled overheating risk data at building and address level that could be integrated into their existing emergency management systems.

Main project deliverables

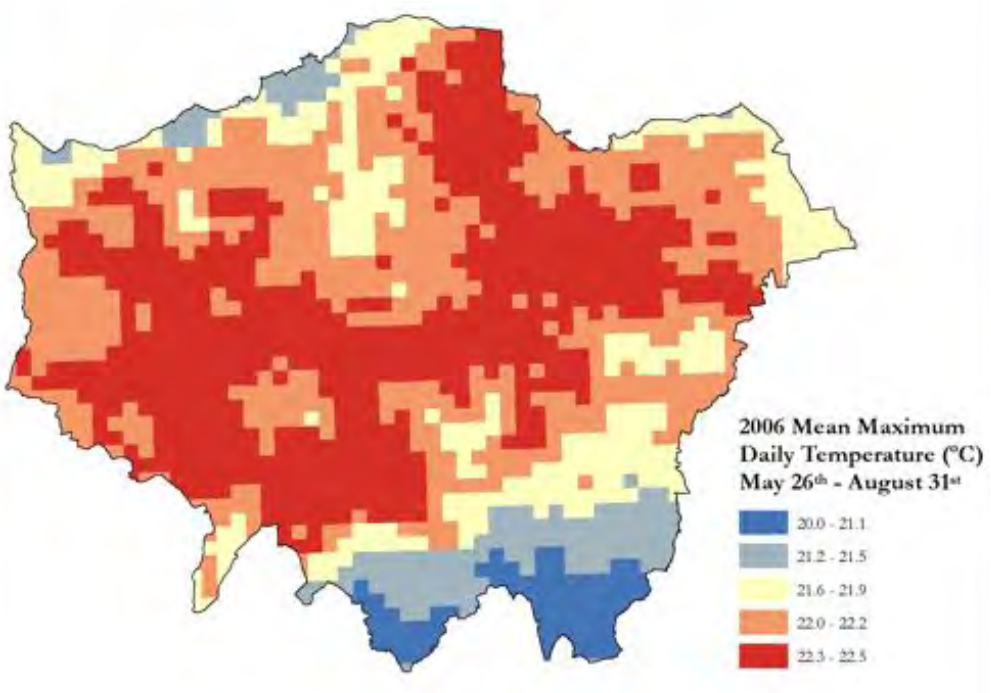
Using the latest **UCL dwelling overheating model**, indoor temperature risks at different outdoor temperatures were estimated for individual addresses in Hounslow. This allowed for the production of a number of visualisations that show the **2D and 3D spatial variation** in dwelling overheating risk and urban heat island temperatures during hot weather.

The modelled indoor temperature risk data was provided to Hounslow using two different building stock models as a basis, including:

1. A dataset containing estimates of relative overheating risk which could be linked directly to buildings based on an Ordnance Survey Unique Property Reference Number, using the Verisk Build Class dataset as a basis, or
2. A more refined estimate of indoor temperatures at individual address level, which would be possible to link with existing Hounslow datasets based on the physical address using a semi-automated matching procedure, derived using Hounslow Energy Performance Certificate (EPC) data.

