How to Master the Practice of Defining Problems

Problem Defintion Tool
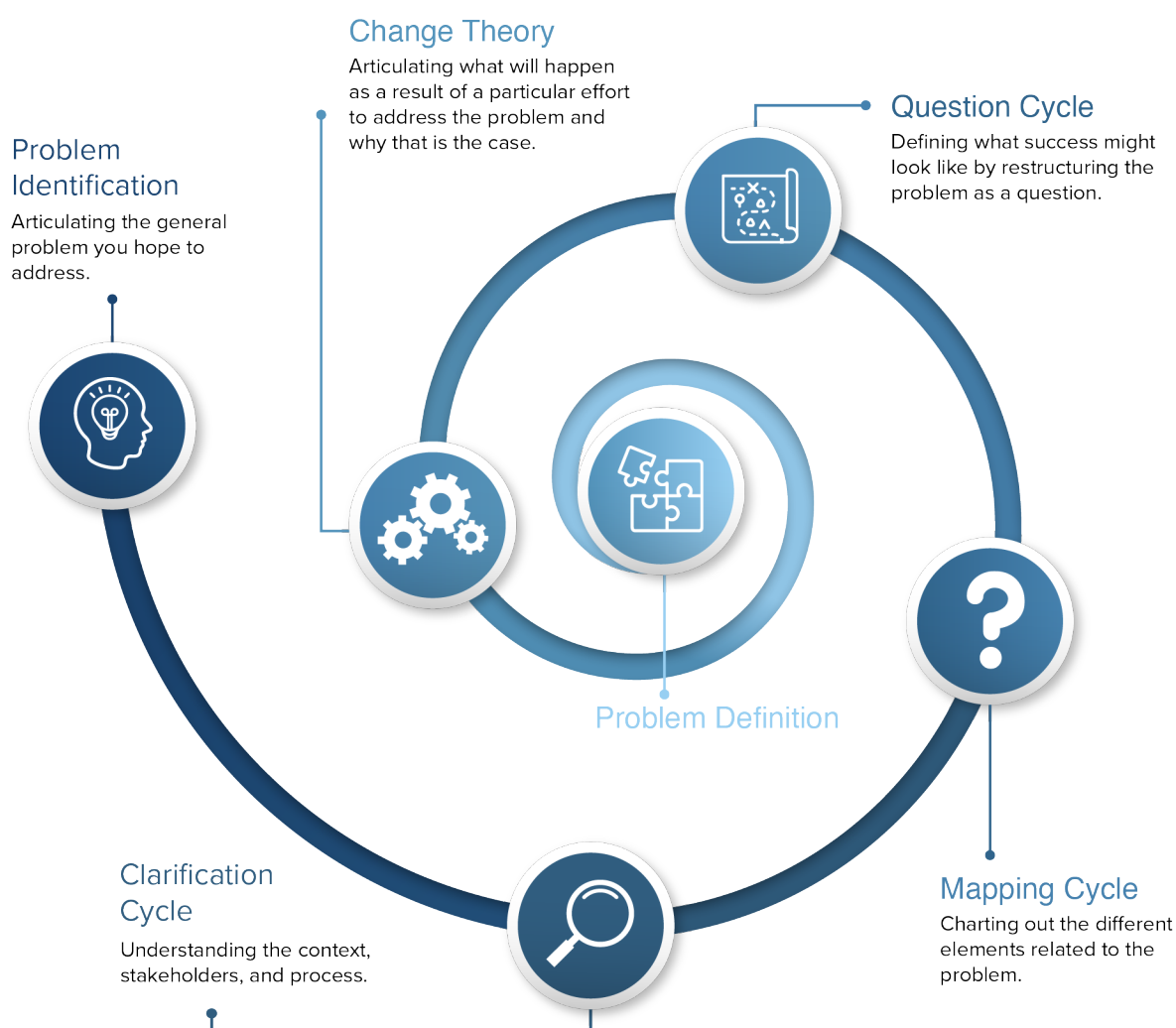
by Stefaan Verhulst, Andrew Young, and Andrew J. Zahuranec

THE**GOV**LAB

Open.Data.Policy.Lab

INTRODUCTION

The first step in addressing any problem should be first understanding what it is. A well-defined problem leads to targeted solutions. It prevents practitioners from wandering from the research path and into thickets of extraneous and unnecessary work. It frames hypotheses in ways capable of yielding strong and robust conclusions, limits the problem space to what is feasible and relevant, optimizes efforts to engage with the communities most affected by the problem at hand, and supports organizations in prioritizing problem-solving efforts and resources.

