Participatory Systems Mapping for Policy Analysis

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Overview

- Complex Adaptive Systems
- Participatory Systems Mapping
- Examples in action
- Conclusion and ways forward

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Steering Complex Adaptive Systems

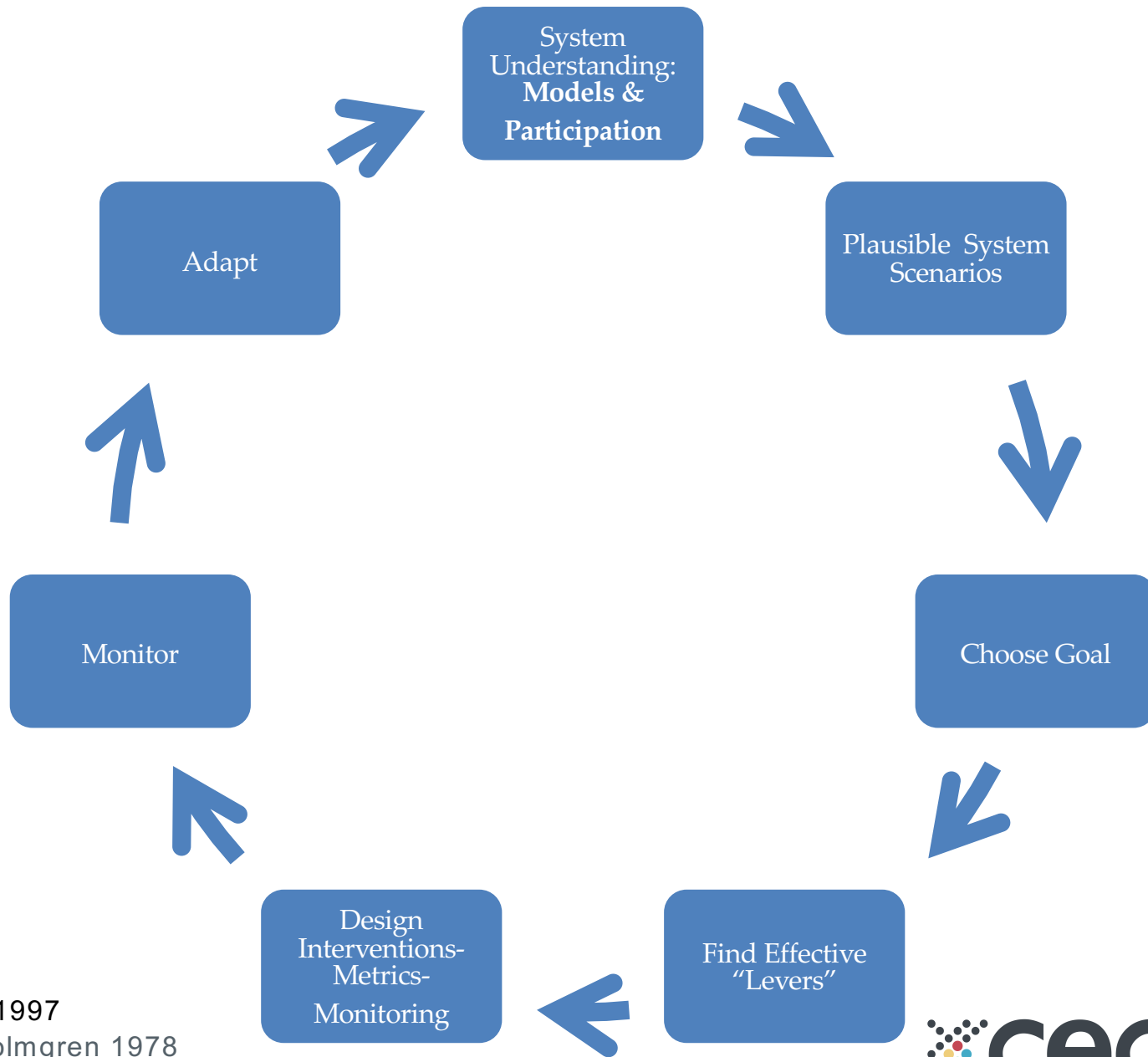- *Not* interacting with static artefacts.....

