
A hand holding a pen over a cityscape, with a circular overlay containing text. The background is a grayscale image of a city skyline, featuring prominent buildings like the Shard and the Gherkin. A hand in a blue sleeve is holding a silver pen, with the tip of the pen pointing towards the center of the image. A large, semi-transparent white circle is overlaid on the left side of the image, containing the main title and a horizontal line.

Session 2 : New generations of tools for the public good

Chaired by Miranda Sharp
Innovation Director, Ordnance
Survey

CITY INTELLIGENCE

GREATERLONDONAUTHORITY

A hand holding a pen over a city map, with a circular overlay containing text. The background is a faded image of a city skyline, including the Shard and the Gherkin. The hand is holding a pen over a map of the city, with a circular overlay containing text.

Session 2 - 1 : Cultural Infrastructure Map

Shonagh Manson: Assistant Director for Culture and Creative Industries

Rachael Roe – Senior Policy Officer

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CULTURAL CONSUMPTION



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CULTURAL PRODUCTION



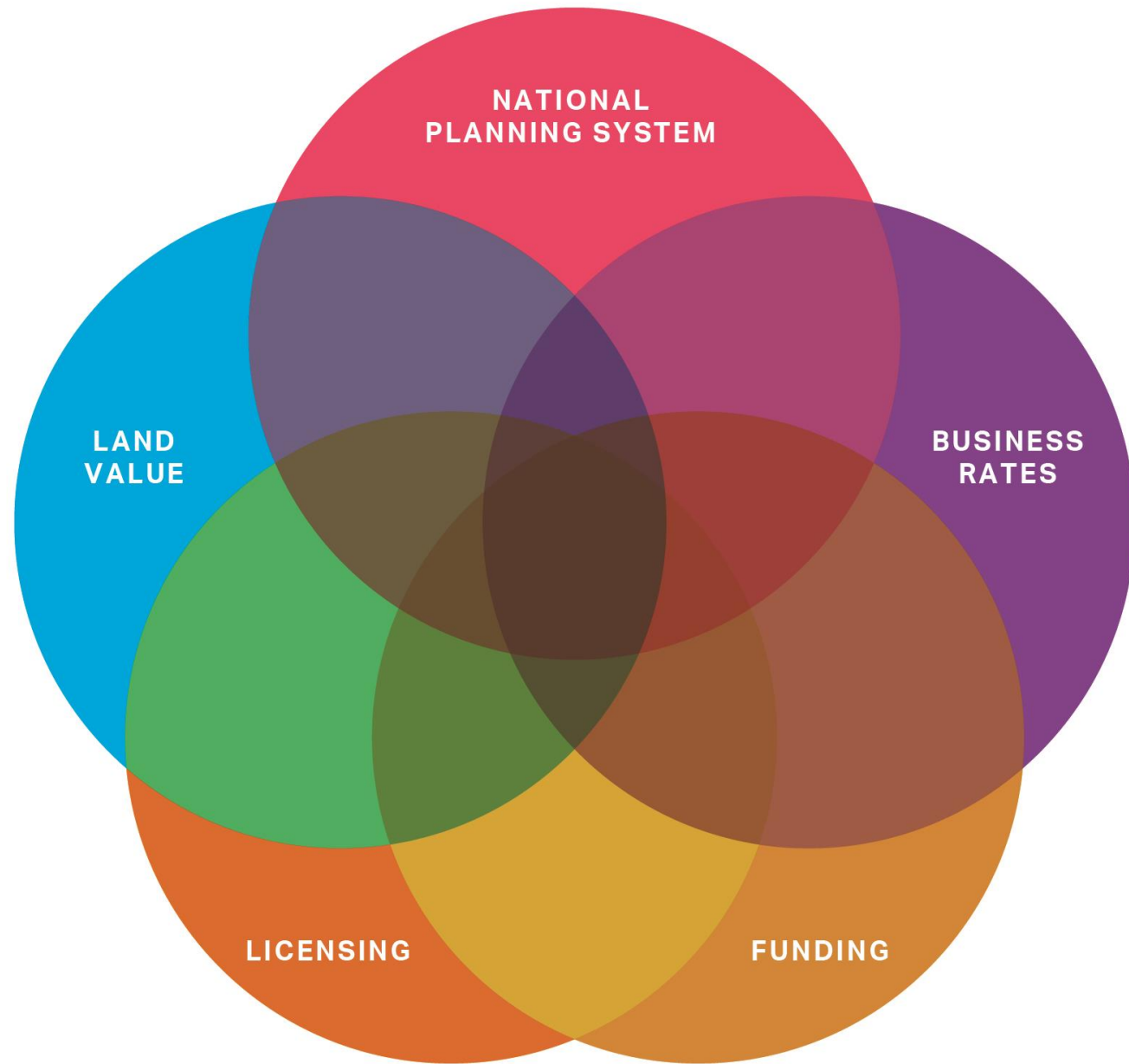
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HACKNEY WICK



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Fish Island Village

Europe's largest dedicated campus for emerging fashion

Plus low-cost studios for HWFI creative community

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The Trampery is a social enterprise supporting entrepreneurs from all backgrounds.
Delivered with support from the Mayor of London and European Regional Development Fund.

thetrampery.com
@thetrampery

- 50,000 square feet of studios across 11 buildings
- Onsite facilities for sampling and fabrication
- Free business support and training available from October 2018
- 25% of studios reserved for under-represented communities, including ethnic minorities and disabled people
- Studios start at £25 a square foot including rent and service charge



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BRITISH
FASHION
COUNCIL



ual London College
of Fashion



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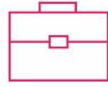
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**Cultural
Infrastructure
Plan**

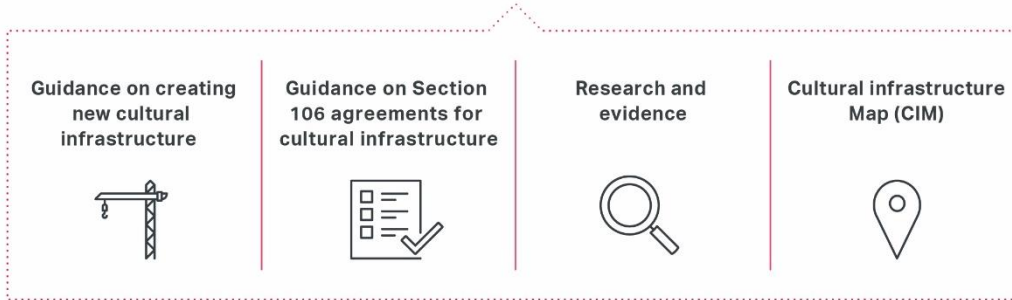
A CALL TO ACTION

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What the Mayor is doing



Resources online toolbox



- [culture](#)
- [theatre](#)
- [music](#)
- [galleries](#)
- [museums](#)
- [pubs](#)
- [communiy centres](#)
- [dance](#)
- [art](#)
- [arts](#)



index.html (2 kB)

[Preview](#)[Download](#)

Visit the Cultural Infrastructure Mapping tool



Data service (11.71 kB)

[Preview](#)[Download](#)

This is a link to the web mapping service that is used by the Cultural Infrastructure Map. It provides the most recent version of the data and supports queries of the data



Theatre (59.17 kB)

[Preview](#)[Download](#)

Buildings with 30 public performances per year.

How data was compiled: GLA commissioned research led by BOP in partnership with the Theatres Trust.

Credit for use: GLA and Theatres Trust



Theatre rehearsal studios (25.18 kB)

[Preview](#)[Download](#)

A building which has a studio which is used by the theatre sector, or a facility which has been appropriated for use by performers and is recognised as an appropriate rehearsal facility which is publicly bookable in some way. Spaces within drama/dance/music schools are not included unless they are publicly bookable spaces.

How data was compiled: GLA commissioned research led by BOP. With thanks to Swain, Robert and Mansfield, Tom (2016): Birkbeck-Jerwood Space London Rehearsal Room Survey 2016.

Credit for use: GLA



Textiles design and finishing services (18.13 kB)

[Preview](#)[Download](#)

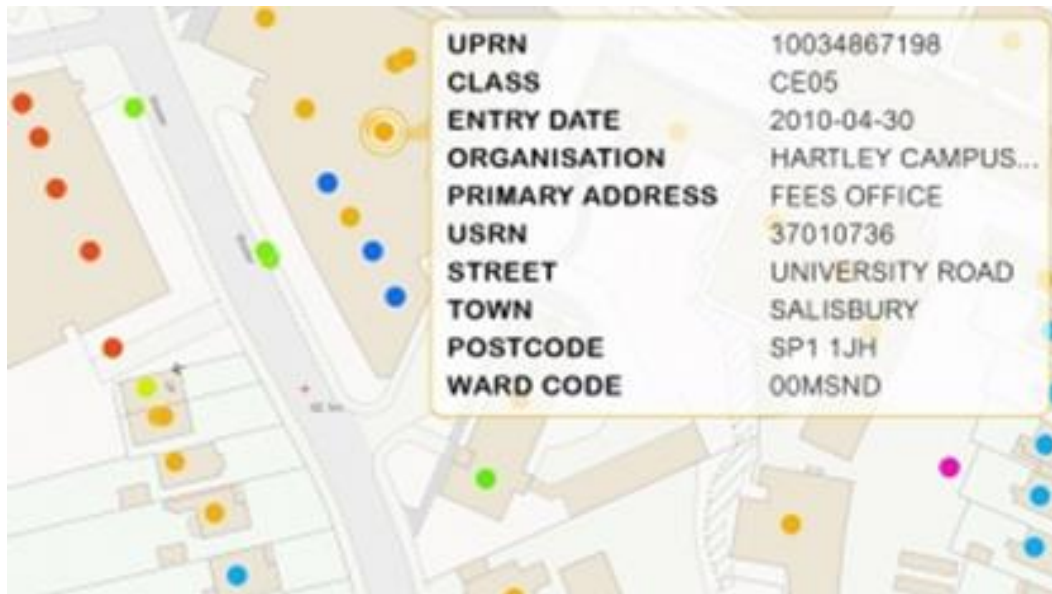
Buildings where businesses that provide services to the fashion industry and other creative sectors, such as textile design, furniture, interiors, etc. Business activities include processes such as the printing and dyeing of textiles, embroidery, knitting, etc.

