**Developing Useful Theories of Change for Complex Settings**

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**Introduction**

Theories of change (ToC) are becoming a routine part of many evaluations, especially theory-based evaluations ([Donaldson, 2007](#_ENREF_4); [Rogers, 2007](#_ENREF_23); [Coryn, Noakes, Westine and Schroter, 2011](#_ENREF_3); [Funnell and Rogers, 2011](#_ENREF_5)). ToC are generally agreed to be descriptions/representations of how an intervention is intended to work in bringing about change. But numerous studies have found that what more specifically a ToC comprises and how it is represented vary widely ([James, 2011](#_ENREF_8); [Stein and Valters, 2012](#_ENREF_25); [Vogel, 2012](#_ENREF_26)). Often, almost anything with boxes and lines is called a ToC. Hence there will, inevitably, be good and bad ToCs, strong and weak ToCs, useful and less useful ToCs.

I have written previously about useful ToCs ([Mayne, 2015](#_ENREF_12)) as well as robust ToCs ([Mayne, 2017a](#_ENREF_13)). This article is rather about developing/building reasonably good useful ToCs. While it uses some of those earlier ideas, it is based more on experience in working with others in a variety of demanding and complex settings to develop useful and useable ToCs, and the lessons learned.

The article first sets out characteristics of complex evaluation settings and then discusses some basic ToC terms and concepts needed to get started. It then introduces a behaviour change model for use as a generic ToC. This is followed by a discussion of the steps involved in developing solid ToCs. A number of issues to consider in developing a ToC are discussed before concluding remarks.

**Complex Evaluation Settings**

Interest here is on building ToCs for interventions that tend towards the complicated or complex. That is, interventions that may involve some or all of the following characteristics ([Mayne, forthcoming](#_ENREF_16)):

* Comprise a number different intervention components
* Include a number of types of intervention activities and strategies.
* Involve a number of different actors, e.g. multiple partners and intermediaries, as well as the beneficiaries.
* Include a number of different pathways to impact.
* Are influenced by a number of external factors.

In such settings, how the intervention is expected to work is not straightforward, causality is complex and there will be a number of different causal factors at work in bringing about the observed results. Today, these characteristics are found in many interventions ([Ramalingam and Jones, 2008](#_ENREF_22); [Byrne, 2013](#_ENREF_1); [Ramalingam, 2013](#_ENREF_21); [Copestake, 2014](#_ENREF_2); [Garcia and Zazueta, 2015](#_ENREF_6); [Gerrits and Verweij, 2015](#_ENREF_7); [Mayne, forthcoming](#_ENREF_16)).

Developing useful theories of change for such interventions is clearly not routine nor something done in a couple of hours with limited effort. There is a need to unpack the complexity. At the outset, agreement is needed on a number of basic concepts and terms, key challenges need to be addressed, and there are numerous issues that need to be considered and resolved. And ways need to be found to break up the complexity into more manageable components. But the effort is worth the investment of resources and time. Theory-based evaluation approaches need good credible ToCs, although this is not often explicitly recognized. Basing contribution analysis ([Mayne, 2011](#_ENREF_10); [Mayne, 2012](#_ENREF_11)) on weak ToCs can only result in weak contribution claims and so the purpose of the undertaking is defeated.

**Getting Started**

Challenges abound in developing ToCs, and if not addressed early on will almost certainly lead to a frustrating and not very successful development process. At the outset, there is need to get agreement and understanding on some basic issues:

* just what is a ToC,
* the purpose of the ToC—how it is to be used,
* the kind of ToC model that is going to be developed and the basic generic ToC elements involved,
* the level of effort involved in developing a ToC, and
* the need for, certainly in complex settings, multiple nested components of a ToC.

***Time and effort is required***

Developing useful ToCs is not a quick-and-dirty process. It takes thoughtful analysis, deliberate discussions, dedicated time and substantial effort by those involved, and hence resources to do so. And in most cases, developing a ToC is an iterative process with significant feedback and challenge, inevitably adding to the time and resources required. In working with others on developing ToCs, I have found that setting aside inadequate time and resources frequently dooms the development process and results in ToCs that fail to serve anybody’s interests.