Data layers

1. Urban heat island
(modelled outdoor temperature, EPSRC LUCID LondUM model)



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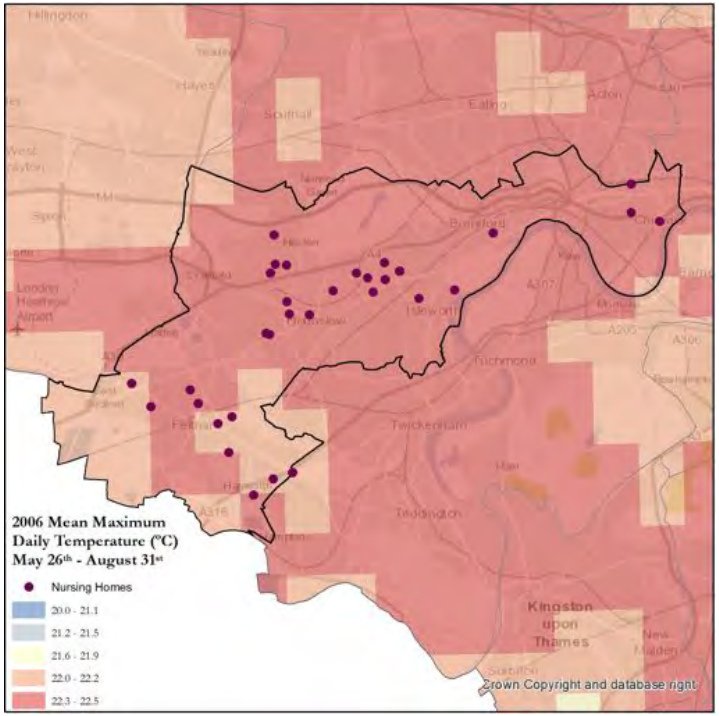
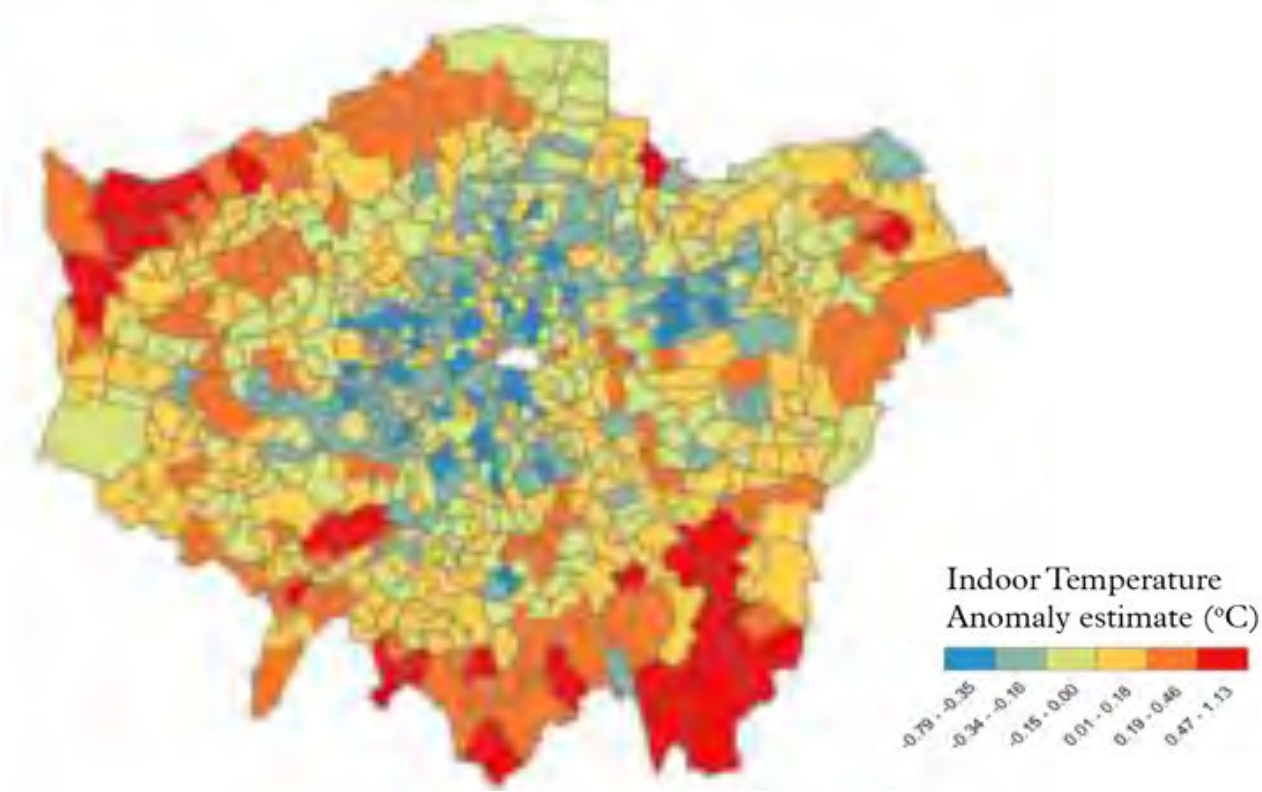


Data layers

2. Building characteristics
(indoor temperature, NERC AWESOME and NIHR HPRU housing stock model)



Data layers

2. Building characteristics
(indoor temperature, NERC AWESOME and NIHR HPRU housing stock model)

Indoor Temperature Anomaly estimate (°C) for a 2-day period with rolling Mean Maximum External Temperature of 28 °C (hotter buildings are highlighted with red colour)

