How to design a Participatory Systems Mapping process

Alexandra Penn and Pete Barbrook-Johnson

18 February 2022

This document should be used in conjunction with our online CECAN toolkit available at: https://www.cecan.ac.uk/sites/default/files/2019-03/PSM%20Workshop%20method.pdf, which gives a detailed description of how to run Participatory Systems Mapping (PSM) workshops and map construction.

One of the key features of PSM is its flexibility and the possibility of designing bespoke analysis. The PSM process is adaptable and can be modified at various stages. This adaptability allows the process to provide best fit to context, stakeholder interests, and to increase buy-in by providing useful and relevant insights to participants from early on in the process. It also supports co-design and co-production processes, in which stakeholders take on increasing ownership of the map, process design, and map analysis. When supported throughout, with built-in capacity building, this vastly increases the chances that maps are used and embedded within organisations, ultimately becoming "living documents", which can be used and modified in the longer term after the facilitators depart.

When designing a PSM process the following stages can be modified, ideally as part of a co-design process:

- Deciding on aim of project
- System definition/boundary
- Choosing stakeholders
- Process design
- Choosing focal factors/system functions (i.e. the initial nodes laid down in the construction of the map and which frame the map at the outset)
- Number and level of general factors (i.e. setting the resolution or scale at which the system is examined)
- The mapping process itself
- Analysis tailored to interests of stakeholders
- Adding additional information to maps

Contact: a.penn@surrey.ac.uk and peter.barbrook-johnson@ouce.ox.ac.uk

Options, strategies, and decisions for all these stages are discussed in the following sections.

Project aim

There are multiple purposes for which a PSM process could be used and every stage of the process needs to be designed to reflect the overarching aims, which might include:

- Solving a specific problem or asking a specific question about a particular system or the impacts of changes or interventions on that system
- Designing new interventions for or uncovering vulnerabilities in a particular system
- Building engagement and connections amongst stakeholders
- Building a shared understanding and ownership of a particular complex system
- Allowing marginalised perspectives to be visualised and communicated to more powerful actors

In general, if collaboration, learning, and communicating marginalised perspectives is important, the process should be designed to be more inclusive of diverse stakeholders and views and more flexible and open-ended. If a quick internal consolidation of expert knowledge for a specific problem in a well-known system is required, processes can be shorter and carried out within specific groups with a few key individuals. Care should be taken with this latter approach however that what is happening "on the ground" is not overlooked. For the most part we are operating in between these two approaches.

System definition/boundary

A system map is most useful when looking at the interaction of factors across multiple domains, however an initial system boundary needs to be set to make mapping tractable. The system could be a particular physical system, for example a water catchment or a non-spatially localised one, for example a policy domain. Decide on the specific problem area you wish to explore. The system will then be defined by this particular problem (or outcomes that matter) and what impacts on it. Narrow the system definition by restricting it to, for example:

- A specific geographical area
- A particular area of policy
- A specific timeframe

Choosing Stakeholders

It is important to bring in stakeholders to cover all key parts/themes of a system as early as possible. Questions to ask to choose include:

- Who affects or is affected by the system we are attempting to map?
- Who has on the ground knowledge? Who has a strategic overview?
- Who is often overlooked? How can we make sure they are represented?
- Are there provocateurs who could usefully be invited to challenge established narrative?

Contact: a.penn@surrey.ac.uk and peter.barbrook-johnson@ouce.ox.ac.uk

The process can be narrowed by reducing diversity of stakeholders, but with a cost to system representation. Stakeholders can and should be brought in at later stages, either by bilateral conversations or through workshops, however this can create resentment if groups feel that their perspective is systematically side-lined. It is important to be aware of potential underlying issues.

Some useful strategies here include:

- Keep group size small, but maintain diversity with single representatives of each sector
- Invite "system thinkers" who are interested and willing to connect to other sectors
- Ask stakeholders at the mapping workshop who else should be invited to contribute
- Identify champions and those who could bridge to other sectors
- Make the process transparent and open, communicate before it starts that it is happening and communicate results throughout, and allow anyone who asks to join to contribute.

