

Energy Revolution Integration Service

Jon Horsley

**ERIS Technical Account Manager,
Energy Systems Catapult**

July 2019

10th Cleanpower & Smart Grids 2019

Cambridge, UK www.cir-strategy.com/events

 @EnergySysCat  **LinkedIn**



What is Energy Systems Catapult?

Mission: Unleash innovation and open new markets to capture the clean growth opportunity

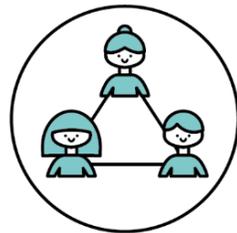
170 Innovation experts



Hubs in Birmingham and Derby



Established and overseen by Innovate UK. Independent from Government. Not for profit



Bridge the gap between stakeholders in the sector

A place to develop and test new ideas



Supporting innovators



Research



Trials



Systems engineering



Digital



Modelling and simulation



Our capabilities and assets

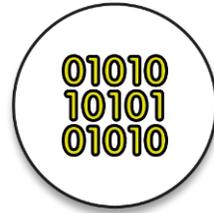


Modelling

National Energy System Modelling (ESME)

Local Energy System Modelling

Building Energy System Modelling



Digital

Home Energy Services Gateway

Living Lab

Data Science

Data Systems

Energy Knowledge eXchange™

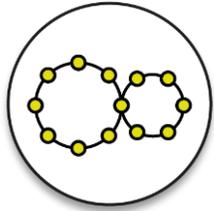


Markets, Policy and Regulation

Policy

Regulation

Stakeholder Engagement



Systems Integration

Systems Engineering and Integration

Business Model Innovation

Dynamic Energy System Architecting and Simulation

Energy System Integration Guides

Future Power System Architecture

Utility 2050



Consumer Insight

Research

Design

Trials



Infrastructure and Engineering

Bioenergy

Carbon Capture and Storage, Industry and Hydrogen

Networks and Energy Storage

Nuclear

Renewables

Transport

Industrial Strategy Challenge Fund and PFER...

£102.5M
4 year
Challenge
31 Mar '22

Circa 10
Detailed
Designs: Jan
'20 – Mar
'22

**...is supporting the
creation of real-world
sustainable, smart, local
energy systems,
addressing whole system
complexities and
supporting the
development of business
models that are
investible and scalable...**

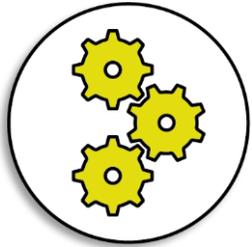
11 Concept
Designs:
6 month
programme
(Jan-Jun '19)

ERIS team
formed within
the Catapult to
maximise
learnings and
value across all
cohorts

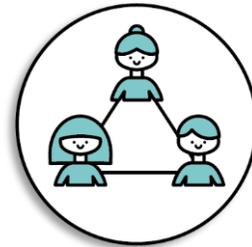
4 Demonstrators:
3 year
programme
(Jan19 – Mar '22)

What is ERIS doing?

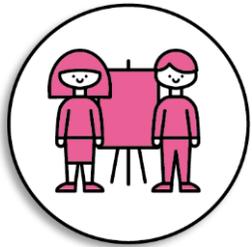
Helping the industry transform by **de-risking** and improving PFER projects:



Better business models: innovators taking a **whole systems** perspective



Building momentum: combining forces; delivering synergies



Enabling commercialisation: Identifying what needs to change (policy, regulation, standards)



Evaluating alignment between programme objectives and projects

Foundations

Systems thinking concepts

Systems Thinking in a nutshell

- Systems Thinking is a mindset:
 - it concentrates on relationships between elements and emergent properties at system level
 - it helps to understand complex systems
 - it tends to be holistic
 - it is like a yin-yang
- It is complex
- Collaboration
- Optimise
- One for all