How data was compiled: GLA led

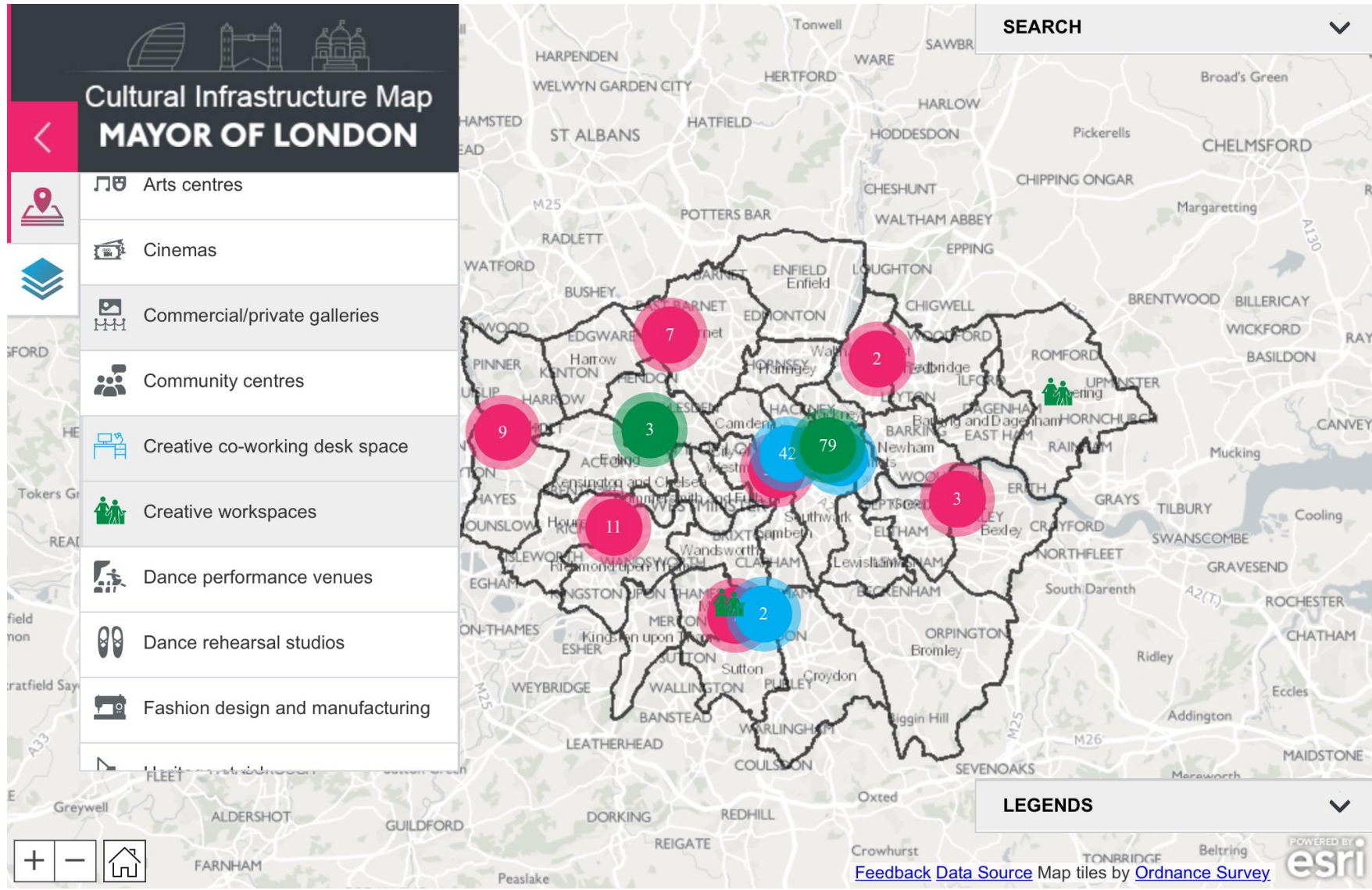
ORDNANCE SURVEY ADDRESSBASE



- ✓ Consistent national data set
- ✓ UPRNs are becoming a standard for linking data
- ✓ Building-level location



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Cultural Infrastructure Map
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Geographic boundaries

- GLA boundary
- London boroughs
- London wards
- LSOA (Lower Super Output Areas) 2011
- Urban villages

Transport

- ▶ Tube / Overground / Tram
- ▶ Elizabeth line (Crossrail)
- ▶ Buses
- ▶ National rail
- ▶ Crossrail 2 - proposals
- Blue Ribbon Network
- Safeguarded wharves

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Cultural Infrastructure Map MAYOR OF LONDON

- Archives
- Artists workspaces
- Arts centres
- Cinemas
- Commercial/private galleries
- Community centres
- Creative co-working desk space
- Creative workspaces
- Dance performance venues

The map displays the City of London with various cultural infrastructure points. Three specific points are highlighted with pink circles and numbers: a '2' near Barbican, a '3' near St Luke's, and a '5' near Old Street. Other points are marked with red icons representing different facility types.

SEARCH

Borough
-Select Borough-

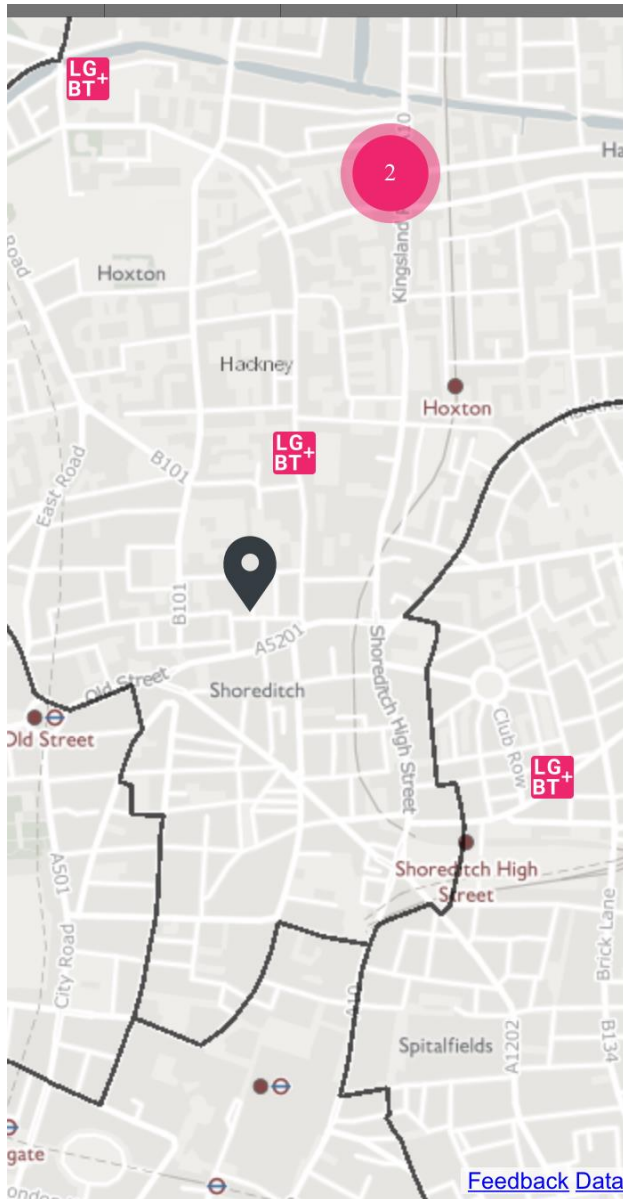
Ward
-Select Ward-

Suggest a facility


The bar chart displays two categories. The first bar has a total height of 3, composed of a green segment (1), a red segment (2), and an orange segment (1). The second bar has a total height of 4, composed of a red segment (3) and a pink segment (1). The y-axis ranges from 1 to 4.


Feedback Data Source Map tiles by [Ordnance Survey](#) POWERED BY


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Click on the map where you want to add the venue

2 Hoxton Square, London, Englar 

LGBT+ night time venues 

Venue Operator 



rachael.roe@london.gov.uk


Colours Horton


Hoxton Square

N1 6

New venue

LEGENDS 

Feedback Data Source Map tiles by [Ordnance Survey](#) 

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MUSIC

Live music venues in London increase in number after decade of decline

SOPHIA SLEIGH

Tuesday 16 July 2019 10:30



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GO LONDON newsletter

Your guide to what's hot in London

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More **music venues** are opening in London after nearly a decade of decline, according to figures released today.

From 2007 to 2016, the number of “grassroots” spaces fell by a third from 144 to 94. High-profile losses included the Astoria in **Soho** and the Elephant and Castle Coronet.

Within the last year, though, the number has risen by six per cent — from 94

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ARTISTS

DISCOVER SPACES

tutti

HOSTS

LIST YOUR SPACE



**Find the Perfect Creative
Space.**



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SUPPORTING THE DEVELOPMENT OF PLANNING POLICY AND IMPLEMENTATION

Boroughs are encouraged to develop an understanding of the existing cultural offer in their areas, evaluate what is unique or important to residents, workers and visitors and develop policies to protect those cultural assets.

Draft New London Plan Policy HC5

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USEFUL LINKS

Data store


<https://data.london.gov.uk/dataset/cultural-infrastructure-map>

Cultural infrastructure plan

www.london.gov.uk/cultural-infrastructure-plan

Cultural Infrastructure Map

www.London.gov.uk/cultural-infrastructure-map

A hand in a blue shirt sleeve holds a silver pen, pointing it towards a cityscape. A large, semi-transparent white circle is overlaid on the left side of the image, containing the main title and speaker information. The background is a grayscale cityscape of London, featuring prominent buildings like The Shard and the Gherkin.