  We need approaches to engineering and manipulating *adaptive*, dynamic, living *processes which reconfigure in response to intervention*

- Will very seldom have access to complete system description for any real system of interest, *unexpected indirect effects*

- *But these are not just technical problems ... profoundly social*

An algal bloom. Villacorte, L.O. (2014) Algal Blooms and Membrane Based Desalination Technology. CRC PRESS

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System Understanding: **Models & Participation**

Plausible System Scenarios

Choose Goal

Find Effective "Levers"

Design Interventions- Metrics- Monitoring

Monitor

Adapt

Rowley *et al* 1997
Mollison & Holmgren 1978
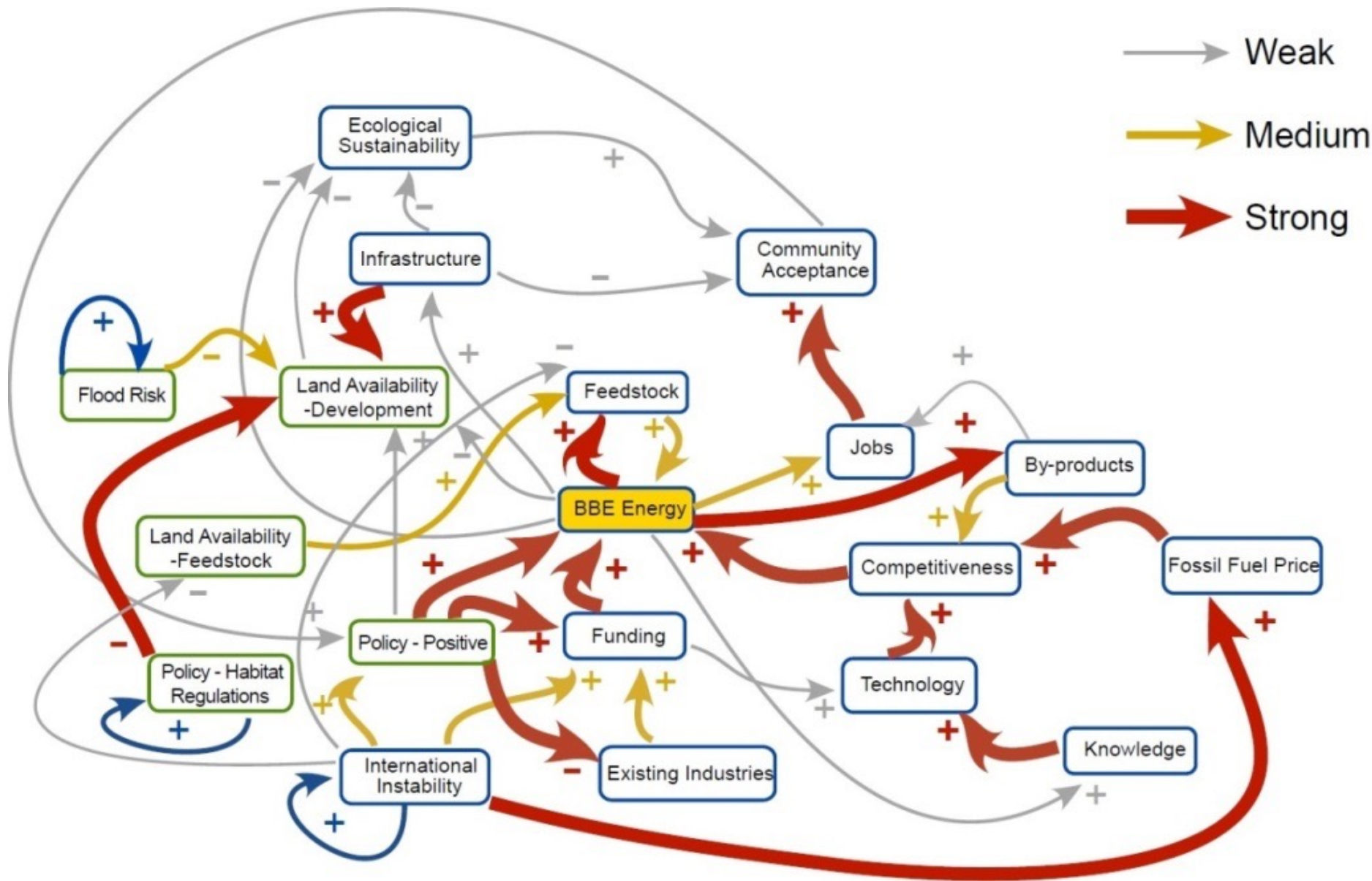Holmgren 2002

