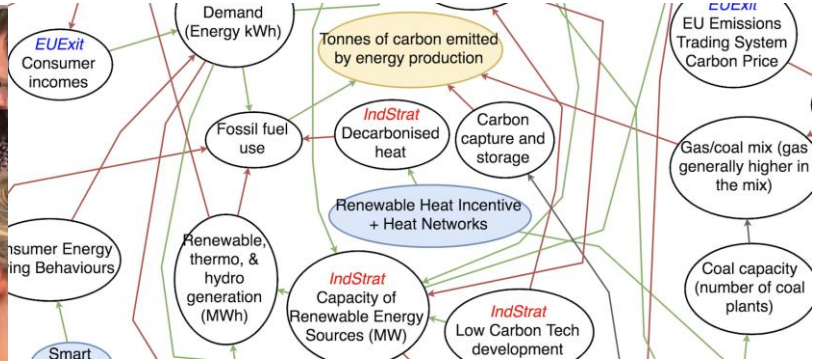

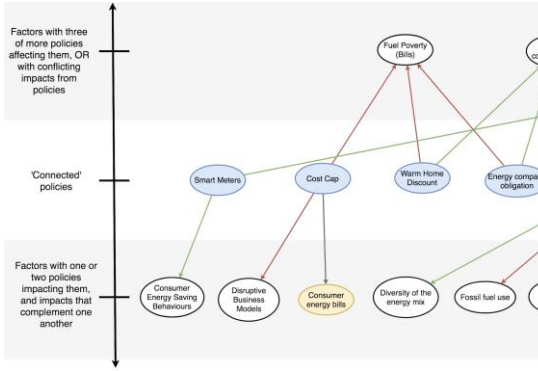

Participatory systems mapping: exploring and negotiating complexity in evaluation with BEIS and Defra

Dr Alexandra Penn, Dr Pete Barbrook-Johnson, Dr Adam Hejnowicz, Chair: Fran Rowe (CECAN)
Jean Davis (Defra)

@DrAlexPenn | @bapeterj | @HejnowiczAP

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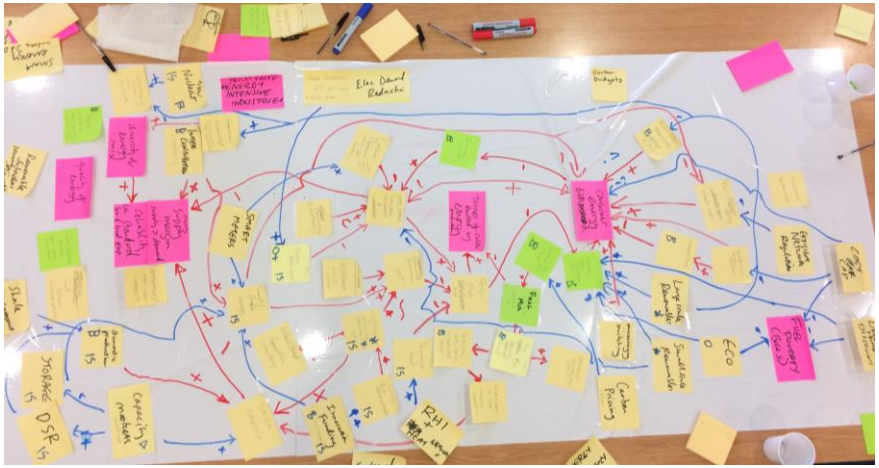
Department for Environment Food & Rural Affairs

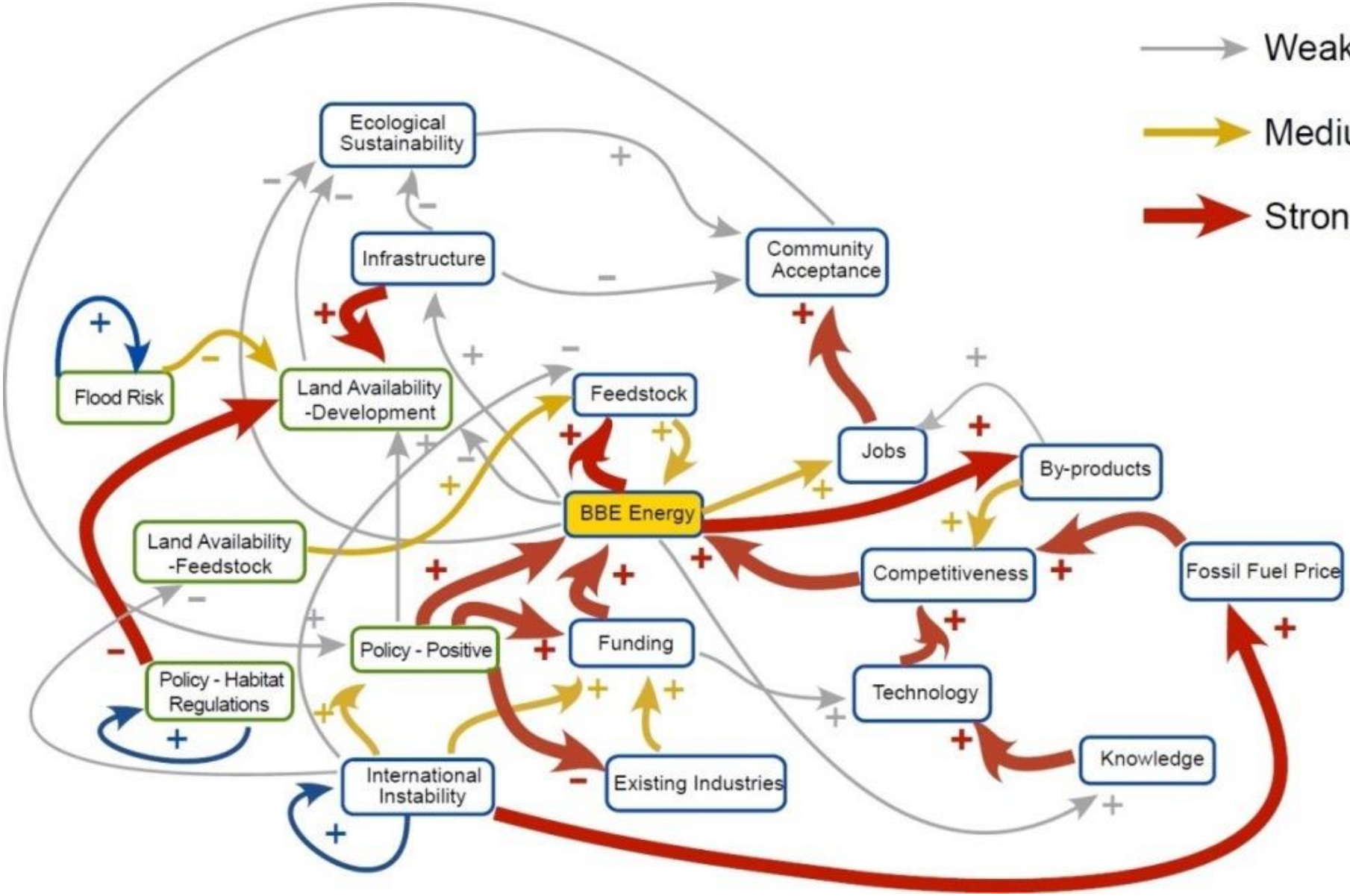
Overview

- What is Participatory Systems Mapping?
- How have we used it in policy evaluation and analysis with BEIS and Defra?
- Reflections from CECAN
- Reflections from Defra
- Q&A