Session 2 - 2 : Sustainable Energy Management Systems

Paul Hodgson: Senior Manager –
City Data

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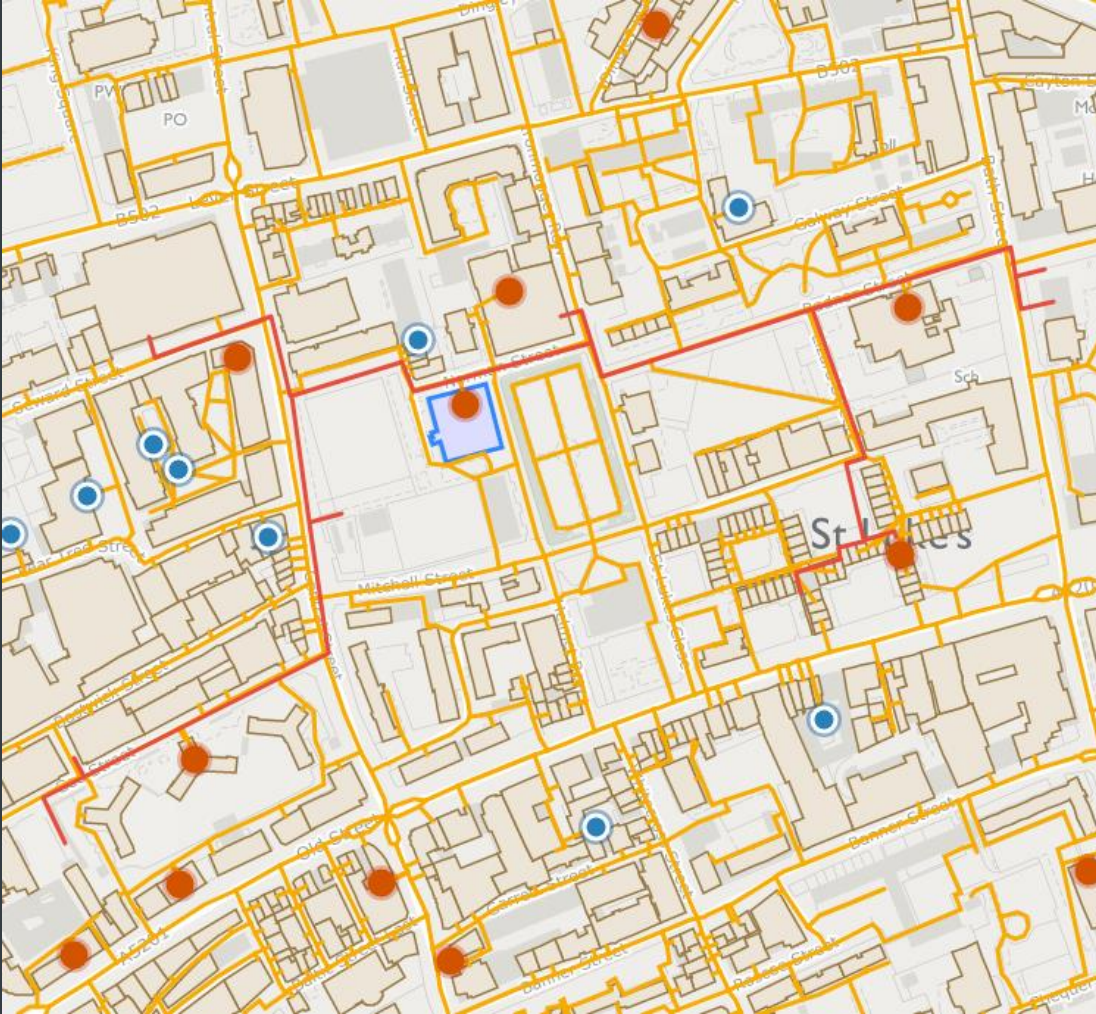
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The changing heat & power landscape



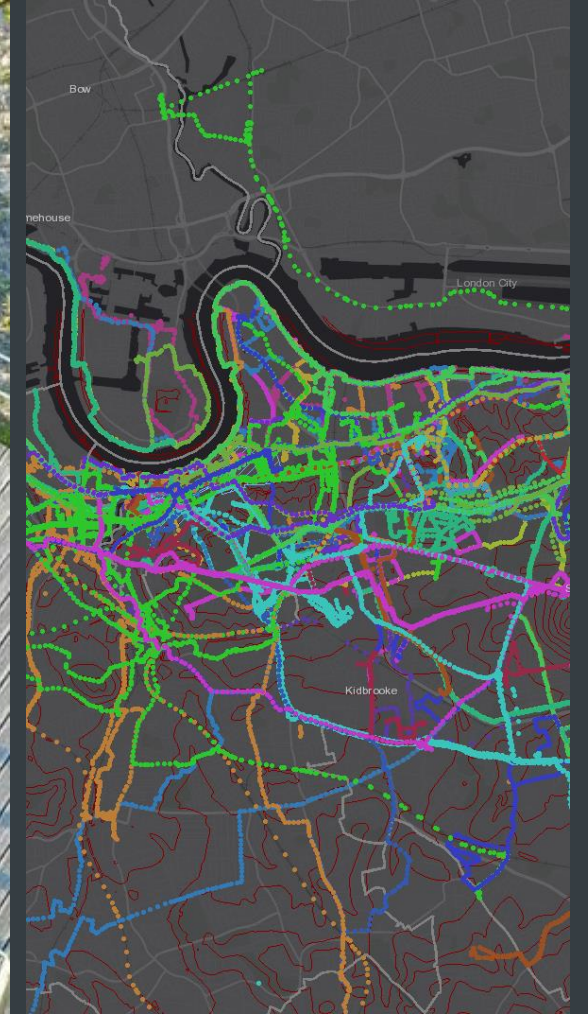
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Maturing technologies



- New types of production
 - Heat pumps
 - Wind, Solar, etc
- Local storage
- Local networks
- Advanced control

Sharing Cities



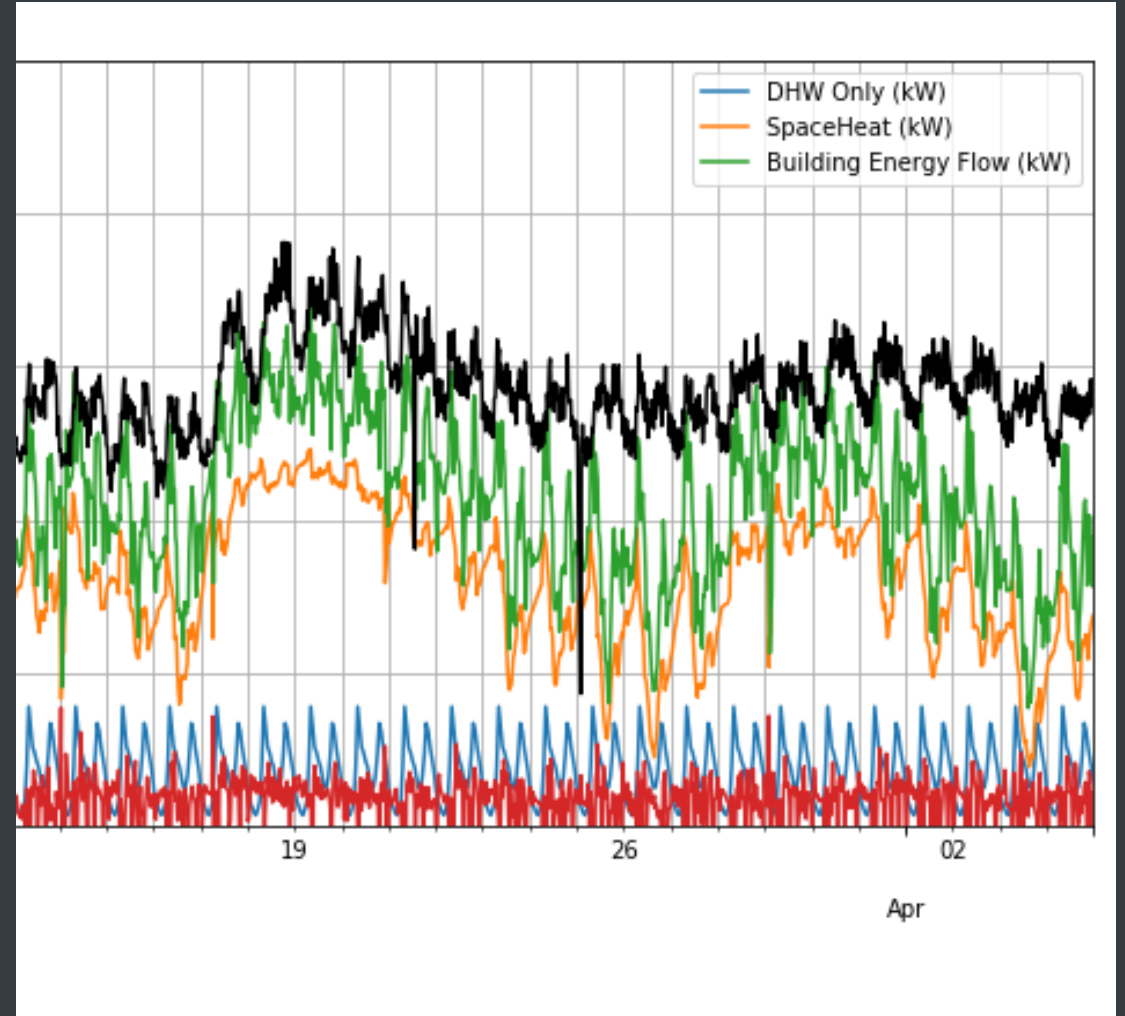
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Greenwich – Current situation

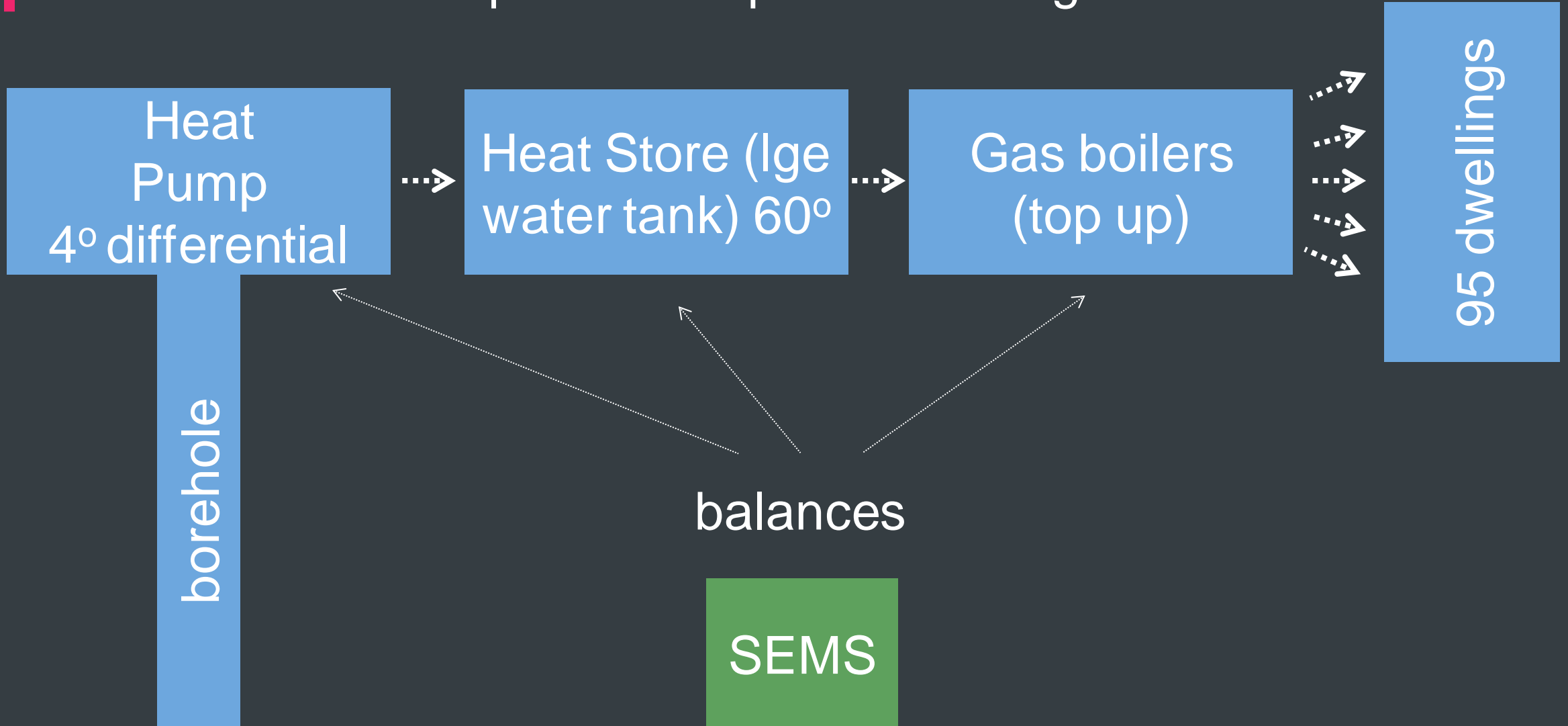


- Three gas boilers in continuous operation
- High uncontrolled heat losses > 33%
- No system controls or monitoring
- High annual costs £80,000/year
- High carbon emissions > 350t CO₂/yr
- Poor air quality

