



# Decision theatres, heat networks and the modelling process: engaging local decision-makers

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WholeSEM Conference

5 July 2016



**EPSRC**

Engineering and Physical Sciences  
Research Council

Local energy infrastructure

Engaging stakeholders in modelling

ABM

Decision  
theatre

Heat  
networks

Policy  
implications

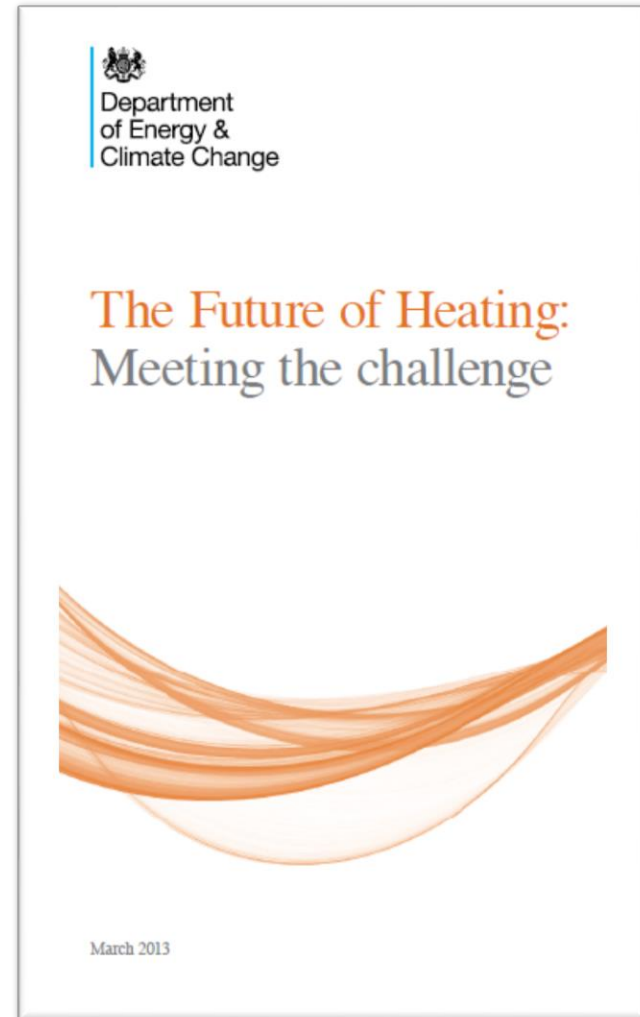
Evidence for using participatory complex systems  
modelling to influence local decision-makers

# Why consider heat infrastructure?

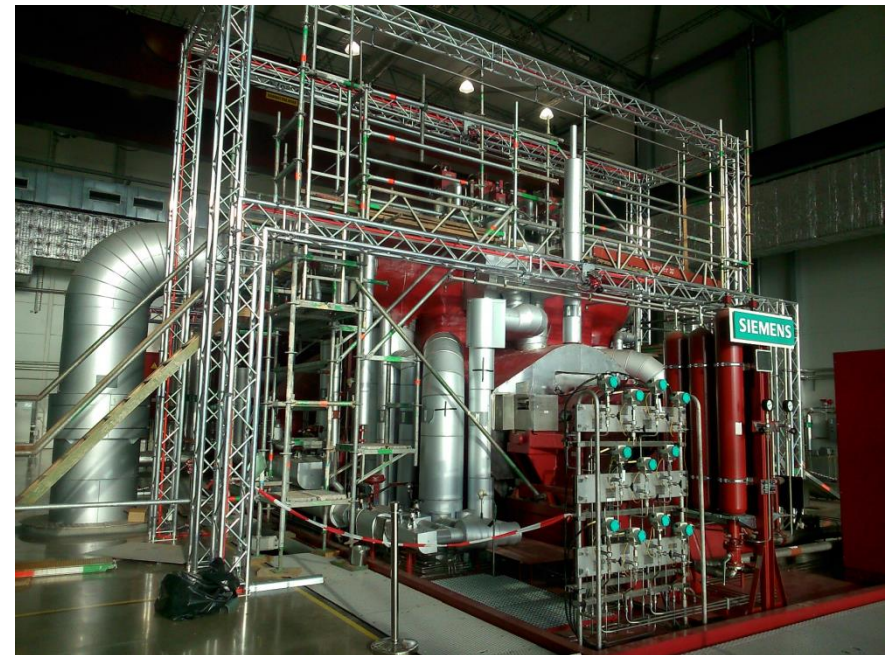


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- 38 per cent of all CO<sub>2</sub> emissions are from heat-related activities
- We spend around £33 billion annually on heat
- Fuel poverty is a key concern
- Around 80% of our demand for heat is supplied by natural gas

