

Decisions and Deserts: Tools to Help Cities Be Smart and Equitable

Results from the Spatial Inequality in the Smart City Project

Funded by The Alan Turing Institute

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From Newcastle. **For Spatial Equality.**

An aerial photograph of a city, likely Newcastle, showing a dense urban landscape with numerous high-rise buildings and a network of roads. The image is darkened to serve as a background for the text.

Spatial inequality and the smart city

Identifying and improving observed inequalities in cities, through the investigation of smart city technologies and evolving spatial demographics

The Team



Rachel Franklin, Professor of Geographical Analysis, Newcastle University

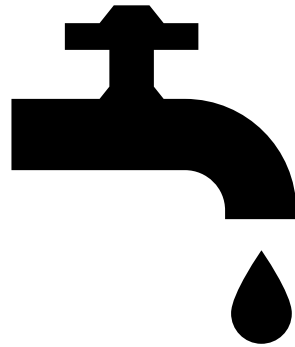
Kate Court, Research Software Engineer, Newcastle University

Caitlin Robinson, Lecturer, University of Bristol

Jack Roberts, Research Data Scientist, The Turing Institute

Eman Zied, Post-Doctoral Researcher, Newcastle University

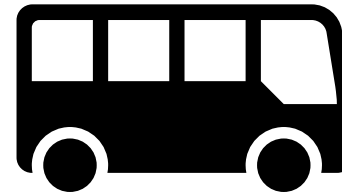
Infrastructure is always contentious – digital infrastructures even more so



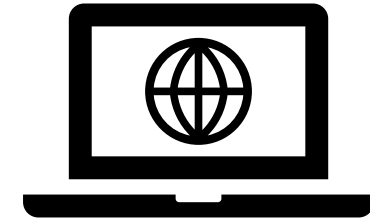
Clean Water
Rights



Fuel and Energy
Poverty



Socio-spatial
exclusion without
public transport



Digital Exclusion

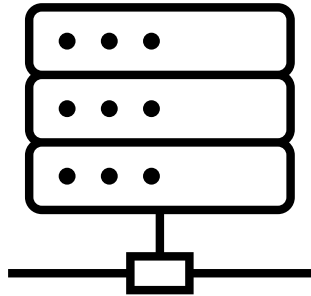
Goodwin, Geoff (2018) Water, infrastructure and power: contention and resistance in post-colonial cities of the South. *Development and Change*, 49 (6). pp. 1616-1630. ISSN 0012-155X

Robinson, C. & Mattioli, G. (2020). Double energy vulnerability: Spatial intersections of domestic and transport energy poverty in England. *Energy Research & Social Science*.

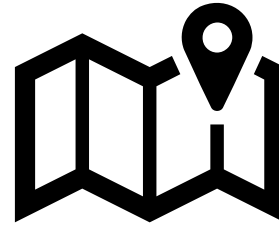
Laura Robinson, Shelia R. Cotten, Hiroshi Ono, Anabel Quan-Haase, Gustavo Mesch, Wenhong Chen, Jeremy Schulz, Timothy M. Hale & Michael J. Stern (2015) Digital inequalities and why they matter, *Information, Communication & Society*, 18:5, 569-582, DOI: 10.1080/1369118X.2015.1012532

Verlinghieri E, Schwanen T. Transport and mobility justice: Evolving discussions. *J Transp Geogr*. 2020 Jul;87:102798.

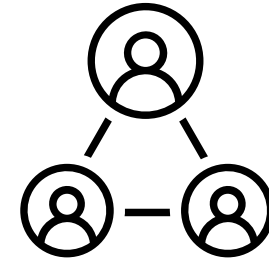
Digital Infrastructures and Equity: Critical Voices