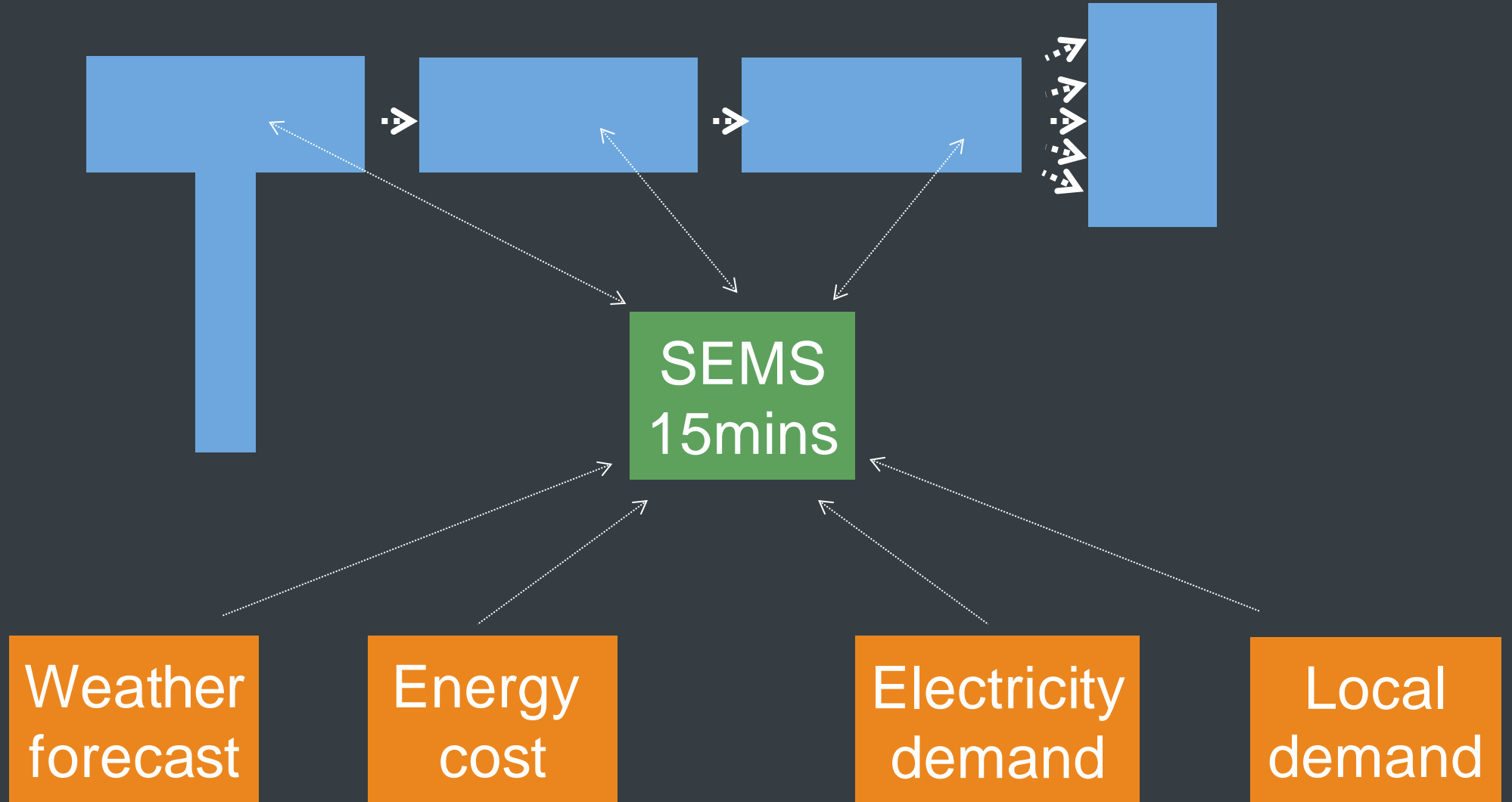
What is SEMs – Step 1: Digital Twin



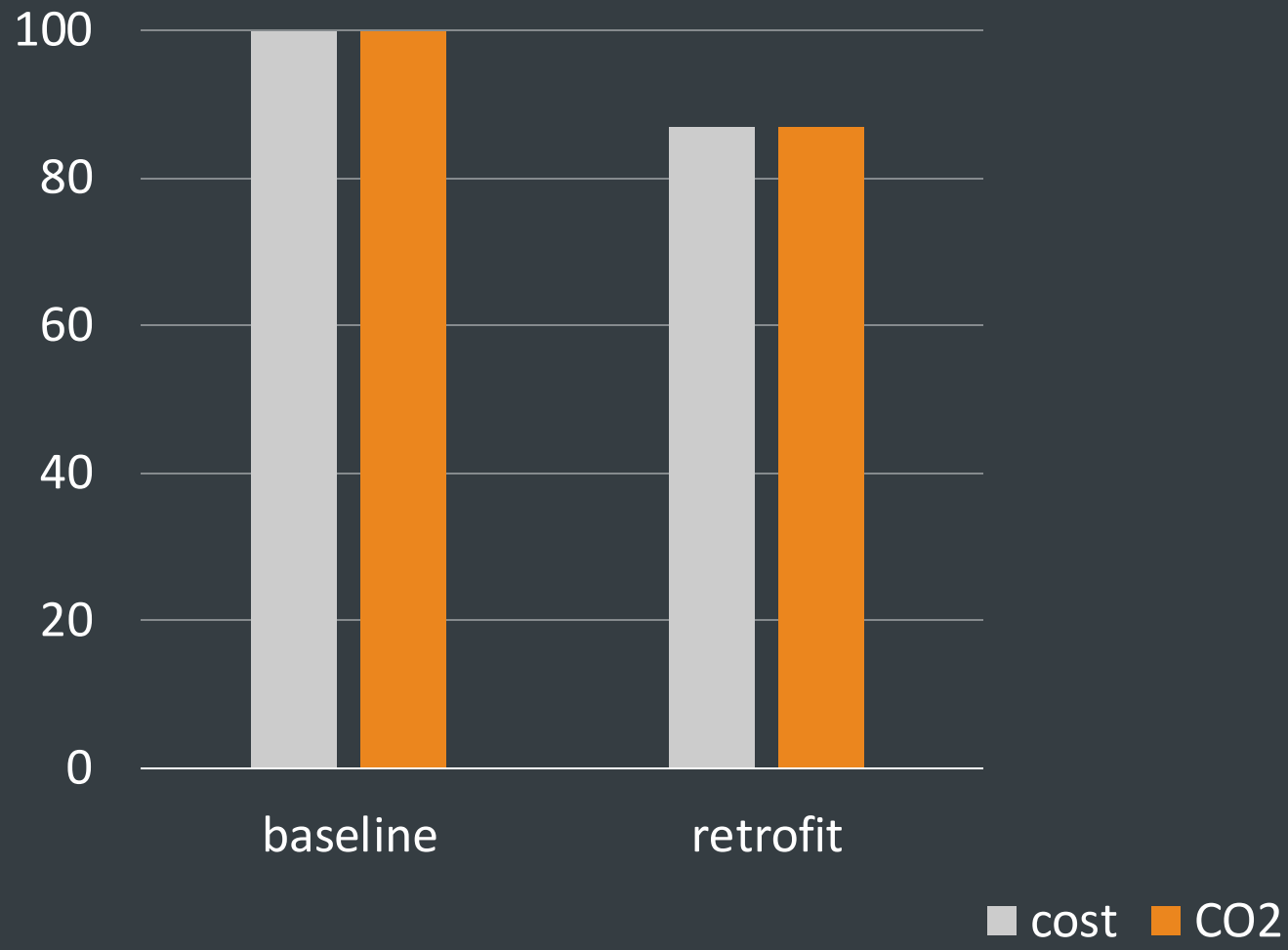
What is SEMs – Step 2: Build optimisation algorithms



