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# Navigating complexity for next generation infrastructure: integrating governance and modelling analysis

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# Infrastructure governance and modelling

## Governance

- Complex, multi-technology, multi-actor infrastructure systems
- Centralised, eagle-eye view control and decision-making not appropriate
- Governance processes of central importance to system performance and development

Governance:

"…the institutions, mechanisms and processes through which economic, political and administrative authority is exercised" Goldthau (2014)

## Modelling

- Important means of representing and managing complexity
- Assumptions and decisions made in model construction
- Link decisions to implementation?

NISMOD

System of systems modelling platform and database for UK infrastructure is an assessment tool for infrastructure performance..

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# Infrastructure governance and modelling

## UK Infrastructure governance

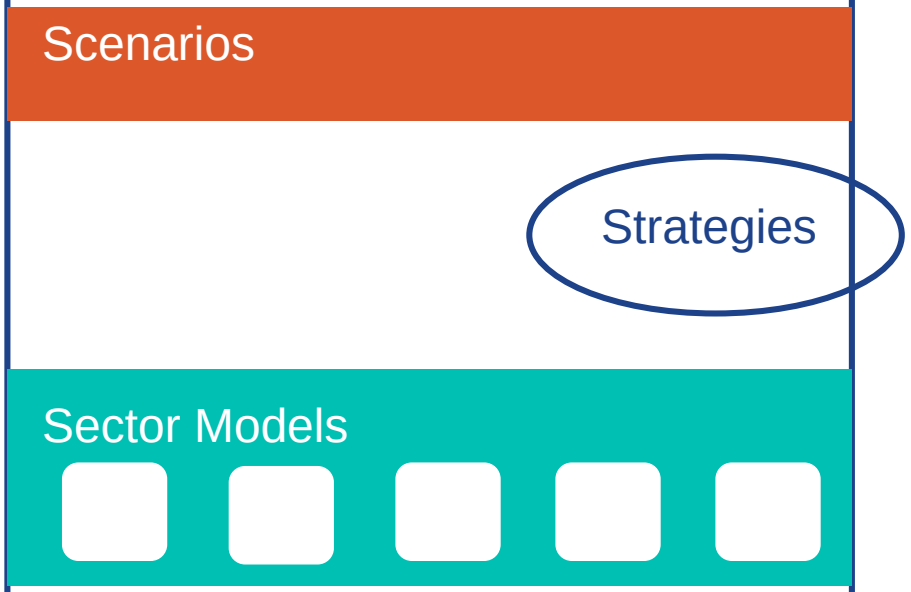
Recent developments at the national level looking across sectors:

- National Infrastructure Commission
- UK Regulators Network

Other governance scales for infrastructure oversight and decision-making that sit alongside

- International
- Sectors
- Local/Regional/City

## NISMOD

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# Governance analysis of NISMOD

- Case study: Use of NISMOD within the National Needs Assessment (completed in 2016)

1) Develop the long term vision for national infrastructure
2) Review the possible future needs for infrastructure services
3) Identify strategic alternatives for delivering the vision
4) Analyse the scale and timing of strategic alternatives would be required to address infrastructure needs
5) Recommend adaptive pathways of policies and investments

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# Governance analysis: sectoral comparison

| | Energy | Transport | Water |
|---|---|---|---|
| **Primary policy goals embedded in strategies** | Emissions | Capacity/congestion | Sufficient supply of services |
| **Representation of change in model** | A relatively wide range of futures including continuation of current trends; electrification of transport and heat; and a more radical future focusing on demand management | Implementation of projects to increase capacity. The list of projects is based upon the NIP pipeline. Increases in system efficiency are also included | New extraction opportunities, new transfer links, different water supply plants (such as desalination), reducing demand and leakage |
| **Governance implications of priorities/choices** | The technologies selected come with different governance needs and existing arrangements (e.g. for centralised vs decentralised technologies); balance of emphasis between new investment in supply, networks and demand side | Who makes the decision (how to meet capacity) affects the response – the priorities of local/national etc. are (different as is what they can influence) | Alternatives of a national supply system (making the most of water resources) vs a local system (would expect simpler control and transport requirements) |

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# Conclusions and next steps

- First step in exploring ways to carry out systematic and rigorous analysis of governance arrangements in tandem with infrastructure modelling
- The system-of-systems model has the potential to deal with governance variations at the sector and other levels of decision-making
- The processes that generate infrastructure visions and articulate the model's 'strategies' need to incorporate not only an appropriate range in technical knowledge but also in governance perspectives.

- Next steps: Develop a process for generating and incorporating governance narratives into the modelling process for NISMOD 2.0
  - More iterative approach to modelling and governance analysis
  - An approach that will allow the capture of information that can be modelled as well as information that cannot
  - To allow interaction with the model at different levels authority to build a more robust analysis of governance change within the analysis of infrastructure futures.

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# Thank you

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