METHOD

Systems Thinking Method

2024

3.3.1. General Introduction

Increasingly complex global problems that are never resolved at the root have left the world awash in failed programs and projects. Despite many efforts to address the complex problems that society faces, plans and solutions rarely endure, because we, and people in general, tend to fall back on the habit of conventional, linear thinking. That approach is natural and easy, but it seldom produces lasting solutions in the complex situations of a community.

We know that the problems we are trying to solve are complex because they share several key characteristics:

- The relationship between the problem and its cause is indirect and hard to pin down.
- The problem persists or recurs despite sustained, long-term efforts to solve it.
- The various agents and factors, when brought together, behave very differently toward one another than when they are separate and independent (they react to and interact with one another).
- The problem itself reacts to our interventions, requiring us to adapt over time.

Problems and opportunities exist within a context. Thus, to understand different phenomena, we need to see them as part of a larger system in which different agents, factors, and processes interact to produce results and behaviors broader than what we observe. A system is a group of interdependent, interacting parts that form a unified whole in pursuit of a common goal. Although there are many kinds of systems (for example, engineering, biological, and ecological systems), the most complex all involve a powerful component: human beings. In these "soft systems," the intelligent agents (that is, people) act on the basis of their views and experiences, learn from their interactions, and adjust their behavior. This makes the larger system continually change and self-organize in response to internal and external demands, making its behavior and outcomes hard to predict or to dictate from the outside.

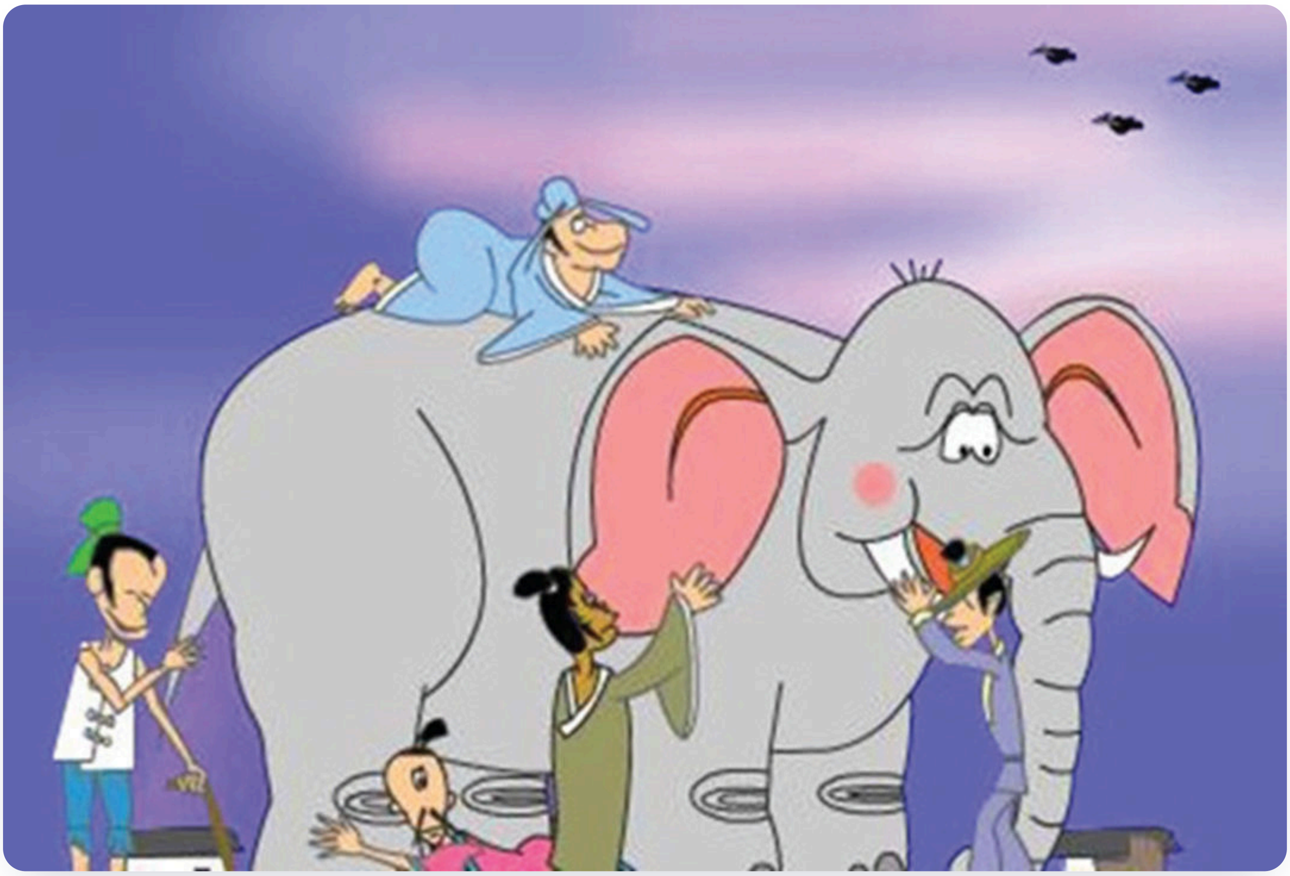
The story of "the blind men and the elephant" and the problem of systems thinking