Participatory Systems Mapping



Invited participants collaboratively construct a systems model of their view of **their system**, its components and drivers and their interdependencies: **factors** and causal **connections**



Qualitative and quantitative factors. Factors from any domain. Positive and negative connections

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Participatory Systems Mapping

"Quick and dirty" models rapidly constructed by stakeholders

- **Use when:**
  - Many intersecting issues, important factors from numerous domains, qualitative/quantitative
  - Multiple interdependencies between system components,
  - Multiple different stakeholders and perspectives
  - Stakeholders behaviour/decisions important in determining outcome of system's development, participation important
  - Detailed local knowledge, not data, available

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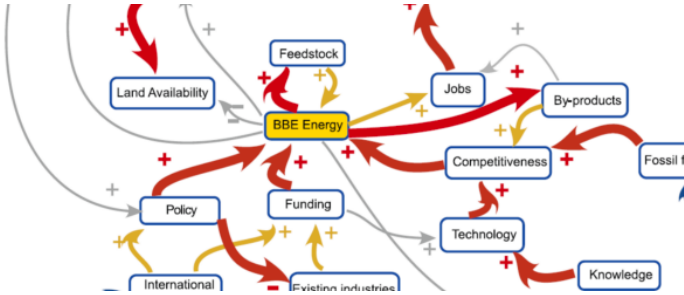
Process

- Before
  - Pick a focal problem
  - Gather knowledge/stakeholders
- During workshop (min 2-3 hours)
  - Pick a focal factor
  - Brainstorm factors
  - Consolidate factors
  - Connecting factors and checking (iterate and prompt)
  - Collect extra info (node/link characteristics)
- After
  - Digitise map
  - Verification
  - Analysis



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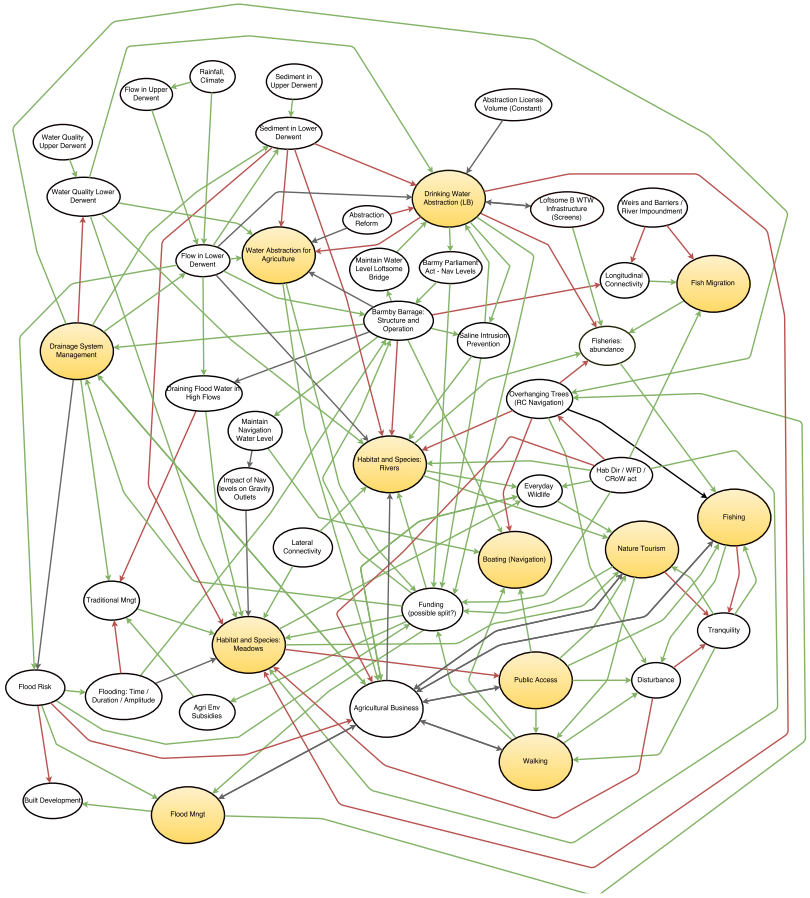
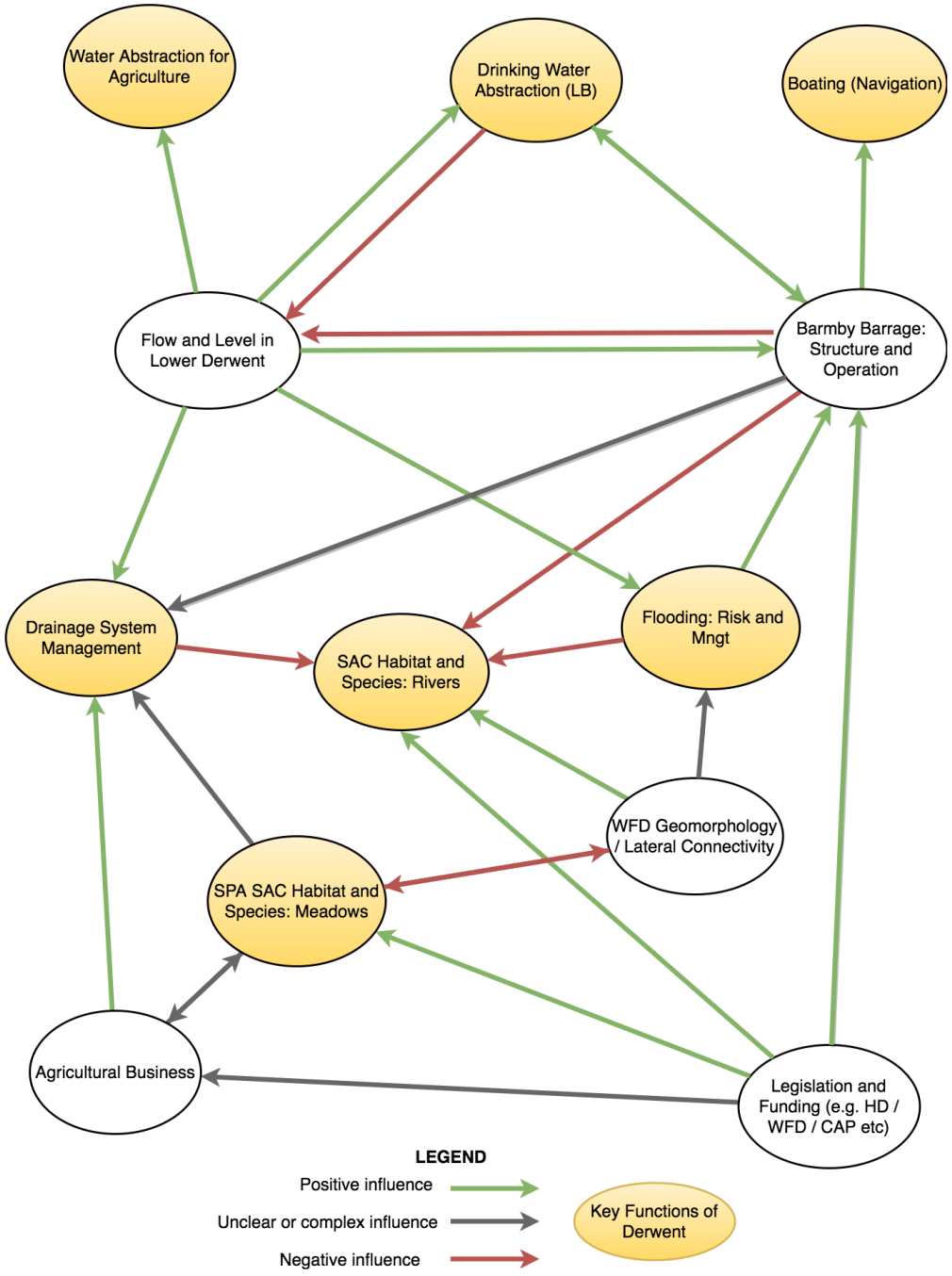
Examples



What is the core system important to stakeholders?