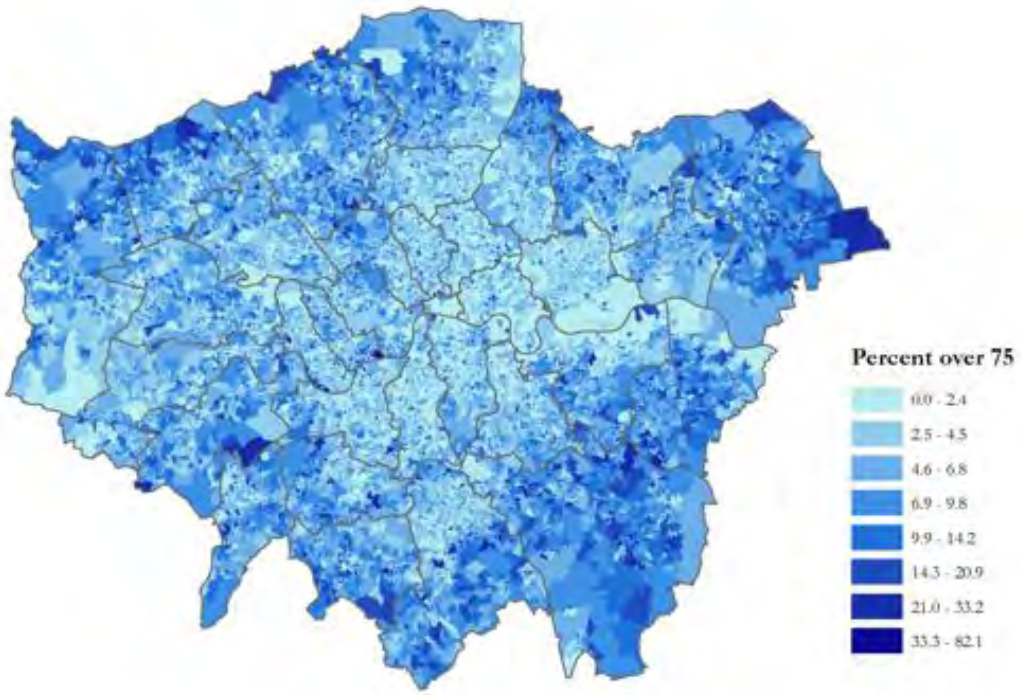
Data layers

2. Building characteristics
(indoor temperature, NERC AWESOME and NIHR HPRU housing stock model)

Daily Mean Maximum Indoor Temperature (°C) for individual dwellings from May 26th to August 31st 2006 taking into account urban heat island effects

Data layers

3. Population age
(Census 2011 data)



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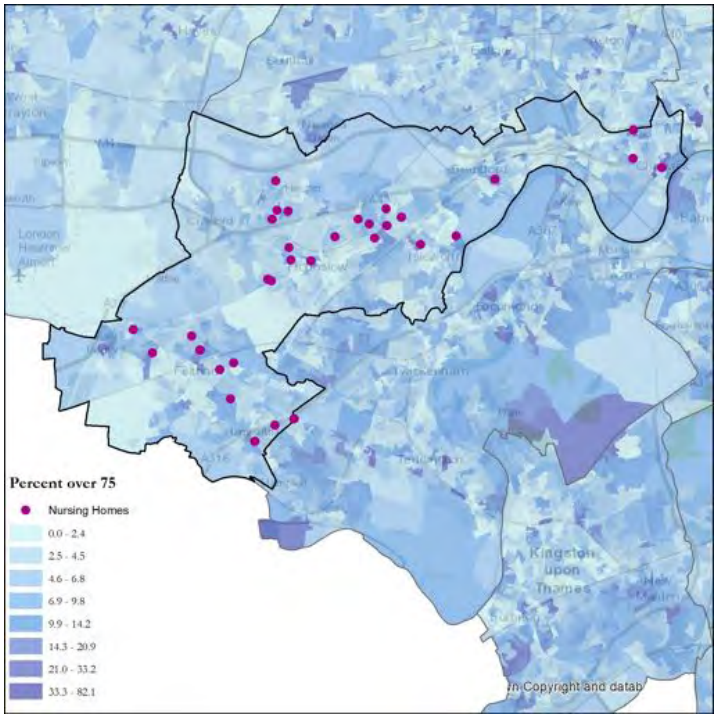


Prototype tool

A screenshot of the heat mortality dashboard, taken during a period of hot weather. The values in the bar chart are holding values.