One man felt the trunk, one the tusk, one the leg, one the ear, and one the tail. After examining the elephant carefully, the five blind fortune-tellers each pronounced their verdict in turn.

- The one who felt the trunk declared: "I thought an elephant would be something else entirely, but it is really just as limp and wriggly as a leech."
- The one who felt the tusk countered: "I don't think it's like a leech at all; it is long, hard, and stiff like a carrying pole."
- The one who felt the ear said: "No, it is flat and broad like a winnowing fan."

- The one who felt the leg reacted at once: "You are all wrong; it stands solid like a temple pillar."
- Finally, the one who felt the tail declared: "None of the four of you is right; I find it frayed and bristly like a worn-out broom."

"The blind men and the elephant" is a familiar fable that almost everyone knows. Beyond its lesson about "learning" handed down by our forebears, the story also carries a lesson about systems thinking worth pondering for managers. The reason each blind fortune-teller had his own impression of the elephant is that each touched a different part. Although each of them spoke a truth, none of them gave an accurate description of the elephant, because their viewpoints were neither comprehensive nor holistic.



The systems approach

New ways of thinking and a new approach are needed to address the world's complex, unprecedented challenges. A systems approach that seeks to create lasting change toward improving a complex problem requires a method that takes a holistic view of the context, the dynamics, and the relationships that connect the local system, so as to keep the complex problem from continuing to develop unchecked. The role of a funded activity within a local-systems approach is to coordinate and mobilize the material resources already present in the local system and the relationships among those resources.

Systems thinking is a way of viewing the world objectively as a unified whole. Within that whole, all the constituent units and factors, and the basic phenomena arising from them, are interrelated and act upon one another. Put more simply, systems thinking helps people see reality more clearly, giving you a new language, a new voice, and a new perspective.

Systems thinking helps us understand that complexity because it:

- Involves understanding the whole context and the dynamics of the independent components: agents, factors, and processes.
- Includes exploring the interconnections among relationships, actions, and interdependencies.
- Provides analytical tools for recognizing the correlations among components and the outcomes they produce.
- Is a challenge: systems thinking integrates analysis and synthesis, asking why things work the way they do.
- Is necessary for SUSTAINABLE social change.

Addressing complex problems is not the "privilege" of systems scientists; everyone must understand and take part in the relevant action. The habits of a systems thinker are shown in the figure below.

System change is: "changing the conditions that give rise to the problem."

Source: Social Innovation Generation (http://www.sigeneration.ca).

3.3.2. Introduction to the Tools Used in Systems Thinking

According to LINC, there are four tools of systems thinking:

Social Network Analysis (SNA) is a tool that can help identify which actors are best positioned to have a positive effect on a network. SNA has been called an "X-ray tool" for complex systems. It makes visible the important but hidden relationships that make systems work. SNA produces a visual representation of the network, allowing you to identify key actors, major gaps, and leverage points.

Causal Loop Diagrams help you understand which parts of the system must be engaged to begin changing the system. Causal Loop Diagrams (CLDs) are used to model dynamic systems in a conceptually holistic way, mapping how the variables (that is, factors, problems, and processes) influence one another. These diagrams are especially useful for exploring the system's underlying feedback structures and for identifying high- and low-leverage intervention points within the system. They also reveal the natural constraints within the system, helping us develop more realistic expectations about our ability to bring about change.

Ethnography is a research method used to better understand the behaviors and norms within a system. Ethnographic research allows us to gain the "insider's perspective," strengthening our understanding of the complex social dynamics within a given context or community. Ethnography can help identify the actors, processes, and institutions typically regarded as influential in a complex social process. It also deepens our understanding of local logic and rationale, sharpening our ability to interpret behaviors and norms within a system.