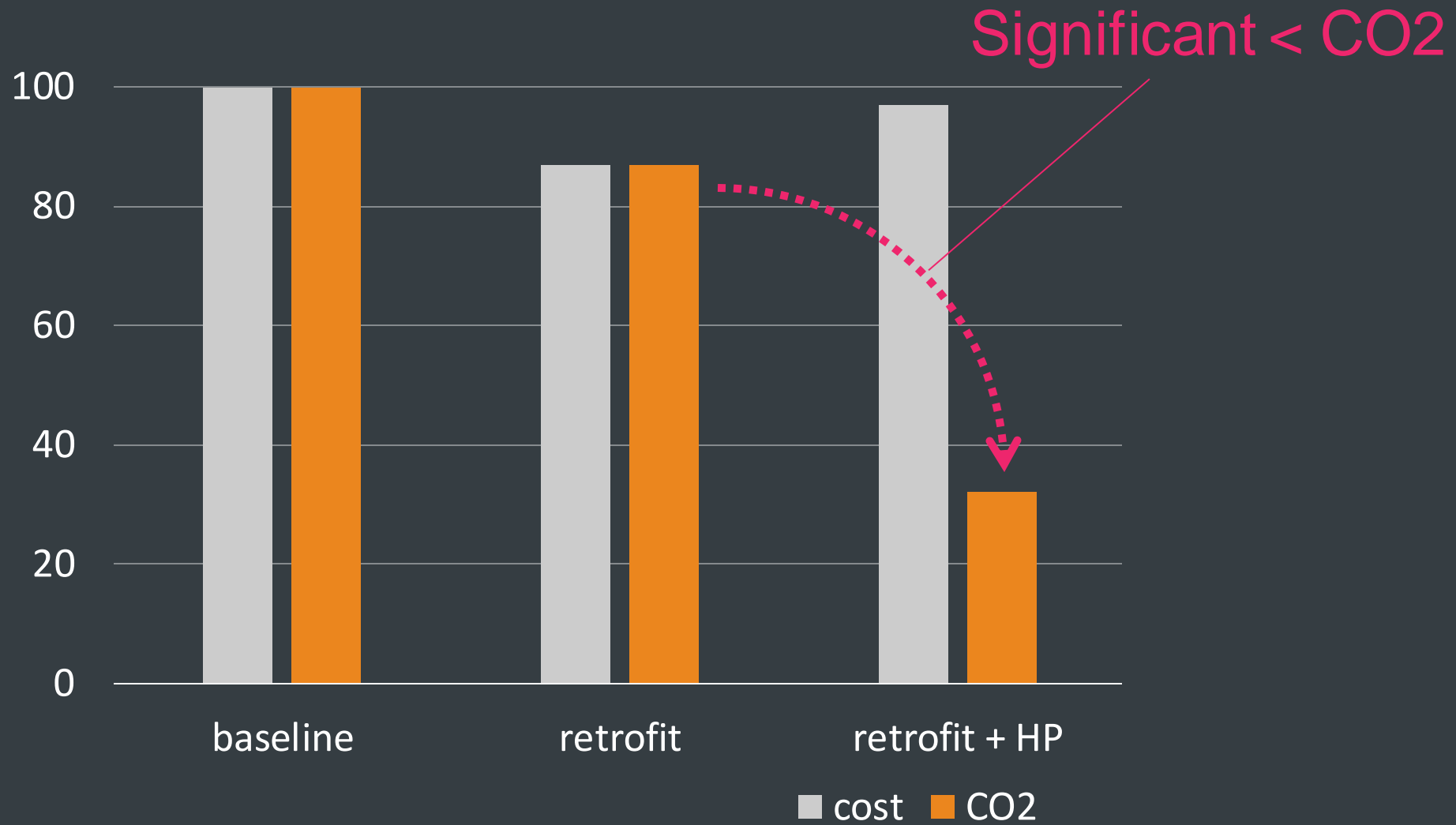
What is SEMs – Step 3: make suggestions to control system



