Actions & Actors System Mapping: a practical guide to delineating systems

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INTRODUCTION

It is useful to represent systems visually, especially when trying to understand the system to support design or evaluation of interventions. Systems maps can help in clarifying and communicating a complex disparate set of social and economic phenomena. The process of analysis that informs the mapping is important, as is the actual map output.

But system maps are often not as useful as they could be. First, systems maps are often abstracted far from any empirical reality, creating a disconnect between systems analysis on the one hand, and intervention strategy and measurement on the other. Second, intangible concepts and a lack of standardisation means that systems maps are often rather like other people's children: fascinating to those who produced it, incomprehensible and a bit annoying to everyone else. Third, some systems maps emphasise representation of actions[3] while others focus more on actors[4], and rarely integrate detailed analysis of both.

Here we introduce an approach to mapping systems that incorporates both actions and actors, and links our conceptual understanding of systems closely to the reality that we are trying to change, and that we are trying to measure. The approach was developed for application to the Market Systems Development (MSD) approach[5], but may be applied across any form of development intervention or social science research. It can provide a foundation for systemic change strategy development and impact evaluation. And it may be especially useful for those seeking or evaluating 'systemic' change, as it can provide a rare and tangible specificity as to what the system is that we are trying to change.

MAPPING ACTIONS *AND* ACTORS

The power of the Actions & Actors method of system mapping lies in the ability to analyse and represent these two key facets of systems in conjunction. This allows us to represent clearly *who* is doing *what* in the system. These are the only two systems concepts we need to undertake the mapping, and they are very straightforward to understand.

- ACTIONS: The things people do.
- ACTORS: The people (including individuals, companies, government departments, etc.)[6]

The focus on the interaction between actions and actors cuts out non-essential parts of the system and encourages mapping only what is important. It also ensures the system map is grounded in the real world. There is no place for actors if we don't know what it is that they're doing that is important for our system. And there is no place for actions that cannot be located within the real live people, firms, government departments that perform that action.

Figure 1: Format of Actions & Actors System Map

[3] See for example, MSD doughnuts (Springfield 2015), Participatory System Mapping (Barbrook-Johnson and Penn 2021), some value chains (Gereffi & Fernandez-Stark 2011)

[4] See for example, FSG Actor Mapping (Gopal & Clarke 2015), Actor-network diagrams (Yang et al 2016), other value chains (Hellin & Meijer 2006)

[5] See Springfield (2015)

[6] These definitions are taken from Lomax (2020). *Six Steps to assess systemic change (and improve your strategy).*

Actions & Actors System Maps are represented in a grid (see Figure 1). On one axis we have actions, and the other we have actors. The resulting grid gives us the opportunity to set out exactly who is doing what, and the nature of important connections between actors in the system. Actions are placed in the approximate sequence in which they occur in real life, and are set out from bottom to the top of the grid. When populated, the grid is somewhat resemblant of value chain maps (see for example Marketlinks n.d.). But while value chain maps are focused on production, Actions & Actors Systems Mapping builds on a flexible typology of action (Lomax 2018) that can incorporate exchanges, and include a range of diverse actions outside of the commodity value chain in a standardised way. This means we can use this set of concepts for analysing conflict, ecological destruction or corporate strategy, as well as agricultural or industrial systems.

The next section explains these underpinning concepts further, providing additional detail that can help to address some challenges of mapping systems. However the short definitions of actions and actors above will suffice for many readers, who should feel free to skip through to the 'how to' guidance from page 5.

OPTIONAL EXTRA DETAIL ON THE CONCEPTS[7]

Social systems are made up of sets of human beings performing various actions. Students study, dairy farmers feed and milk cows, politicians produce legislation, aid workers report to donors, and Instagram influencers take selfies.

Some actions are ***transfers***, and involve shifting resources from one actor to another, usually in exchange for other resources – often in the form of money. As well as buying and selling goods and services, there are also important information transfers between actors. Advertising is an information transfer about the benefit of buying something. Information transfers can be very subtle – a teacher's stern expression tells the pupil to stop misbehaving.

Other actions are ***transformations***. Actors don't just shift resources amongst themselves, they also transform the nature of those resources. Farmers turn seeds into crops. Carpenters turn timber into furniture. Writers turn blank paper into books. These transformations usually produce an output resource of value, but use up input resources in doing so.

In these examples, you'll have noticed we often **define actors by the types of actions they do** (students study, teachers teach, farmers farm, etc.). We follow this approach here. Actors are included and categorised in the system based on their performing actions that we are interested in – usually because we are trying to improve them through intervention. Actors can be individuals, or groups that form a decision-making unit such as households, companies, government departments, and so on. To support analysis of interactions between humans and nature, we also include 'nature' as an actor.

