



Modernising National Infrastructure

The practical issues

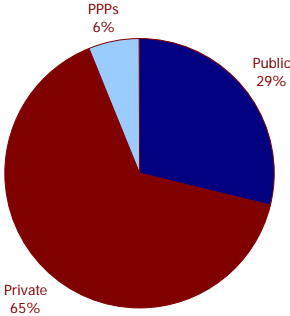
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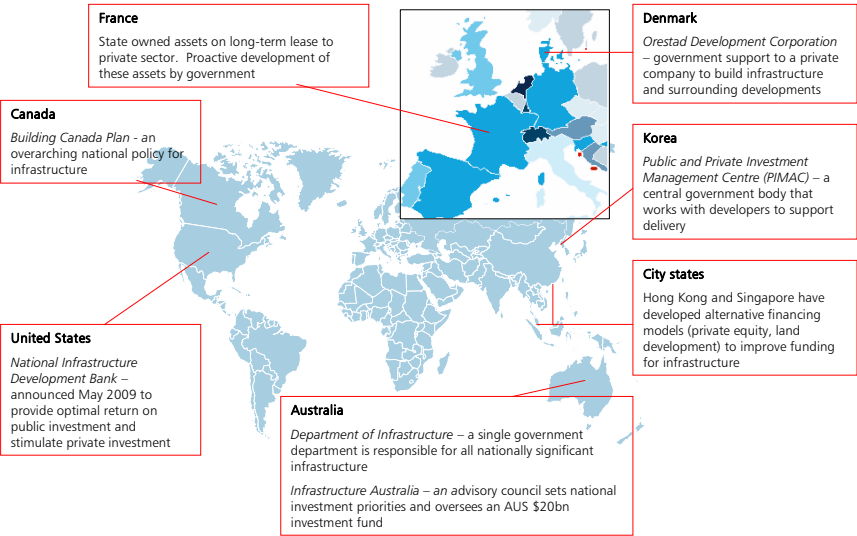
A brief history of UK infrastructure

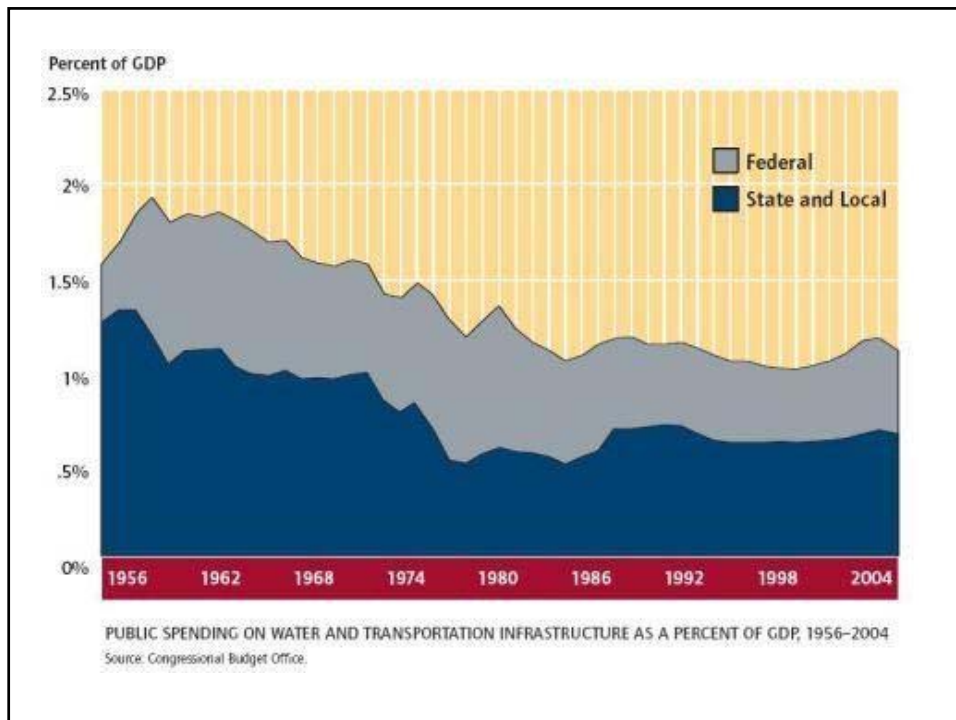
1. 19th century: World leader in developing water and waste systems, urban and long distance road and rail connections. Still benefiting from much of this early investment
2. 1950's – 70's: Significant expansion of national infrastructure under state control including motorways, nuclear power, North Sea oil and gas
3. 1980's – 90's: Early leader in privatisations including telecommunications, water, energy and rail, signifying a shift to market-driven decisions on infrastructure
4. 1990's – 00's: Pioneer of new forms of private sector engagement (PPPs and PFIs)
5. But much is ageing and we have set ourselves challenging targets, particularly in relation to energy generation

Private participation in infrastructure



Proactive approach by international competitors





Questions for analysts

- Science
- Technology
- Engineering
- Design
- Interdependency
- Optimisation
- Provocation



Science

- Should we want to understand how infrastructure at a national scale works and can we do so?
- How do we describe the socio-technical context within which it sits?
- Do we have a language to describe and analyse the interdependencies of the components?