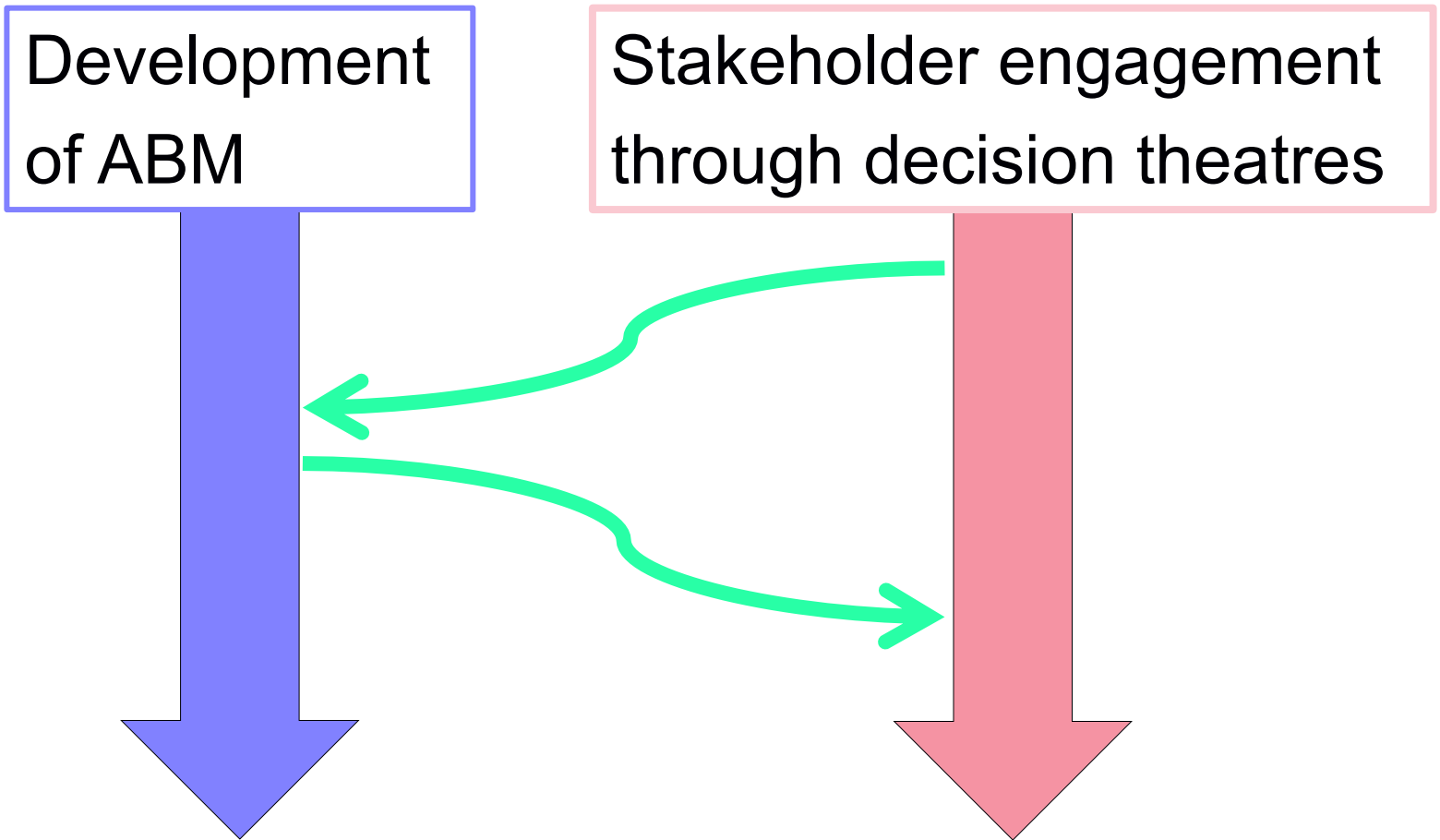


- Heat networks can offer efficient provision of heat in urban areas.
- Significant challenges, multiple stakeholders.