A component of the smart city – sensors collecting data



Geographically uneven distributions, replicating existing urban inequalities



Consequences affect certain populations more than others

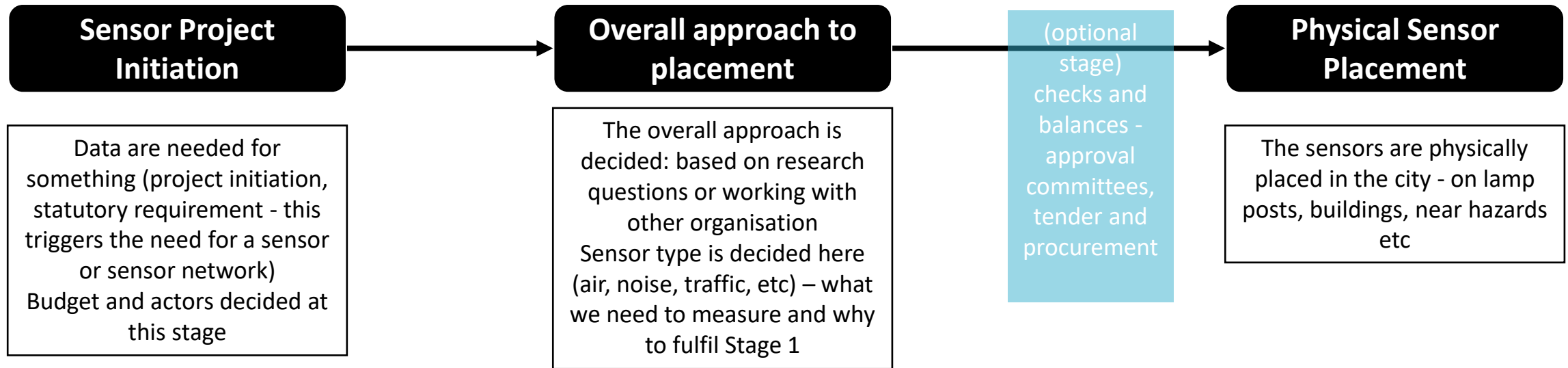
Shelton, T., Zook, M., & Wiig, A. (2015). The 'actually existing smart city'. *Cambridge journal of regions, economy and society*, 8(1), 13-25.

Shelton, T., & Clark, J. (2016). Technocratic values and uneven development in the "Smart City". *Metropolitics*.

Kitchin, R. (2016). The ethics of smart cities and urban science. *Philosophical transactions of the royal society A: Mathematical, physical and engineering sciences*, 374(2083), 20160115.

Kitchin, R., & Lauriault, T. P. (2015). Small data in the era of big data. *GeoJournal*, 80(4), 463-475.

How are Decisions Made on the ground?