Technology

- What are the critical new technologies that will change the way we think about infrastructure
 - Plastic electronics
 - Composite materials
 - Embedded connectivity
 - Adaptive systems
 - Novel sensors
- How does technology innovation work at this scale?
- What are the processes of maturation over a long timescale – how to avoid lock-in

Engineering

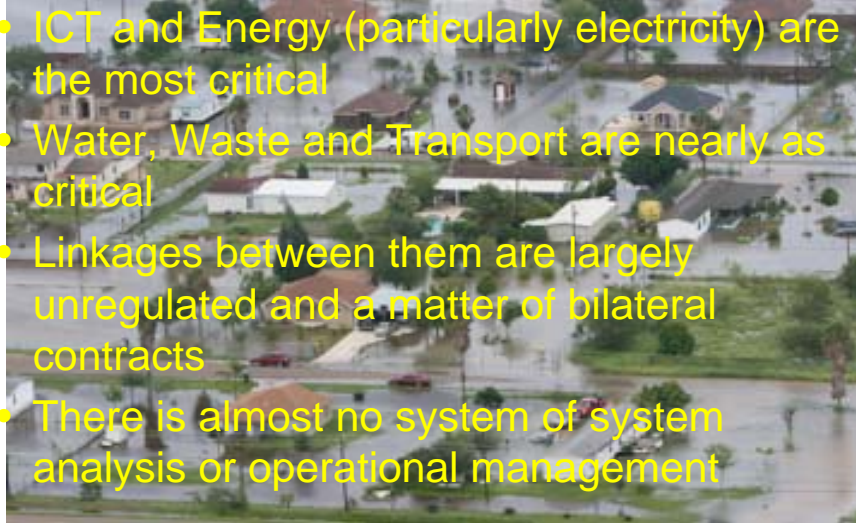
- How do we engineer solutions to modernisation in a way that delivers
 - Resilience
 - Low carbon
 - Social acceptance
 - Economic performance
 - Service quality
- Can we do this at the scale we need to, and at the rate we have to?
- What can we learn from eco developments elsewhere

Design

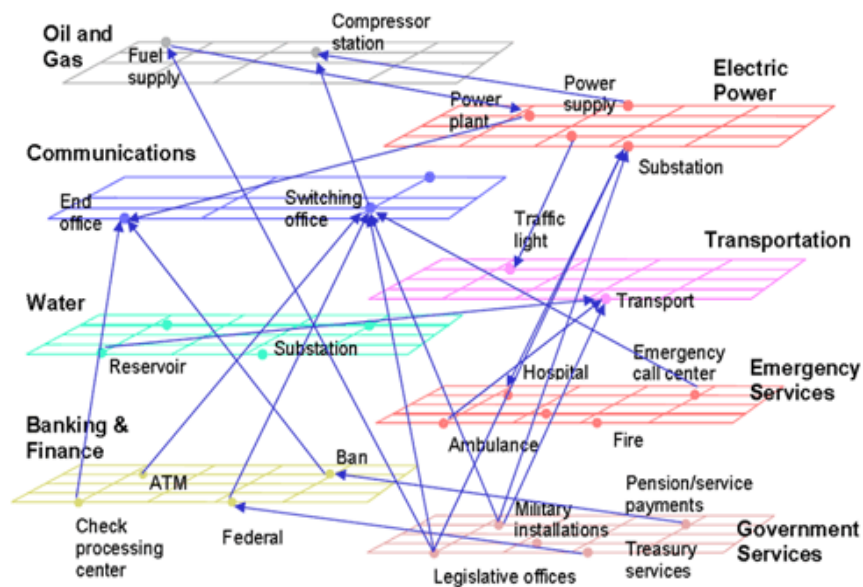
- Attitude to infrastructure is largely habitual
 - can we change habits by good design?
- How do we convert society from consumption to conservation and conservation?
- Does conservation mean more effective collaboration?
- What is the role of the media in advocating 'good' designs