System archetypes

The Iceberg Model

Observable

- We see events
- We are tempted to fix the symptoms
- Sometimes we see patterns

Hidden

- We often forget that the systemic structures determine emergent behaviour
- We strive to fix what we can fix when we should be addressing the system
- We often forget the PESEL nature of our real systems
- The way that people interact with systems is heavily influenced by their mental models
- We only see what's above the water (10% of what's going on)

Events
Patterns
Systemic structures
Underlying forces / mental models

Ref: Using systems thinking to solve real-world problems, Monat and Gannon, College Publications, 2017, ISBN 978-1-84890-235-0

© Energy Systems Catapult 31

Language

System thinking in the energy system
A primer to a complex world

INDUSTRIAL STRATEGY | UK Research and Innovation

Purpose of this document:

- introduce Energy Systems Catapult's view of whole energy system thinking and define a vocabulary that will inform the context and approach of the Energy Revolution Integration Service (ERIS)
- share concepts and methodologies with the energy innovation community that will encourage the creation of more robust concepts and transformations than would otherwise be the case.

Audience:
Innovate UK and Smart Local Energy Systems (SLES) Assessors, Innovators and ERIS consultancy team.

The ERIS definition of the whole energy system

PERSPECTIVES
Governance Investment Time Place

Resources
Physical
Information
Commercial
Policy

Vectors

System satisfies consumer needs
• Mobility
• Comfort
• Health
• Leisure
• Production

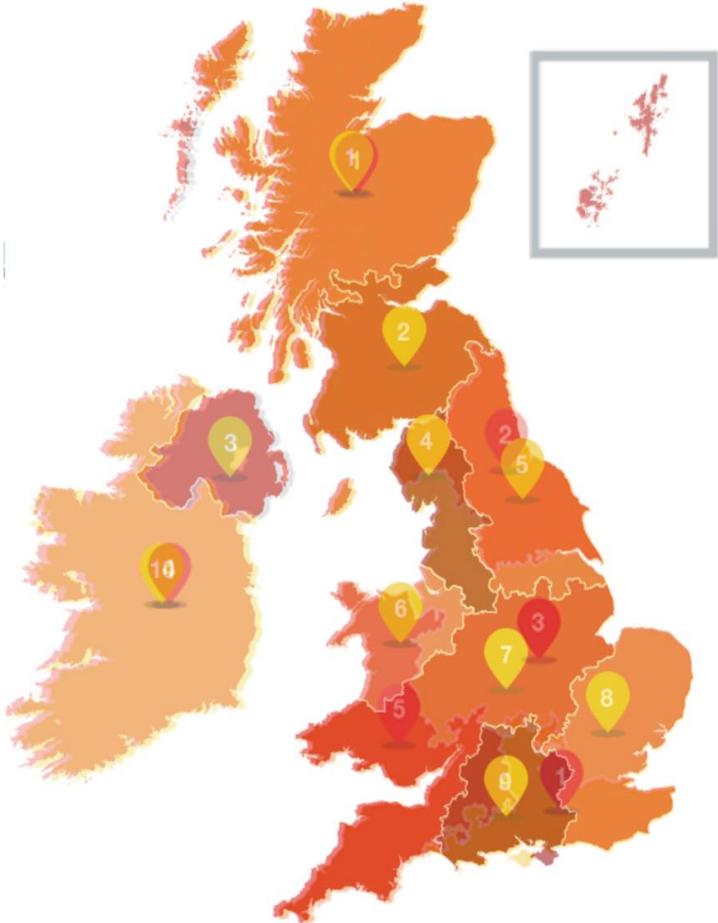
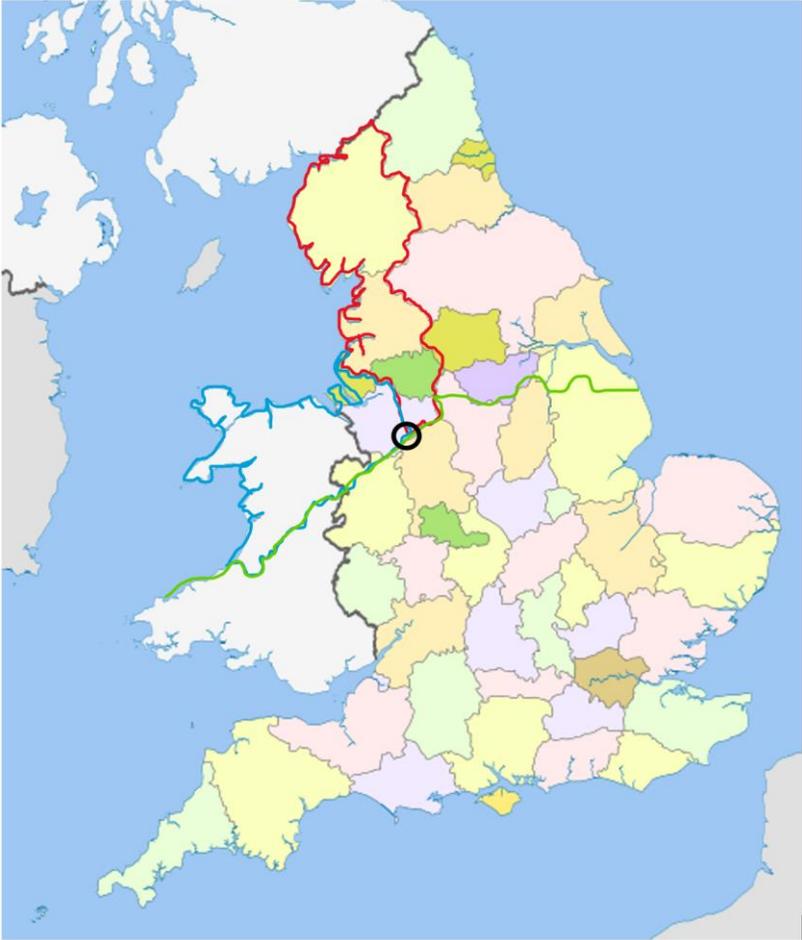
Actors
• Government
• Citizens and society
• Resource providers
• Manufacturers
• Service providers and product vendors
• Investors
• System operations...