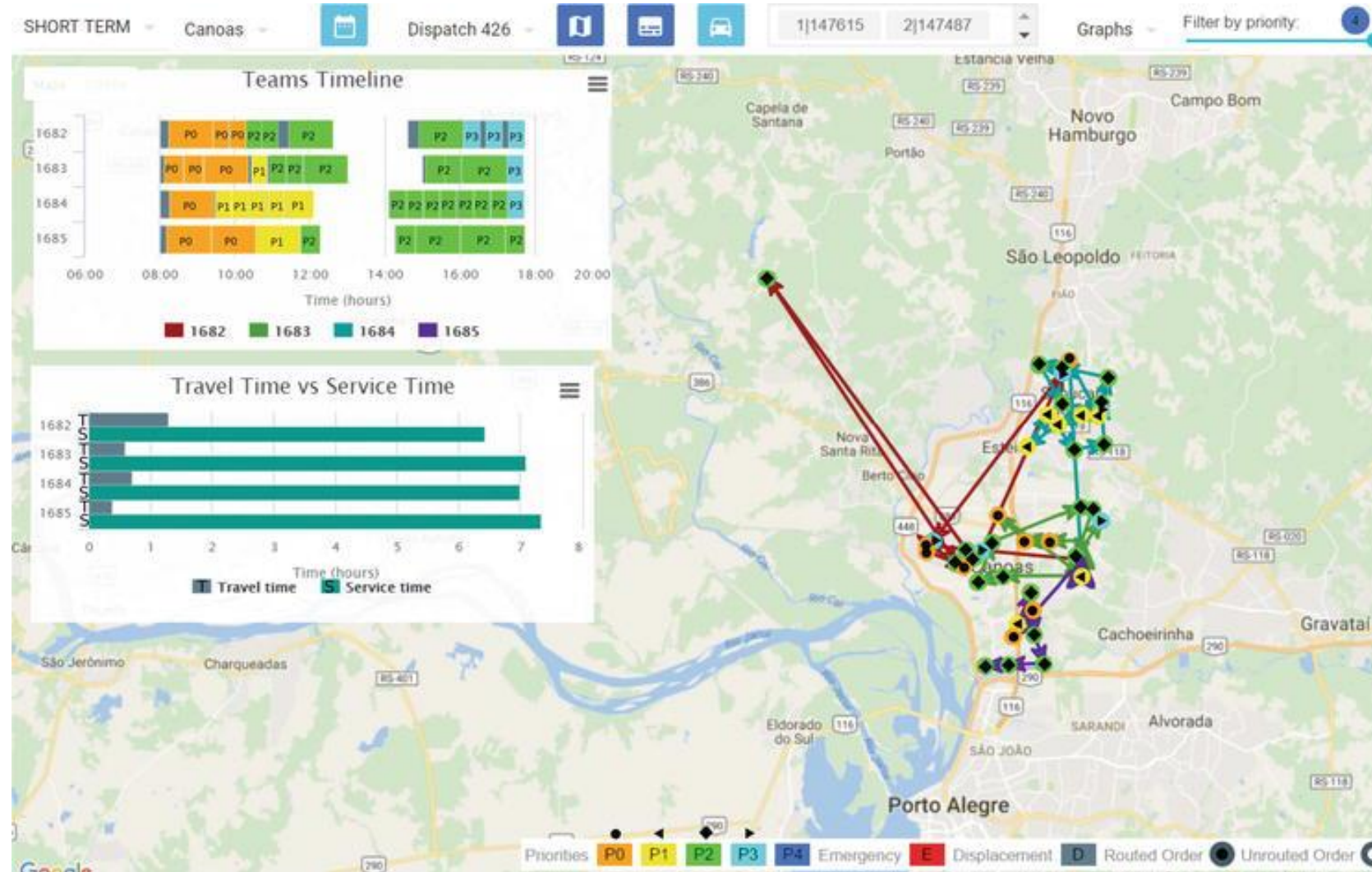


- Main Priorities:**
- Technical Specification
 - Budget
 - Maintenance

Making *Good* Decisions is Hard

Can we develop tools and procedures to help create networks that all people and places can benefit equally from?

Spatial Decision Support Systems



- Barriquello, C. H., Garcia, V. J., MagdielSchmitz, M., Bernardon, D. P., & Fonini, J. S. (2017). A Decision Support System for Planning and Operation of Maintenance and Customer Services in Electric Power Distribution Systems. In (Ed.), System Reliability. IntechOpen. <https://doi.org/10.5772/intechopen.69721>



Knowledge Base (Spatial Data, Documents...)