Interdependency

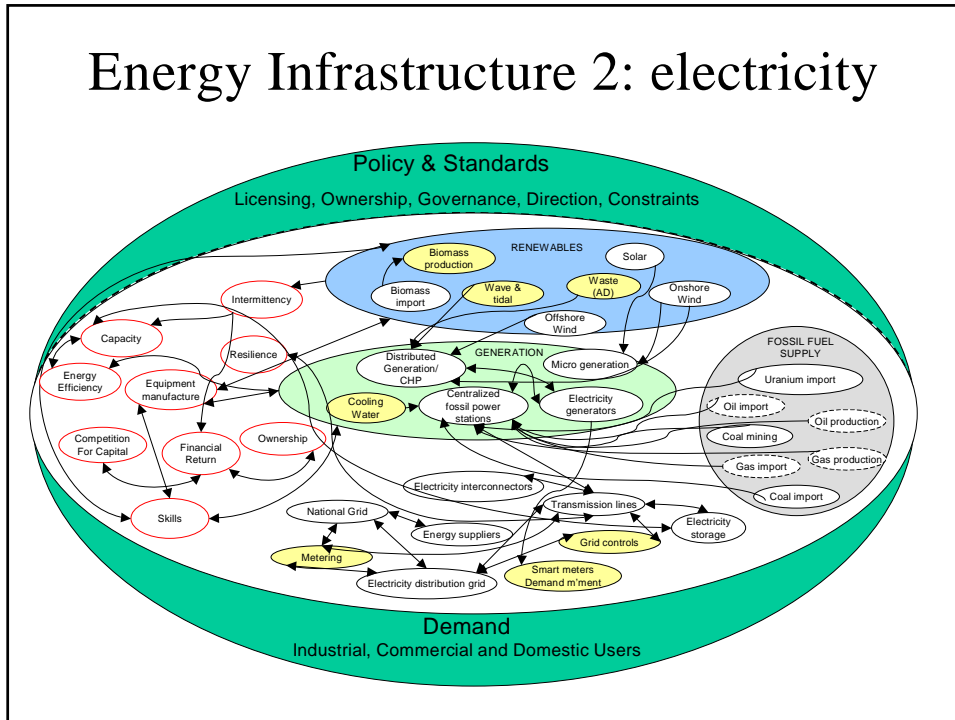
- ICT and Energy (particularly electricity) are the most critical
- Water, Waste and Transport are nearly as critical
- Linkages between them are largely unregulated and a matter of bilateral contracts
- There is almost no system of system analysis or operational management



A simplified view of interdependence



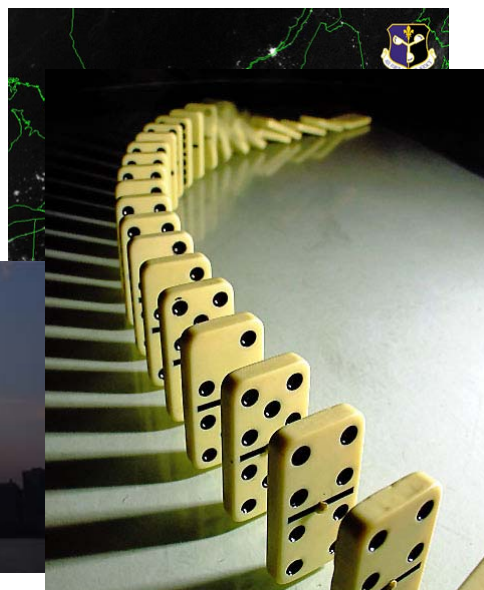
Energy Infrastructure 2: electricity

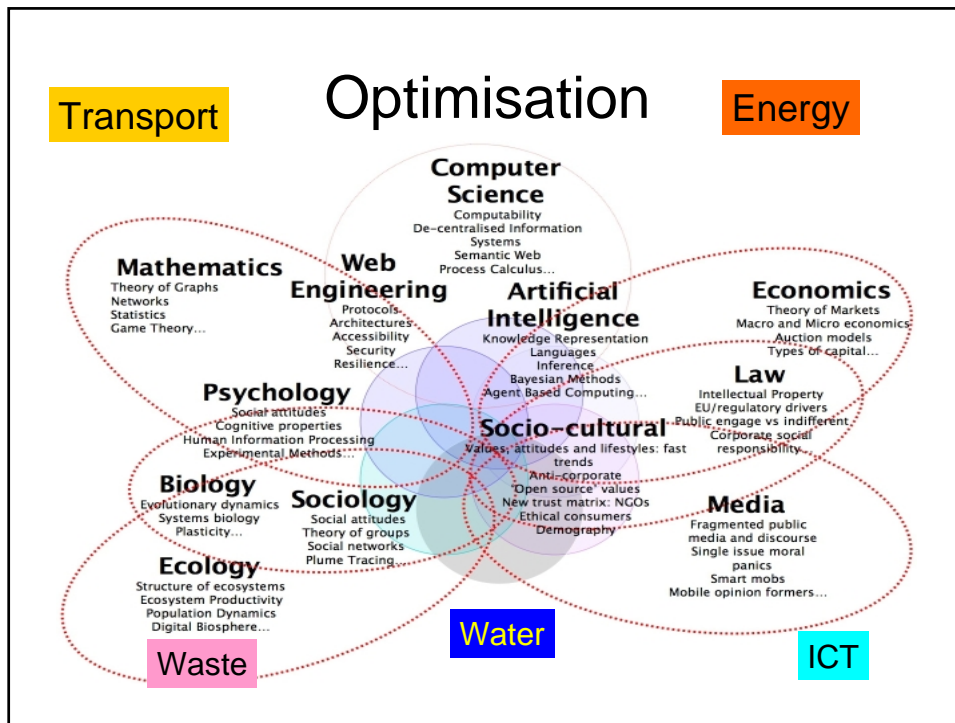


13th August 2003 – NE USA – possible cascade failure



Crudely edited satellite photo





Provocation

- How does the UK develop and maintain a culture that values National Infrastructure Modernisation?
- Where are the skilled STEM professionals to do the work?
- What is the right balance between energy security, environmental protection, economic growth, engineering feasibility and social acceptability?
- What is the role of Government at a range of scales in helping the agenda?
- How dangerous is the do nothing option?