- How can local energy infrastructure be scaled-up?
- What national and local policies might be needed?
- How can we engage decision-makers in the modelling process?







# What is a decision theatre?

- Originally developed in Arizona State University, and used by Newcastle University to look at flood risk management.
- Prototypes for making decisions in the face of uncertainty.
- Actively engages researchers and leaders to visualise solutions to complex problems.
- Uses data visualisation, modelling and simulation



## References:

ARIZONA STATE UNIVERSITY, Decision theatre network, <https://dt.asu.edu/home>.

WALSH, C. L., GLENDINNING, S., DAWSON, R. J., ENGLAND, K., MARTIN, M., WATKINS, C. L., WILSON, R., MCLOUGHLIN, A., GLENIS, V. & PARKER, D. 2013. Collaborative platform to facilitate engineering decision-making. *Proceedings of the ICE-Engineering Sustainability*, 166, 98-107.

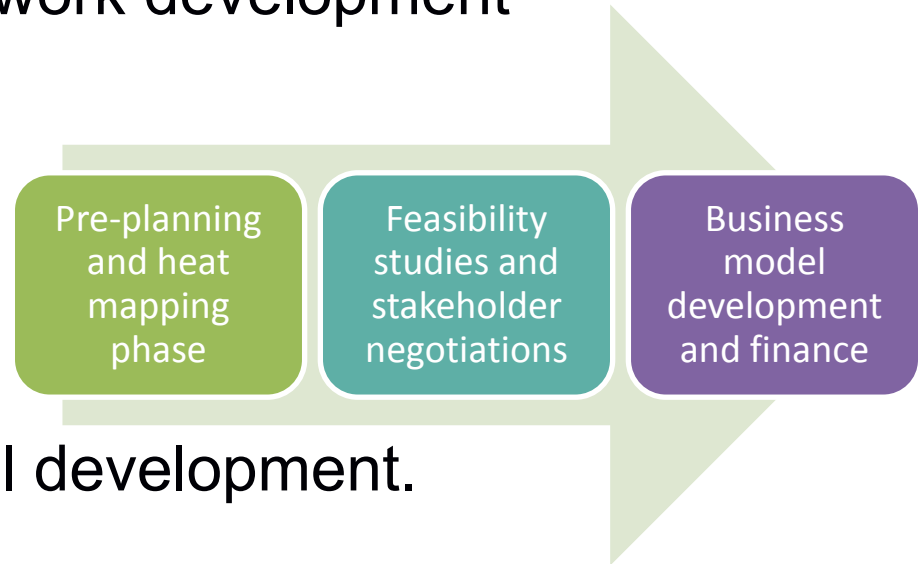
- Used to explore the heat network development process.

## Workshop 1 – Oct 2014

- Identify actors and decision processes for model development.

## Workshop 2 – Mar 2015

- Use the model with stakeholders to identify policy interventions.