A systems map of the energy trilemma

This systems map was built by analyst and policy teams at BEIS, in collaboration with researchers at CECAN. It shows the causal relationships between a range of key energy trilemma outcomes, BEIS policies, and other factors. The map is an intersubjective object reflecting the views and knowledge of the BEIS staff who created it.
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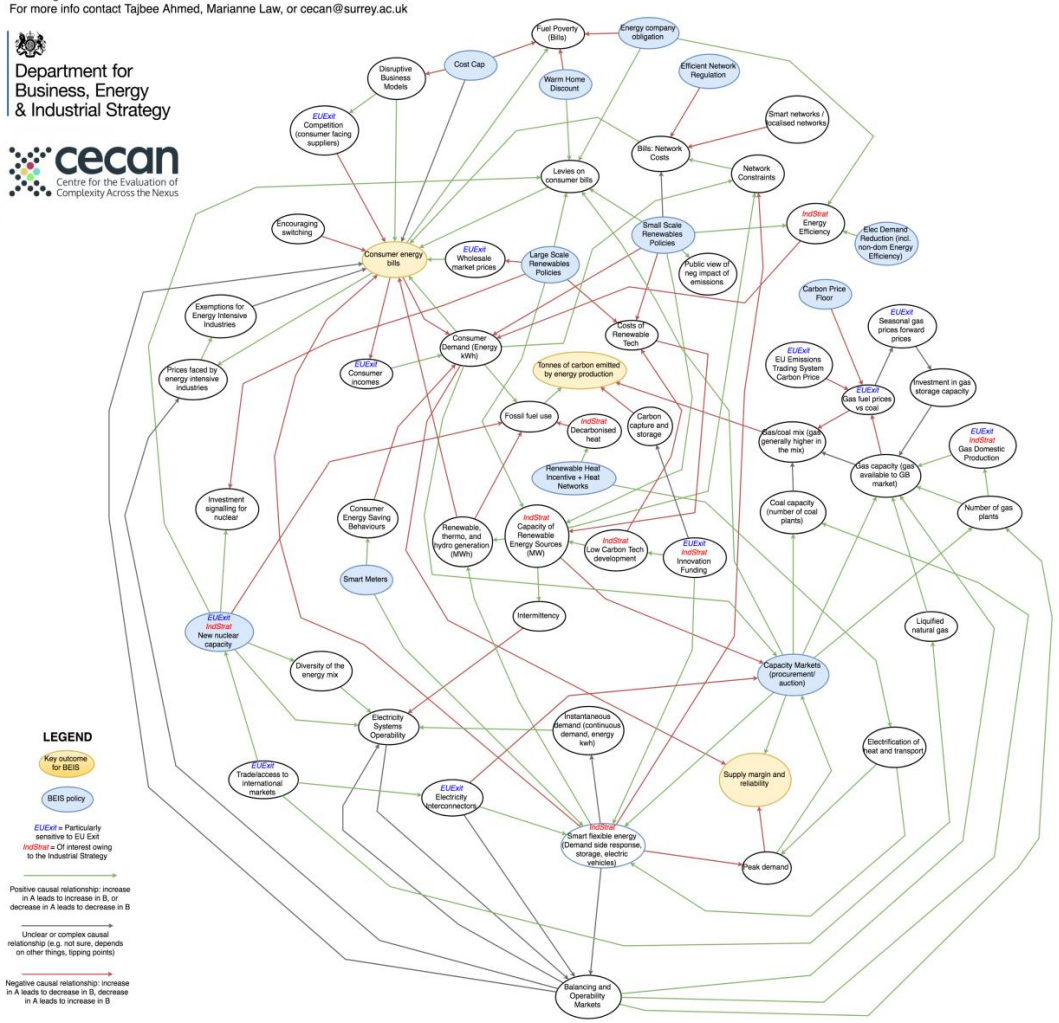
How to use this map:

1. Print me out and put me up in your team area
2. Take a look at me before and during your policy mapping exercises



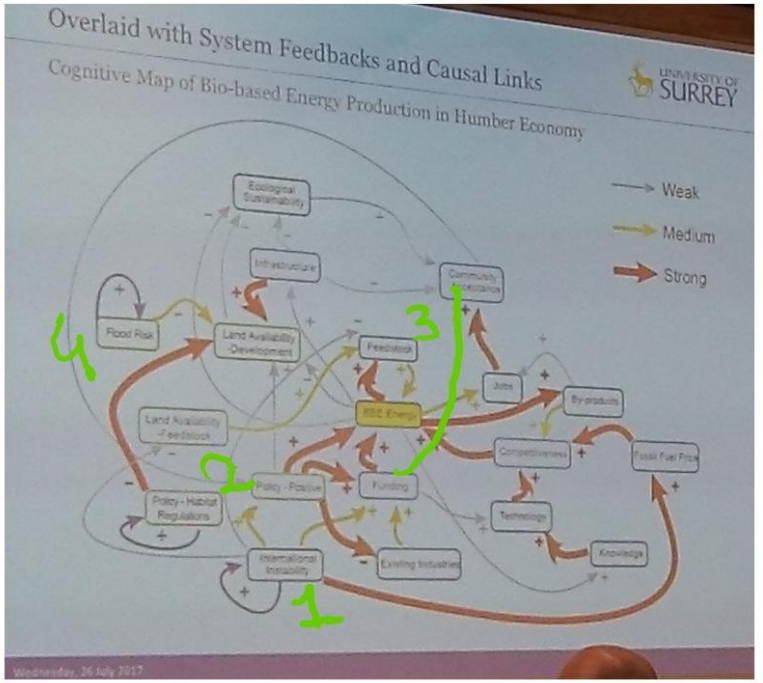
Examples

Start mapping from multiple important policy outcomes for BEIS & important influences. The action of multiple policies on system then added