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Construction, Outputs & Analysis

PARTICIPATORY SYSTEMS MAPPING

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**

Penn AS, Knight CJK, Lloyd DJB, Avitabile D, Kok K, Schiller F, et al. (2013) Participatory Development and Analysis of a Fuzzy Cognitive Map of the Establishment of a Bio-Based Economy in the Humber Region. PLoS ONE 8(11): e78319

Process

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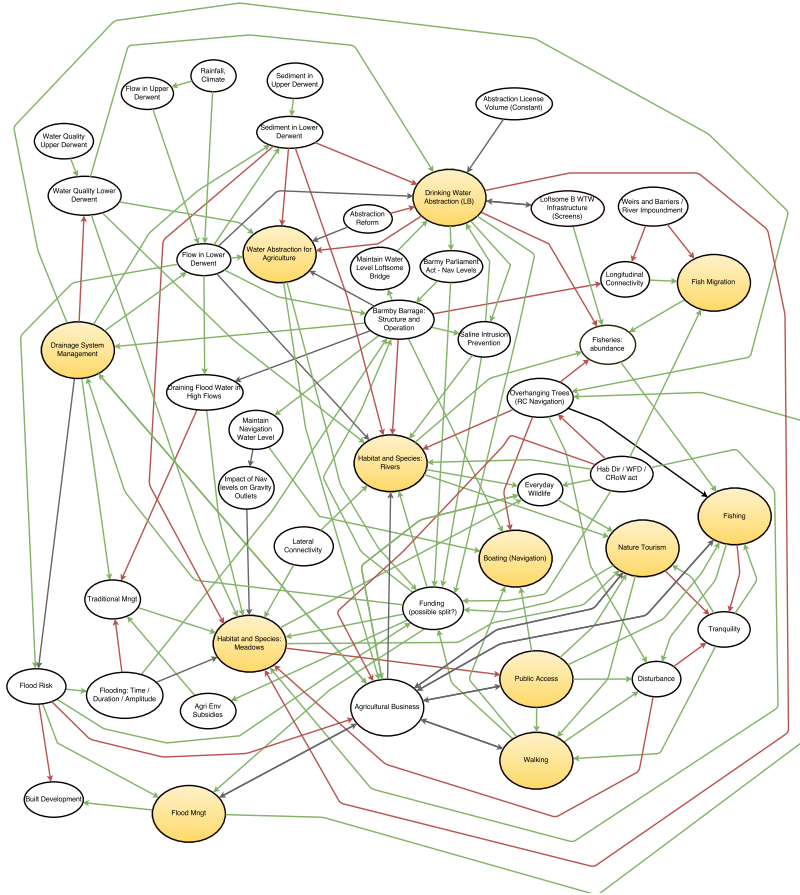- During workshop (min 2-3 hours)
  - Pick a focal factor
  - Brainstorm factors
  - Consolidate factors
  - Connecting factors and checking (iterate and prompt)
  - Collect extra info (node/link characteristics)
- After
  - Digitise map
  - Verification
  - Analysis

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Examples

What is the core system important to stakeholders?

LEGEND

Positive influence →

Unclear or complex influence →

Negative influence →

Key Functions of Derwent

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

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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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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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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How are we using it?