A prototype tool was developed and demonstrated that used real time historical, current, and forecast weather data to estimate individual dwelling overheating risks and heat related mortality in Hounslow and across London.

Lessons learnt

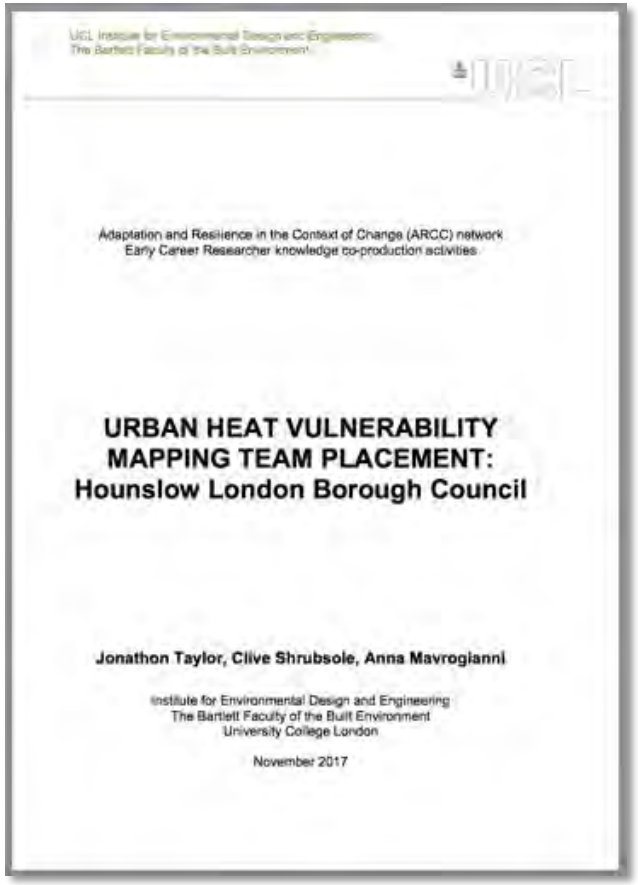
The project served as a **valuable collaborative experience**, and provides a good basis for **ongoing cooperation** between academics at UCL and public bodies to operationalise research outputs. The following lessons were learnt during the proccess:

- **Input from a wider range of stakeholders** would have helped. Despite enthusiasm and a desire to improve public health in the Borough, there was a lack of resources within the team leading to some delay in the delivery of communications and project outcomes.
- The **involvement of PHE as stakeholders**, and their existing familiarity with Hounslow Council, meant that UCL were able to quickly establish credibility with Hounslow, and generate interest from multiple departments (Emergency Planning and Housing).
- UCL now has an **understanding of the databases and GIS tools** held within the Borough of Hounslow, and can generate dwelling and urban heat island outputs that can be integrated into existing systems. However, the population vulnerability data is held in separate datasets in Hounslow, and it is unclear whether these might be linked in a single system.

Lessons learnt

- **Time pressures** meant that Hounslow had little resources to dedicate to this project. Events, such as the Grenfell Tower tragedy towards the end of the project, meant that even fewer resources were available. Therefore, the scheduling of future projects should recognise that such collaborations are secondary to the day-to-day operations of the Borough staff.
- Dwelling overheating and UHI exposures were produced at the individual building or address level for Hounslow. Developing **semi-automated address matching** methods or utilising an Application Programming Interface (API) to geolocate EPC addresses would be useful in the future.

Final report



Adaptation and Resilience in the Context of Change (ARCC) network
Early Career Researcher knowledge co-production activities

URBAN HEAT VULNERABILITY MAPPING TEAM PLACEMENT: Hounslow London Borough Council

Jonathon Taylor, Clive Shrubsole, Anna Mavrogianni

Institute for Environmental Design and Engineering
The Bartlett Faculty of the Built Environment
University College London

November 2017

The **final report** is available to download from the ARCC website.

Thank you! Any questions?