You may also have noticed that **actions always pertain to resources**. These can be of several forms. Physical resources are perhaps most obvious – buildings, tractors, seeds, roads, and so on. Some physical resources are more often thought of as 'natural resources', such as land, water, or clean air.

[7] This section builds on the core ideas from Mechanisms of Social Change. See Lomax (2018). *Mechanisms of Social Change: Outline of a Conceptual Framework.*

Human resources include everything pertaining to human beings, especially their skills and other factors related to ability to perform actions. Financial resources – cash and credit – are especially important in facilitating exchanges. Least tangible, but often most important, are information resources which include information about how to perform actions, the costs and benefits of performing actions and so on. Social capital is an important type of information resource that underpins relationships between actors.

Resources form the inputs for actions, and also measure the outputs from actions. All interventions in MSD seek to improve performance of certain actions as measured in resource outputs. For a farmer producing mangoes, this might be better mangoes, more mangoes under cultivation, increased yield of mangoes from existing trees, improved timing of mango production relative to demand, etc. And all interventions in MSD seek to improve resource outputs by improving resource inputs. We might seek to provide our mango farmer with information about best practice in post-harvest handling, security of land tenure that allows her to invest in more trees, improved pesticides, chemicals for off-season production of mangoes, etc.

Understanding **destruction and appropriation as actions** helps to apply the same concepts to important areas such as conservation and conflict. Most exchanges we usually think of are consensual, but there are important exceptions. Nature cannot consent to appropriation of unowned resources – collection of firewood, pumping river water for irrigation, catching fish from the sea. Often this leads to over-exploitation. Nature is not the only victim – pickpockets steal wallets, governments insist on tax payments, companies copy intellectual property. Such transfers may have positive or negative outcomes, and the same is true of transformations. Arsonists burn others' property. Soldiers kill. Judges send people to prison. Drivers of cars with combustion engines emit toxic gases. Here we see nature can be a perpetrator as well as a victim. Mango pump weevils eat mangoes. Frosts damage cereal crops. Mosquitos spread malaria. Tsunamis kill people and destroy property.

Transfers usually include resources from the supplier and from the buyer, and cash is often one of the resources involved in the exchange. Transformations, meanwhile, are often performed by an actor on her own resources (for example farmers producing their own crops). But **sometimes transformations involve two or more actor sets**. For example, many services are transformations of others' resources as part of an exchange (haircuts, financial management, etc). And the non-consensual transformations set out above are also performed on resources belonging to others or to nature. Transfers and transformations that involve two sets of actors are central to MSD, but we have seen that not all are exchanges. We use 'transactions', 'interactions' or 'connections' interchangeably to refer to this group of actions. It is also important to remember that many production actions, such as 'growing crops', are not transactions but are nevertheless integral to our understanding of systems.

HOW TO MAKE AN ACTIONS AND ACTORS SYSTEM MAP

There are five tasks involved in mapping a system using this approach. While there's a rough order to these tasks (see Figure 2) it is certainly an iterative process, and you will revisit earlier tasks as you learn more about what is going on in the system, and as you prioritise what actions and actors you consider important. You might work through the system mapping steps with only a few actions, then repeat the process as your system boundaries expand.

The five tasks are as follows:

1. ACTIONS What are the important actions?
2. ORDER: In what order do these actions happen?
3. ACTOR SETS: What actors do each of these actions?
4. TYPES: Are there important categories within the actor sets?
5. INTERACTION: Who is doing what?

