Resilient Futures

Chair's Welcome

Seth Bullock

Project origins

Resilient Futures

Global Uncertainties
Security for all in a Changing World

3 year multidisciplinary project funded by the EPSRC/ESRC as part of the RCUK Global Uncertainties Programme.

Next generation resilience ‘Sandpit’ with 20+ academics to “generate adventurous, interdisciplinary projects targeting infrastructure resilience”

8 partner organisations:

University of Southampton
Loughborough University
Newcastle University
University of Essex
King's College London
Durham University
University of St Andrews
The University of York

Core goal of producing an **interactive computer-based demonstrator system** as a tool for exploring **infrastructure interdependencies** and the **community and technological impacts** of natural and malicious hazard events.

Future Scenarios and Episode Development

Andrew Dainty, Pete Fussey
Dan Sage, Indraneel Sircar, Chris Goodier, Lucy Gregson-Green and Lee Bosher

Three Generations of Resilience

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1st generation

- In-built redundancy
- Hardening
- Physical adaptation

- **ROBUSTNESS**

2nd generation

- Community empowerment
- Motivation
- Ability to react and prepare

- **RECOVERY**

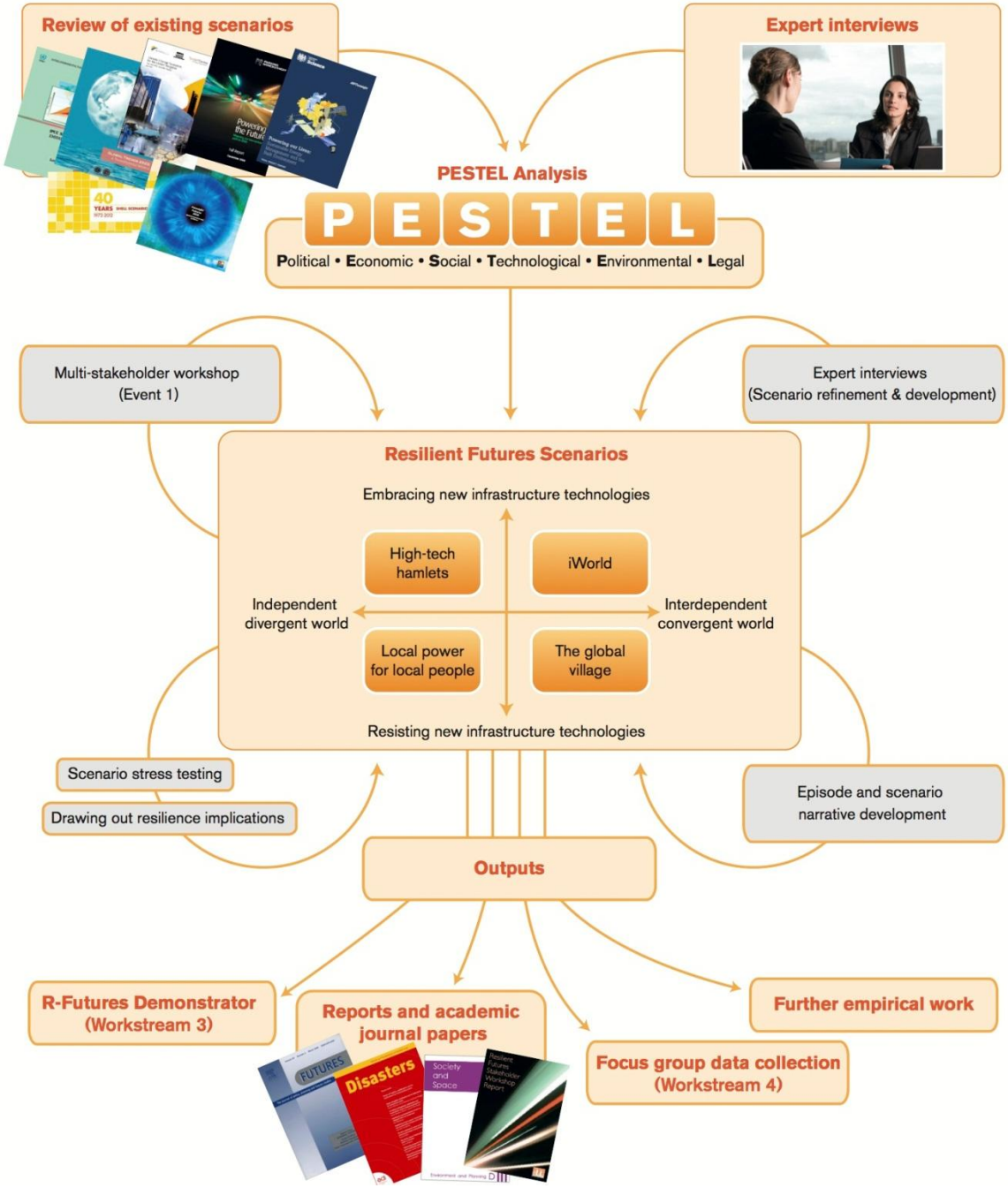
3rd generation

- Evolving into something different
- Learning to become more resilient

- **ADAPTABILITY**

Source: *Shared Responsibilities, Institute for Public Policy Research (2009)*

The *R-Futures* scenario & episode development process



Identification of predetermined factors

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- Consistent factors across scenarios
  - Higher population (77m in 2050)
  - More households (35m in 2050, up 40%)
  - Older population (75 and over 6% in 2033 from 3.5% today)