Participatory Systems Analysis (PSA) is a process that can be used to allow the relevant strategic actors within the same system to engage actively with one another, so as to better understand their own system, create shared visions of how the system might improve, and reach consensus on practical courses of action. Participatory systems analysis is a process that emphasizes the system's actors and the processes that allow them to interact, learn from one another, and find feasible areas of collaboration. PSA is not a tool we use to analyze a system; rather, it is an approach within which many tools and techniques (including those in this guide) can be used to help actors analyze the system to which they belong. PSA must also drive a cyclical movement between analysis and synthesis (zooming out and zooming in).

The drafting team encourages individual readers and organizations to consult the original sources at https://linclocal.org/2023/02/07/linc-uses-systems-thinking-and-collective-action-to-reduce-pollution-in-vietnam/ and https://linclocal.org/tag/systems-thinking/ to learn more in the original English.

In the context of the LSPP project, the project team used two main tools, Social Network Analysis and the Causal Loop Diagram, through capacity building provided by the organization LINC (https://linclocal.org/). This document will go into depth introducing these two tools, the Causal Loop Diagram and Social Network Analysis, along with case studies that were put into practice in the LSPP project.

3.3.3. Causal Loop Diagram

The following are the steps, along with some guidance and points to keep in mind, for building a Causal Loop Diagram (CLD) model of a complex problem you care about.

Step 1: Describe the problem

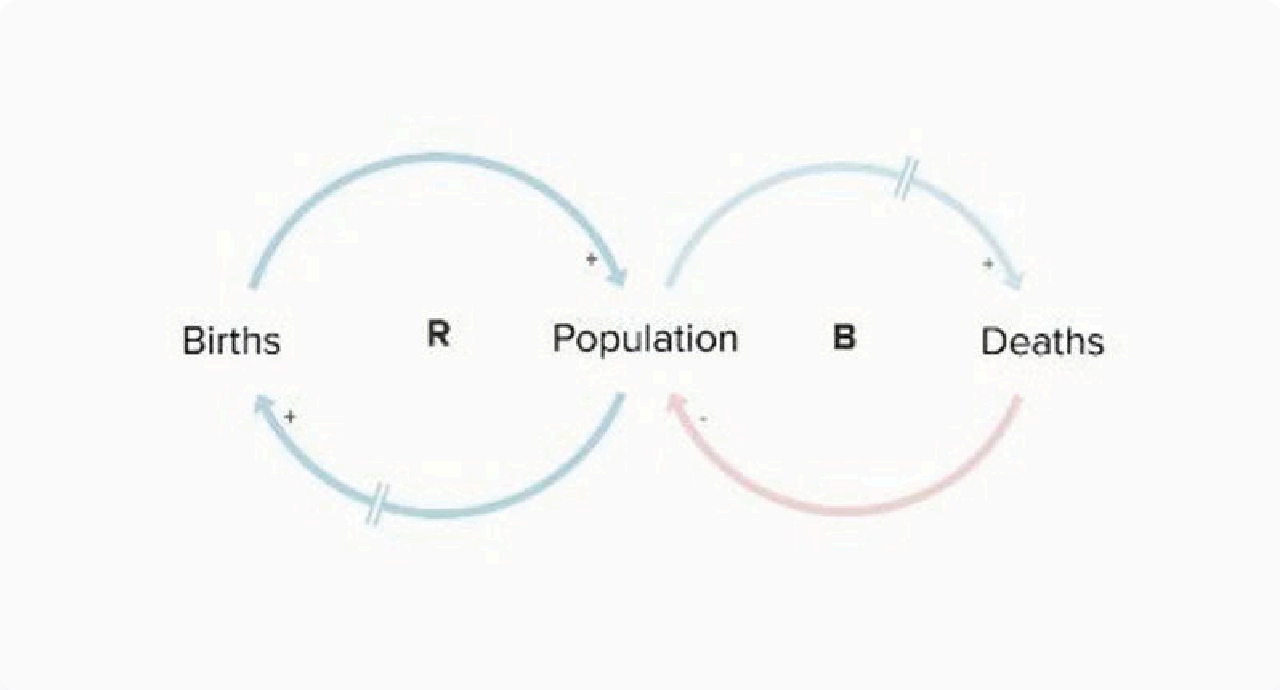
Steps:

- First, describe the current state of the problem you want to improve. Think about the social change you previously identified as important for your organization:
  - What is the current condition or situation that is unacceptable?
  - Why is this a problem for your organization, community, or society?

- Write a short paragraph (2–4 sentences) explaining the problem and answering the question.