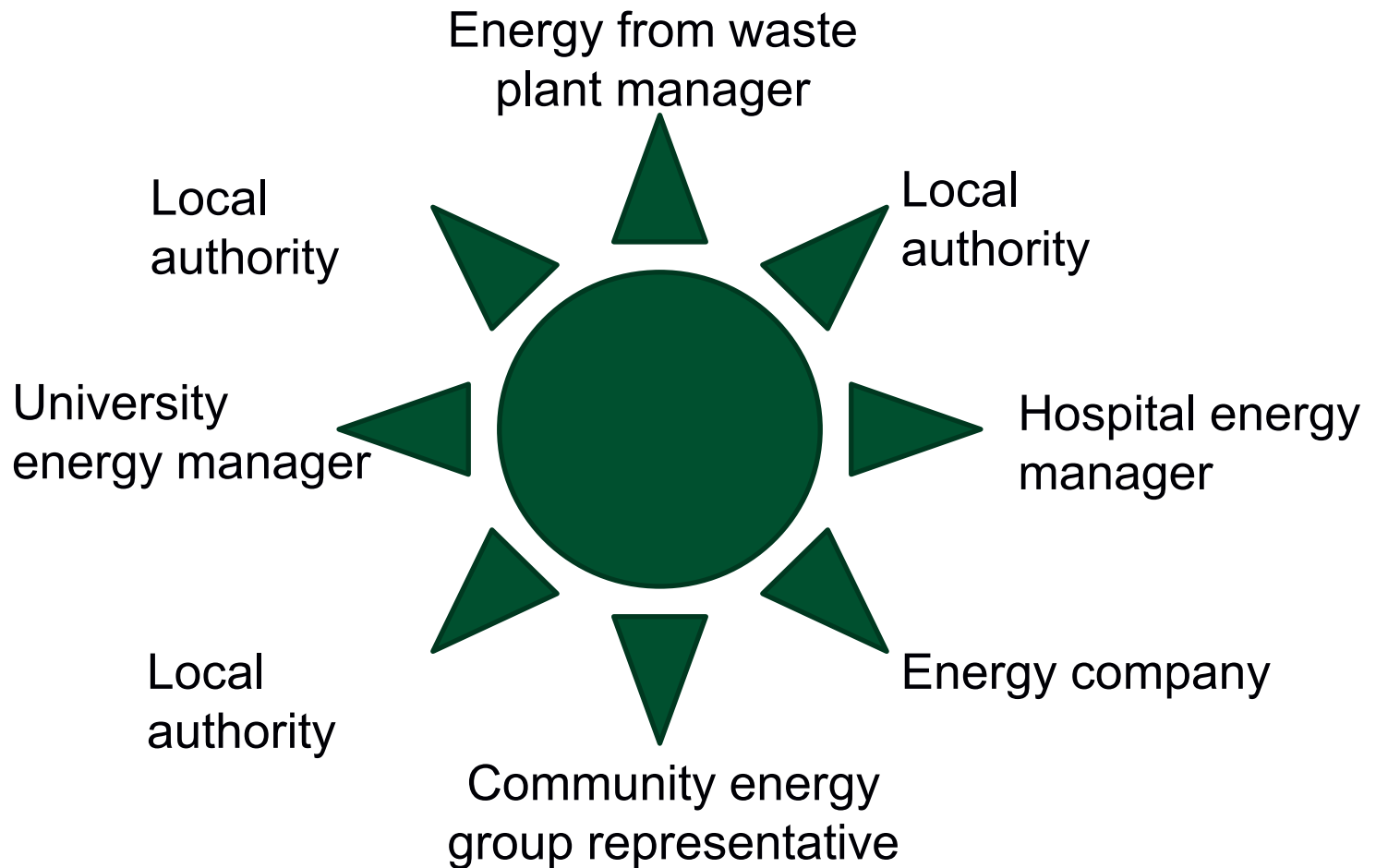
For participants:

- Sharing and learning across different perspectives
- Opportunity to reflect on their organisation's work with district heating

For us:

- Contribute to development of ABM
- Analysis of policy and development processes for district heating