***What is a theory of change?***

As noted above, those involved in developing a ToC likely have different ideas about what a ToC is and should look like. At the outset, therefore, some effort is needed to get reasonable agreement among key players on ToC terms and concepts, and indeed on the very need for a ToC. Otherwise, buy-in to developing a solid ToC is going to be difficult. Below, I set out the terms and concepts I employ, and that I have found very useful. For more detail on many of the points below, see [Mayne (2015](#_ENREF_12)) and ([Mayne, 2018](#_ENREF_15)). If different terms and concepts are to be used in developing ToCs, they should be clearly defined in order to get everyone speaking the same language and working towards the same ends.

The term ***impact pathway*** describes a causal pathway showing the linkages between the sequence of steps in getting from activities to impact. A ***theory of change*** adds to an impact pathway by describing the causal assumptions behind the links in the pathway—what has to happen for the causal linkages to be realized. A ToC is a model of how the intervention is expected to work (ex ante) or has worked (ex poste). To confuse matters, impact pathways are sometimes called *logic models* or *result chains*, and theories of change sometimes referred to as *program theories*. In my thinking, impact pathways, logic models and results chains do not, on their own, constitute theories of change since they don’t identify the causal assumptions at play.

***There can be different versions and components of an intervention ToC***

There often is an unstated belief that there should be one single ToC for an intervention. ToCs try to do and show many things, and for most complicated or complex settings, laying everything out in a single ToC usually results in a visual mess—the spaghetti ToC model. A key factor to bear in mind is that, for any intervention, a ToC is a conceptual model and hence there can usefully be several representations of the ToC, each varying with the amount of detail required. ToCs of different levels of detail serve different purposes.

There is usually a need for a big picture ToC and for detailed ToCs for each of the different pathways to impact:

* A ***Narrative ToC*** is the elevator pitch version of the ToC, set out in text which describes broadly how the intervention is intended to work. It might typically set out in a few words the key pathways of the intervention and then describe the intended key results. It should only be a sentence or two.
* An ***Overview ToC*** could just be a simplified impact pathway showing as relevant any sub or nested theories of change pathways, OR a ToC showing the main pathways to impact, along with, in either case, the rationale assumptions. The concept is to capture the big picture.
* More detailed ***Nested ToCs***, showing the several impact pathways and the causal link assumptions details that support the theory of change, or a series of detailed nested pathway ToCs for each main pathway to impact.

It is useful to develop for any intervention, both the Overview ToC showing the big picture and the key pathways to impact, as well as Nested ToCs for each of the pathways. This is an effective way of *unpacking complex interventions*. Individual pathways need to be identified from the intervention document and/or, in the case of a project-based intervention, a review and identification of the general types of projects undertaken.

The process is usually iterative. A good Overview ToC may not be evident until the nested ToCs have been worked on, and a good Narrative ToC may not be possible until both the nested and the Overview ToCs have been identified.

In what follows, the focus will mostly be on building a good ToC, not directly on the issue of unpacking complexity. That is, on building a ToC for a straightforward intervention or on building a ToC for one nested ToC in a complex setting. [Koleros and Mayne (2019](#_ENREF_9)) give one example of unpacking a complex intervention using actor-based ToCs.

***ToCs can be used for different purposes***

There is also likely to be different ideas on how ToCs are to be used. Too often, a ToC has been developed by evaluators as the result of a requirement to do so in an evaluation, and then put in an Annex, but not actually used for anything in the evaluation. A clear idea of how the ToC is to be used needs to be agreed among the evaluators, the intervention staff and other key stakeholders at the outset. Otherwise different individuals involved will have different aims in mind for the ToC, and as a result different ToCs in mind.

Key purposes and uses, depending on the context, are:

* *To show the big picture*: To provide a visual model of how the intervention is expected to work.
* *To show detail on the pathways to impact*: More than the big picture is needed. Specific components of the intervention can be modelled and used for detailed analysis.
* *To strengthen design*: To identify weaknesses in the design and implementation of the intervention.
* *To assist with planning*: To connect program, project and results planning with activities, the reach of key targets and expected results.
* *To seek agreement from multiple perspectives:* The process of building ToCs can form the basis for agreement among key stakeholders on how the intervention is expected to work and the issues needed to keep in mind during implementation.
* *To identify M&E needs*: To identify what needs to be monitored and what issues given attention in an evaluation
* *To help develop data collection tools*: To provide a key input into the design of data gathering tools, and hence needs to be available prior to developing such tools
* *To understand what works for whom and when*: To provide insight on how, for whom and why the intervention is working or not.
* *To make causal claims*: To provide a basis through confirming a TC on which to make causal claims about the contribution the intervention is making to observed results.
* *To tell your performance story*. To provide a framework for describing how the intervention has performed.