Choosing System Functions/Focal Factors

Choosing the right system functions or outcomes is crucial. They are the building blocks of the process and frame the focus of a system map. Thoughtful choice of functions is important to ensure all key aspects of a system are covered in mapping and potential interactions and trade-offs in different outcomes or different actors' concerns can be detected. Key strategies for choosing focal factors include:

- Ask what is important to who?
- Ask for functions of importance to all key groups to ensure that what matters to different groups is covered
- Listing the key groups and generating functions explicitly for each
- If some groups are not represented in the workshop, you can ask participants to consider and generate functions/things cared about by these absent groups. This can be particularly useful to broaden perspectives.
- More than one type of function can be explicitly included, for example specific policy outcomes plus important outcomes/functions for specific stakeholder groups. Again, this can be useful to broaden perspectives on what matters within the system.

It is important to be aware that if we include pre-defined functions/outcomes selected by one group or perspective, that this is not neutral and may indeed lead participants to feel an agenda is being imposed on them. Try to avoid this and always state explicitly that outcomes can be added, redefined or questioned.

A process can be bounded by specifying only a fixed number of outcomes to be included, but care should be taken that this does not narrow the map too much. Options include:

- We can constrain the number of functions to control the size of the map, e.g. pick at most 2 important functions for each stakeholder group etc.

Contact: a.penn@surrey.ac.uk and peter.barbrook-johnson@ouce.ox.ac.uk

- We can ask for important functions in advance from stakeholders in email communication, so these are already in place at start of first workshop.

Choosing general factors

We ask participants to brainstorm factors which are influenced by or influence functions. These factors must be variables and should be from a wide range of domains. The key criteria for including them is that they make a difference to how the system works. It is important that a wide brainstorming happens so that we ensure that all domains of influence are covered, but if we have limited time we can constrain the process by:

- Asking participants to suggest a limited number of factors each
- Asking the group to choose a limited list to start mapping with, e.g. pick the 20 most important factors
- Allow only relatively high-level factors to start with or consolidate factors suggested to achieve this
- Provide some suggested pre-prepared factors but allow additions and changes to these. In this situation it is important to be aware of biasing the map or of potentially controversial issues. The less powerful actors are or the more overlooked they feel their perspective is, the more important it is to allow them full control over what is included in the map.

Mapping Process

The mapping process essentially consists of drawing causal connections between factors. Starting from the focal factors, the "functions", and then bringing in the general factors. The process is often staged to facilitate better system thinking. For example, in a map containing policy outcomes, general system factors and policy interventions, all outcomes and the general factors which impact or are impacted by then are mapped first, with policies only added at the end. This is to prevent the recapitulation of familiar, but perhaps inaccurate, linear models of change.

Mapping is an important part of the whole process as it forces participants to articulate to themselves and to each how they think the system works and to clarify this. There may be large parts of the system for which there is widespread agreement on connections and others in which different actors have different ideas. The time taken for this part of the activity will depend on how much consensus there is within the group as well as how much thought has previously been given to cause in the system.

Discussion of links and the unearthing of different perspectives on how the system is connected is often one of the main useful outputs of a systems mapping process according to workshop feedback. It is important therefore to give sufficient time to this rather than see rapid map production as a priority.

Again however, this can be tailored to the aims of the process. If the aim is a quick consolidation or visualisation of knowledge within a pre-existing group, this process can be

Contact: a.penn@surrey.ac.uk and peter.barbrook-johnson@ouce.ox.ac.uk

performed rapidly. However, the more diverse the group, the more uncertainty there is about system interconnections or the more disagreement, controversy or power differential between actors exists, the more important it is to give sufficient time to the process.

To reduce the time spent on this in workshops:

- The number of functions and factors can be constrained as described above to reduce map size
- Facilitators can stipulate that only strong connections are included
- Outline maps can be supplemented with a large amount of bilateral feedback from stakeholders
- If uncontroversial or well-established parts of the system exist and are already mapped, for example parts of the physical water system in catchment contexts, these could be provided as a basis for critique and additional mapping. This would have to be done carefully to skewing map framing too much or supressing any local variation however

Analysis Design

Analysis design needs to be kept in mind from the start of the workshop process as the information we collect and how maps are built is usually modified to allow the analysis that we want and which is most relevant to particular stakeholders. We need to ensure that the map contains information on: what outcomes/functions matter to particular stakeholder groups, e.g. policy makers, local communities; what interventions or changes are expected and who controls or owns them; what aspects of the system are controlled or controllable and by who?