Interface

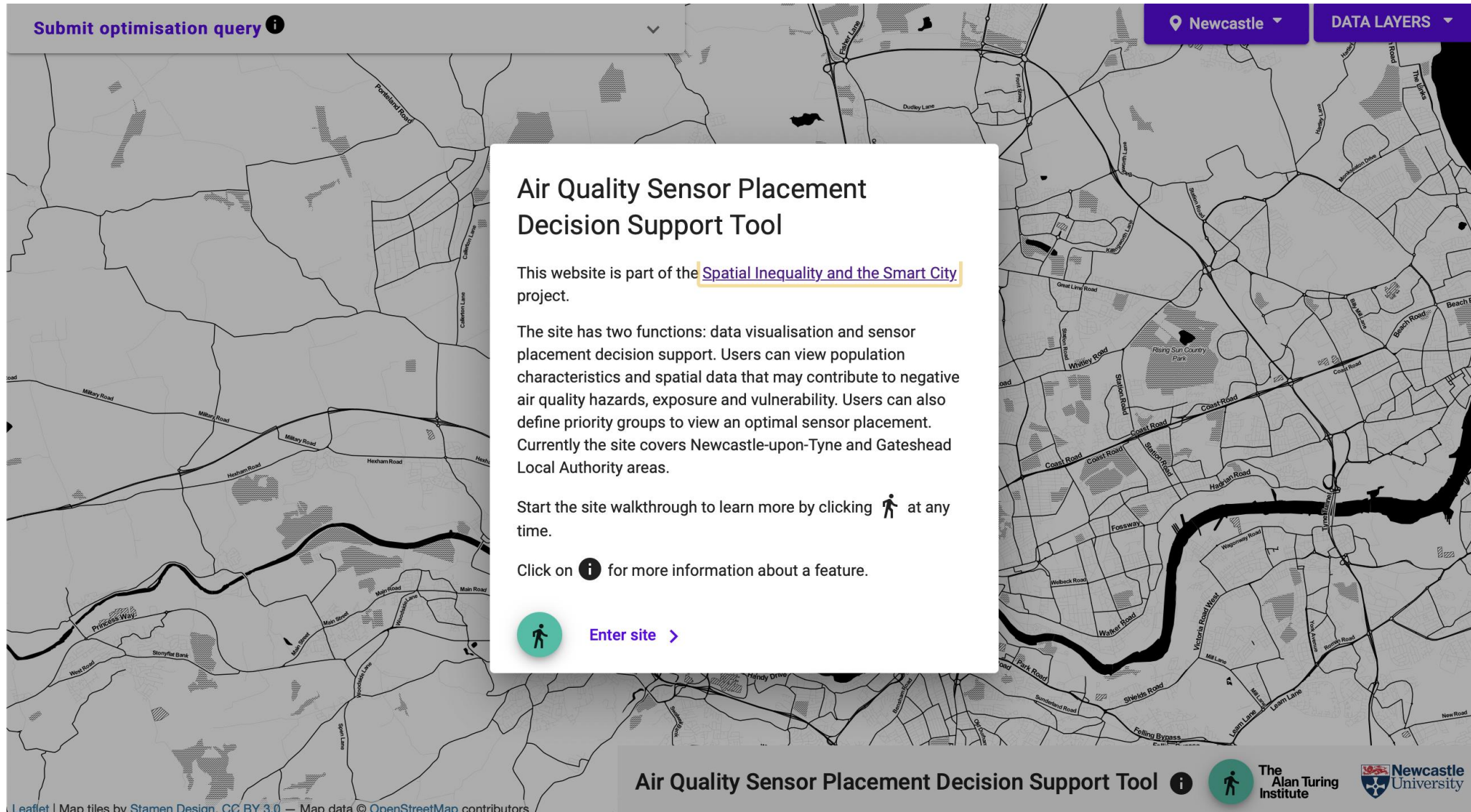



Back End Decision Making Process



Create an Intuitive tool to help visualize and work through trade-offs and outcomes, *before* sensors are located

Goals:

1. Visualise and evaluate trade offs and constraints
2. Evaluate the wider purpose of the network
3. Embed decision-maker feedback
4. Enable human-in-the-loop' decision making




Submit optimisation query 


Newcastle  DATA LAYERS 


Air Quality Sensor Placement Decision Support Tool




This website is part of the [Spatial Inequality and the Smart City](#) project.

The site has two functions: data visualisation and sensor placement decision support. Users can view population characteristics and spatial data that may contribute to negative air quality hazards, exposure and vulnerability. Users can also define priority groups to view an optimal sensor placement. Currently the site covers Newcastle-upon-Tyne and Gateshead Local Authority areas.

Start the site walkthrough to learn more by clicking  at any time.