This article does not focus per se on using ToCs. Rather, the point made below is that for the same intervention there are likely different useful ToCs for different purposes. [Mayne and Johnson (2015](#_ENREF_17)) discuss various uses of ToCs. [Silva, Breuer, Lee, Asher, Chowdhary, Lund and Patel (2014](#_ENREF_24)) discuss the many uses of ToCs in a medical research setting.

**A Basic ToC: the COM-B Model of Behaviour Change**

Most interventions involve changing the behaviour of target populations, institutions and/or other intermediaries. The ToC models I use and have found very useful are based on an evidence-based behaviour change model from the social sciences.

***The COM-B model***

 [Michie, Stralen and West (2011](#_ENREF_18)) set out a ***COM-B model*** of behaviour change that is based on an extensive synthesis of behaviour change models in the literature: behaviour (B) occurs as the result of interaction between three *necessary* conditions, capabilities (C), opportunities (O) and motivation (M).

***Capability*** is defined as the individual’s psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills. ***Motivation*** is defined as all those brain processes that energize and direct behaviour, not just goals and conscious decision-making. It includes habitual processes, emotional responding, as well as analytical decision-making. ***Opportunity*** is defined as all the factors that lie outside the individual that make the behaviour possible or prompt it. ([Michie et al., 2011: 4](#_ENREF_18)) [italics and bold added]

Their COM-B systems model is shown in Figure 1. Note that both capabilities and opportunities can influence motivation and all three not only bring about behaviour change but can also be influenced by the resulting behaviour change, i.e., there is often a feedback loop from behaviour change to capacity change. If behaviour change seen as limited, then there may be a need for more capacity change work.

Capabilities

Behaviour change

Opportunities

Motivation

**Figure 1: The COM-B System Model**

In a theory of change context, for the COM-B model we have Figure 2 ([Mayne, 2018](#_ENREF_15)).

An advantage of this generic form is that it tells a clear performance story: outputs reach intended audiences and lead to changed capacity of those audiences, which leads to a change in their behaviour. This results in direct benefits that over time lead to enhanced wellbeing (impact). At each stage of the story, there are events and conditions needed to get from one step to the next (assumptions).

Behaviour Change

Capacity Change

**Figure 2: The COM-B Based Theory of Change**

Reach & Reaction

Outputs/

Activities

Direct Benefits

Improved Wellbeing

*Reach*

*Assumptions*

*Capacity Change*

*Assumptions*

*Behaviour Change*

*Assumptions*

*Direct Benefits*

*Assumptions*

*Wellbeing*

*Assumptions*

***External Influences***

Capability

Opportunity

Motivation

Timeline

**Supporting Actions**

(to help bring about the assumptions, including the enabling environment)

While Figure 2 appears as a linear model, in practice it often is not at all linear. First there are the feedback loops shown in the figure. Behaviour (or practice) change, for example, usually takes some time to be realized and often needs reinforcing with further capacity change to bring about sustained practice change. And evidence of realizing direct benefits will often bring about yet further practice change. It is useful to build in the specific causal link assumptions associated with the feedback loops.

Secondly, in the figure the supporting actions are shown as somehow affecting the assumptions. In practice they are specific actions aimed at bringing about specific assumptions that need to be made explicit, and involve their own nested COM-B ToC, usually best illustrated in a separate diagram. The result can be a quite complex representation, far removed from a simple linear causal model.

On the other hand, the apparent linearity of Figure 2 can be useful as the basis of the change story being told. i.e. to develop the Narrative ToC.

The COM-B model structure is vastly superior to the more common – and more simplistic one in which outputs lead to immediate outcomes, intermediate outcomes and then to impacts/final outcomes. None of the terms in that ‘outcomes’ structure have any inherent meaning, and often are the subject of not very useful debate about which type of outcome a result is, a distraction in building a ToC.