Explore policy interactions

Systems Maps are Thinking Tools

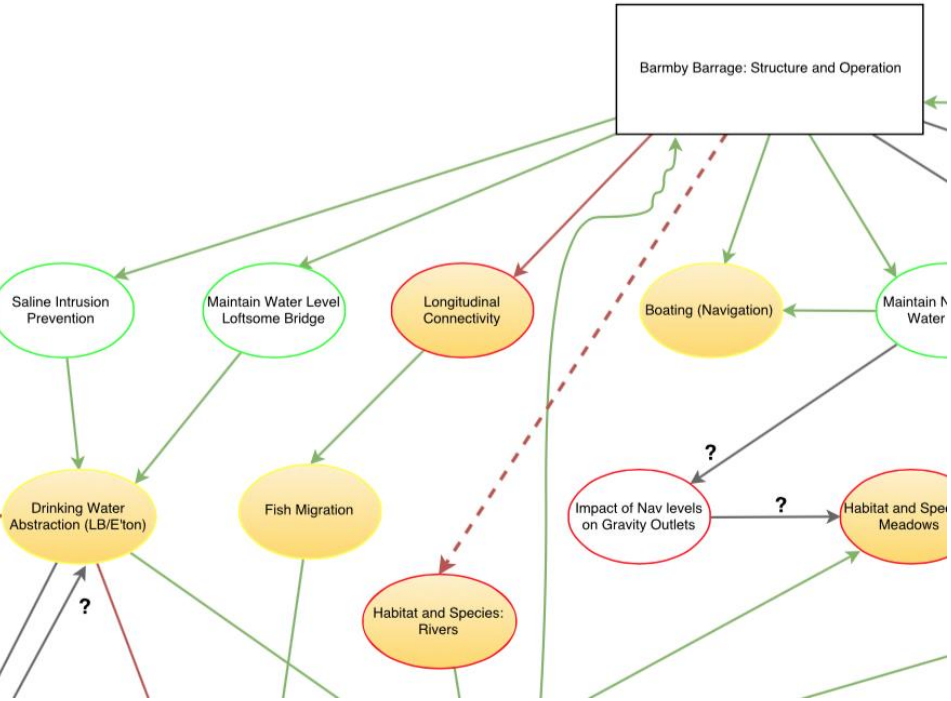
- What is our ecosystem and
- How could we change it?
- What parts of the system can be influenced and by who?
- Is this practical?
- How would we do it?
- What if we connect/disconnect these factors?
- What if we changed/influenced this factor?
- What collaborations needed?
- What to buffer/mitigate against?
- Have we included what is important to all stakeholders?



1. How to build resilience against international instability?
2. What if…Policies were interconnected?
3. What if…Funding was related directly to the community?
4. Why is flood risk not influenced by other components?

Paul van der Cingel @pvandercingel Jul 26
Replying to @HirokiSayama @DrAlexPenn
Great stuff for provoking dialogue. #NetworkLiteracy

Improved Thinking Tools: Combining stakeholder perspectives with network analysis



Living, interactive & open co-created understanding & exploration of changing, evolving complex systems….Online tool under development

- **Thinking tools to explore causal paths**
  - Indirect effects, (policy) interactions, missing connections, what ifs…. DISCUSSION
- **Network analysis of model structure:** Highly central/influential factors
- **Stakeholder perspectives on factors:** Important, controllable, variable
- **Combined: Using or mitigating complexity in real world -** Key factors & upstream/downstream connections
- System & stakeholder "levers", vulnerabilities or "canaries"
- Opportunities; challenges; collaborations; interactions/trade offs diverse interests/goals; change scenarios

Improved Thinking Tools:

- "Upstream" of key outcomes: What apart from policy?
- "Downstream" of policies: where do causal paths or influences overlap – synergies or tensions
- Impact of change on stakeholder interests –trade offs? Indirect effects of policy
- Influential/central factors in system:
  - Influenced by who? Vulnerable to change?
  - Influence on what? (Multiple) policy outcomes/stakeholder interests?
- Contextualise & sense check ToCs: externalities, indirect effects

Summary: Participatory Systems Mapping

"Quick and dirty" models rapidly constructed by stakeholders

- **We get:**
  - Built together: discussion and thinking tool; integrates knowledge of diverse stakeholders
  - Rapidly visualize whole system and interactions
  - Make tacit knowledge explicit
  - Whole system overview: interactions, context, complexity (interdependencies & intersecting issues)
  - "Our" complex system (Intersubjective object)
  - Meaningful analysis & insights

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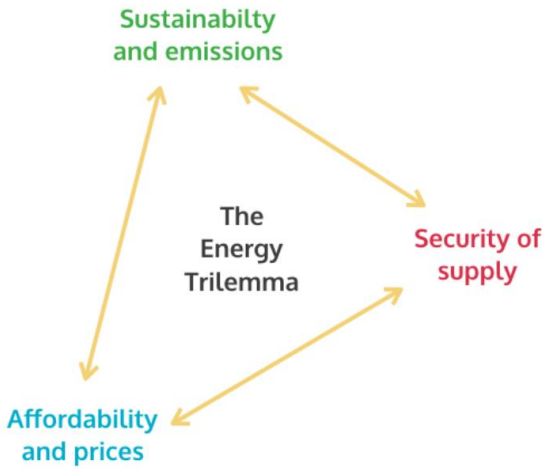
EXAMPLES FROM 3 CECAN CASE STUDIES

SYSTEMS MAPPING IN ACTION

BEIS Energy Trilemma (live)

- Energy Trilemma (prices vs carbon vs security)
- Crowded policy landscape
- Map the trilemma and BEIS policy impacts
- Inform evaluation planning
  - Evidence gaps
  - Complementary or clashing mechanisms
  - Prioritise future evaluations
- Reality of use(!)
  - Print and put up on wall
  - Look at before and after policy mapping exercises (‘this map has the breadth but no depth’)



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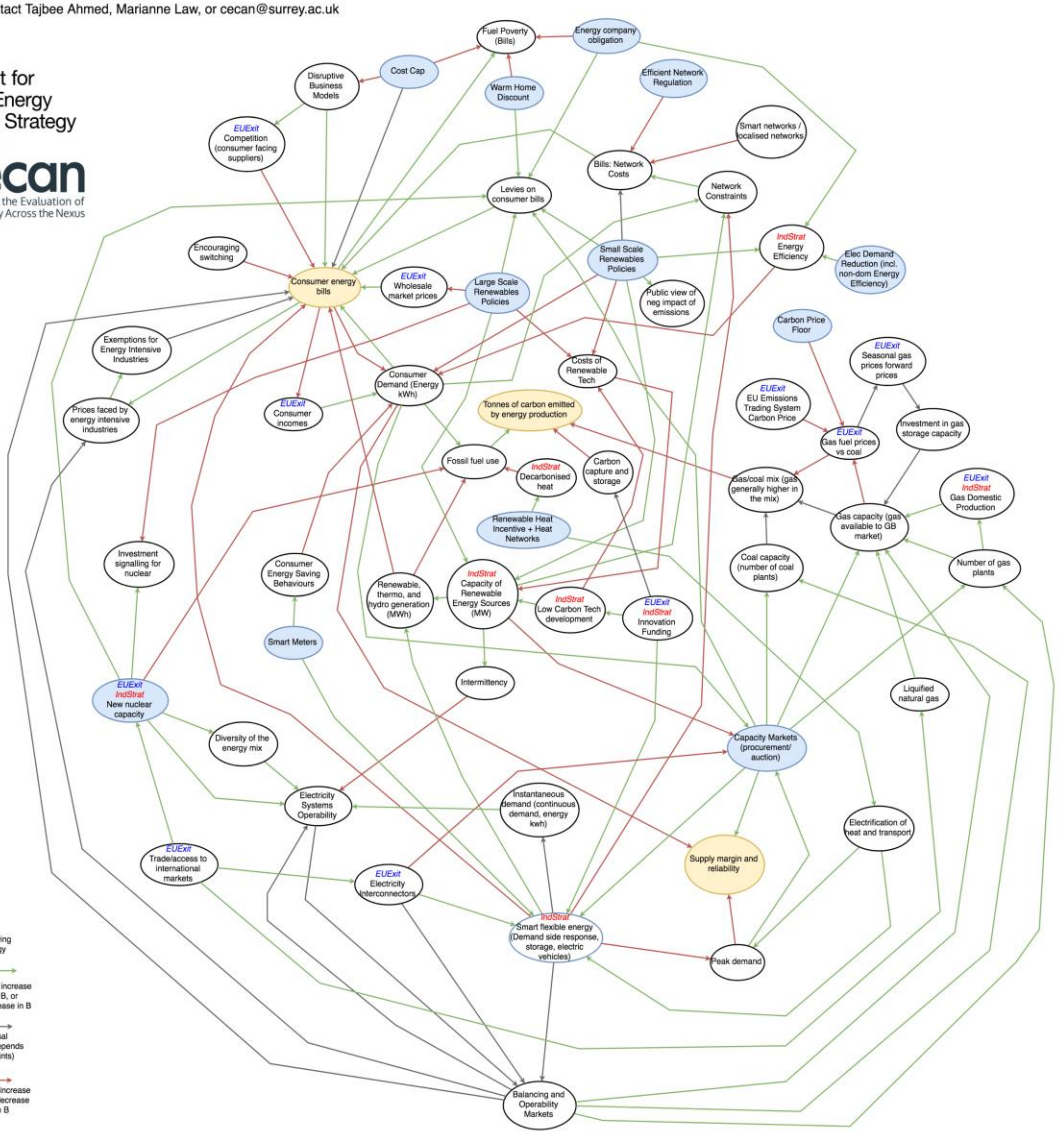