SYSTEMS MAPPING IN ACTION

CECAN case study – 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')

Sustainabilty and emissions

The Energy Trilemma

Security of supply

Affordability and prices
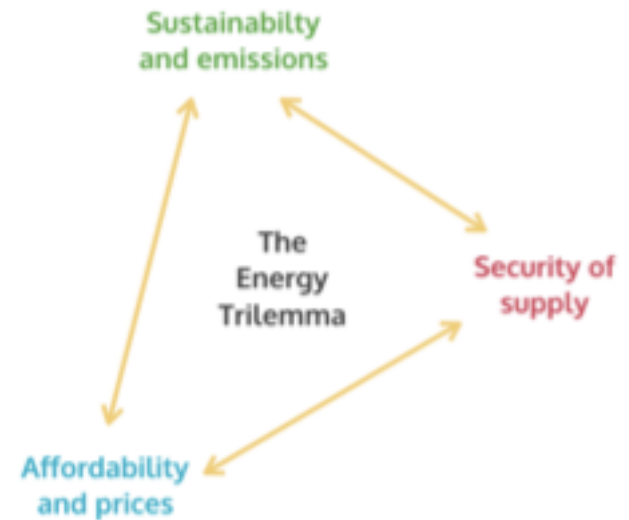
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CECAN case study testing – BEIS Renewable heat (live)

- 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 usual mix of stakeholders
  - BEIS, Defra, National Grid, Farmers reps, Developers, Finance, Waste, Local gov, etc

CECAN case study – Marine Pioneer

- Piloting new approaches to collective management of marine resources- Natural capital approach
- 2 sites, North Devon and Suffolk
- Systems mapping at outset with MMO, EA, WWF-responsible for delivery
- Where are we now? What does whole system look like?
- How might natural capital approach fit here? What is missing?
- Communication "up" –complexity of reality on the ground

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So what next?

# CONCLUSIONS AND WAYS FORWARD

Reflections

- Wider view – scoping - 'above' any individual evaluation or policy
- Pull / natural slide into policy planning and ex ante analysis
- Next steps?
  - How to incorporate into existing processes?
  - How to communicate to policy teams and others?
  - Standardise / regularise the process? Building capacity?
- Differences between departments / cultures
- Fit with other methods
- Raises new questions

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# CCTool (coming soon) – online systems mapping

Build, share, and analyse maps
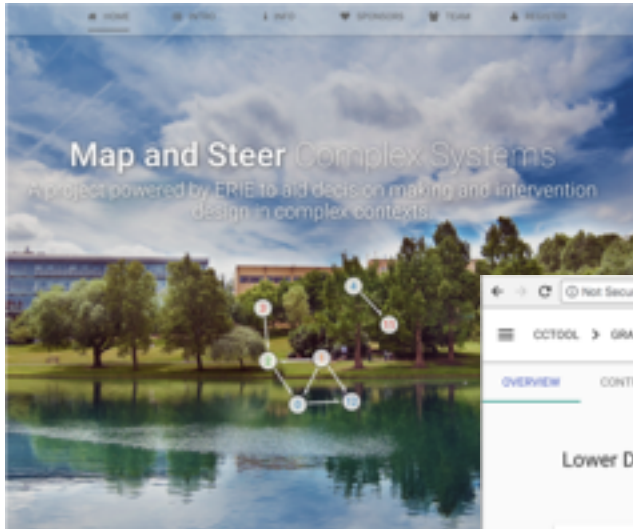
Conclusions

- Intuitive and flexible
- Quick and cheap

- Many meanings and confusion
- Analysis only as valuable as the effort you put in
- Does not give certainty
- Does not communicate easily
- 'So what?' Test: **B+** (growing interest)
- 'So what next?' Test: **D**
  - Fitting into existing policy analysis processes
- Appropriateness and fitness for purpose
- Method as an entry point for a wider cultural shift towards more complexity-appropriate analysis

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THANKS!