Notes:

- Discuss what has been observed and experienced as a group.
- Refer to undesirable events, data, and statistics.
- Do not include presumed causes or solutions in your statement.
- Identify the general concepts contained in your problem statement. This will help you set the boundaries of your problem.



Step 2: Identify the key variables

Steps:

- Identify the key variables that affect the problem and the connected system.
- Start with 10–12 variables, including the main outcome you care about (for example: level of democracy, public participation in political processes, youth participation in politics, etc.).
- Group discussion:
    - What different factors drive this problem?
    - Which variables obstruct the problem?
    - If you have trouble naming variables, think about related influences from the social, technological, economic, environmental, and political domains (STEEP). Variables can be problems, processes, policies, laws, social customs, perceptions, beliefs, and so on.

  - Write each variable on a sticky note and post them all on the board.

Notes:

- Think only about the system as it is, not the ideal system.
- Together, define and agree on the meaning of each variable.
- When naming variables:
  - Use nouns and noun phrases.
  - Make sure the variables can change (think about them increasing and decreasing).
  - Prefer neutral or positive terms.
  - Variables should be consistent in their level of aggregation.
  - Distinguish between actual and perceived variables.

Step 3: Identify the relationships

Steps:

- Identify all the possible causal relationships among the variables you have identified.
- Arrange all the variables in a large circle.
- Choose one variable and think about how it interacts with the others. What does this variable cause?
- Using a marker, draw arrows from that variable to the other variables on the board to indicate the causal relationships you believe exist.
- Repeat the process until you have considered all the variables and their relationships with the other variables in the circle.
- To understand these relationships clearly, identify the drivers (causes) and the outcomes (effects):
  - Count the number of incoming and outgoing arrows for each variable.
  - Drivers are variables with more outgoing arrows than incoming arrows.
  - Outcomes are variables with more incoming arrows than outgoing arrows.
  - Using a marker, identify the outcome variables.

Notes:

- Include only causal relationships (not correlations) in your CLD.
- Some variables may have many relationships while others may have only one or two. This is fine.
- To indicate a relationship, think about the long-term and short-term impact as an unintended consequence.

- Removing/adding variables, as well as condensing and combining them, is not unusual during discussions about relationships.
- Simple CLDs may have one or two outcomes, while complex CLDs may have many outcomes.

Step 4: Begin your CLD

Steps:

- Begin the CLD by gradually combining all the relationships you have identified:
    - Start with one important outcome and 2–3 main drivers.
    - Create a "core loop" using this outcome and the drivers—read through it to make sure it makes sense.
    - Add the drivers and outcomes referenced in the relationships identified in Step 3.
    - Arrange and rearrange the variables and relationships repeatedly based on the emerging CLD—move variables that are related closer together.
    - Once all the variables and their relationships have been combined into the CLD, add the appropriate signs.
- Now try narrating the resulting CLD to see whether it makes sense:
    - Consider whether there are gaps in your understanding or leaps of logic—add more variables and relationships if needed to make the logic of the causal connections clearer.
- Move closely related variables together to reduce visual clutter in the diagram.

Notes:

- Not all of the relationships identified in Step 3 will be included in the CLD. Be prepared to drop "direct" relationships that are better captured through an intermediary.
- You may need to add new variables and relationships.
- If two variables move in the same direction (directly proportional), assign a plus sign (+).
- If two variables move in opposite directions (inversely proportional), assign a minus sign (–).
- If there is a delay in a relationship, place a double-slash mark (//) on the corresponding arrow.
- Make sure all the variables fit within the time frame relevant to your problem.
- If there is more than one way two variables can be related, think about all the possible situations and represent the relevant relationships through separate arrows.
- For variables you want to remove, tuck them into a corner of the board, because you may change your mind and decide to use them later.

Step 5: Identify the feedback loops

Steps:

- Next, identify the feedback loop(s) that emerge from the relationships you have identified.
- Review all the variables and relationships. A loop is formed when a variable leads to a causal chain that ultimately feeds back to itself (that is, the circle is closed). Do you see a path that has led to a complete circle? Are there open loops that could be closed with additional causal connections? If so, add more variables and relationships to close those loops.
  - Consider whether you need every variable or relationship—remove those that seem insignificant, irrelevant, or redundant.
- Identify the type of loop and assign the appropriate sign.
- Name each loop with a "theme" that reflects the story of that loop.
- Continue rearranging the variables and relationships on the board until you achieve an ideal layout based on the proximity of related variables.

Notes:

- There may be one or more loops depending on the complexity of the problem and the number of variables used.
- If the number of minus signs (–) is even, it is a reinforcing/positive loop.
- If the number of minus signs (–) is odd, it is a balancing loop.