LEGEND

Key outcome for BEIS

BEIS policy

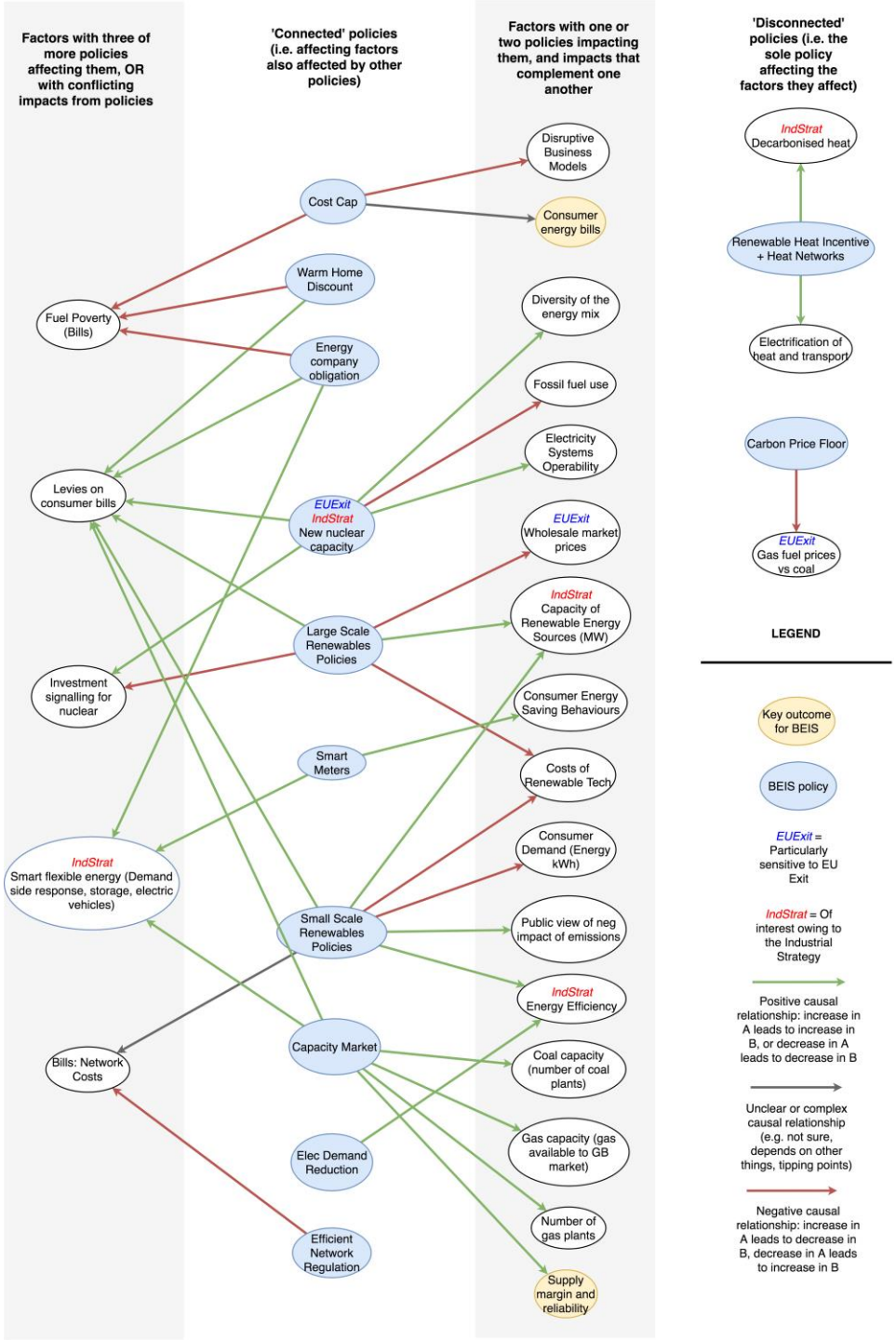
EUExit = Particularly sensitive to EU Exit

IndStrat = Of interest owing to the Industrial Strategy

Positive causal relationship: increase in A leads to increase in B, or decrease in A leads to decrease in B

Unclear or complex causal relationship (e.g. not sure, depends on other things, tipping points)

Negative causal relationship: increase in A leads to decrease in B, decrease in A leads to increase in B



Example analysis:

