The role of governance in accelerating transition towards more integrated, service-oriented infrastructure operation

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Current infrastructure operation challenges:

1. Governance based on **unmanaged growing demand** is both inefficient and unsustainable;

2. Current design and operation **do not integrate the end-users**, in terms of their crucial role in selecting and using technological options, and the variety of their wants and behaviours; and

3. **Separate and parallel delivery** of different infrastructure streams prohibits the development of potential joint solutions, or even substitutions, between infrastructure systems.
Aim & objectives; “Towards MUSCos”

Mainstream

Utility A

Utility B

Utility C

Utility D

End user

Appliances

Payment

Product

Alternative

Utility A

Utility B

Utility C

Utility D

MUSCo

Service delivery contract

Coordination

End user

Appliances
## Case Studies

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Key features (including main technologies)</th>
<th>Location</th>
<th>Utility Sector</th>
<th>Initiator</th>
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<tbody>
<tr>
<td>Woking Borough Council</td>
<td>A Special Purpose Vehicle, retrofit of council property savings recycled to finance low carbon energy generation (via CHP) and retrofit of social housing.</td>
<td>Woking</td>
<td>Energy</td>
<td>Local Authority</td>
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<tr>
<td>Olympic Park Energy Centre</td>
<td>The largest CHP Plant in the UK providing heat to the Olympic park. Commissioned by Olympic Development Agency to meet sustainability goals.</td>
<td>London</td>
<td>Energy</td>
<td>Government Agency</td>
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<tr>
<td>Yorkshire Water Water Saving Trials</td>
<td>Water company funded water saving device roll out. Pilot trial to provide evidence on water saving potential and demonstrate action on demand management.</td>
<td>Scarborough and Wakefield</td>
<td>Water</td>
<td>Utility Company</td>
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<td>Kimberley Clark Water Recycling Scheme</td>
<td>“Long loop” recycling of effluent from paper mill re-used as process water following intensive treatment. Novel financing mechanism (piggy-backing on a high payback scheme).</td>
<td></td>
<td>Water</td>
<td>Private sector</td>
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<tr>
<td>Eco-Island</td>
<td>Retrofit and low carbon energy schemes. Instigated by Eco-Island Community Interest Company (CIC). Operation of energy generation (small scale wind, CHP and smart grid) will be undertaken by an ESCo run in partnership with the CIC.</td>
<td>Isle of Wight</td>
<td>Predominantly energy</td>
<td>Community Interest Company</td>
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<tr>
<td>Welborne</td>
<td>Proposed development of 3,000 house and employment land. Proposed management of properties updating and infrastructure by the community that occupies the site.</td>
<td>Portsmouth</td>
<td>Energy, Water, Transport</td>
<td>Landowner</td>
</tr>
</tbody>
</table>
Case study findings

• Infrastructure governance goes beyond utility governance
• Multiple participants: a key challenge, but also a key to success
• Integration of diverse actors
• Multi-dimensional relationships, multi-dimensional solutions
• Relationships are dynamic
• The importance of internal governance
• Systemic approach to technology change
How supportive is current governance?

Institutions
- European
- National
- Local

Technology
- End use
- Transmission
- Generation

Ecosystem

Top-down, market-led, fractured

Business
Separate
End Users

Discrete and mono-directional
Looking for theories to explain alternative governance – multi-level governance

**Contribution**

• Changing interaction between different levels of governance and the need to engage of non-governmental actors in policy development and delivery

**Application**

• The importance of developing a *common framing* of the problem. (Smith and Stirling 2006).

• The need to **engage multiple actors** in the process of innovation, knowledge production, infrastructure provision, communication and policy (Smith 2007).

• The need for national regulation to **allow innovation at different scales** and from different non-utility actors (Bolton and Foxon 2013).

**Limitations**

• Interaction of actors and technology

• Nature or structure of internal governance of partnerships
Looking for theories to explain alternative governance – co-evolutionary framework

Contribution

• Identifies coevolving systems relevant for analysis of transitions

Application

• Coevolution can lead to the development of joint structures between different systems which may remain stable, and contribute to a long-lasting transition, or be disrupted by change at the micro or macro level, as well as internal dynamics

• When actors combine into joint structure there is a greater potential for them to interact with an infrastructure system in a more integrated and effective manner

Limitations

• Does not go far enough to describe how internal rules could improve the stability of joint structure
Looking for theories to explain alternative governance – institutional dynamics

Contribution

• It is possible for communities to conserve and efficiently utilise jointly managed resources without the need for central governance.

Application

• Design principles to help understand the requirements of internal systems of institutions required to support self-governance.

Limitations

• No application to infrastructure yet
Result – governance analysis framework

External Institutions
- European
- National
- Local

Joint structures
- Business
- Internal Institutions
- End Users

Technology
- End use
- Transmission
- Generation

Ecosystem

Integration across scales
Adaptive, supporting joint structures
Systemic approach to technology change
Motivations aligned
Further develop our understanding of the joint structure, and in particular the nature of internal institutions required to support self-governance of infrastructure.

Undertake modelling of specific parts of the framework to examine the consequences of proposed alternative approaches for infrastructure governance.

Apply framework to analysis of integration between infrastructure systems (such as water and energy) to identify how governance might support exploitation of cost and resource efficiencies resulting from infrastructure interdependence.
Thank you for your attention!

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