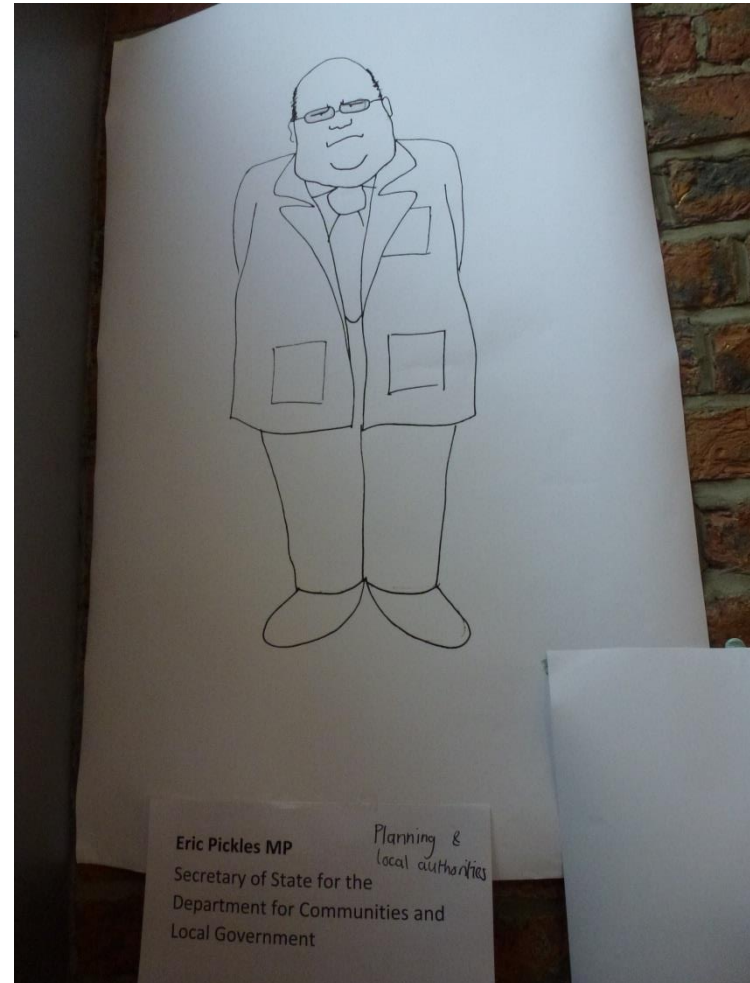
*Chatham house rules*



# 'Virtual' participants



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# Workshop 1 - Activities



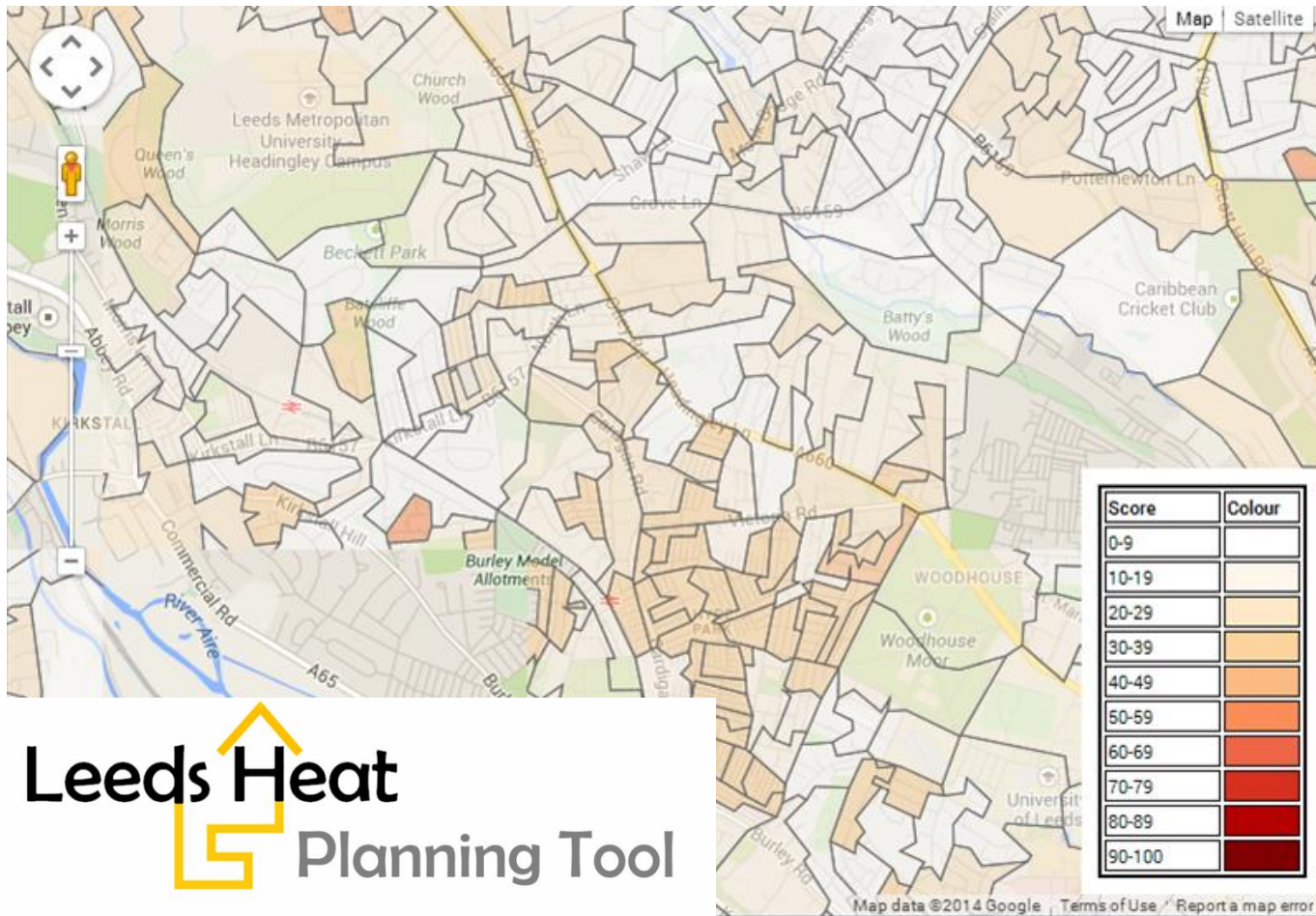
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# ABM development: Data



