Participatory Systems Mapping for Policy Analysis

Dr Alexandra Penn and Dr Pete Barbrook-Johnson

University of Surrey
@DrAlexPenn | @bapeterj
Overview

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

System Understanding: Models & Participation

Choose Goal

Find Effective “Levers”

Design Interventions-Metrics-Monitoring

Monitor

Adapt

Plausible System Scenarios

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

![Fuzzy Cognitive Map of the Establishment of a Bio-Based Economy in the Humber Region](image)
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
What is the core system important to stakeholders?
Improved Thinking Tools: Combining stakeholder perspectives with network analysis

- **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

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

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

a.penn@surrey.ac.uk
p.barbrook-johnson@surrey.ac.uk
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 visualisation
  - 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
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

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
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
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!