As we believe many initiatives fail due to lack of refined problem definition, this tool serves to support public entrepreneurs in better defining the problem their project is trying to solve. The tool described here leads users through a step-by-step self-reflective journey that includes core questions, brainstorming tips, and examples to help the reader develop a sound problem statement.

Change Theory

Articulating what will happen as a result of a particular effort to address the problem and why that is the case.

Question Cycle

Defining what success might look like by restructuring the problem as a question.

Problem Identification

Articulating the general problem you hope to address.

Problem Definition

Clarification Cycle

Understanding the context, stakeholders, and process.

Mapping Cycle

Charting out the different elements related to the problem.

PHASE ONE: PROBLEM DEFINITION

Begin by writing down the problem you hope to address in as few words as possible. The problem could be large or small but should serve as a concise summary that an outsider could understand. For example:

Problem Definition: *Large numbers of people are overdosing on opioids in the State.*

BRAINSTORMING TIPS:

- Shorter is better. Try to stay under 280 characters;
- Avoid jargon or details that an outsider would have difficulty understanding.
- Avoid passive voice to frame the problem in relation to the problem owner and group you want to help.

USEFUL RESOURCES:

- Innovation Skills Accelerator: Problem Definition
- *Solving Public Problems,* Chapter 4: Defining a Public Problem
- Periodic Table of Open Data Elements

Photo by Patrick Perkins on Unsplash

PHASE TWO: CLARIFICATION CYCLE

After drafting your problem statement, expand it to a full paragraph describing the context, stakeholders, and process that would be required to solve the problem. As the title suggests, the goal of this phase is to arrive at a more granular understanding of the problem area, disentangling individual elements until you arrive at an issue that can be feasibly addressed. The brainstorming tips to the right might be useful in this. For example:

- Why are people overdosing in the State? *Because they are addicted to opioids.*
- Why are they addicted to opioids? *Because of overprescribing by doctors and pharmacists.*
- Why are prescribers overprescribing? *Because of an overemphasis on pain reduction and a lack of awareness of addiction risks.*
- Why do prescribers not know addiction risks? *Because they do not know prescribing norms or patient history.*
- Why do they not have this information? *Because there is no accessible database for tracking this information.*

Revised Problem Definition: *"Large numbers of state residents are overdosing on opioids. This problem is exacerbated by misconceptions about the safety and efficacy of painkiller drugs among prescribers, leading to overprescribing, as well as a lack of awareness as to the sheer number of painkillers prescribed. The state does not have a resource to allow doctors to see data from drug companies, other prescribers, or law enforcement."*

BRAINSTORMING TIPS:

- **The Five Whys**: Using the initial starting point, ask yourself "why is this problem taking place?" Once you have an answer, ask yourself the question four more times to arrive at a root cause or more actionable piece of the problem.
- **The Seven "So What's:"** Using the initial starting point, ask yourself "why does this problem matter?" As with before, repeat the question six more times with increasing specificity.
- **Reframing:** After establishing the legitimacy and value of the project, bring in educated outsiders who can speak freely and provide input. Ask them what is missing and what the objective should be.
- **Divergent Thinking**: Ask yourself what you would have if the problem were solved. Then, ask what actions might need to be taken to achieve that vision and what obstacles might emerge.
- **Challenging Assumptions**: Ask yourself what problems might underlie your understanding of the problem. What evidence supports your understanding of the situation?

USEFUL RESOURCES:

- [People-Led Innovation: Toward A Methodology for Solving Urban Problems in the 21st Century](#)