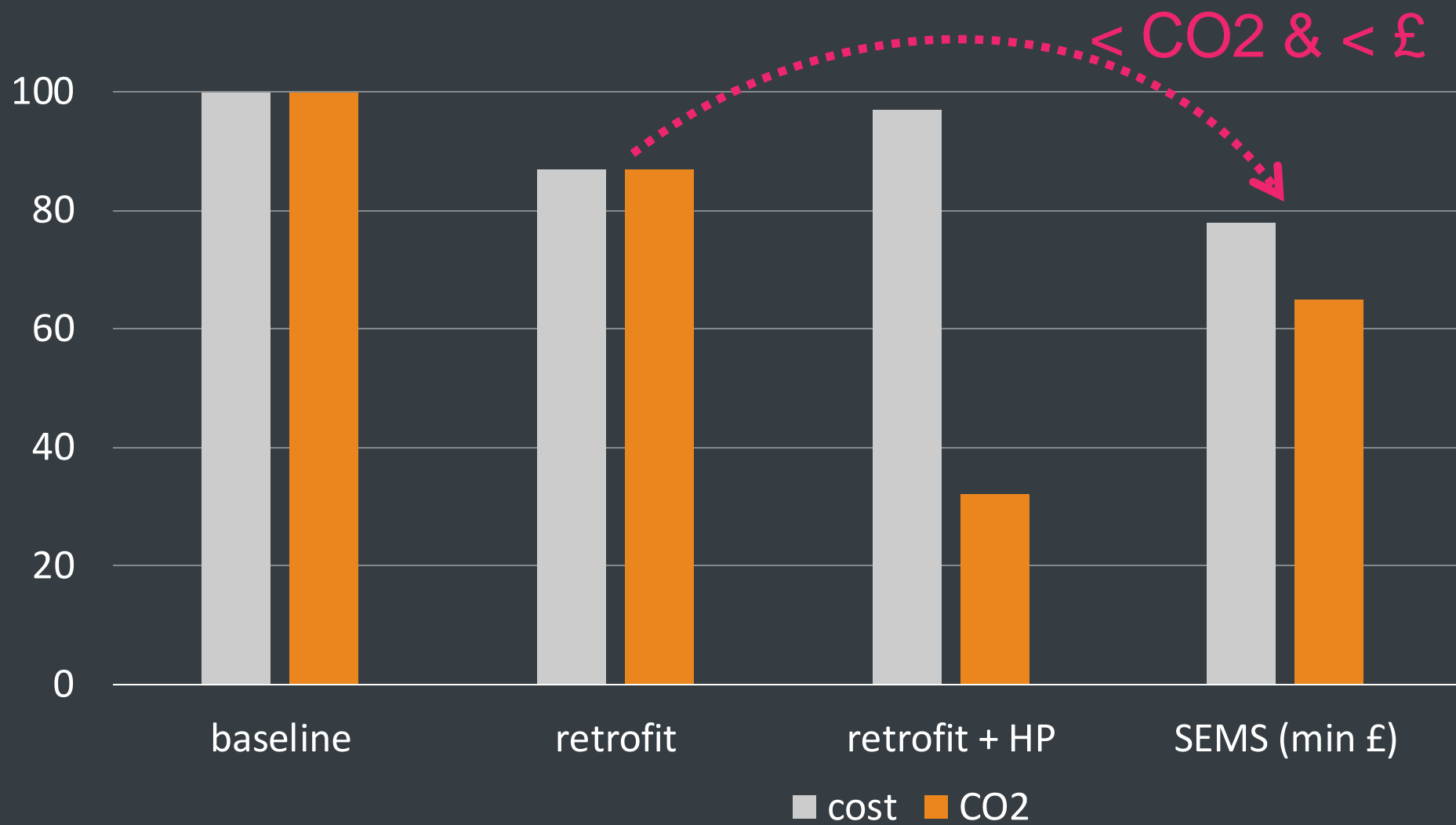
SEMS – potential savings



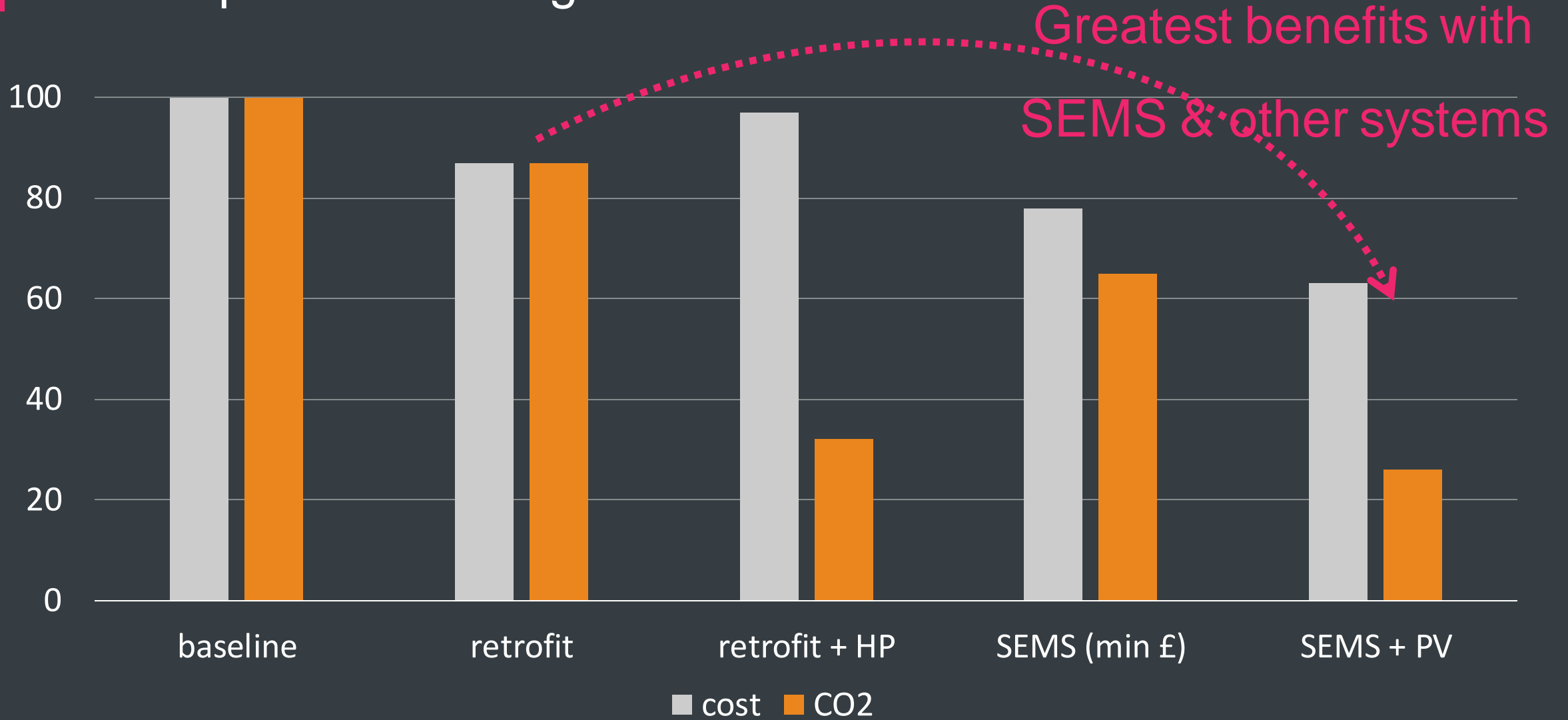
SEMS – potential savings



SEMS – potential savings



SEMS – potential savings

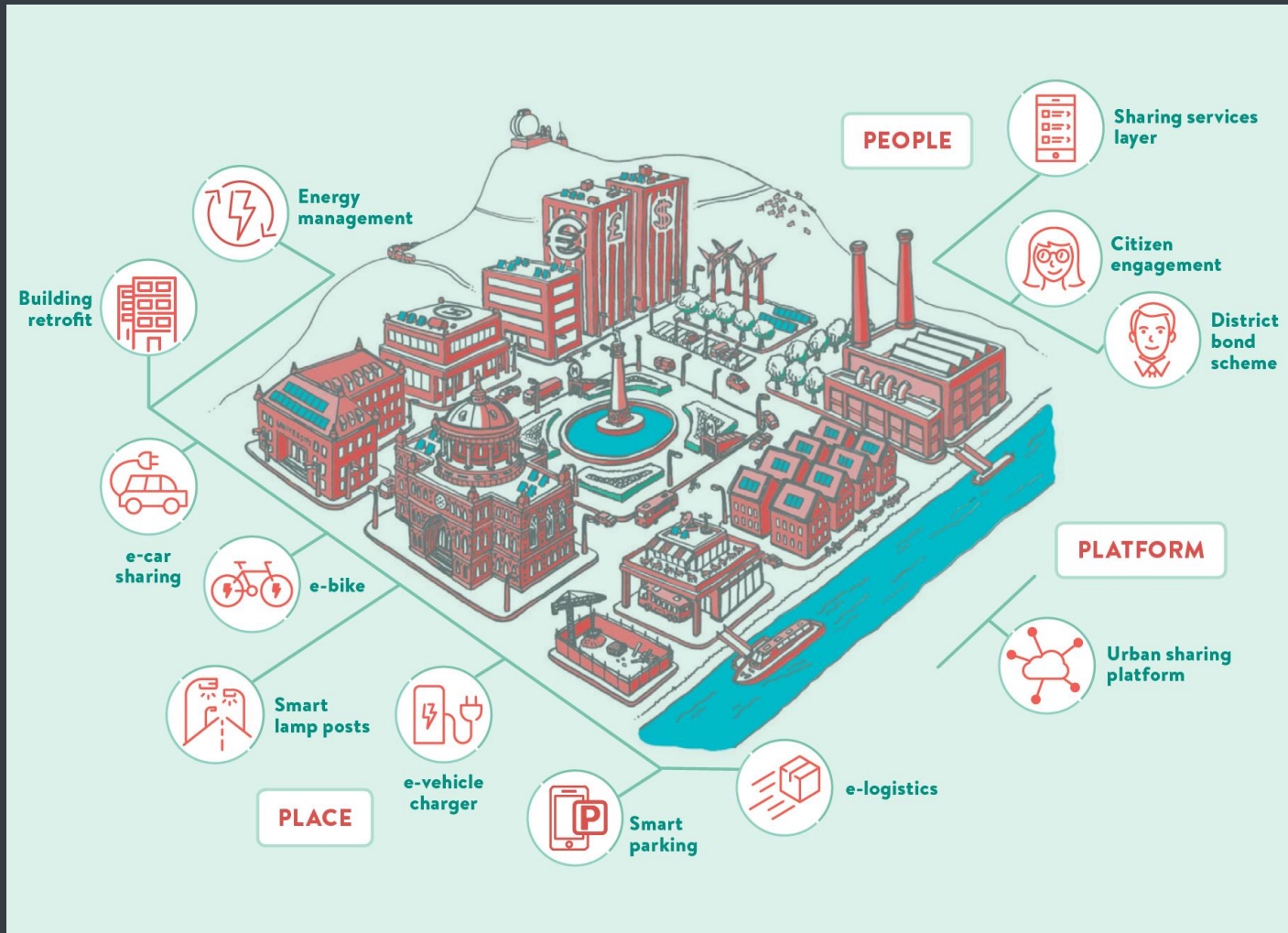


SEMS future potential




- Photovoltaics
- EV charging
- Plug demands
- Energy Aggregators

Lessons learnt



- The digital twin helped with designing the algorithms
- The real benefits from SEMS will come as we connect more systems

A hand holding a pen over a cityscape, with a circular overlay containing text.

Session 2 - 3 : Air Quality Modelling

Theo Damoulas

Deputy Director, Data-Centric Engineering,

Associate Professor, Depts. of Computer Science and Statistics,
University of Warwick

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Air Quality Modelling

@Turing

Theo Damoulas

Deputy Director, Data-Centric Engineering,
Associate Professor, Depts. of Computer Science and Statistics,
University of Warwick



London Air Quality project

<https://www.turing.ac.uk/research/research-projects/london-air-quality>

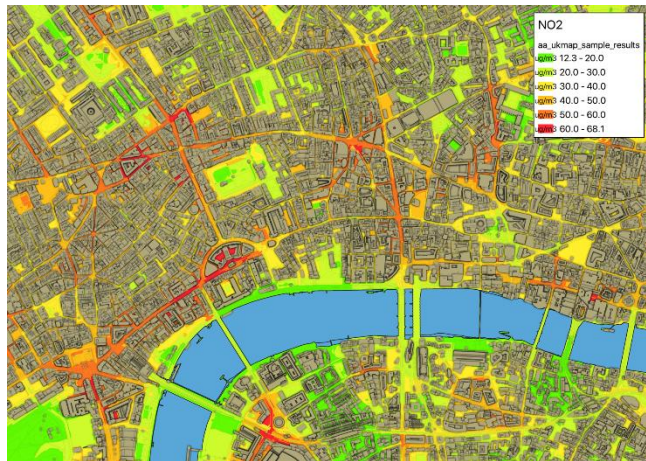
<https://www.turing.ac.uk/research/impact-stories/understanding-urban-air-quality>



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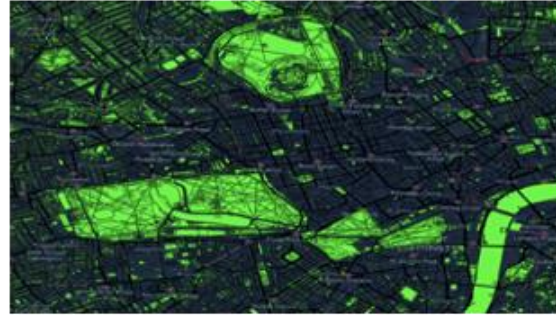
- Ensure data from a wide range of networks brought together to a single place for analysis
- Develop machine learning models from a range of quality of sensors
- Present best estimates and forecasts in a way app/web developers and citizens can use
- Accurately find and optimise low pollution routes when walking, running, or cycling



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- Data Driven
- Statistical ML
- Evidence integration
- Uncertainty

Parks



Road network



Land use



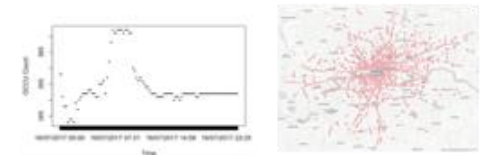
LAQN ~100 Ref. grade sensors



Diffusion Tubes ~1000 sensors



TfL SCOOT loop detectors



Breathe ~100 AQ Mesh sensors



Weather

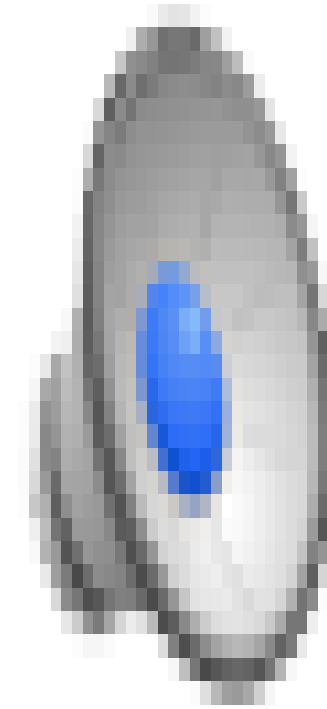
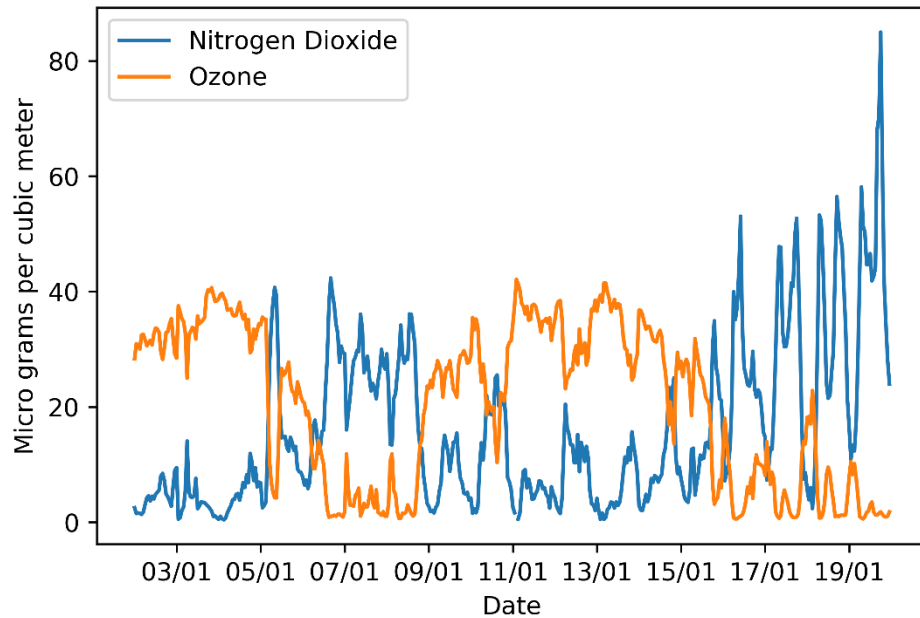


Waze incidents & Traffic



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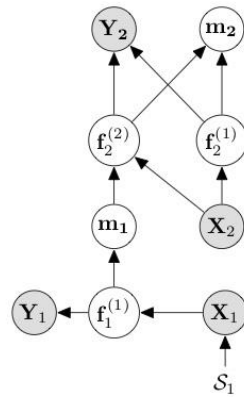
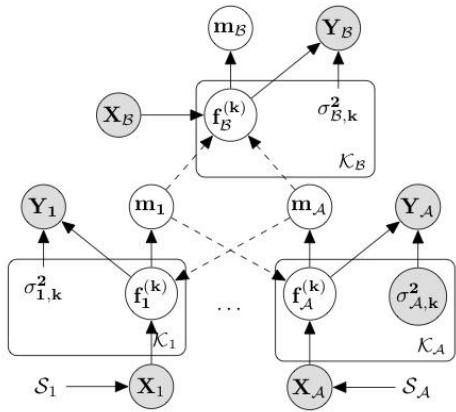
- Integrating ground and satellite data
- Multi-resolution sensor integration
- Multiple pollutants – Multitask learning
- Probabilistic deep learning models