Policies' synergies and tensions…

Combining network characteristics with stakeholders' views of factors

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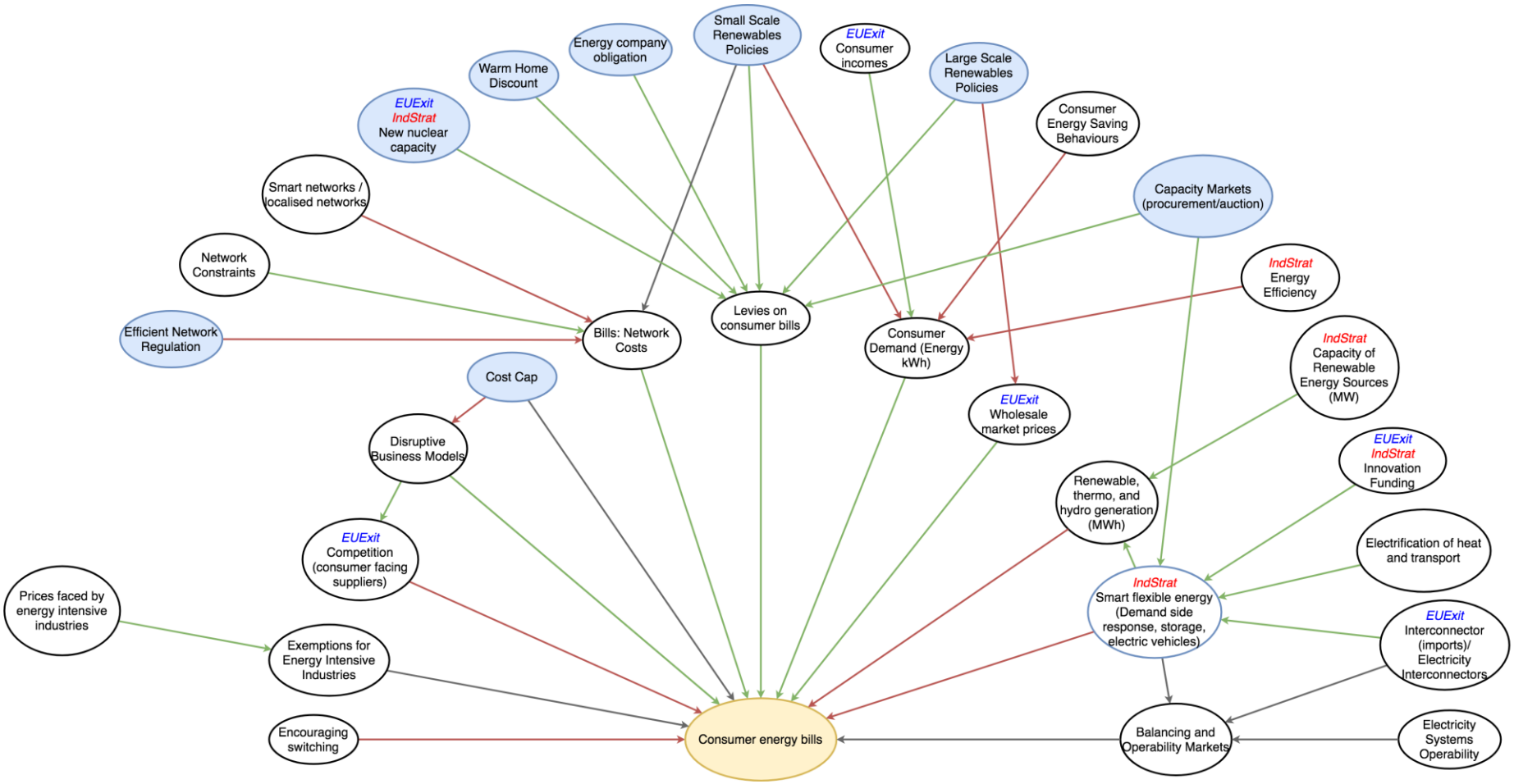
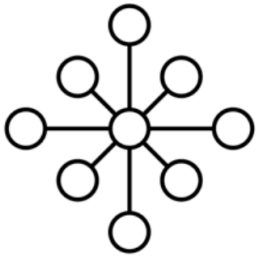
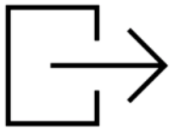
Example analysis: Upstream of key policy outcome



Example analysis: simple network analysis



Consumer Energy Bills	16 connections
Smart Flexible Energy	11 connections
Consumer Demand	10 connections
Capacity Markets	10 connections
Balancing and Operability Markets	9 connections
Gas capacity	8 connections
Capacity of Renewable Energy Sources	8 connections
Levies on consumer bills	7 connections
Small scale renewables	7 connections

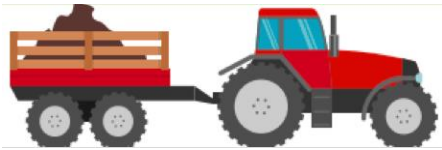


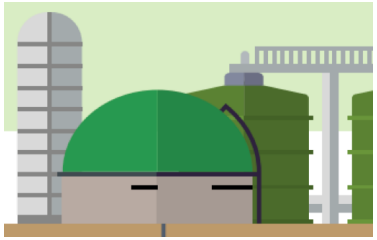
Amongst highly connected factors, Balancing and Operability Markets has a particularly strong effect on the rest of the system, whilst also having a relatively low number of factors affecting it - 9 connections, 3 in, 6 out.

Consumer energy bills (16 connections, 12 in, 4 out), Levies on consumer bills (7 connections, 6 in, 1 out), and Gas capacity (8 connections, 6 in, 2 out) are particularly affected by other factors, whilst influencing relatively few themselves.

BEIS Renewable heat (live)

- RHI evaluation happening now – CAG consultants – using realist approach
- Large biomethane and biogas plants
  - Big budget burners
  - Complex ‘ecosystem’ around these plants
- Map of biogas and biomethane production systems
- **Inform evaluation – C-M-Os and data collection**
- Inform wider policy planning in decarbonising heat team
- Gather an unusual mix of stakeholders
  - BEIS, Defra, National Grid, Farmers reps, Developers, Finance, Waste, Local gov, etc





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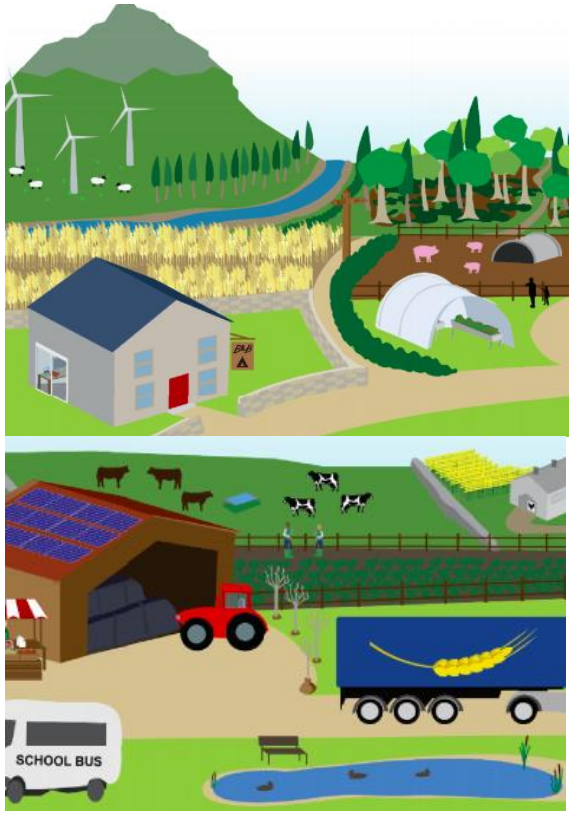
Defra Future Farming and Countryside (live)

- Transition from EU CAP to a new domestic framework
- Complex “rural system”, many policies and desired outcomes, key role of stakeholders
- Opportunity to link ex ante analysis and policy planning with evaluation

- Map individual policy areas then combine:
  - Environmental Land Management
  - Agricultural Productivity & Resilience
  - Rural communities
  - Animal and Plant Health
- All including policy outcomes, new policies & factors that matter to stakeholders
- Individual maps for each area
- Mega-map – Policy interactions, indirect effects, missing evidence, more joined up thinking?
- Living document for ongoing analysis
- Capacity building in DEFRA

Health and Harmony: the future for food, farming and the environment in a Green Brexit



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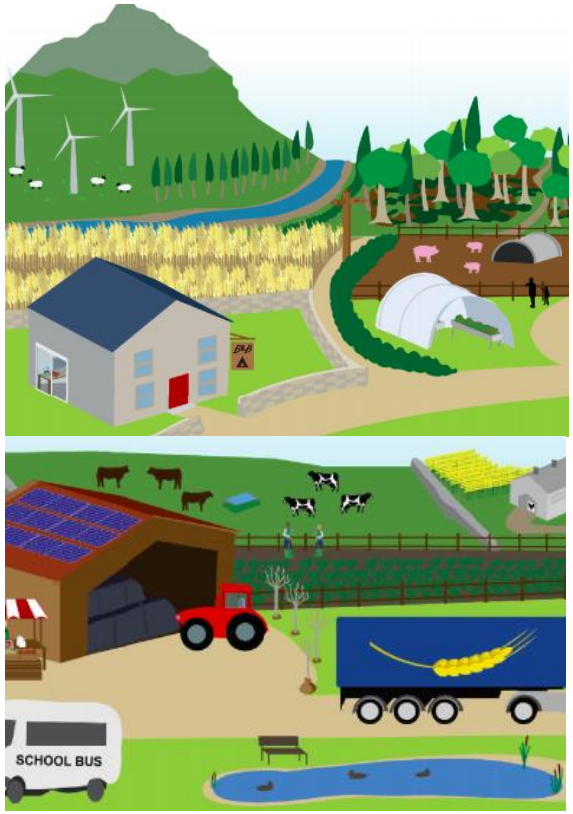
Defra Future Farming and Countryside (live)