PHASE THREE: MAPPING CYCLE

With a high-level perspective of the core problem developed during the clarification phase, can further expand your understanding by looking at the context in which the problem exists. The goal of this stage is to ensure that the proposed solution will have the desired effect by examining potential positive and negative effects. It is also to uncover potentially overlooked factors that might prevent the approach from succeeding. The brainstorming tips to the right can help officials through this cycle. For example:
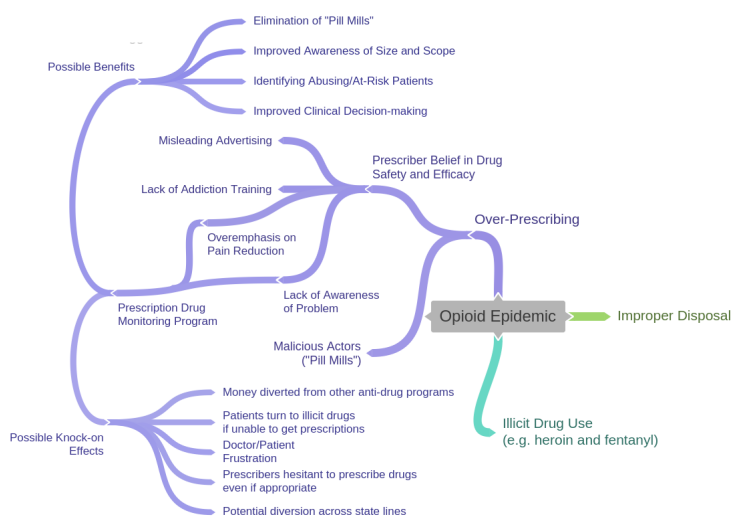
BRAINSTORMING TIPS:

- **Topic Mapping**: By reviewing existing literature in the field, produce a scan of the issues related to the topic that can provide a basic overview of the situation. This might reveal gaps in research or trends and commonalities.
- **Systems Mapping**: Workshop and present the aspects of the problem with an emphasis on contributing and knock-on effects. Use this exercise to better understand causes and effects and ensure risks do not outweigh rewards.
- **Process Mapping**: Map out the real-world timeline of how the problem has progressed and the likely impact on that timeline if a solution were introduced.
- **Disrupting Mental Models**: Write down and interrogate key assumptions. Ask if your beliefs are _the_ truth, if the truth is obvious, if it is based on real data, and if that data is representative.
- **Self-Evaluation**: Interrogate your capabilities and position to see if you can realistically offer a solution to the problem.
- **Prioritizing**: Ask how different strands of the problem should be prioritized according to greatest potential impact, feasibility, and relative importance. If multiple strands of the problem area are to be addressed, consider the sequence in which it should occur.

USEFUL RESOURCES:

- [Adolescent Mental Health: Using A Participatory Mapping Methodology to Jointly Identify Key Topics, Questions, and Priorities for Future Work and Data Collaboration](#)
- [Mapping how data can help address COVID-19](#)
- [PeaceTech Topic Map: A Research Base For An Emerging Field](#)

PHASE FOUR: QUESTION CYCLE

After you've mapped the problem statement, you might ask yourself how this information can be synthesized into a research question. In doing so, you can reorganize your thinking toward the aspect of the problem you hope to study and what a "success" for you might look like. What is the target of your work? What are the metrics you want to track or goal you hope to achieve? Who might be involved and has similar work been conducted in the past that you could build on?

In these ways, question-driven thinking, more than solution-driven thinking, can be useful in exposing how you specifically relate to the challenge at hand. For example:

Revised Problem Definition: *"Large numbers of state residents are overdosing on opioids. This problem is exacerbated by misconceptions about the safety and efficacy of painkiller drugs among prescribers, leading to overprescribing, as well as a lack of awareness as to the sheer number of painkillers prescribed. The state does not have a resource to allow doctors to see data from drug companies, other prescribers, or law enforcement. The questions, then, are: How will overdose rates in the State be affected by enabling data collaboration between doctors, other prescribers, drug companies, and others? Understanding the sensitivities of this data, what is the minimum asset that doctors need to make informed decisions and how can it be meaningfully protected?*

BRAINSTORMING TIPS:

- **Insight Type:** Research questions can yield many types of insights, but your goal might be targeted at one type of "insight" over another. Ask yourself if you seek situational awareness(also known as descriptive insights), an understanding of cause and effect, (also known as diagnostic insights) a prediction about the future (also known as predictive insights), or an assessment of impact (also known as prescriptive insights).
- **Public Value:** Research questions will also, ideally, allude to the ways in which the information can help a problem stakeholder. Ask yourself if your question can improve governance, empower people, create opportunity or solve some other public problem.
- **Audience:** It can often be helpful to frame your question in a way that recognizes who will be affected by the answer. Often, those charged with solving the problem are not most affected by them and so individuals must think critically about what the larger, societal consequences of their intervention might be.
- **Using Expert Crowdsourcing:** To help identify questions that are useful and relevant, especially on issues where you might lack knowledge, it might be beneficial to solicit the input from an outside group of expert stakeholders.