  - Climate change targets (80% reduction by 2050)
  - Increased global demand for energy (global energy demand doubled by 2030)
  - Increased global demand for fossil fuels (Chinese oil demand up 100% by 2036)
  - Reduced supply of fossil fuels from non-OPEC nations
  - Ageing infrastructure (closure of all current nuclear plants by 2035, five coal plants by 2015)
  - Some climate change effects (e.g. 2-4C increase in UK mean winter temps, sea level changes c. 18-26cm)

X axis

- The uncertainty around levels of global convergence, or the pace globalisation, is common to several reports (IPCC, Foresight, NIC, IEA) .
- This axis has potential resilience implications:

	More interdependent and convergent world	More independent and heterogeneous world
Energy infrastructure	Centralized and interconnected power generation (e.g. Saharan solar array and European super grid)	Highly decentralized power generation, regional competition, local or regional energy markets
Transport infrastructure	More travel, more flying, European high speed rail networks, more integrated public transport	Much less travel, more walking/cycling more compact cities, less public and private transport, more teleworking

Y axis

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- Other futures studies use a range of axes:
  - Social values (e.g. belief in material wealth vs. social well-being)
  - Role of the state (e.g. Big Society)
  - Levels of economic growth
  - Attitudes towards global environmental issues (i.e. do we meet targets or try to meet targets – price of carbon)
  - ***Acceptance of technological change*** (e.g. smart cars, embedded generation etc.)

And so: 2050 Scenarios

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Embracing new infrastructure technologies