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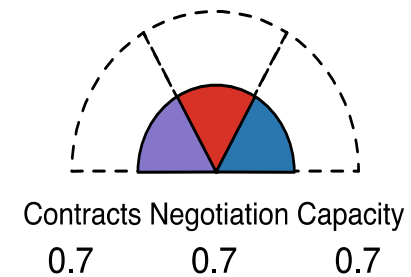
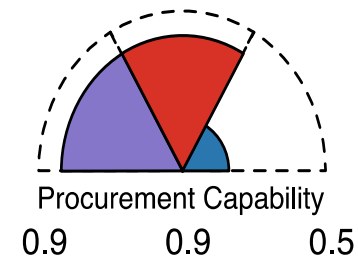
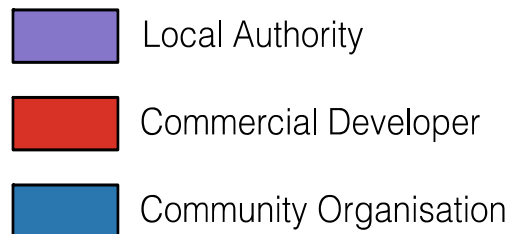
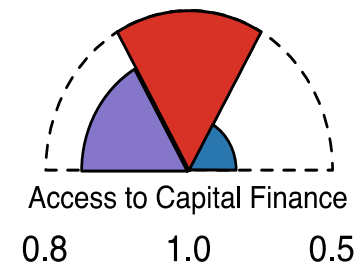
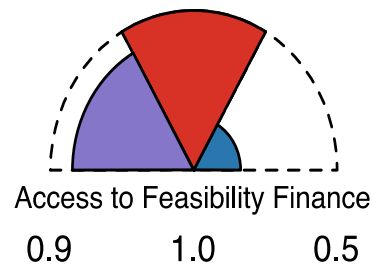
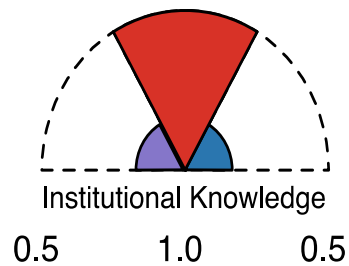