Motivations
• Clean air
• Stability
• Security
• Political power
• Profit
• Jobs
• Control
• Fairness
• Carbon reduction
• Economic growth...

RELATIONSHIPS
Communication Trading Supply chains Research chains Politics

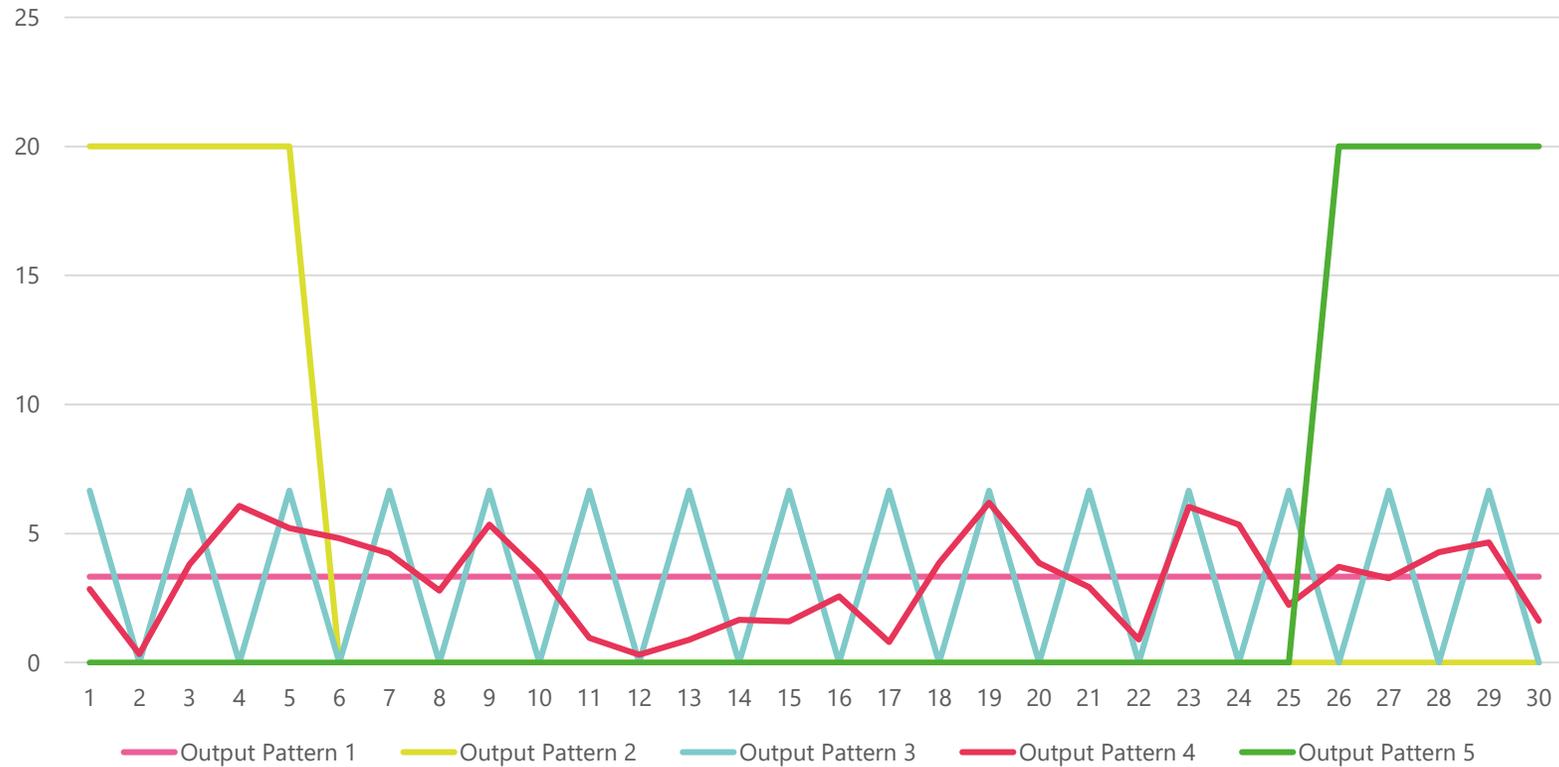
© Energy Systems Catapult

A clear definition of "local"