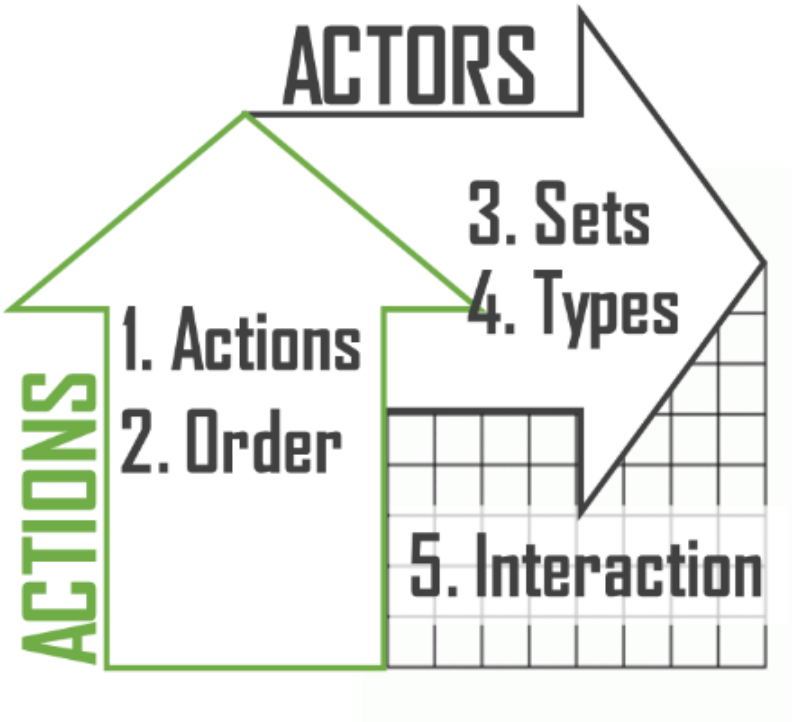

Figure 2: A&A Systems Mapping process

TASK 1: ACTIONS

What are the important actions?

First we set out the actions that we want to include in the system.[8] Systems are defined subjectively, so there are decisions to be made. If we are trying to make the system work better for some section of the population, we'll start with what those people do. Let's say we're trying to improve incomes for vegetable farmers – we look at the key things that vegetable farmers do. Often this follows a buy-produce-sell pattern, such as the following.

- Buy inputs for vegetable production.
- Produce vegetables
- Sell vegetables

Then we need to look at the cause of low incomes for vegetable farmers. Let's say the problem is low yields, caused by soil acidity, and we plan to solve this by introducing a new input for vegetable production: agricultural lime that when applied neutralises soil acidity.[9]

This means we now need to include in our system map the other actions that are going to be relevant to farmers being willing and able to buy and use aglime. We come up with six more actions:

- Production or import of aglime
- Sale of aglime to farmers
- Sale of aglime to retailers
- Distribution of aglime to local markets that can be accessed by farmers
- Provision of information about aglime to farmers (including how to use, benefits of using, etc)
- Provision of information about aglime to retailers (including the benefits of selling aglime)

We are looking at the actions first, and we can do this without specific actors in mind. However, you can see from inclusion of retailers and farmers in the example that we can provisionally include actors if it helps to define the actions more clearly, and if we have some knowledge of who is doing what.

Tips

All actions you describe in the system are aggregations of other actions. For example, 'produce vegetables' includes planting, applying chemicals, the crops growing through interaction with the sun, air and soil, harvesting, and so on. Only break actions down where it is useful to do so and where it matters for strategy or measurement – keep it as simple as you can. But do keep a detailed description of what is included in each action in your system.

What about supporting functions, rules, norms, or other systems concepts that aren't always understood in actor level terms? See Lomax (2021) for more information on how to translate these into their composite actions, actors, and resources.

[8] There are a range of approaches for finding what actions are important in the system. Those implementing MSD programmes will often use the diagnostic process from the Operational Guide (Springfield 2015).

[9] This example is adapted from the experience of the Market Development Facility in Fiji. See https://beamexchange.org/practice/snapshots/soil-fiji/ for more information.

TASK 2: ORDER

In what order do these actions happen?

We now follow a similar approach to value chains to get the actions into a logical order. The system map is often more complex than a standard value chain, so we sometimes have to 'stylise' this sequence.

The sequence in Figure 3 deals with three types of resource: vegetables, aglime, and information. Information is an input into aglime purchase decisions, and aglime is an input into vegetable production, so the sequence follows this order. We present the sequence here from the first action in the system at the bottom, to the last action in the system at the top.