Step 6: Refine and iterate your CLD

Now that you have a draft CLD, you can continue to refine it further, validate your ideas, and update the map. You can do this by:

- Adding more related variables and loops.
- Reaching out to your extended network and presenting the diagram to partners and other collaborators.
- Consulting and engaging additional experts, seeking their confirmation as well as their opinions on which parts of your CLD are meaningful or need further evidence.
- Conducting additional research (academic studies, authoritative statistics, government and international-organization reports, etc.).
- Continuing to observe the behavior of the problem and the related system.
- Incorporating new insights into your CLD as they emerge.

Some additional rules and tips

Variables:

- Name variables as nouns or noun phrases (the link expresses the action).
- Use neutral or positive terms, for example "participation" rather than "increased participation," or "growth" rather than "contraction."
- Avoid double negatives, for example "reduce the increase in revenue."
- Frame variables in a way that can increase or decrease—on a measurable scale where possible (for example, not "religion" but "faith"; not "attitude toward X" but "support for X").
- Include only variables with a causal relationship (excluding correlation).

Arrows and relationships:

- If two variables move in the same direction (directly proportional), the arrow carries a plus sign (+); if they move in opposite directions (inversely proportional), the arrow carries a minus sign (–):
  - Example: If "when A increases, B increases" or "when A decreases, B decreases," both variables move in the same direction (directly proportional) and the arrow is marked (+).
  - Example: If "when A increases, B decreases" or "A decreases, B increases," the two variables move in opposite directions (inversely proportional).
- Do not use double-headed arrows, as this can cause confusion.
- Question marks (?) or combined signs (+/–) should not be used to represent a relationship; be clear about the nature of the relationships.
- If you are unsure which sign to apply to a relationship:
  - Consider the multiple causal pathways connecting the two variables in question and draw them out on a separate diagram.
  - Consider different scenarios and their impact on the relationship between the variables.

Loops:

- Name your loop clearly and identify the loop type (R = reinforcing, B = balancing).
- Identify the target state for balancing loops.
- Incorporate delays.
- Incorporate intermediate variables to clarify your logic.
- Building a CLD is an iterative process—refine and revise it as many times as needed.

Identifying causes and effects

Causes and effects can be identified through several analytical frameworks. Here we give a brief overview of two of them.

When identifying the key variables that may be the causes and effects of a complex problem or target situation, you and your team will rely mainly on the collective knowledge of the group, the stakeholders, and experts in the field. Such a process usually includes brainstorming, desk research (secondary research), and field research.

However, when you are just getting started or your team runs into difficulty, it is worth considering these analytical frameworks.

The STEEP framework gives us several important factors (social, technological, economic, environmental, and political) that can help stimulate the group's thinking.

Factor description	Example
Social (S): the sociocultural aspects of life	values, attitudes, demographic influences, education, family, and friends
Technology (T): how technology affects the problem	new technologies, technological impact, pace of development, research costs
Economy (E): finance- and market-related dynamics	economic growth, inflation, exchange rates, unemployment, income
Environment (E): broader environmental-resource issues	materials, resources, waste, regulations, energy, climate change
Politics (P): laws, policies, and governance dynamics	labor policy, government policy, law, security, public opinion, rights

How to read a Causal Loop Diagram

The first time you encounter a Causal Loop Diagram (CLD), it may look like an overwhelming graphic full of lines and puzzling symbols. This document offers some tips for reading and decoding causal loop diagrams. First, the four basic parts of a causal loop diagram are:

- Variables (sometimes called factors or elements);
- Relationships (sometimes called connections or links);
- Relationship signs (indicating the behavior of the relationship); and
- Loops (indicating the type of behavior the loop contributes to the system).

Levels of causes and effects

It also helps to recognize that causes and effects can occur at different levels. So try to consider the different levels when identifying your causes and effects.

Level	Description
Individual (Micro)	A factor influences individuals to react in a certain way.
Organization (Intermediate)	A factor contributes to changes within an organization or institution.
Society (Macro)	A factor contributes to changes at the societal level.
System (Holistic)	How individual actors respond to certain factors cumulatively determines the behavior of the system.

In the simple model above—involving Births, Population, and Deaths—we see that population is affected by births and deaths. Only three variables are included here: Births, Population, and Deaths. There are four relationships shown by four arrows. The signs on the relationships include plus and minus signs (+ or –) and a double slash (||). Two loops are shown: the loop on the left labeled "R" and the loop on the right labeled "B." So what do those symbols mean?