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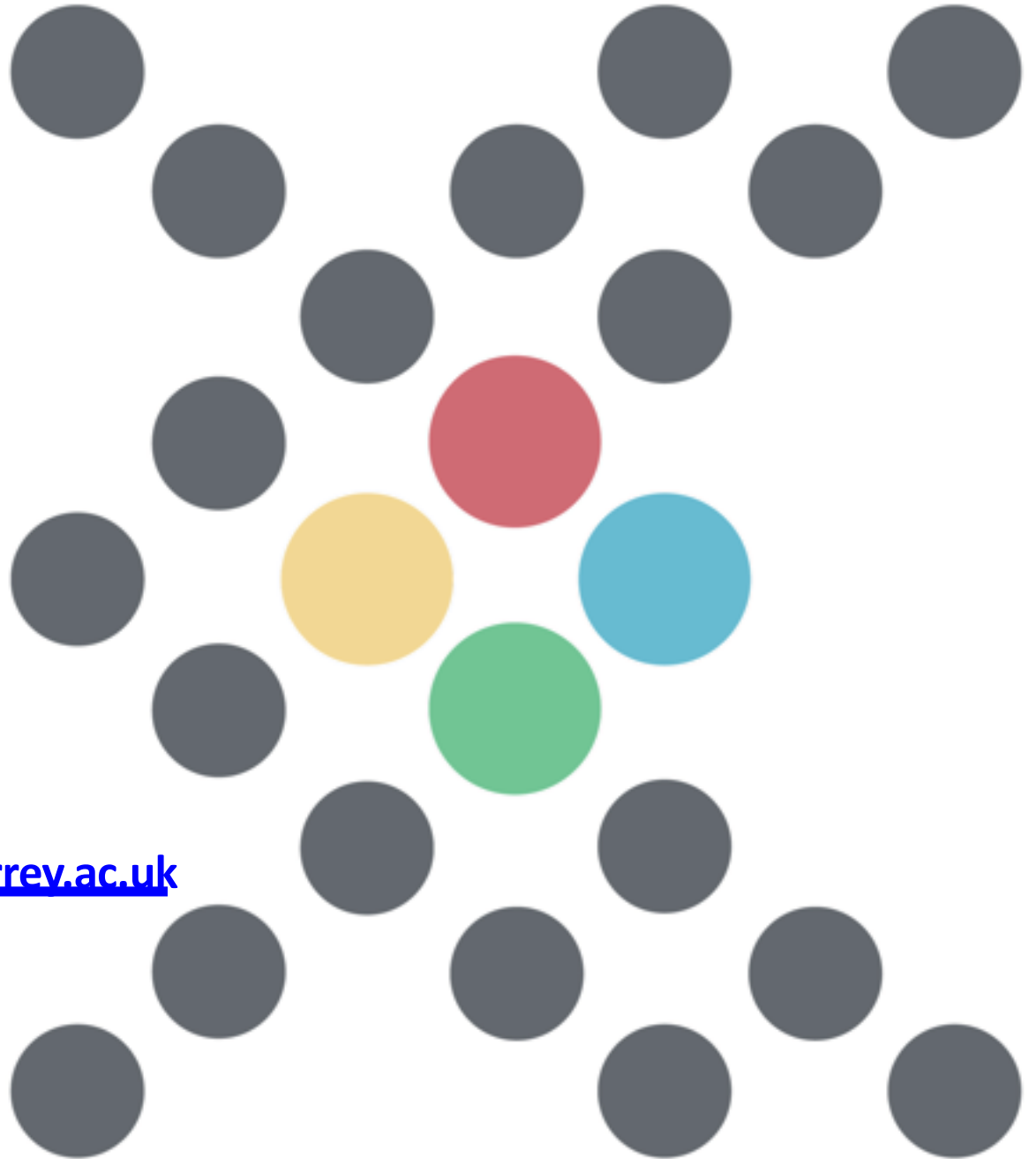
ADDITIONAL MATERIALS

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

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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)

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

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Way Forward: systems mapping + other methods

- A way into complexity and policy as acting on and forming part of complex adaptive systems
- Can we use it to frame complexity-appropriate analysis (appraisal and evaluation designs)?
- Scoping identify need for/context for methods/approach
- Combination with other methods eg realist methods –CMOs, data
- Within context of adaptive (policy) cycle –usually used for system understanding and intervention design
- Vision is integration, complexity thinking & evaluation embedded. Ongoing interaction & learning with dynamic CAS
- Small steps!

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