USEFUL RESOURCES:

- [Smarter Crowdsourcing](#)
- [The 100 Questions Initiative](#)
- [The Data Assembly: Responsible Data Re-Use Framework](#)

PHASE FIVE: CHANGE THEORY CYCLE

Finally, the problem statement can be supplemented with a concrete theory of change articulating the underlying assumptions of what will happen as a result of your project and a theory of why that is the case. With detail, develop a cohesive story starting with a problem you want to solve, and then describe the activities you will perform, the outcomes that those activities will produce and how those outcomes will end up having the expected impact. Using the tips to the right, you might produce something like:

Revised Problem Definition: *State residents are overdosing due to opioid-related causes. This problem, borne from misconceptions about the safety and efficacy of prescription painkillers, can be best mitigated at its source: Prescribers. With a prescription drug monitoring database supported by state agencies, drug companies, and healthcare providers, the state can give doctors and pharmacies data to limit use and misuse of addictive drugs. We seek to investigate whether this information will meaningfully impact overdose rates and what kind of information prescribers need, understanding the data sensitivities involved.*

This project has several possible outcomes. The most optimistic scenario entails complete adoption of the service by all prescribers in the state, leading to a significantly reduced overdoses from prescription drugs. The most pessimistic scenario envisions the database being ignored or obstructed by most prescribers. Both these scenarios are unlikely. More plausibly, the platform will be adopted by many prescribers across the state, though gaps will exist where IT infrastructure is lacking. Obstacles might arise if drug companies decline participation in the system or if the state is unable to devote the resources needed to keep the database up-to-date.

Several metrics emerge, the most obvious being page views and the number of searches, which should be available to the web host. To observe the effect on

overdose numbers, the state can examine the number of emergency room visits and opioid-related death rates. While this data is available in standardized formats in major cities, additional resources are likely necessary to collect and standardize data from rural communities. An additional possible obstacle exists in the decentralized nature of the state's government. Officials might need to liase local bodies to gain real-time access to data.

BRAINSTORMING TIPS:

- **Developing Issue Trees**: Write out how events might proceed in different circumstances, ranging from most to least likely.
- **Identifying Barriers**: List the obstacles most likely to arise if different hypotheses are acted upon to verify that long-term and short-term consequences are not opposed, and the solution does not merely shift the burden.
- **Quantifying and Measuring**: Discuss what types of impact are important for the project and whether the data points for understanding it are available. In clear, realistic terms, articulate how long it will take to measure success or failure and how often data must be collected.

USEFUL RESOURCES:

- [Open Data Impact: When Demand and Supply Meet](#)
- [Open Data in Developing Economies: Toward Building an Evidence Base on What Works and How](#)
- [Leveraging Private Data for Public Good](#)
- [The Third Wave of Open Data Toolkit](#)
- [Open Data in Action: Initiatives During the Initial Stage of the COVID-19 Pandemic](#)

ADDENDUM: WORKSHEETS

PHASE ONE: PROBLEM DEFINITION

In the space below, write out your problem as concisely as you are able:

PHASE TWO: CLARIFICATION CYCLE

Using the problem definition above, fill out the following tables:

Why is this problem taking place?	
Why is that aspect of the problem taking place?	
Why is that aspect of the problem taking place?	
Why is that aspect of the problem taking place?	
Why is that aspect of the problem taking place?	

Why does this problem matter?	
Why does that matter?	
Why does that matter?	
Why does that matter?	
Why does that matter?	
Why does that matter?	
Why does that matter?	