The arrows connecting two variables represent the relationship between them, and the direction of the arrowhead indicates the direction of influence. In this example, the first arrow at the top left indicates that Births affect Population. The plus sign (+) indicates that the two variables are directly proportional (in some CLDs the symbol used is "s" for "same direction"). So we can read this relationship as: "when births increase, population increases." Note that it can also be read as: "when births decrease, population decreases."

Looking at the arrow from Deaths to Population, we see a minus sign (–), indicating that the two variables are inversely proportional (sometimes represented by the symbol "o" for "opposite direction"). That relationship can be read as: "when the number of deaths increases, population decreases." Note again that it can also be read as: "when the number of deaths decreases, population increases."

There is also a double slash on two arrows—the ones pointing from population to deaths and to births. That symbol indicates a time delay. They can be read as: "when population increases, births increase after a delay," and "when population increases, deaths increase after a delay."

Now, putting them together, we can see two feedback loops: the births loop and the deaths loop. Reading the first, "when births increase, population increases; when population increases, the number of births also increases over time." We see that this loop is labeled "R," indicating that it is a reinforcing/positive loop. It is called a reinforcing/positive loop because, starting with an increase in births, the feedback leads to still more births. In any loop where you read the entire cycle and the change in the variable when you start is the same as the change when you come back around, the change has been reinforced.

Reading the second loop, "when the number of deaths increases, population decreases; when population decreases, the number of deaths also decreases over time." That loop is labeled "B," indicating that it is a balancing/negative loop. It is called a balancing/negative loop because, starting with an increase in deaths, the feedback leads to a gradual decrease in deaths. In the subsequent cycle, deaths will rise again. In any loop where you read the entire cycle (once) and the change in the variable when you start is opposite to the change when you come back around, the change has been balanced.

Example of a causal diagram: the problem of plastic-waste pollution growing ever more serious and requiring immediate action.

3.3.4. Social Network Analysis

Social Network Analysis is the process of understanding social structure through the use of networks and graph theory. This method describes the structure of a social network as a set of relationships among entities and actors—the nodes (which include individual actors, groups of people, or objects within the network)—and the relationships, the links between actors (relationships or influences), that connect those nodes.

3.3.4.1. Building an SNA research plan

In this exercise, you are developing your research plan to conduct a social network analysis (SNA) on a problem or question related to your work.

Step 1: Define the purpose

Part A. Begin by thinking about any program or activity you are involved in where you understand the connections among a group of organizations or people, or where understanding the influence of the different members of the group may be important to the program's goal. Write down the name of the program or activity and note why the relationships matter for achieving your goal. Write more than one idea; we have included an example to help you get started.

If you cannot think of a program or activity, you may consider how the relationships among groups within your organization might affect your work.

Program / Activity	Program goal related to connecting the actors	Why understanding the connections is important to achieving your goal

Example: Technical-support program for maternal health clinics	Example: Build the capacity of the health clinics, including establishing peer support	Example: We need to understand how local health clinics in an area are sharing information in order to target technical support effectively

Part B. Now think about some specific questions you might want to answer about the group among your programs or activities that would provide you with useful information. Remember that you can ask questions about both individual members of the group and the relationships among groups, and that you can ask questions for different purposes, including activity design, evaluation, and facilitating discussion among group members.

Brainstorm questions for the different categories and purposes below (you do not need to ask a question for every category or purpose). Then note how you might use the answers in your work. We have included some examples related to a Maternal Health Behavior Change Program to help you generate ideas. The question categories are:

- Questions about individual group members
- Questions about connections between groups
- Activity-design questions
- Activity-evaluation questions
- Facilitation/support questions

Example questions:

- Which local clinic is most influential in providing information on maternal health across the clinic network?
- Do specific clinics that receive technical support see their level of influence in the network increase?
- Overall, does the program lead to more or less sharing of maternal-health information among the clinics?
- Which organizations might be best positioned to serve on the program's steering committee to ensure the program has broad reach across the region?
- What are some important discussion points for local health-clinic representatives when they jointly review the needs of the community?
- Does information tend to move between clinics across communities, or only within a community?

How can you use the answers to these questions in your work?

Step 2: Define your network boundary

Based on the purpose established above, define your network boundary. This is how you will determine who is included in your network analysis and who is not. It should be designed to include the appropriate group of members to allow you to answer your key questions. It can be a single statement, a series of criteria, or a set of questions you can ask participants to determine whether they are in the network.