***Components of a ToC***

The following definitions and descriptions of elements essential to a ToC are useful whether or not one is adopting a behaviour change model.

***Outputs***

Outputs is a term everyone uses, but it can mean different things to different people, and hence needs to be carefully defined. I try to define outputs as the goods and services delivered by the intervention. But some use ‘outputs; to cover what I would call early outcomes. And sometimes it is not quite clear just what the service been provided is. All to say there is a real need to define and agree on just what is meant by the term.

***Reach and reaction.*** Reach and Reaction refer to the target groups who are expected to receive the intervention’s outputs and their initial reaction to these outputs. [Montague and Porteous (2013](#_ENREF_19)) discuss the importance of building reach into ToC models. A frequent cause of failure of any intervention is its not reaching the right target group with the right types of messages. But again, things may not be that clear. What does ‘receive an output’ actually mean?

Furthermore, one may need to distinguish between those who are expected to be reached by the intervention from those who have actually been reached. Usually, those actually reached are those who *participate* in the intervention, get involved in some fashion.

***Assumptions in a ToC****.* In a ToC context, I define two types of assumptions:

* ***Rationale assumptions*** – These are the underlying hypotheses or premises upon which the intervention as a whole is founded. They are usually the underlying causal statements on which the intervention is based.
* ***Causal link assumptions*** – These are the events and conditions needed (i.e., necessary) for the associated causal link to work—for the cause to lead to the effect. The set of such assumptions are the events and conditions that have to occur for each link in the causal pathway to work as expected. They are not the causal statement associated with the causal link.

Identification of causal link assumptions is an essential part of a ToC. Their identification is as important as the identification of the results set out in the pathway. The causal link assumptions are an intrinsic part of the pathway. The clear performance story mentioned above is only realized if all the causal link assumptions are realized.[[1]](#footnote-1)

Project personnel will gain a number of advantages from carefully defining the causal link assumptions between the activities delivered. Since they are necessary or likely necessary, once you identify them you can then ask if it is likely that they will be realized. For some assumptions, it will not be self-evident that they will happen, and so these may be ***at-risk assumptions***. But this is where the other partners or other *supporting actions* often come into play (see below). Knowing these assumptions are at risk, the manager of a well-designed intervention will arrange for partners (or their own team members) to work intentionally to bring about these at-risk assumptions.

For example, in an intervention to improve education outcomes for girls by providing training to teachers on gender-sensitive teacher method, there may be a realization that social norms on educating girls need changing. That is, without greater support from parents and the community for girls’ education, improved education outcomes are unlikely. This then is an at-risk assumption, and those implementing the intervention may need to find a way to engage with the community to build support for girls’ education.

Identifying at-risk assumptions is one element of what I call ***theory of change analysis***, where each result and each assumption is challenged using a specific set of criteria. In this way the roles of all the partners are brought to light, and quite often gaps in the intervention design are found. For more discussion see [Mayne (2017b](#_ENREF_14))

***Supporting actions****.* Figure 2 includes *supporting actions****.*** These are actions undertaken by an actor to ensure that the assumption(s) in question will be realized, i.e., engagement efforts needed to help ensure the assumptions, especially at-risk assumptions, are brought about. And each of these supporting actions is typically itself a mini nested ToC, showing just how the actions are seen as bringing about the assumption(s). Usually it is better to build those ToCs separately from the main ToC, so things do not get too crowded, but showing how they interact with the main ToC. The supporting actions establish the enabling environment. In the above example, the engagements efforts with the community would be supporting actions.

Figure 2 references the *enabling environment* namely, all those other events and conditions needed to make the ToC work—to enable the ToC. It usually (but not always) refers to things beyond the intervention.

***External influences****.* Figure 2 also allows for showing *external influences* at work. Theseare events and conditions unrelated to the intervention that could influence the realization of the intended results. As such, these *other influencing factors* could be contributory causes, explaining in part the observed results. Typical external influences are social and economic trends at work, specific events that have occurred, other interventions overlapping with the intervention in question or environmental factors at work. It is often of interest to know if any external influences have contributed positively or negatively to how well the intervention is working. It is usually not a question of external influences being alternative explanations for the observed results, i.e., explanation other than the intervention[[2]](#footnote-2). Rather, external influences along with the intervention may be all contributing to the observed results.