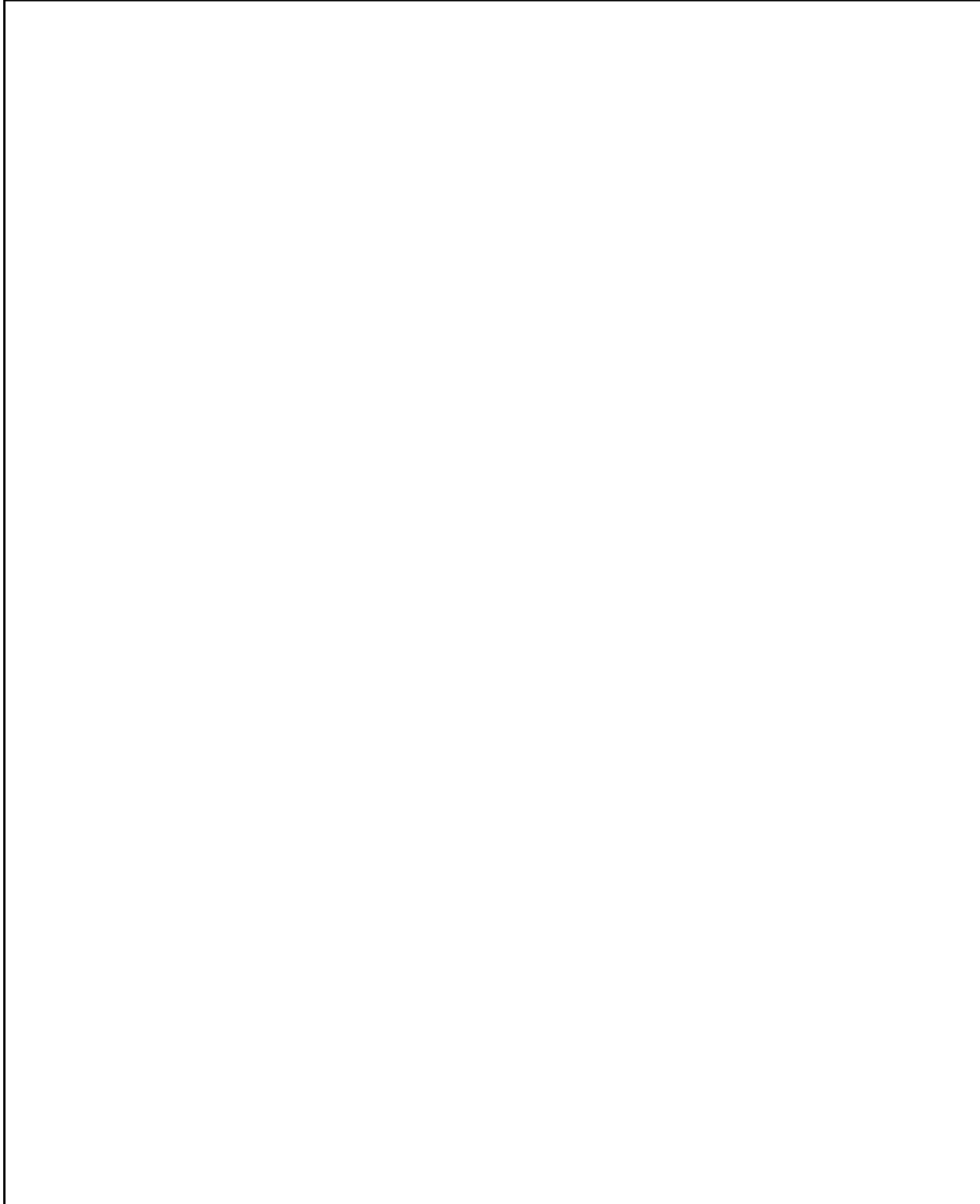| How do I view the problem and its various elements?	How does an outsider view the problem?

What would I have if the problem were solved?	
What steps would need to be taken to achieve that?	

What evidence supports my conception of the problem?	

PHASE THREE: MAPPING CYCLE

In the space below, sketch out a diagram that explains the aspects of the problem, timeline, or alternative hypotheses that might explain it. Use the diagram to inform a discussion about your capabilities and the priorities that you should have going into the project.

PHASE FOUR: QUESTION CYCLE

What research question am I trying to address?	

What is my metric of success?	

What kind of insight will this research generate?	

What kind of public good will the insights yield?	

PHASE FOUR: CHANGE THEORY CYCLE

Using your previous work to fill out the following tables:

What are possible outcomes from this work?	
Highly Likely Scenario:	
Somewhat Likely Scenario:	
Somewhat Unlikely Scenario:	
Highly Unlikely Scenario:	

What obstacles might emerge in each of these scenarios?	
Highly Likely Scenario:	
Somewhat Likely Scenario:	
Somewhat Unlikely Scenario:	

Highly Unlikely Scenario:	

What will I measure?	How will I gain access to the metric?