- Approach to analysis
- Merged “mega map” –very large
- Preliminary network analysis –highly influential or influenced factors in network
- Contextual information e.g. ownership of policy
- Developing new tools for larger network
- Interim: manual upstream and downstream of key outcomes, policies and functions as selected by DEFRA and highlighted by network analysis
- Contextualising ToCs
- Key connections between policy areas – smaller “meta map”
- Multiple levels of visualisation
- Working for ongoing usability

Health and Harmony: the future for food, farming and the environment in a Green Brexit



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REFLECTIONS FROM CECAN

Reflections from CECAN

- Wider view – vital for complex systems
- Opportunity for reflection and knowledge sharing –boundary object
- Pull ‘above’ any individual evaluation, policy, or department
- Pull into policy planning and ex ante analysis
  - Aids integration of the policy cycle
- Generates new evaluation questions
- Usability
  - How to incorporate into existing processes?
  - How to communicate to policy teams and others?
  - Building capacity
- Differences between disciplines and cultures
  - Highlights different world views
- Fit with other methods
  - Framing for other methods
  - Appropriateness

Related methods

Type	Whose Knowledge?	Specificity / Rigidity	Analysis type	Use
CECAN system mapping	Diverse stakeholders'	Medium	Network and Node characteristics	Generate broader system understanding
Fuzzy Cognitive Mapping	Anyone's	High ('impact of X')	Simulate – update values of factors	Find most influential factors
Policy maps / logic maps / Theory of Change	Policy makers' / evaluators'	Low	No formal	Discipline policy thinking and evaluation focus
Dependency modelling / Bayesian Networks	Anyone's and data	High ('X impacted by')	Simulate/ Probabilistic	Assess contribution

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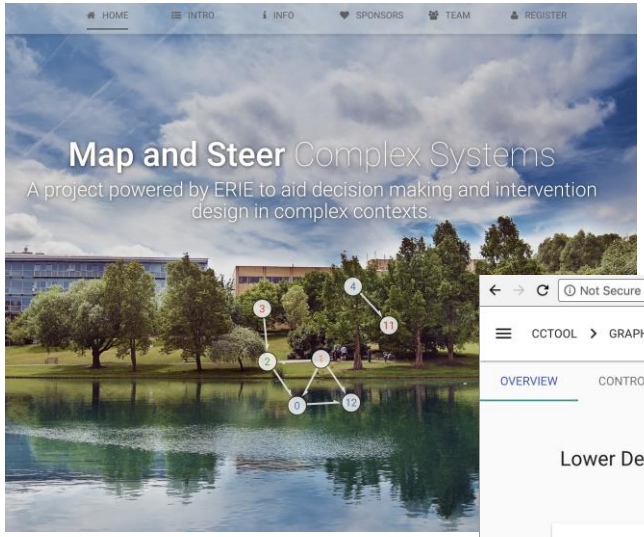
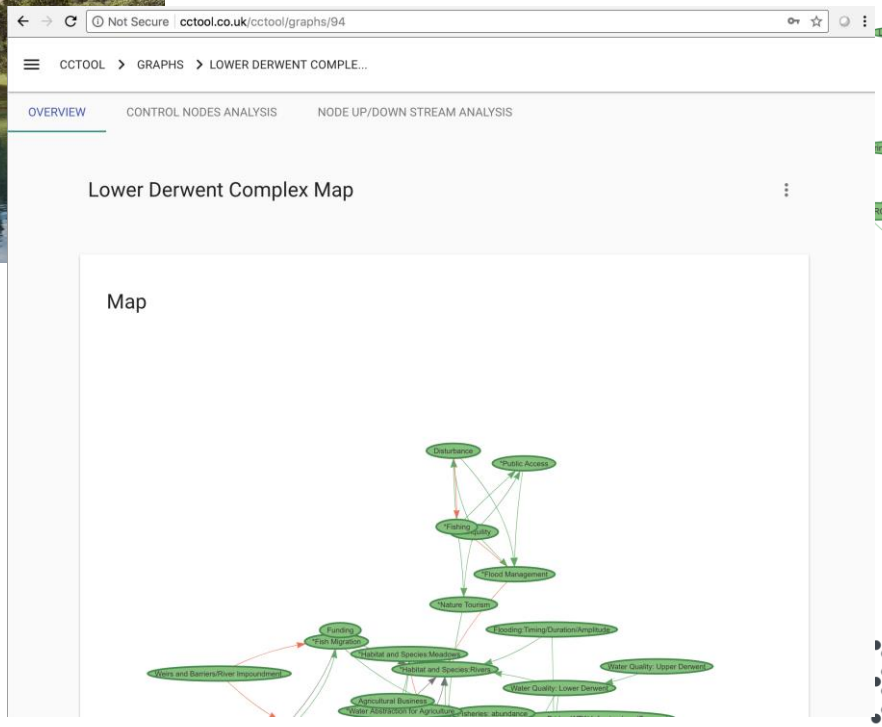
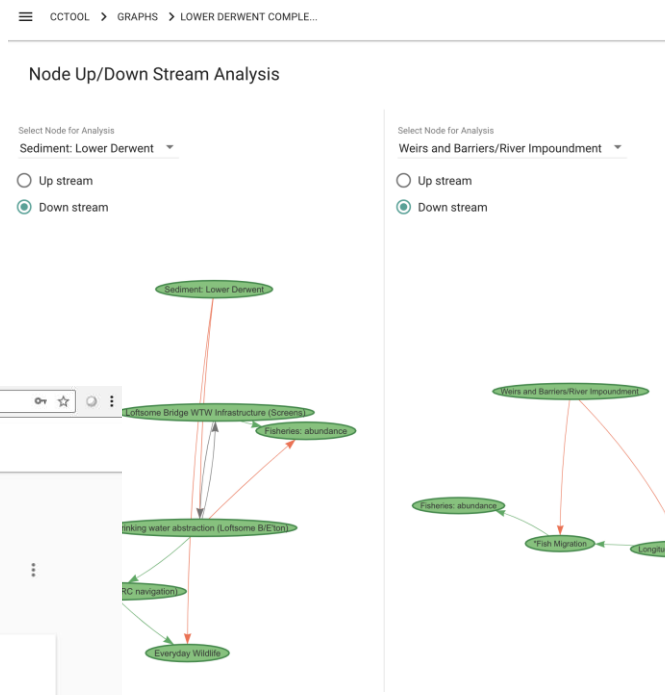
CCTool (coming soon) – online systems mapping

- Build, share, and analyse maps







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Conclusions

- Intuitive and flexible
- Quick and cheap
- Does not give certainty
- Careful thought needed on communicating
- Appropriateness and fitness for purpose
- Ongoing effort to integrate into existing processes
- Method as an entry point for a wider cultural shift towards more complexity-appropriate analysis
  - Step towards genuine adaptive iterated policy cycle
  - Ongoing interaction & learning with dynamic CAS

Department for Environment Food & Rural Affairs

Future Farming & Countryside Systems Mapping

Jean Davis

Senior Research Officer

Insights and Evaluation

Forestry Commission England | NATURAL ENGLAND | Environment Agency

A Complex Environment

The Task for Future Farming and Countryside

- **How do we jointly focus on achieving outcomes as we transition from EU common agricultural policy to a new domestic framework?**
- Need to approach this with a holistic method that takes into account stakeholder views and experiences;
- While also recognising the complex interactions between policies, people and the natural environment.
- Difficult questions need innovative solutions - systems mapping was a natural choice.