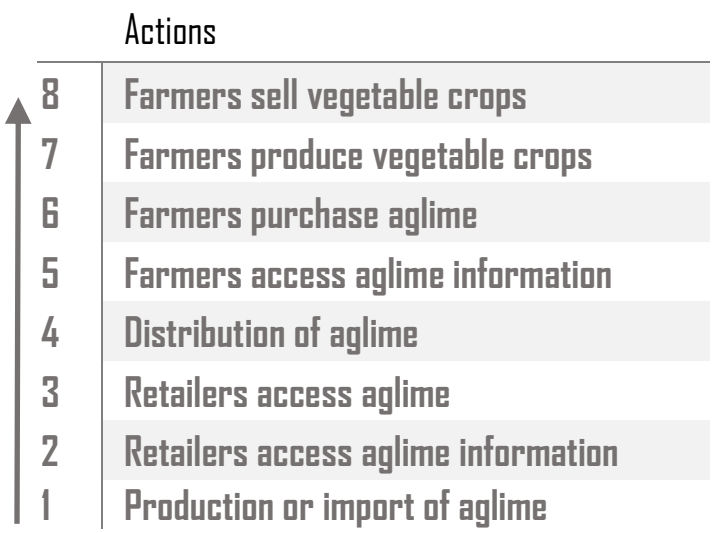

Figure 3: Actions in a stylised sequence

In sequencing the actions, we can check that transactions are not duplicated. In our example, we had two actions that are two sides of the same transaction. "Buy inputs for vegetable production" and "Sale of aglime to farmers" is combined as "farmers purchase aglime".

Tips

It helps to map out the sequence if you know how the systems works in reality. If you're struggling, you may need to go out and get more information.

In some maps variation in business models may mean that the order is different for different actors. This is fine – map the sequence for most actors and describe any variation in the narrative.

For service-based systems such as tourism or finance, you lack the basic process stages of resource transformation to inform the sequencing. For these cases it's often easiest to follow the temporal order of the service from the consumer perspective (for example investigating holiday options, booking the holiday, paying for the holiday, the actions taken on holiday, consuming while on holiday, and so on) then follow the payments from booking agents through to hotels and operators in a rough temporal sequence.

TASK 3: ACTOR SETS

What actors are involved?

Actor 'sets' are groupings of actors based on what they do – or what we want them to do – in the system. Actor sets should refer to a real set of actors in the real-world system we're looking at.

While it is useful to start from existing groupings in the real world, there are two caveats:

- It is often the case that these existing groupings don't include everyone of interest. Those who perform actions *informally* are frequently overlooked – and we want to make sure we know about all the actors involved.
- The labels we use for actor sets should be defined around the actions in our system, and avoid being drawn into use of existing labels that describe actor characteristics other than actions.

In our aglime example, we have four sets of actors (see Figure 4). The vegetable farmers are there, as are the input retailers. We have grouped together aglime producers and importers, and added the actors who buy vegetables from farmers.

The convention used here is to start with the key actors in the middle. Here this is vegetable farmers. Those they sell to are put on the left, and those they buy from are put on the right.

Actor sets:	Vegetable buyers	Vegetable farmers	Input retailers	Aglime producers & importers

Figure 4: Actor sets

TASK 4: ACTOR TYPES

Are there important categories within the actor sets?

Within each of the sets we can then get into more detail about important groupings of actors. These might be important for various reasons. The types may reflect different business models, sizes of business, socio-economic groupings, public or private sector, or any other categories that are important to the intervention.

Setting out the types helps to further delimit the system. For instance, the types of 'vegetable buyer' specified in the example in Figure 5 excludes the informal domestic market for vegetables, as the programme is focused on vegetable production for export and formal markets. Often systems are delimited around particular elements of the target group – vegetable farmers in this case. Interventions may focus on women farmers, or young farmers, or farmers below a particular level of poverty. Any of these may be specified at this stage.

Actor sets:	Vegetable buyers	Vegetable farmers	Input retailers	Aglime producers & importers
Actor types:	-Formal domestic buyers -Exporters -Specialized aggregators	-Subsistence -Semi-commercial -Commercial	-Small retailers -Large hardware stores -Market traders -Gov. extension agents	-Concrete companies -Importers

Figure 5: Actor Sets and Actor Types

TASK 5: INTERACTION – PUTTING IT ALL TOGETHER

Who is doing what?

Mapping the interactions between actors and actions is then just a question of populating the grid. Most of the work to support this will have been done in coming up with the lists of actions and actors but populating the grid can help to check for consistency. For instance, in our aglime example mapped in Figure 6, aglime producers and importers may sell aglime direct to farmers, and as such they are involved in *action 6* 'farmers purchase aglime'.

The most basic version of the Actions & Actors Systems Map uses just one symbol for an actor being involved in an action in any capacity. The nature of each action and each actor's involvement should then be detailed in an accompanying narrative description. Figure 7 illustrates this basic representation, using a circle to indicate an actor being involved in the action.