<http://sure-infrastructure.leeds.ac.uk/leedsheatplanningtool/>

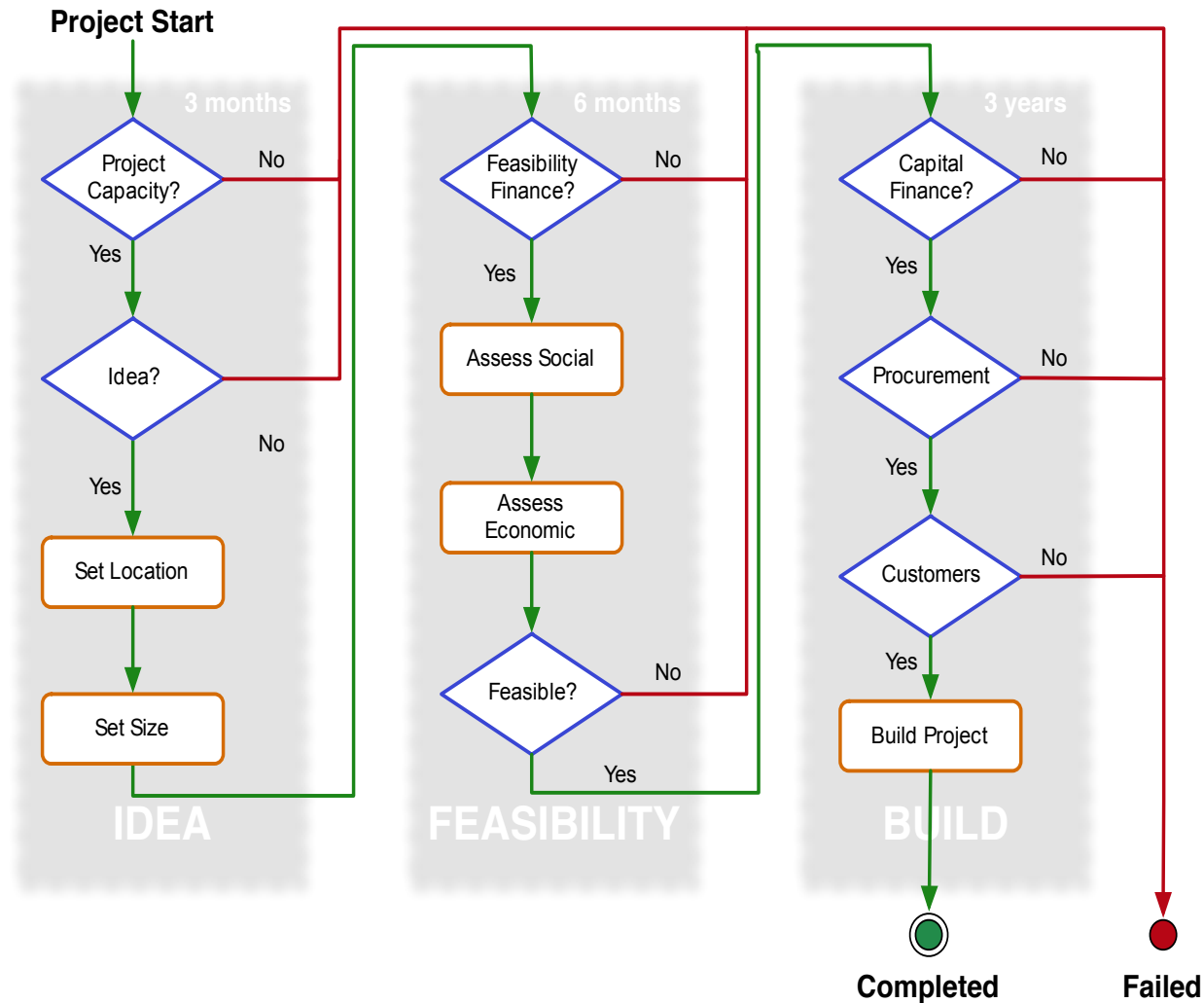
# ABM development: Instigators



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# ABM development: Decision framework



# Workshop 2 – Hands on

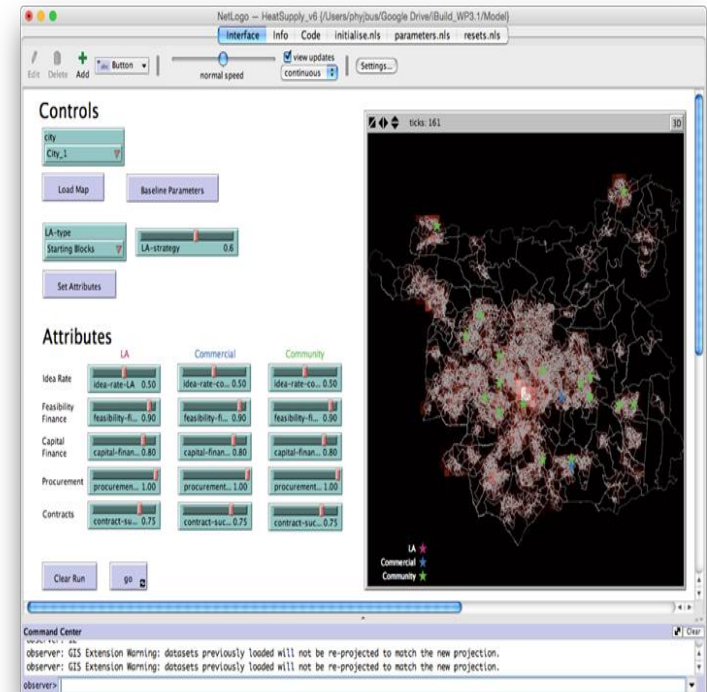


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- New decision theatre suit as part of Newcastle University's Science Central.