***Timeline****.* Many ToCs are shown with no idea of the timeline involved along the pathways. It is extremely helpful to indicate even a rough idea of how long it is expected to take for the results along the pathway to occur. Unrealistic timelines have undercut many interventions. Further, when nested ToCs are developed, their timeline needs to be congruent with where they interact within the timeline of the main ToC. If they do not accommodate to the main timeline, a weaknesses in intervention design may be apparent.

**Steps in Developing a ToC**

***A process for developing the ToC***

While ToCs need to be developed in a participatory manner, a useful way to do this is for one or two people to develop a reasonably decent draft ‘strawperson’ or ‘approximate’ ToC that is then used as the basis for discussion and challenge among those involved. The alternative of starting with a blank page tends not to be a good way to proceed since, as noted at the outset, there are many views on what a good ToC should entail and how it should be depicted. Starting with a reasonable clear and intuitive draft ToC with basic terms and concepts set out, allows people to start on the same page and then to challenge, debate and improve upon it.

It is essential to get solid, thoughtful team feedback on the draft ToC—on the various pathways thought to be at work and the causal link assumptions behind each of the pathways. It is on these issues more useful and productive ToC discussions can be held using such a preliminary draft as opposed to starting with a blank sheet. Without considered and challenging feedback there will be no participant buy-in. Moreover, weaknesses may not be captured without the to-and-fro of challenging questions. In a participatory mode, the evaluator can push people to explain and justify their reasoning on all the steps in the ToC, including, probing to determine if there is supporting prior research or if any prior research is familiar to the team.

It is often the case that a Toc gets revised as the project goes along, as more understanding about the intervention and its context is gained. Indeed, developing a common understanding about the ToC of an intervention is usually a very useful product, with significant insights gained.

If circumstances demand starting with a blank page in a participatory setting, then using a structured generic ToC such as the COM-B model is a useful alternative way to proceed. As discussed below, the COM-B model elicits in a step-by-step logical and intuitive fashion just what is needed to build the ToC.

In developing a useful and useable ToC, I would now argue that it is essential to some ToC expertise at the table. Developing a ToC (or more likely different ToCs for different aspects of the intervention) is not at all simple and straightforward.

***First steps***

It can be useful to start with agreement on a preliminary ToC Narrative. This is the 2 or 3 sentence description of how the team sees the intervention working. With that general agreement on what the intervention is all about, you can proceed to identify all of the actors involved and the key pathways to impact.

**Identify the barriers to change**. It can be quite useful at the outset to identify the expected barriers that are or are likely to impede the intervention in bring about the changes expected. This can be part of the problem identification that the intervention is addressing. These barriers to change will likely relate to specific assumptions in the ToC.

**Identify the various actors involved in the intervention**. It is useful early on to identify all those ***actor groups*** that are part of the intervention in some way and establish their roles. These groups would include:

* *Beneficiaries*, the target group or groups that are expected to benefit from the intervention.
* *Delivery agents*, contracted groups or coalition partners who deliver aspects of the intervention.
* *Intermediaries*, other actors, usually partners involved in the intervention, whose roles are to support bringing about the benefits to the intended beneficiaries.

**Identify the key pathways to impact**. Then one can try to identify the key ways the intervention is aiming to bring about the expected changes. The intervention may have a number of components all working in different ways to bring about or contribute to the overall goals. Key actors involved with the intervention may have their own pathways to helping to bring about change. The intervention may involve a number of different types of projects, with each type representing a pathway. And remember, developing useful ToCs is an iterative process, so it may only be later that the most useful pathways to use are identified. But at this point an inventory of the various pathways is being created.

In a complex intervention with many actors involved, it is often *useful to focus first on the main ToC story (pathway) about the how the beneficiaries of the intervention are to be affected*. This pathway identifies the changes needed to bring about the desired benefits for the beneficiaries, including changes in the behaviour of the beneficiaries. The other pathways often focus on other actors involved in the intervention.

**Identify intervention activities.** Lots of attention is usually paid to the various higher levels of results (outcomes and impacts), and for obvious reasons. But in complex interventions, I have found that it can be a challenge to get clear statements of what activities the intervention is actually undertaking—indeed often to set out just what the ‘intervention’ entails— and what outputs are delivered to whom as a result of each of these activities. Yet these are essential building blocks of a good ToC.