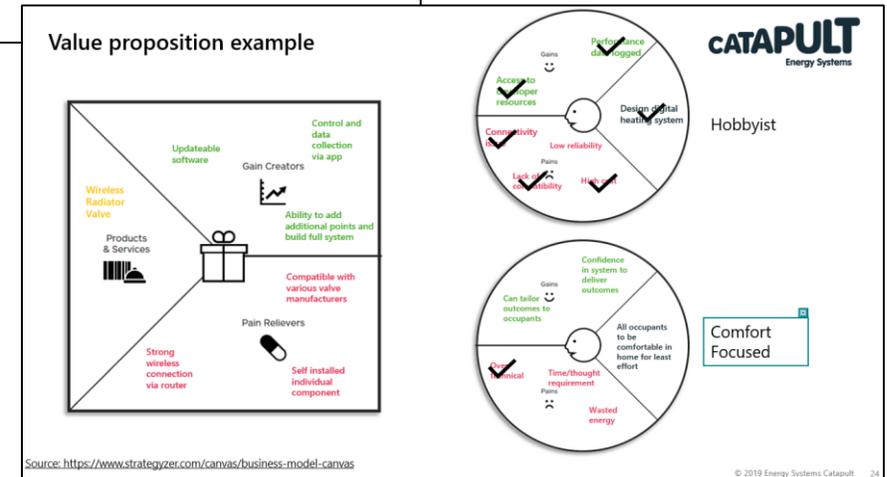
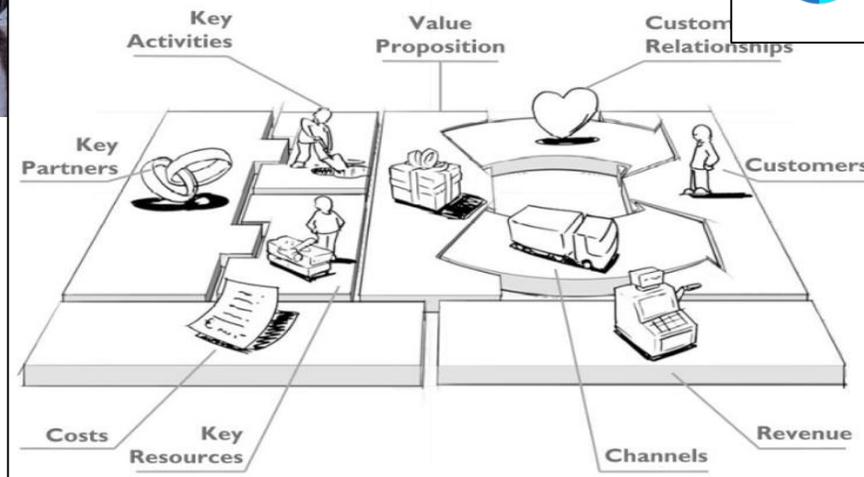
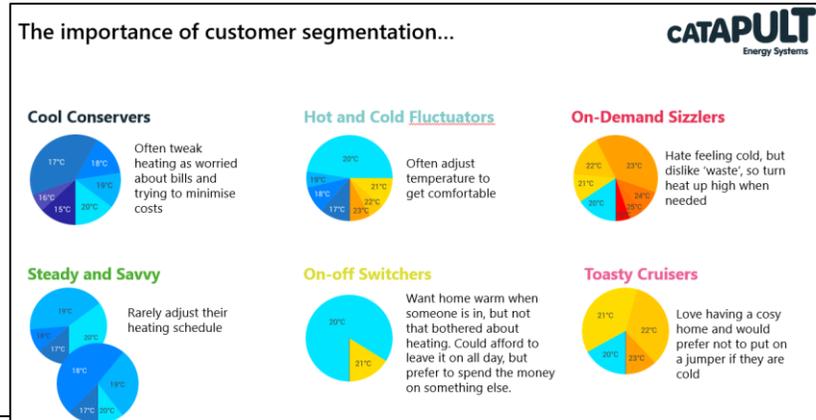
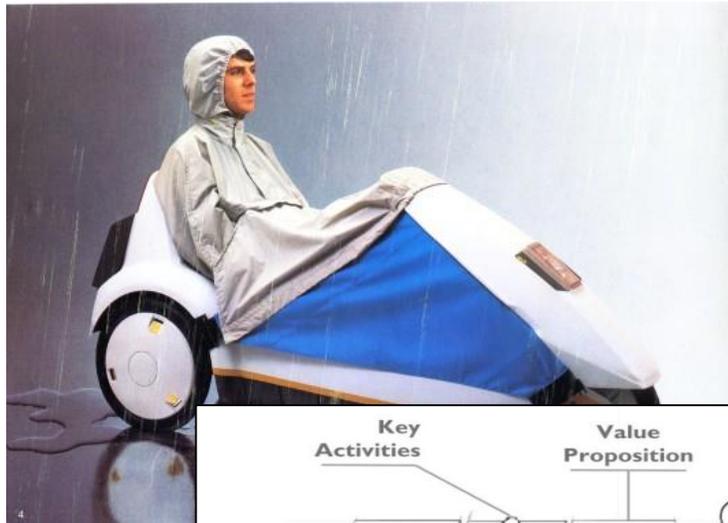


Commercial arrangements that can be delivered by the physical system

Example patterns of output (all delivering 100 units in 30 minutes)



Recognising the importance of the customer



CATAPULT

Energy Systems

Jon Horsley
as@es.catapult.org.uk