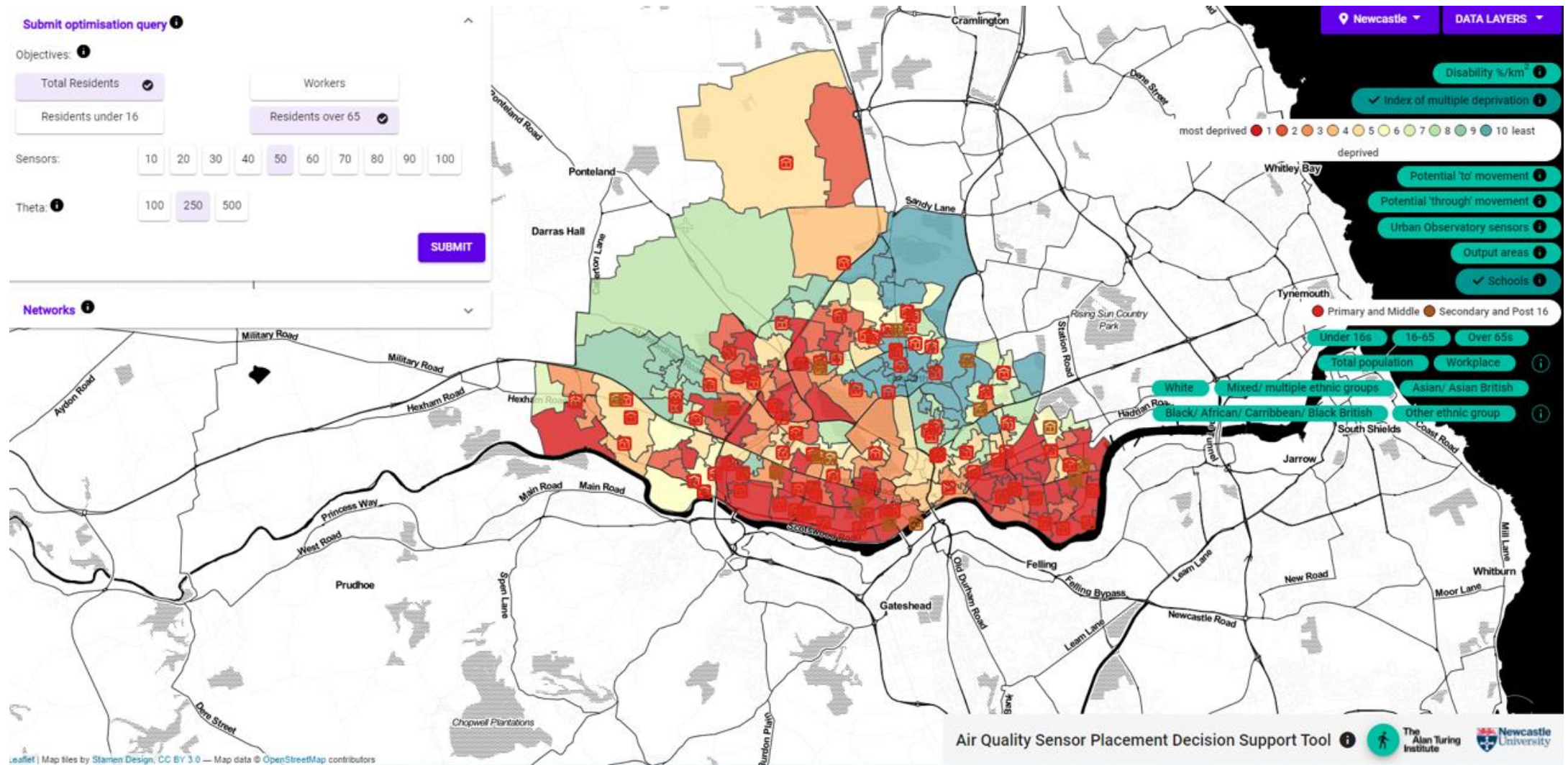
Click on  for more information about a feature.