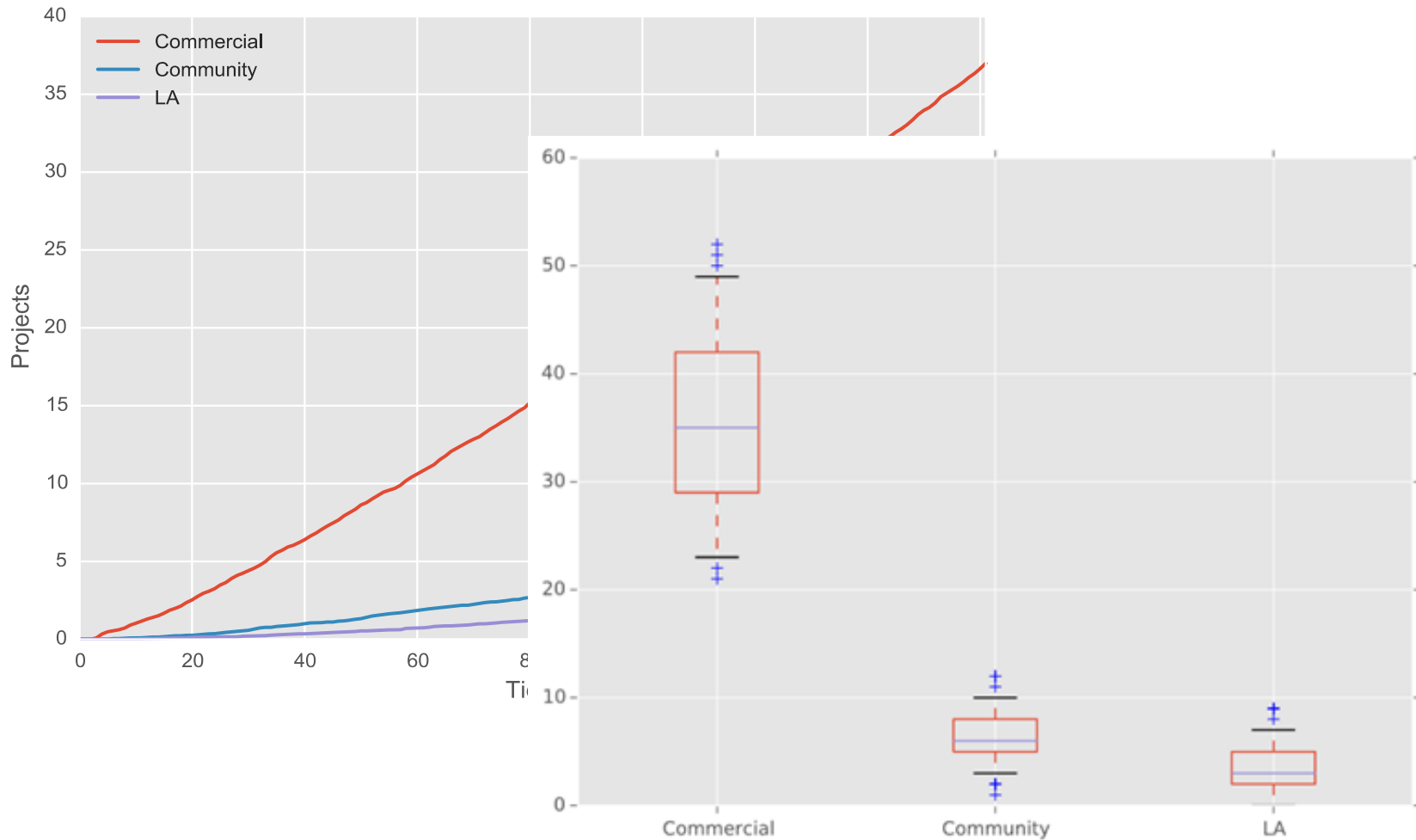
- Participants used the ABM to explore their own policy interventions.



ScienceCentral  
CENTRAL TO NEWCASTLE SCIENCE CITY



# Model results





1. Identified the need for **systemic intervention** and policy portfolios that support multiple stages of the decision process.
2. Policy may need to be **specifically targeted at different instigators** as a result of their differing capabilities and motivations.
3. Support for **networking and learning** could be an effective way to increase capabilities and project success rates.
4. Clear **strategic role of local authorities** in co-ordinating and promoting local energy infrastructure e.g. sharing feasibility modelling.

# Stakeholder feedback



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1. **Value to participants** as well as researchers – space to step back from day-to-day.
2. **Early and continued stakeholder engagement** in model development:
  - Test framework.
  - More confidence in the model having been through process?
3. Enabled participants to envisage system-wide interdependencies and possible holistic policy solutions => **options not answers.**

**Decision theatre concept has clear benefits for policy-relevant social simulation.**



**Thank you for your attention!**

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