Network boundary examples:

- Example 1: All registered health clinics in a given province or district.
- Example 2: Public and private facilities that provide, or support the provision of, healthcare services in a given province or district; must be an organization/agency rather than an individual; support includes financial, technical, and monitoring support.

Step 3: Identify the right actors

Identify the correct set of actors in the network. If the members of your network are organizations, you will also have to consider choosing the right person within each organization to provide appropriate data. Write down a few ideas about how you must identify the right actors in your network.

Strategy for identifying network members: Example: Obtain the list of registered health clinics from the government's ministry of health, including the phone numbers of the clinic directors. Then contact the directors to explain the purpose of the study and identify the right person or people at each clinic who will know the extent to which the clinic shares information with other clinics.

Step 4: Determine attributes and connection types

Think about the data you will need to answer your questions. This includes considering whether there are attributes you will need to include in your analysis for both the individual people or organizations in your network and all the types of connections between those people or organizations that you want to measure. For example, for personal attributes of people, you might be interested in the gender of each network member, their position, or something about their role. For connection attributes, you might be interested in formal or informal partnerships, joint membership on a local committee, or how often the representatives of the organizations meet.

Write below a few personal attributes, attributes, and connection types you would want to include in your analysis.

Individual attributes	Attributes and connection types
Example: location of the health station by village; year of establishment of the health	Example: frequency of interaction and sharing of information on maternal-health issues over the past

clinics	6 months

Step 5: Data collection

Once you have identified your network members and the attributes you want to include in the analysis, you need to establish your data-collection method. This method must give you comprehensive information about all the people or organizations in your network and all the connections among them, according to the attributes you have decided to include.

This is usually the most time-consuming part of the process, especially if it requires surveys or interviews to collect data. In some cases, practical constraints may require you to go back and revise some of your plans to limit the amount of data needed; for example, in the example above we might decide that we can include health clinics from only one or two representative villages rather than every village in the district.

If you are conducting a survey, it is important to ensure that you are following good practices in survey methodology to reduce subjectivity and bias. For this exercise, we will not design a survey but instead simply decide on a general plan for collecting data. Please indicate below whether the data for your analysis already exists or whether you will need to collect data, and how you will go about compiling or collecting your data (in-person interviews, online surveys, telephone surveys, etc.).

Data-collection question	Data-collection plan
Will you need to collect new data or use existing data for the analysis?	Example: New data
What are your potential data sources?	Example: A survey of health-clinic managers
How will you collect the data?	Example: Telephone interviews with managers

3.3.4.2. SNA metrics

Assessing the actor level.

Metric	Description
Degree centrality (degree rank)	This is the simplest level in the family of centrality metrics. At this level, we count the number of connections a node has. In general, nodes with high connectivity are local connection points/hubs, but are not necessarily the best connected to the wider network. Note that degree includes all connections, whether incoming or outgoing.

In-degree centrality	Measures the number of connections into a node. In general, nodes with high in-degree are leading nodes, regarded by others as a source of advice, expertise, or information.
Out-degree centrality	Measures the number of connections out of a node. In general, nodes with high out-degree can reach many nodes and promote the flow of information across the network (but are not necessarily the most effective nodes at disseminating information).
Closeness centrality	Measures the distance from one node to another. In general, nodes that are close together can most easily transmit information to the rest of the network and often have a broad view of what is happening across the network.
Betweenness centrality	Measures the number of times a node lies on the shortest path between two other nodes. In general, nodes with high betweenness can control the flow of information and act as important bridges in the network. They can also be potential points of failure (or bottlenecks).
Eigenvector centrality	Measures how connected a node is to other highly connected nodes. In general, nodes with high eigenvector centrality are the leaders of the network, although they may not have the strongest local influence.
Size	Measures the number of neighboring nodes a node has (plus the node itself). It is similar to degree, but counts nodes rather than connections.
Reach	Two-step reach measures the portion of the network within two steps (the direct connections of the direct connections) of a node. In general, nodes with high reach can spread information through the network via "friends of close friends."
Reach efficiency	Reach efficiency normalizes reach by dividing it by size (the number of neighboring nodes). In general, nodes with high reach efficiency are less connected but have more exposure per direct relationship.

Social Network Analysis (SNA) is a powerful tool for identifying the complex relationships and structural characteristics of a network. Beyond identifying the central actors in a network, it can provide measures of how tightly interconnected and how fragmented the network is. It can also identify subgroups or clusters within a given population. All of this information can be used to gain a deeper understanding of the strengths and weaknesses in communication, the power structure, and the stability of the network. As a result, SNA is widely applied in international development work.

Assessing the system level.