***Using the COM-B model to develop ToCs***

Based on the above steps, you have likely identified a number of pathways and for each of these pathways there is a need for a ToC. The COM-B model provides a solid and intuitive basis for developing these ToCs. There is a need to go through each of the elements in the generic model, setting out for the intervention just what outputs (good and services) are being delivered, who they are expected to reach with what assumptions, what components of capacity (capabilities, opportunities and motivation) for each actor are expected to change, and the subsequent expected behaviour changes, along with the causal link assumptions at each stage. I have found that this task/step is best done first in text format.

First, I usually set out the pathway results as text in terms of: activities/outputs, reach, capacity change, behaviour change, direct benefits and wellbeing changes, including estimates of when these changes are thought likely to occur. Then I go back and add in the assumptions needed to get from step to step, all in text.

One may then be able to define key common terms in the statements of results and assumptions to be able to reduce the number of words used, and to simplify the ToC a bit, knowing what detail is being dropped. The Overview ToC will now be easier to illustrate, typically showing the key pathways to impact.

Finally, a diagrammatic model of the ToC can be drawn for both the detailed ToC and any simplified version you have. At each phase, the ToC model should be subject to challenge and revision as needed.

**Identifying desired behaviour and capacity changes**. In seeking to understand the kind of changes the intervention needs to bring about, it is useful to identify the current capacity and behaviour practices of the various actors involved, and then to set out the capacity and behaviour practices expected once the intervention has been in place. This is a practical way of identifying the *barriers to change* previously mentioned. Then the discussion can focus on how to get to there from here in terms of the capacity and behaviour changes needed. That is, just what events and conditions are needed to bring about the needed capacity changes (capabilities, opportunities and motivation) which in turn are expected to bring about the desired behaviour changes.

**Generating and assessing causal link assumptions**. Causal link assumptions are key to a good ToC. Identifying them can be a challenge, but I find the challenge diminishes with experience.

*Focus on a specific causal link*. Remember, these are the (likely) necessary events and conditions needed for the causal link to ‘work’, i.e. to contribute to accomplish/achieve the effect in question. So they need to be developed link-by-link. What will it take for the specific cause (the prior result) to contribute to the effect? These are NOT assumptions that apply to the ToC as a whole. Those might be rationale assumptions. And they are NOT descriptions of the causal link. That is, the assumption that A causes B or contributes to B, is not a causal link assumption. That is the description of the link. The identification of the causal link assumptions uses logical analysis, assessment of barriers to change, and (where they are available) prior research and evaluation findings.

*Use logical analysis*. Perhaps the key tool in identifying assumptions is logical analysis. Here, using the COM-B ToC model helps, since it provides an intuitive structure for the step-by-step analysis. In [Mayne (2018](#_ENREF_15)) I discuss some generic causal link assumptions for each of the steps in the model. For example, for Getting to Reach & Reaction, one has to be able to identify the target population and be able to literally reach them with some form of communicate with them. If a Direct Benefit is that new agriculture products are sold, obviously there is a need for a relevant market to exist (a causal link assumption).

*Identifying barriers to change*. Since they are necessary for a causal link to operate, assumptions entail risks to a causal link working and hence represent barriers to change that are part of the context and setting of an intervention. [Pawson and Tilley (2004: 4](#_ENREF_20)) talk about the importance in realist evaluation “to take heed of the different layers of social reality which make up and surround programmes”. They mention four types of reality, which I adapt here as four groups of barriers to change[[3]](#footnote-3):

1. **Infrastructure** (the wider social, economic, and cultural setting of a program/intervention including social norms);
2. **Institutional setting** (the characteristics of the institution involved, such as power structures, authorities and policies);
3. **Interpersonal relations** (nature and history of key relationships among stakeholders, such as communications levels, networks, historical relationships and trust among groups); and,
4. **Individuals** (characteristic and capacities of stakeholders, including commitment factors that affect the propensity to make change).

Each of these 4Is can be considered as sources of possible or potential barriers in an intervention, and hence exploring them can suggest needed causal link assumptions. The 4Is relate to the COM-B model as follows:

* The *Individual* group relates to Capabilities and Motivation
* *Infrastructure*, *Institutional Setting* and *Interpersonal Relations* links with Opportunity.