We can ask a large variety of questions with systems mapping and analysis, for example:

- What are potential influences on functions/outcomes that matter? Are they vulnerable or supported?
- What are potential unexpected impacts of external change or of planned interventions? And who do they impact on? Are there co-benefits or potential negative indirect effects?
- Are there trade-offs between different stakeholders' interests?
- Are there interactions between different interventions? Synergies or clashes?
- Are there interactions between planned interventions and other potential changes or risks? Synergies or clashes?
- What could be outcomes of different scenarios of change?
- If mapping is being used to design interventions, which points of intervention would have most beneficial impacts and for who and are controllable by those wishing to act? (System levers)
- If we want to uncover vulnerabilities which factors have the most impact on functions that matter to different groups?

Contact: a.penn@surrey.ac.uk and peter.barbrook-johnson@ouce.ox.ac.uk

For all of these, we should discuss with stakeholders or participants from the start what is most relevant to them. What are the sorts of questions and concerns they have about their system?

We need to make sure we have designed the workshop process to gather the information that we need and that stakeholders can see from an early stage how mapping might provide insight and that it includes and is directed towards what matters to them. Process design must thus consider question such as, what sorts of factors do we need to include in the system map to be able address these questions and what additional information on map factors and connections will also be required?

Drawing out relevant insights from early in the process is crucial to maintain engagement. What is relevant is context-dependent and requires good facilitator understanding of context and judgement. For example, highlighting unexpected connections between different parts of a system or unexpected influences on what matters even at early stages of mapping. Performing network analysis to pull out key insights before a map is finalised Stakeholders should also be asked to reflect on what is surprising or interesting in the map at every stage.

Ideally analysis should be co-produced with stakeholders and is an iterative process throughout workshops. As participants gain a better understanding of how analysis works and what it can do they should be supported in suggesting analysis and sequences of analysis which answer questions they have.

This sort of process is most effective if substantial time is spent understanding the specific system context and discussing stakeholders' particular challenges and possible blind spots before mapping begins.

The whole mapping process can thus be directed towards the sorts of insights from analysis that would be relevant on the ground and a map and analysis that can challenge participants preconceptions about their own system.

Adding extra factors/factor information

In order to allow us to perform the analysis that we want, extra information is often collected on factors towards the end of the mapping process or afterwards.

This could include:

- Controllability of factors (easy, medium, hard, uncontrollable) for different specific stakeholder/actor groups
- Importance of factors for different specific stakeholder/actor groups
- Vulnerability of factors (high, medium, low) to specific expected external changes or drivers
- Ownership of factors by different specific stakeholder/actor groups

However, any information relevant to any novel analysis could be collected. Additional factors, particularly external drivers or interventions can also be added.

Contact: a.penn@surrey.ac.uk and peter.barbrook-johnson@ouce.ox.ac.uk

This information is best and most rapidly gathered in workshops using small group discussion with pre-prepared factor lists, or individual labelling or voting on factors using stickers etc. directly onto the map. It can be solicited online after workshops, but the potential for misunderstanding or incomplete data is higher.

Bringing it all together

Depending on context and time and resource constraints, different configurations of workshops, bi-lateral interaction, and dissemination events can be used. Some information can be gathered outside workshops, in advance, over email or via shared online interfaces. The core face-to-face group interaction and discussion is vital however to the collective generation of new insights and the development of a systems perspective for those not already thinking in those terms. This interactive component is always the heart of the process. In every mapping process, we expect to go through several rounds of mapping followed by verification and review. Verification and analysis bring up new aspects of the system and prompt reconsideration of the structure of the map. A stable version of the map should be reached after a few iterations, however in the longer-term, maps should be treated as updatable living documents rather than fixed models. It can also be useful to revisit and redo a mapping process after a change in the system or after some time has passed. In this way mapping can be used as a reflective tool as well as a way to track system change.