Metric	Description
Elements	The total of all nodes (elements in Kumu) on the map.

Connections	The total of all edges (connections in Kumu) on the map.
Density	The ratio of the actual number of connections to the number of possible connections in a network. "1" is the highest density coefficient and "0" is the lowest.
Reciprocity	In a directed network, reciprocity measures the likelihood that two nodes have an equal number of connections running in either direction between them.
Average degree (average rank)	Calculates the average number of connections across all nodes in the network.
Diameter	This is the shortest path between the two most distant nodes in a network. If any part of the network is disconnected, the diameter will be infinite (∞).
Average path length	Calculates the average number of steps to travel from one node to another in the network. If any part of the network is disconnected, the average path length will be infinite (∞).

- **Transitivity:** a measure of how close three nodes are to one another.
- **E-I index:** a measure of connectivity inside versus outside your group.
- **Homophily/heterophily networks:** the likelihood of connecting with others inside your group versus outside it.
- **Core-periphery structure:** which nodes are part of the central core versus the less-connected periphery.
- **Structural holes:** a set of measures for examining where the gaps are in the network of connections, which lead to inequality among nodes.
- **Redundancy:** measures where multiple paths exist between two nodes.

DOs and DON'Ts for SNA

Throughout the Local Systems Practice (LSP) course funded by USAID, we had the opportunity to work with USAID missions, local partners, and civil society organizations (CSOs) on many SNA social networks.

Things to DO:

- **DO state the research question clearly.** Like any research method, SNA is only useful if you clearly understand the question you are trying to answer. Clarifying the research question ensures that (a) SNA is the right method to answer your question, (b) resources are used efficiently, and (c) you collect all the data needed to answer your question. Collecting a mass of data and then hoping it all adds up to something meaningful is a leading cause of wasted resources. You should also take the time before starting the SNA to make sure that you and your team agree on the research question before diving in.

- **DO know how the information will be used, and by whom.** The audience matters. Know what your audience(s) need from the SNA to ensure you capture the right data (not the most data). Understanding how this information will be used ensures that you capture/identify the most appropriate actors and the most relevant relationships.
- **DO clearly define the boundaries (start small first).** When it comes to SNA, more is often not the same as better. The most successful (useful) SNAs we have studied are those with tightly defined boundaries, meaning the researcher has thought deeply about which actors are included in the network and the characteristics of those actors. Whether you are using a roster method or a snowball method, thinking carefully about the actors in the system will save you significant time in the long run.
- **DO work together with a local partner.** A local partner is essential. Ideally this partner (a) has knowledge of the system/problem you are studying and (b) has some basic technical skills (for example, surveying) so that you can transfer the method. Working with a local partner makes your research better and promotes local ownership and development.
- **DO engage local stakeholders throughout the process.** All development efforts should include local components, and SNA is no exception. We find it most useful to hold focus-group discussions with those members before collecting data, to test assumptions and verify our approach. In addition, we encourage SNA practitioners to consider how to present findings back to local stakeholders (noting any potential confidentiality concerns). Sharing and validating the key findings with local stakeholders is an indispensable part of the most successful SNAs.

Things to NOT do:

- **DON'T do SNA in isolation, without stakeholder participation.** SNA can answer many questions about the relationships among actors in a system. However, it cannot answer questions that begin with "why." Consider adding some qualitative techniques to your research approach (focus-group discussions, qualitative survey questions, etc.) to help you understand and contextualize the data.
- **DON'T try to do everything.** Something about SNA tends to make people overly ambitious. Adding more stakeholders to your list and extra questions to your survey instrument is tempting. But more can lead to less. We find that SNAs with clearly defined boundaries and certain carefully-considered questions produce the most useful results and keep users from getting lost in a sea of data that often adds no information.
- **DON'T neglect standard research procedures.** The goal of all research in development must, first and foremost, be to do no harm. Do not forget that SNA is also research. SNA results are often not anonymized. Be sure to obtain IRB approval and follow standard research-ethics procedures.
- **DON'T stop at number one.** SNA is a point-in-time exercise, most accurate at the moment it is done. Repeating your SNA in the future can provide valuable information

about changes in the network over time. SNA can be valuable as an M&E tool for programs in a complex environment.

- **DON'T be afraid—you can do it!** SNA may seem intimidating at first. However, with a little training and some simple (and free) software, you can carry out an SNA well.

To learn more about using SNA in international development, see the LSP User Guide at www.localsystemspractice.org.

3.3.5. Case Study: Applying Systems Thinking in the PHA Network

See the QR code for detailed information.