*Prior research and evaluation findings*. Most interventions have been tried before and so some research or evaluation findings are likely to be available. These too may identify needed causal link assumptions.

*Comparing with current reality*. Somewhat like setting out the current and future capacity and behaviour changes expected, one can compare the assumptions identified with current reality. This again identifies constraints to change and what may be needed if the assumptions are to be realized and the intervention ends in success.

**Building credible causal narratives**. Credible causal narratives around each causal link in the ToC is another way to strengthen the ToC. These are the arguments setting out how the causal links in the ToC are expected to work. They explain how and why a cause is causally linked to the subsequent result (the effect). There are a very useful addition to the TC description.

**Actor-based ToCs**. Once the main story line is sorted out, then one can explore the ToCs for the additional actors in the intervention—delivery agents and intermediaries. Typically, the role of other actors is to address what would otherwise be at-risk assumptions and take the actions most likely to ensure these causal link assumptions are realized.

These *actor-based ToCs* then are nested ToCs within the overall ToC. [Koleros and Mayne (2019](#_ENREF_9)) discuss using actor-based ToCs. Generally speaking, these actors are expected to undertake some action they previously were not taking to help bring about the changes needed; that is, the actors change their behaviour. Once again, the COM-B model will be helpful.

**Writing out a text ToC.** At some point a text version of a ToC is usually needed to explain the ‘ToC story’. I have found that writing out that text version of how each causal link is expected to work can itself be a very useful tool for detecting weaknesses in a ToC. That is, discussing in text each of the steps, namely: Getting to Outputs, Getting from Outputs to Reach, Getting from Reach to Capacity Change, Getting from Capacity Change to Behaviour Change, getting from behaviour Change to Direct benefits and then from Direct benefits to Improved Wellbeing. Writing up these ToC explanations to others, step-by-step, often reveals missing assumptions or logical inconsistencies.

**Issues/Concerns/Considerations in Developing Useful ToCs**

**Agreeing the need for an evaluable ToC.** Evaluators are often presented with a ToC developed by the intervention designers or the implementers who feel considerable ownership for their ToC. The ToC may indeed have served some useful purposes during the build up to and the design of the intervention, however, often it is not an adequate ToC for evaluation purposes. It can be a challenge then to convince these same people -- who are likely the ones funding the evaluation -- that there is need for more work to develop an evaluable ToC. [Koleros and Mayne (2019](#_ENREF_9)) discuss an evaluation where this was a problem and how it was resolved.

**Using nested ToCs to unpack complexity.** Actor-based ToCs are one form of nested ToCs. Nested ToCs usually consist of different but concurrent pathways to impact, and likely ‘come together’ at some point along the causal chain of events. By design they are relatively straightforward pathways and while meant to contribute to the overall goals of the intervention, will typically have a more immediate interim aim. Identifying these proximate aims is a good way to start to build the nested ToCs.

In complex interventions (which are more the norm these days) there is a need to unpack the complexity in some meaningful way. An Overview ToC can be the guide to do this, with each of the pathways to impact that have been identified being set out as separate nested Causal ToCs, separately indicating how each is interlinked.

There is a choice to be made in setting out a nested ToC in terms of the level of detail pictured. One doesn’t want a spaghetti-type ToC that is really only useful for the person who built it: you want a ToC that tells a good causal story in a readily-understood way. Sub-or **Nested ToCs** within a larger ToC is a good way to capture what is needed while still making the ToC (or the several ToCs) meaningful. ToCs with nested ToCs is a good way to depict ToCs for complex interventions and unpack the complexity.

**Simplifying ToC models.** For any ToC there is a choice to be made about how much detail to include, especially along the pathway. Indeed, the amount of detail in a ToC depends on the purpose for which it will be used. Keeping the pathway story line as close to Figure 2 as possible, preserves the story line. Thus, for example, Figure 3 is the same generic ToC as Figure 2, but with the pathway simplified. However, no essential information is lost, and story line is basically maintained. The Reach and Capacity aspects dropped have been folded into the Behaviour Change assumptions.

However, to get to a more simplified ToC, I have found it necessary to first develop the more detailed ToC. That is, it is quite difficult to develop a good streamlined/simplified ToC without first developing the more complete model. Furthermore, if it turns out when verifying the ToC that expected changes did not occur, then one can go back to the more detailed ToC to explore what might have happened to inhibit or hamper the anticipated results.