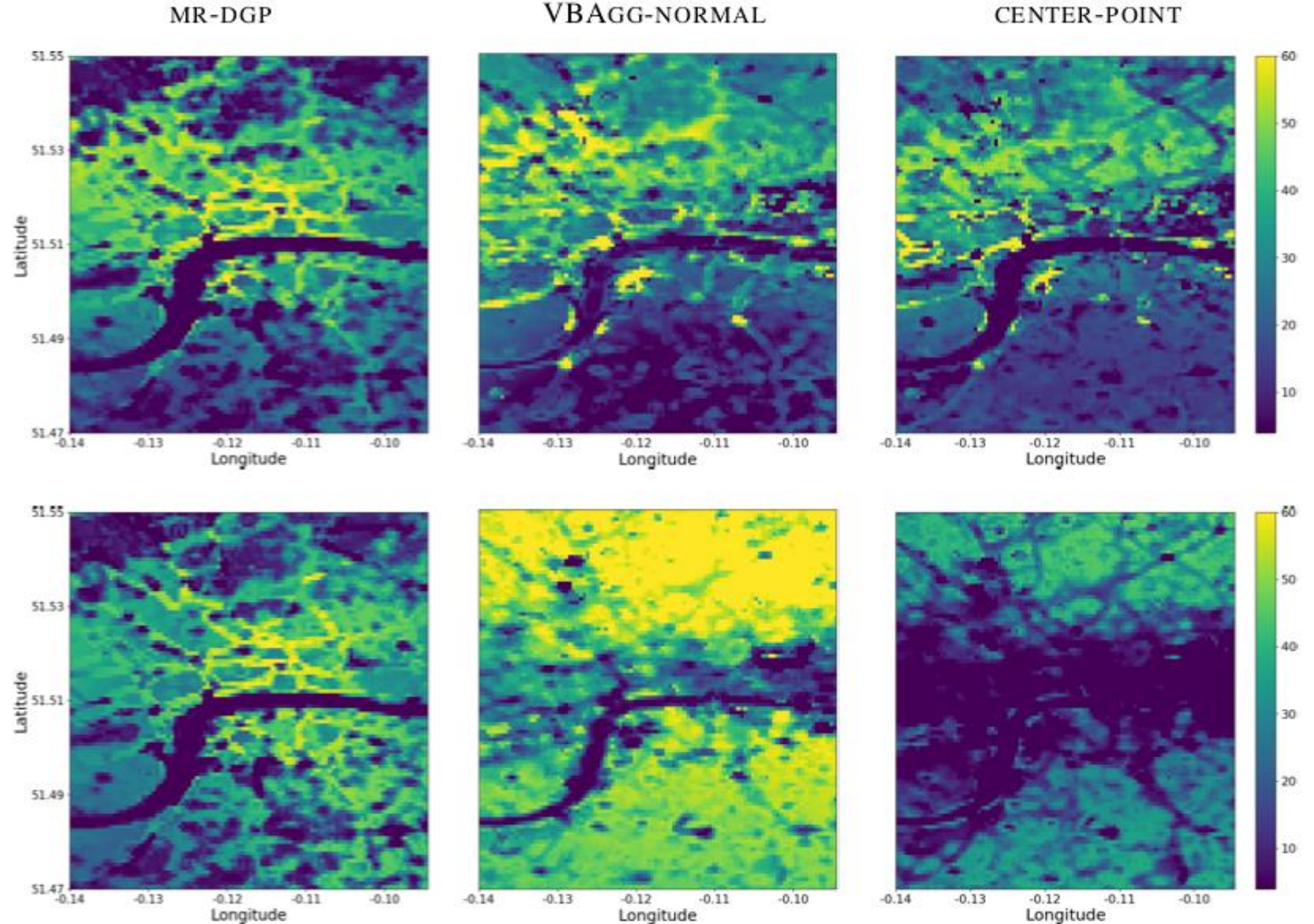
Multiresolution Multitask Learning

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- Evidence integration
- Multi-resolution capabilities
- In Space and Time
- Hourly hyper-local estimates



Published in top ML Conference NeurIPS 2019



Multiresolution Multitask Learning

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- State of the art performance
- Uncertainty quantification

Table 1: *Inter*-task multi-resolution. Missing data predictive MSE on PM25 from MR-GPRN, MR-DGP and baseline CENTER-POINT for 4 different aggregation levels of PM10. VBAGG-NORMAL is inapplicable in this experiment as it is a single-task approach and can be seen as a special case of MR-GPRN without composite weight corrections.

Model	PM10 Resolution			
	2 Hours	5 Hours	10 Hours	24
CENTER-POINT	12.72 ± 1.29	13.56 ± 1.88	14.99 ± 3.63	16.21 ± 2.54
MR-DGP	13.22 ± 0.89	13.24 ± 1.6	14.41 ± 1.42	14.59 ± 1.18
MR-GPRN	10.54 ± 1.15	10.21 ± 0.92	10.11 ± 1.13	10.17 ± 0.68

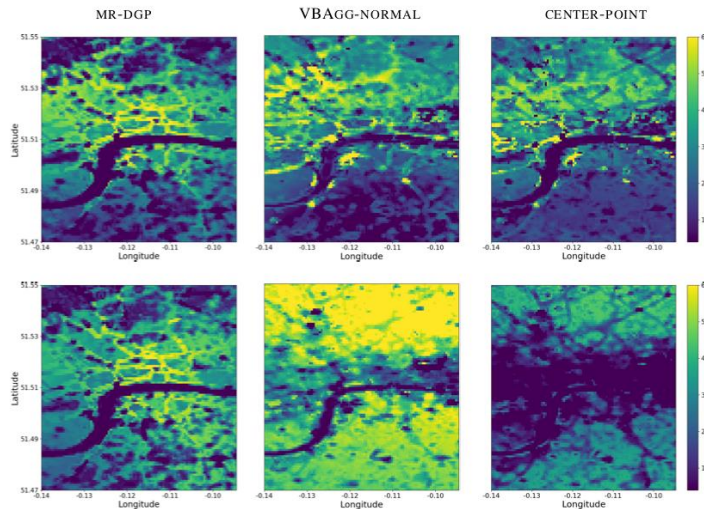


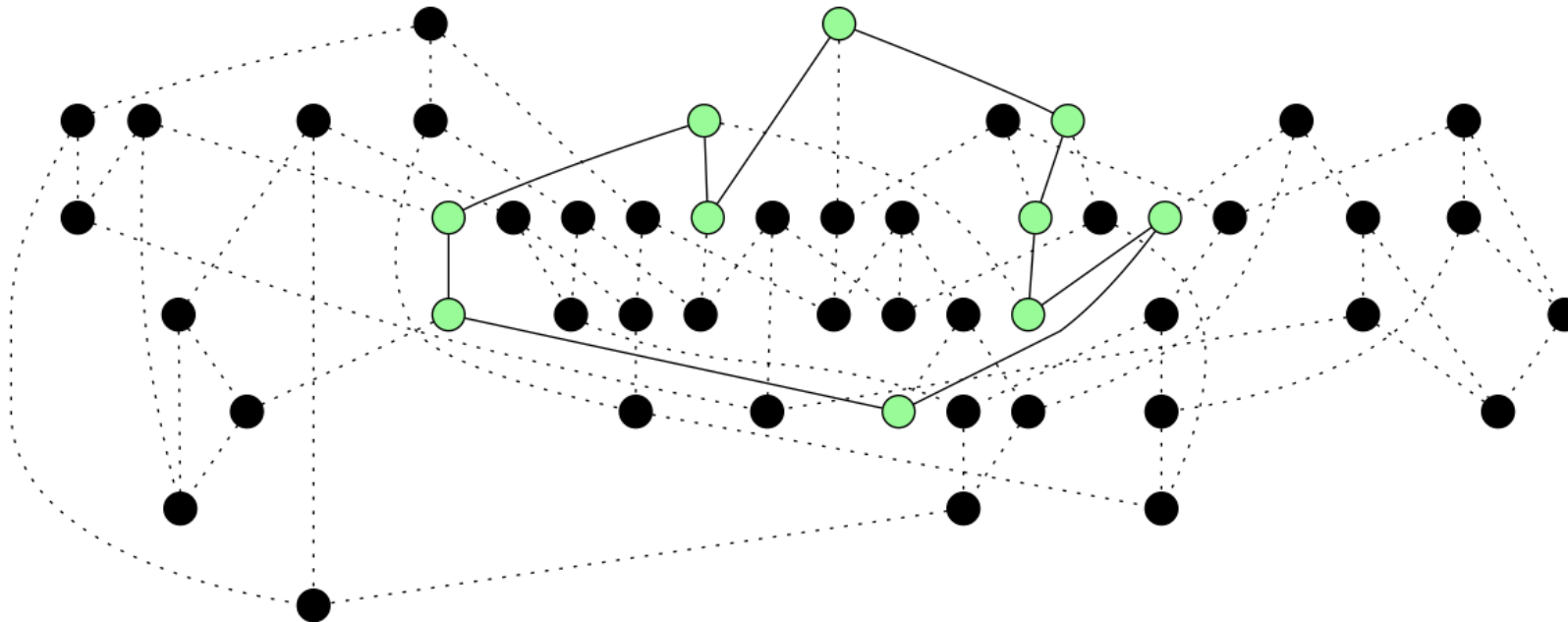
Table 2: *Intra*-task multi-resolution. **Left:** Predicting NO₂ across London (Fig. 4). **Right:** Synthetic experiment results (Fig. 2) with three observations processes and scaling bias.