High-Tech Hamlets

i-World

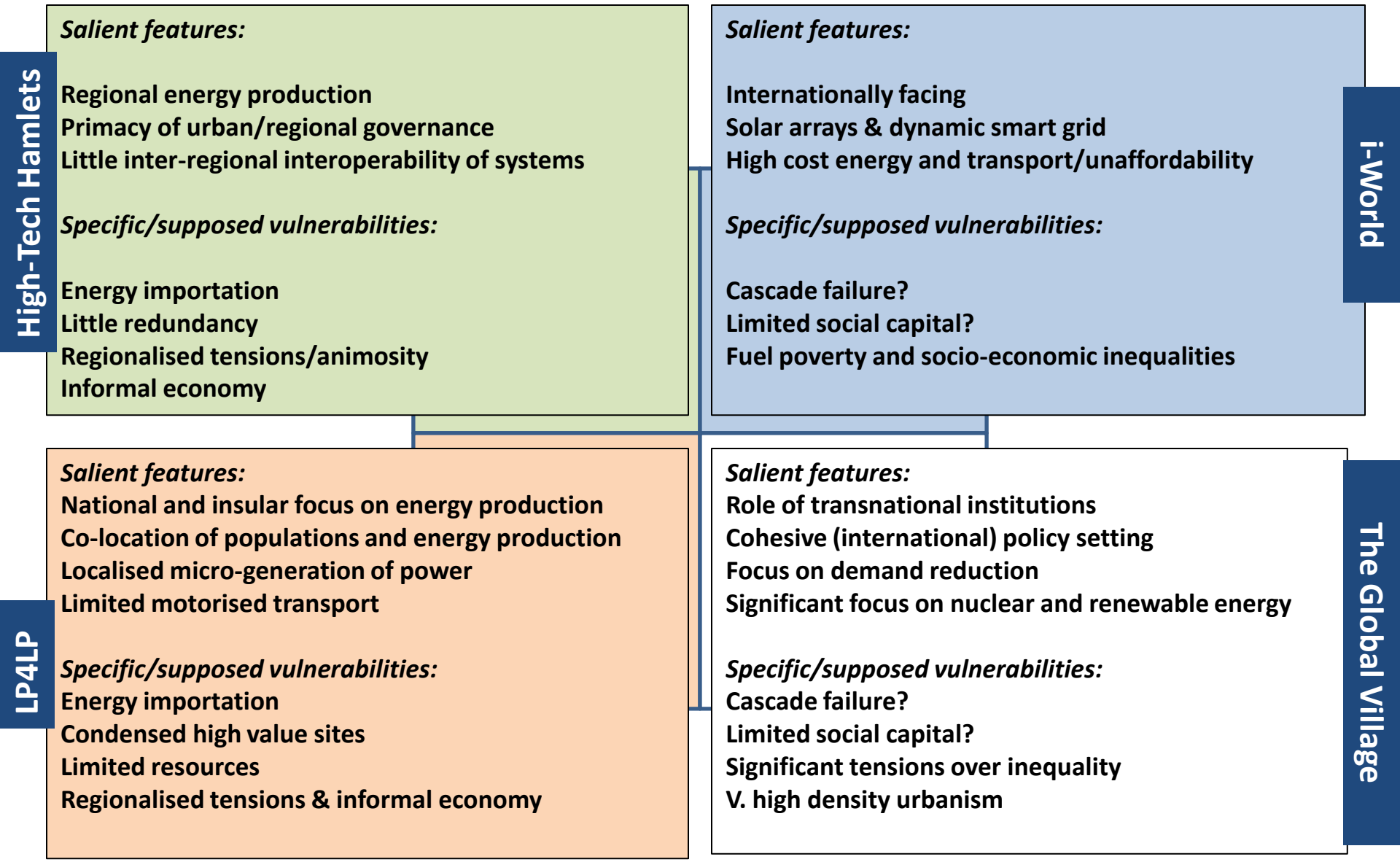
Independent, divergent world

Interdependent, convergent world

Local Power for Local People

The Global Village

Resisting new infrastructure technologies


High-Tech Hamlets
Salient features:
Regional energy production
Primacy of urban/regional governance
Little inter-regional interoperability of systems
Specific/supposed vulnerabilities:
Energy importation
Little redundancy
Regionalised tensions/animosity
Informal economy
i-World
Salient features:
Internationally facing
Solar arrays & dynamic smart grid
High cost energy and transport/unaffordability
Specific/supposed vulnerabilities:
Cascade failure?
Limited social capital?
Fuel poverty and socio-economic inequalities
LP4LP
Salient features:
National and insular focus on energy production
Co-location of populations and energy production
Localised micro-generation of power
Limited motorised transport
Specific/supposed vulnerabilities:
Energy importation
Condensed high value sites
Limited resources
Regionalised tensions & informal economy
The Global Village
Salient features:
Role of transnational institutions
Cohesive (international) policy setting
Focus on demand reduction
Significant focus on nuclear and renewable energy
Specific/supposed vulnerabilities:
Cascade failure?
Limited social capital?
Significant tensions over inequality
V. high density urbanism

Episode development: principles and approach

- Role of episode: stress test the scenario and to draw out different resilience implications
- Work through 3Gs of resilience across different scenarios
- Extreme (to stress test) but credible
- Probe some of the issues of all-hazards responses/planning

Expert interviews

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- 30 experts were interviewed to develop the scenario/eps and understand resilience implications:
  - **Transport:** BAA, Network Rail, British Transport Police, DECC, Costain, Amey, DHL
  - **Energy**: National Grid, Electricity North West, UKERC
  - **Resiliency**: Commission for Rural Communities, Camden Borough Council, Deloitte, Environment Agency, Cabinet Office, Health Protection Agency, Arup, NaCTSO
  - **Academia:** engineering, planning, economics, human geography