Process design is adaptive and iterative (as shown in the diagram below). As participants become more familiar with systems mapping, they tend to suggest new approaches. A feedback loop from the workshops and other engagement to the process and analysis design itself is thus usually, and ideally, present. This is an important part of building ownership of the map and running a genuinely impactful and useful process. Our aim should be to facilitate stakeholders' exploration and learning of their system, build their complexity literacy, and leave them able to understand and interact with their system in new ways.

Contact: a.penn@surrey.ac.uk and peter.barbrook-johnson@ouce.ox.ac.uk

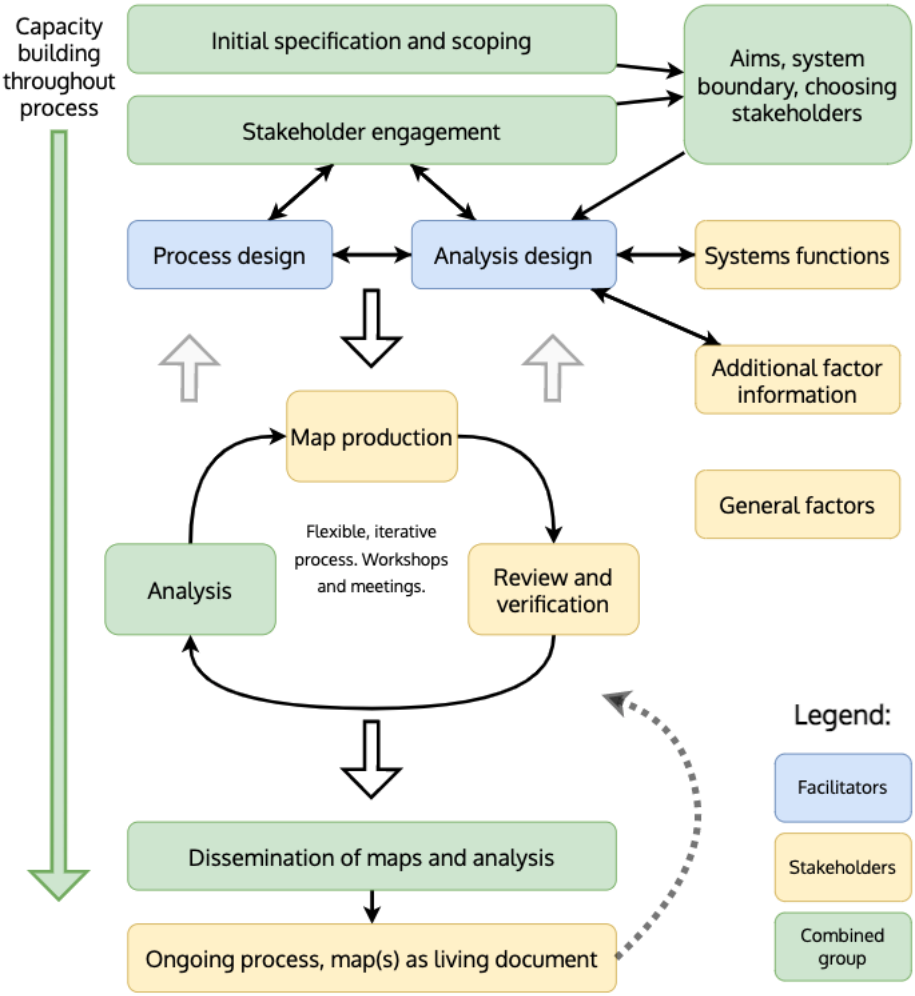

Figure: The adaptive and iterative bespoke PSM process

Acknowledgements

The authors would like to thank all our colleagues, project partners and workshop participants who have helped us develop our thinking on PSM process. In particular, Martha Bicket, Jean Davies, Adam Hejnowicz, Caitlin Jones, Verena Knerich, Chris Knight, Fran Rowe, Helen Wilkinson, Anna Rios-Wilks and Beth Wills.

Contact: a.penn@surrey.ac.uk and peter.barbrook-johnson@ouce.ox.ac.uk