Systems Mapping: Challenges and Opportunities

Challenges

- Size and complexity of the map
- The new and innovative nature of the methodology and of systems thinking
- Ongoing evolution of the systems maps (also opportunity)
- Future usability/user-friendly interactions

Opportunities

- Helped policy colleagues ‘think through’ their policies
- Showed the true level of complexity
- Threw light on important stakeholders as mediators
- Highlighted important teams/policy areas for coordination
- Demonstrated the role of non-Defra owned policy

“Sometimes I see my job as putting order into chaos. Systems mapping confirmed that, but focussed my mind on who to speak with next”

Future Work

- Network analysis which might identify policy clash and synergies
- Identify highly influential factors which could be vulnerabilities or levers and;
- Contextualise and sense check our Theories of Change

"The mapping workshops have been a good process to go through. They've made us think through the steps as to how our policy will achieve the end goal, and how other policies may also affect that end goal"

Thank You

THANKS

Q&A DISCUSSION

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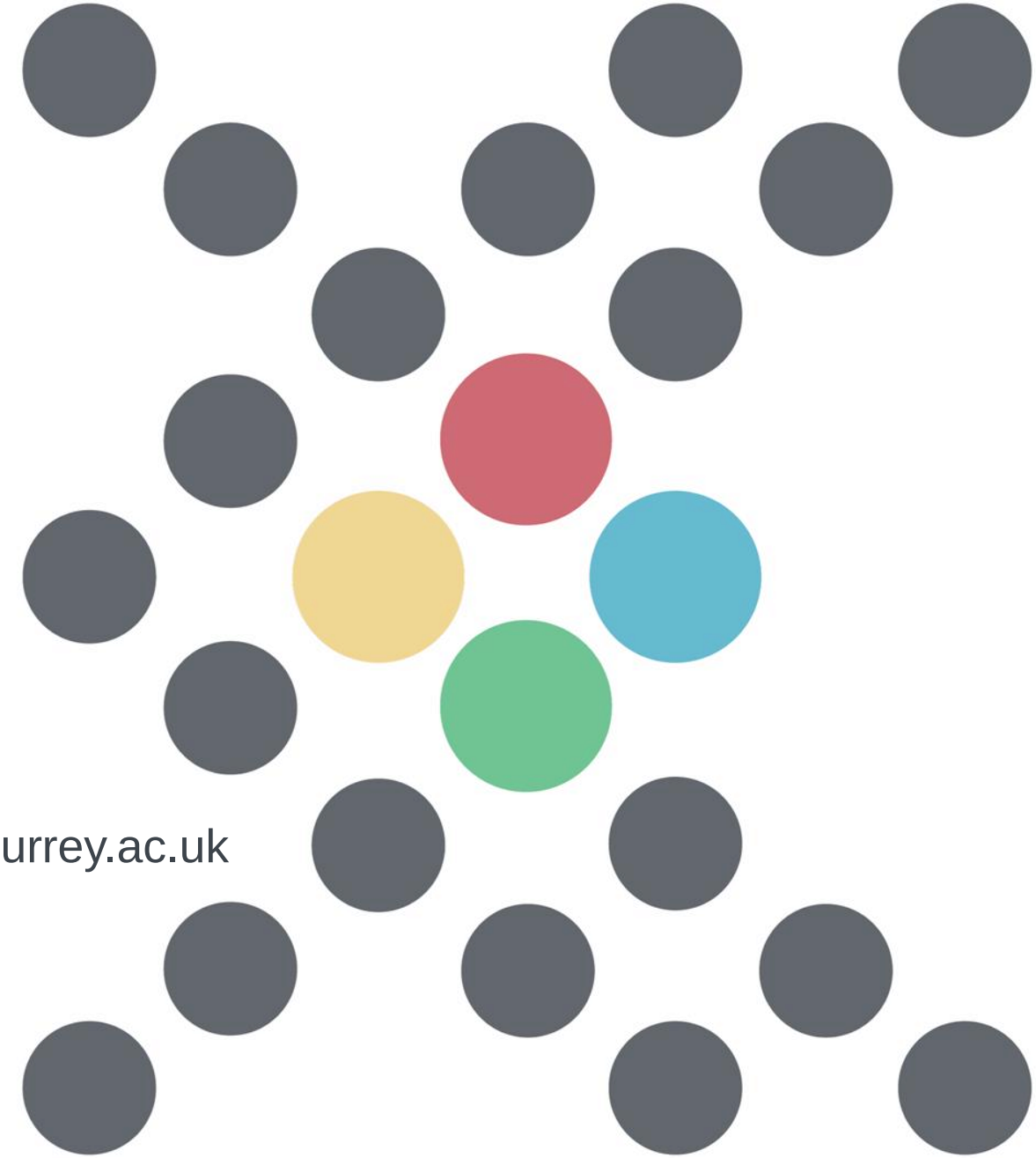
p.barbrook-johnson@surrey.ac.uk



Helpful Comparison to Theory of Change or Logic Models?

- Sense check and contextualize with broader system
- System context: Check intervention mechanisms, potential overlap, policy clash
- Do links in ToC exist in systems map? If not, why not? Indirect? Incorrect assumptions?
- What are externalities? What else impacts on ToC factors? What else do they influence?
- Unexpected indirect effects, +/- feedbacks
- Trade offs between important factors?
- NB Need to be able to compare factors
- Iterative process-learning

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What to Monitor?

- Evidence: Which factors or links can we measure/have data for?
- Use map to suggest alternative intermediate outputs or signposts
- “Canary” factors? Vulnerable or variable, highly influenced by important factors or intermediaries. Detect onset unexpected effects?
- Factors in uncertain causal pathways –test the causal structure

CECAN systems mapping – when/how to use?

- Where does it fit with policy maps etc?
- Pre-evaluation:
  - Prioritising and designing evaluations
    - Evidence gaps / Key mechanisms
    - Contradictory or complementary policies
    - Capture stakeholder input
- During evaluation
  - Inform middle range theory
  - Inform data collection
- Policy planning and design

Sheate, W.R. et al. (2016) Learning lessons for evaluating complexity at the nexus: a meta-evaluation of CEP projects, Final Report to CECAN, November 2016.

Instrumental / Purpose-based use	• direct use of an evaluation's findings in decision making or problem solving • suggests changes to overall mission and aims
Conceptual use	• suggests changes in thinking or behaviours
Process-based / Structural use	• suggests changes on the basis of knowledge gained while undertaking the evaluation (Kirkhart, 2000) • suggested changes may refer to the organisation's or programme's structure
Strategic / Persuasive use	• evaluation is used to influence policy • can provide arguments in support of a political position (or not)

Resources

- Workshop process guide – cecan.ac.uk/resources (at the bottom)
- Software (use what you know!?)
  - Draw.io (google/one drive) – for drawing easily and sharing
  - Gephi – for network analysis and vis
  - R – for visualisation and analysis
  - CCTool (coming soon) – for all!
- CECAN CPD course
- Surrey module/short course coming 2019
- CECAN advice for your systems mapping efforts