	Actor sets:	Vegetable buyers	Vegetable farmers	Input retailers	Aglime producers & importers
	Actor types:	-Formal domestic buyers -Exporters -Specialized aggregators	-Subsistence -Semi-commercial -Commercial	-Small retailers -Large hardware stores -Market traders -Gov. extension agents	-Concrete companies -Importers
	Actions				
8	Farmers sell vegetable crops	●	●		
7	Farmers produce vegetable crops		●		
6	Farmers purchase aglime		●	●	●
5	Farmers access aglime information		●	●	●
4	Distribution of aglime			●	
3	Retailers access aglime			●	●
2	Retailers access aglime information			●	●
1	Production or import of aglime				●

Figure 6: A&A Systems Map worked example with basic representation of actions

Tips

We've not done it here, but at this stage it is sometimes helpful to rephrase the action descriptions to include all actors involved. The action description can then be used more clearly to refer to the role of any of the actors who perform the action, which supports use of the mapping to create a measurement framework.

If desired, more information on the nature of each action and each actor's involvement can be included in the systems map. Figure 7 shows the same system with exchanges represented as sideways arrows with supply or demand side specified, and production actions represented as up arrows.

	Actor sets:	Vegetable buyers	Vegetable farmers	Input retailers	Aglime producers & importers
	Actor types:	-Formal domestic buyers -Exporters -Specialized aggregators	-Subsistence -Semi-commercial -Commercial	-Small retailers -Large hardware stores -Market traders -Gov. extension agents	-Concrete companies -Importers
	Actions				
8	Farmers sell vegetable crops	D→	←S		
7	Farmers produce vegetable crops		↑		
6	Farmers purchase vegetable crop inputs		D→	←S	←S
5	Farmers access aglime information		D→	←S	←S
4	Distribution of aglime			↑	
3	Retailers access aglime			D→	←S
2	Retailers access aglime information			D→	←S
1	Production or import of aglime				↑

Figure 7: A&A Systems Map with detailed actions

In making choices about how to represent actors' relationships with the actions, there is often some subjectivity. This is because actions are often an aggregation of more detailed set of transactions. Annex 1 provides more detailed guidance on symbols that can be used to represent various types of transaction if you want to include more detail on the nature of the action and each actor's role.

CONCLUSION: THE BENEFITS OF A&A SYSTEM MAPPING

Many programmes seeking systemic change struggle to articulate what the system is that they are trying to change. Producing the Actions & Actors Systems Map provides a transparent representation of what this system is, which helps to communicate with stakeholders as well as to focus strategy. Because the map links directly to the empirical reality of that system, it provides a basis for measurement and evaluation, as well as locating the system underperformance that interventions are designed to address. The performance of each action can be measured for each actor involved in terms of the quality, quantity, rate and timing of their resource output. Monitoring and results measurement plans can therefore be set out based on each populated cell on the grid.

The flexibility of the underlying concepts means Actions & Actors Systems Mapping can be applied to any social or social-ecological system, including analysis of negative impacts. And because there is a causal sequence embedded into the structure of the systems map, it can inform the design of theories of change or results chains. Desired behaviour changes can be defined for each actor involved in each action, and using the grid to set out how behaviour changes are interconnected can help to avoid gaps in the logic of intervention strategy. The system map should be treated as a live tool. As understanding of the system develops, or as programme priorities shift, or as the system itself changes over time, these changes should be reflected in the system map.

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ANNEX 1: ADVANCED CODING OF ACTIONS

The table below outlines some examples of ways to represent actions, including those with negative impacts such as appropriation and destruction. This list is illustrative of some options for representation. It is not an exhaustive list of types of action, nor is it prescriptive about these actions should be represented.

Actor Set 1	Actor Set 2	Actor Set 3	Nature of Action
One actor			
↑			Actor 1 **produces** their own resources
×			Actor 1 **destroys** their own resources
Two actors			
S→	←D		**Exchange** with Actor 1 on demand side and Actor 2 on supply side
D→	×		Actor 1 **appropriates** resources from Actor 2
↑	×		**Production** by Actor 1 that causes **destruction** of Actor 2 resources.
↑	←F		**Production** by Actor 1 that is **facilitated** by Actor 2.
↑	←S		**Production** by Actor 1 that uses resources input by Actor 2.
Three actors			
S→	←D	←F	**Exchange** between Actor 1 and Actor 2, **facilitated** by Actor 3.
S→	←D	←D	**Exchange** in which Actor 1 supplies resources to Actor 2 and Actor 3.
S→	S→	←D	**Exchange** in which Actor 1and Actor 2 supply resources to Actor 3.

Note 'facilitation' is used here as a shorthand to represent a more complex set of actions. We might want to use this shorthand especially for actions performed by information intermediaries or service providers, and especially where there is no practical benefit to the user in breaking the transaction down into separate component actions. Examples might include the role of estate agents 'facilitating' property transactions, or transport service providers 'facilitating' distribution.