 [Enter site >](#)

  The Alan Turing Institute 

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Data Layers



Submitting a Sensor Optimisation Query and Choosing a Network

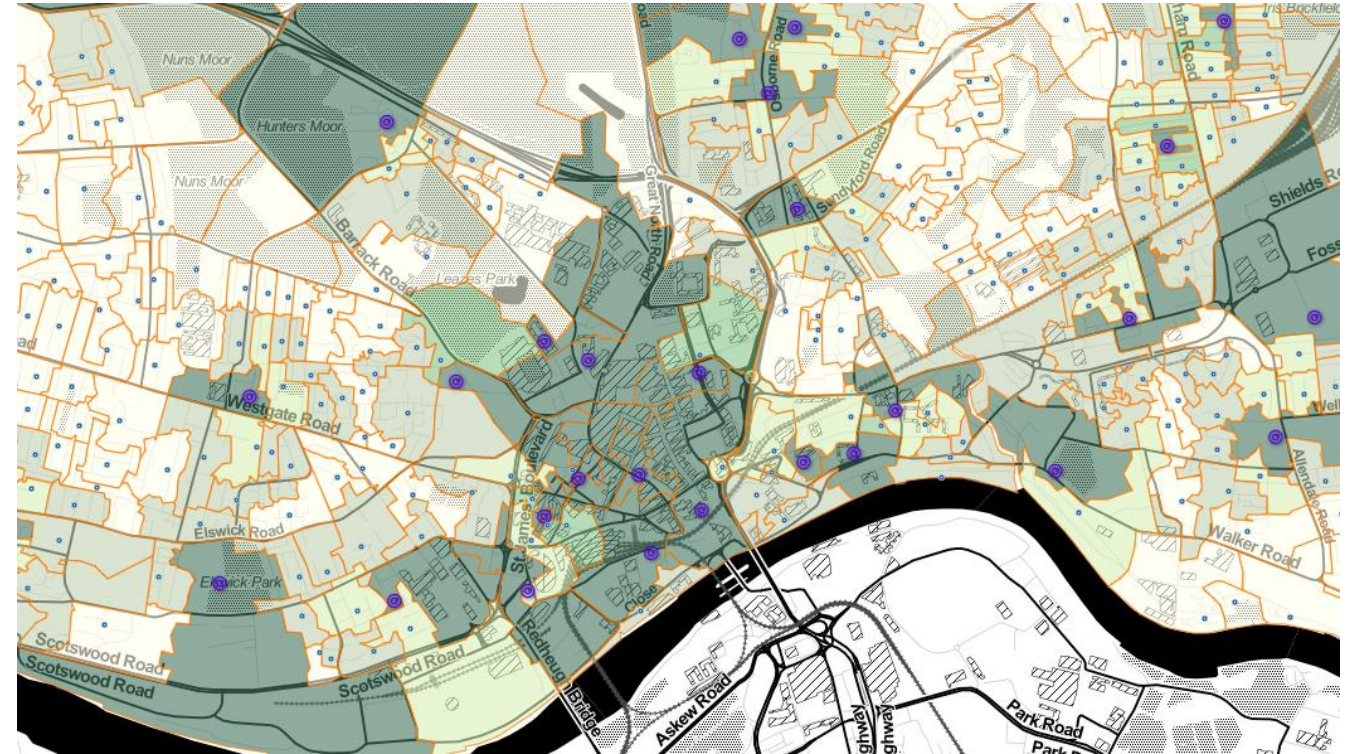


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Air Quality Sensor Placement Decision Support Tool



Human In The Loop – Changing the Network



Thank you!

Further reading

Zied, E. Robinson, C., Franklin, R. S, Roberts, J., Court, K., [upcoming] Decisions and Deserts: Tools to Help Cities Be Smart and Equitable

Zied, E. (2022). Supporting Equitable Smart Cities in the North of England, Regional Studies Association. [online]

Robinson, C., Franklin, R. S, & Roberts, J., (2022). Optimizing for Equity: Sensor Coverage, Networks, and the Responsive City, Annals of the American Association of Geographers,

Robinson, C., & Franklin, R. S. (2021). The sensor desert quandary: What does it mean (not) to count in the smart city?. Transactions of the Institute of British Geographers, 46(2), 238-254.