Model	RMSE	MAPE	Model	RMSE	MAPE
CENTER-POINT	18.74 ± 12.65	0.65 ± 0.21	MR-CASCADE	1.61	5.87
VBAGG-NORMAL	15.98 ± 9.5	0.72 ± 0.47	VBAGG-NORMAL	1.8	2.53
MR-GPRN	12.95 ± 7.78	0.51 ± 0.33	MR-GPRN	1.68	2.96
MR-DGP	8.7 ± 5.51	0.36 ± 0.17	MR-DGP	0.3	3.83

Minimum Exposure Routing

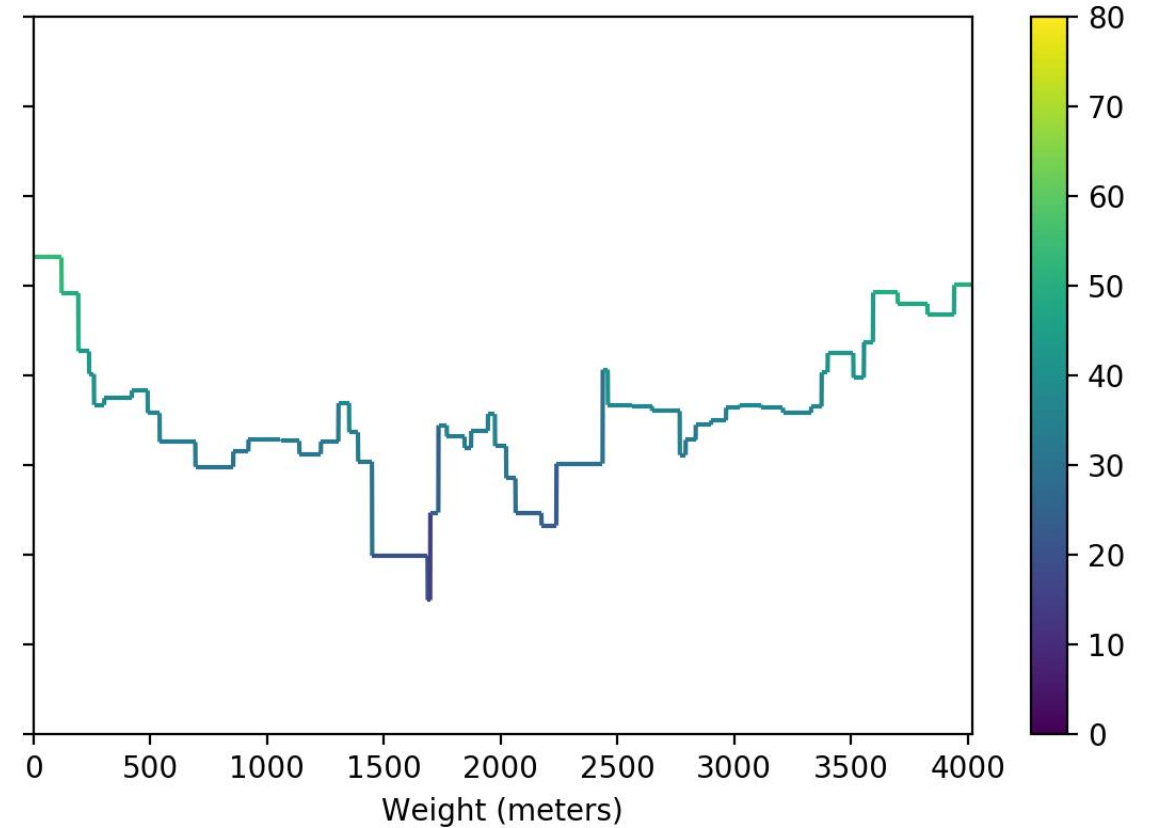
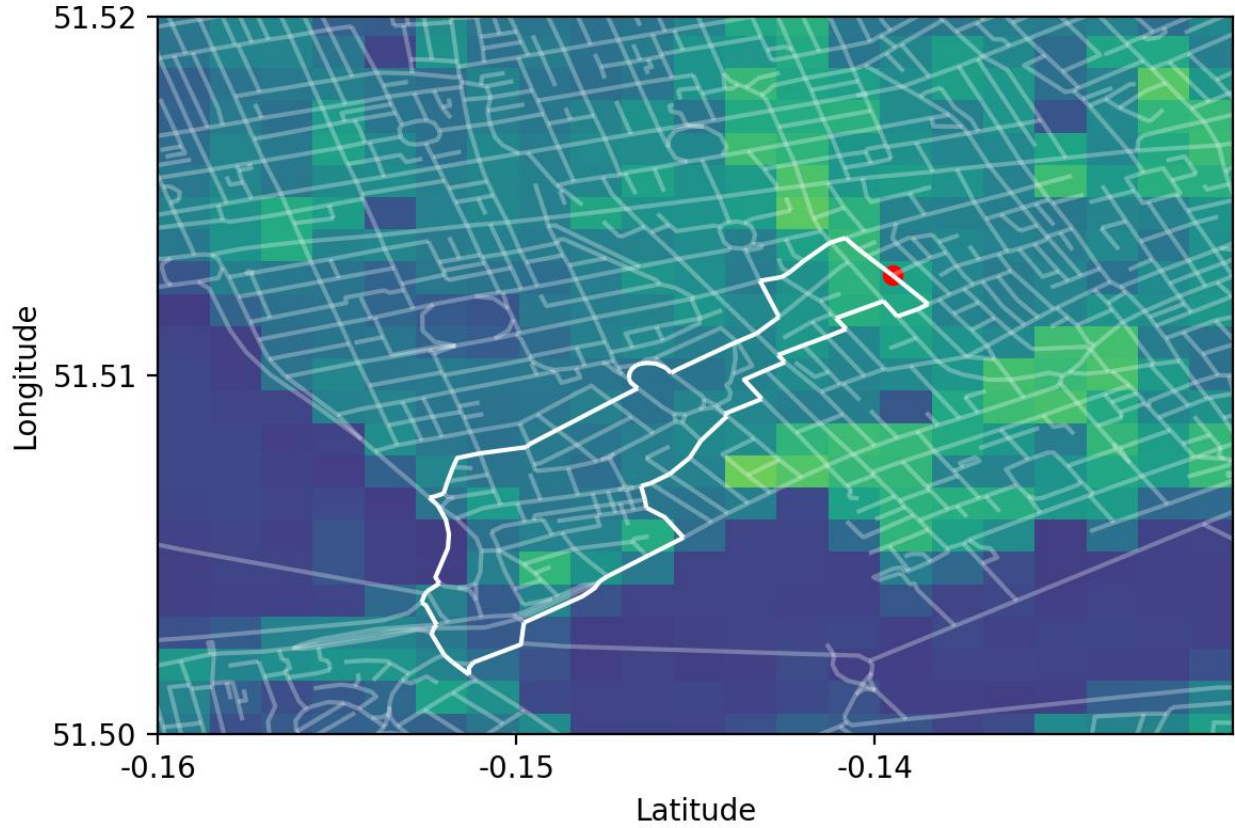
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- Graph Optimization
- Optimal routes
- Minimum exposure to APs



Minimum Exposure Routing

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Minimum Exposure Routing

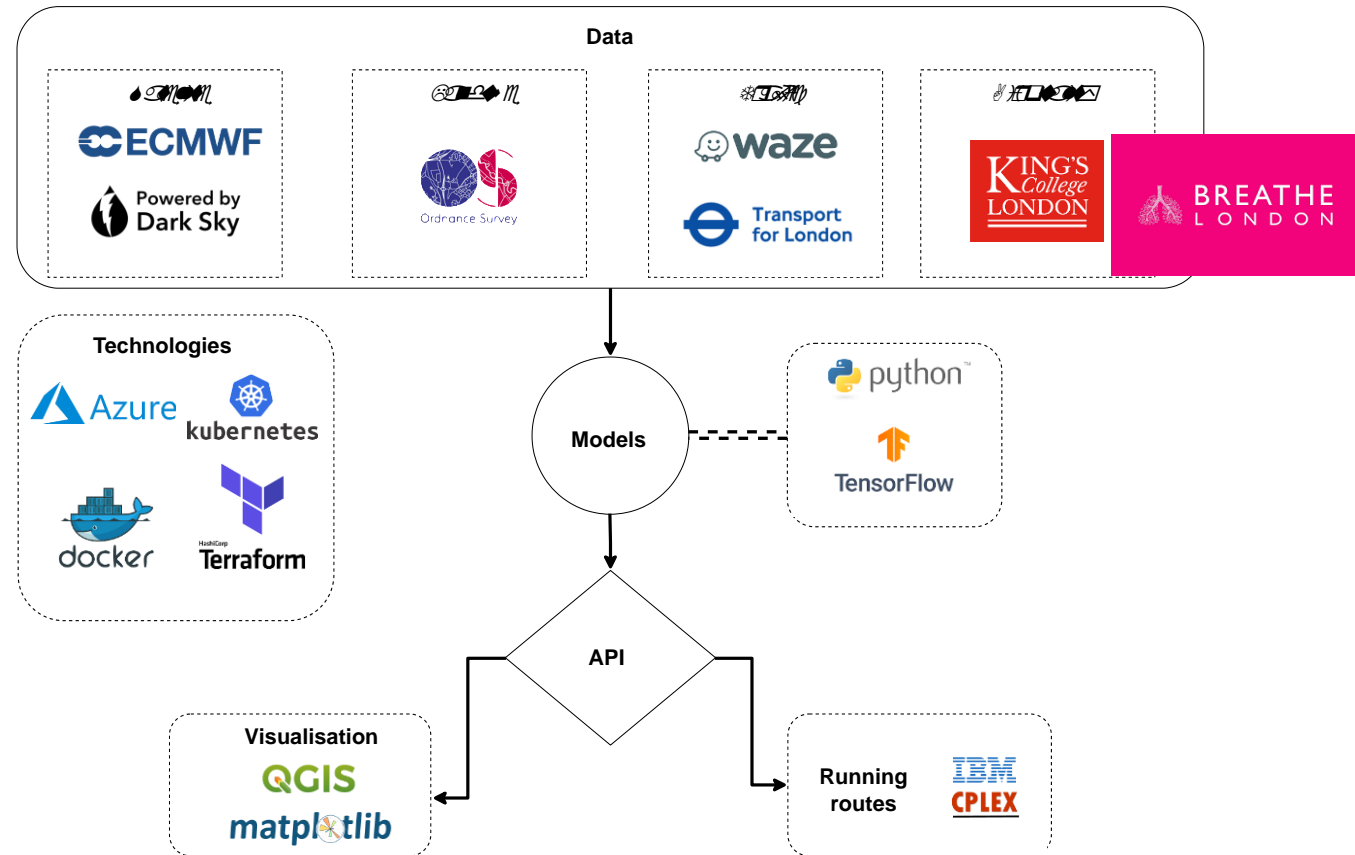
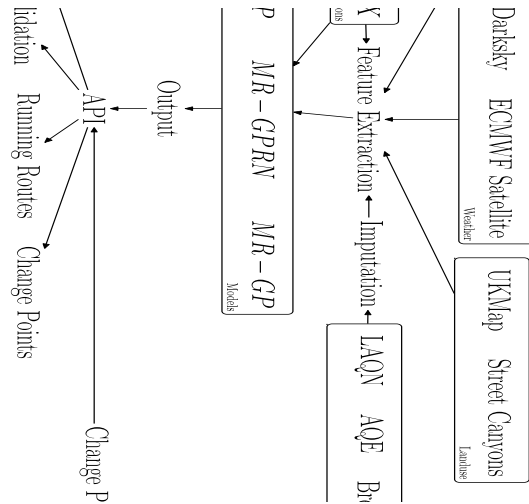
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- Hard computational problems
- APIs, Mobile apps
- Releasing in 2019-2020



Cross-city cloud-based system of ML algorithms and modelling

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Air Quality Modelling

@Turing

Thank you! Any questions?

London Air Quality project

<https://www.turing.ac.uk/research/research-projects/london-air-quality>

<https://www.turing.ac.uk/research/impact-stories/understanding-urban-air-quality>