Behaviour changes

Outputs/

Activities

***External Influences***

Direct

Benefits

*Direct Benefits Assumptions*

*Behaviour Change Assumptions*

* Assumptions about reaching target groups
* Assumptions about bringing about capacity change
* The actual behaviour change assumptions

Wellbeing changes

*Wellbeing Change Assumptions*

**Figure 3 A Simplified Generic Theory of Change**

Time line

**Supporting Activities**

(to help bring about the assumptions, including the enabling environment)

**Project-based interventions.** For interventions that comprise a large number of individual projects, developing useful ToCs can be especially challenging. However, frequently the projects can be grouped into a reasonable number of types of projects, with each group representing a particular pathway to impact. The groupings might be based on such things as different target groups, different mechanisms used to achieve impact, or possibly even different geographical areas. However, there needs to be a reasonable degree of similarity of projects within a group so that a generic ToC for the group can be developed.

**Concluding remarks**

Theories of change are increasingly being relied upon as an essential element in modelling interventions and for undertaking evaluations. There is a reason for this. A ToC can be an extremely useful tool for facilitating the design, implementation and evaluation of an intervention. But it is not something that can be developed on the back of an envelope. It requires serious analytical thinking about an intervention, considered and unhurried discussion among stakeholders, the appropriate resources and, of course, adequate time.

Increasingly today, interventions are complex with multiple components. Building a single ToC for such interventions is not practical nor, indeed, useful. Rather, the complexity of the intervention and its setting needs to be unpacked, and individual ToCs for the different pathways for the intervention need to be developed. An Overview ToC can then show how these nested ToCs fit together and contribute to the desired impacts.

Interventions aim at changing the behaviour and practices of beneficiaries and other intermediaries. Therefore, theories of change should make use of the extensive research that has been undertaken regarding how to bring about such behaviour change. The COM-B model discussed here has proven itself to be a practical, intuitive and credible basis for useful theories of change where behaviour change is involved. The COM-B model can often be the basis for the nested ToCs that make up a complex intervention.

A ToC is not just boxes and arrows built around a collection of beliefs. A weak ToC will not prove useful in trying to understand and confirm what is going on. If the steps outlined above in developing a ToC are followed, then a reasonably *robust ToC* can emerge. However, if at all possible it would be very useful to undertake a structured *Theory of Change Analysis* where each element of the ToC is assessed against a set of criteria. A recent article of mine on robust ToCs discusses this type of analysis ([Mayne, 2017a](#_ENREF_13)). An earlier discussion of many of the ideas is also available [Mayne (2017b](#_ENREF_14)).

When possible it is useful to view the development of a useful ToC for any given intervention as evolving over time, with the ToC being revised as knowledge and understanding about the intervention and its context improves. This is not to suggest that ToCs need to aim for perfection. A ‘good enough’ ToC that is fit to purpose is a better aim.

Robust theories of change should be used to help in the design, implementation and evaluation of interventions.

**References**

Byrne, D. (2013). "Evaluating complex social interventions in a complex world." *Evaluation* 19(3): 217-228.

Copestake, J. (2014). "Credible impact evaluation in complex contexts: Confirmatory and exploratory approaches." *Evaluation* 20(4): 412-427.

Coryn, C. L. S., L. A. Noakes, C. D. Westine and D. C. Schroter (2011). "A Systematic Review of Theory-Driven Evaluation Practice From 1990 to 2009." *American Journal of Evaluation* 32(2): 199-226.

Donaldson, S. I. (2007). *Program Theory-Driven Evaluation Science: Strategies and application*. Mahwah, NJ, Lawrence Erlbaum. Available at https://<http://www.researchgate.net/publication/235930890_Program_theory-driven_evaluation_science_Strategies_and_applications>

Funnell, S. and P. Rogers (2011). *Purposeful Program Theory: Effective Use of Theories of Change and Logic Models*. San Francisco, Jossey-Bass.

Garcia, J. R. and A. Zazueta (2015). "Going Beyond Mixed Methods to Mixed Approaches: A Systems Perspective for Asking the Right Questions." *IDS Bulletin* 46(1): 30-43. Available at <http://onlinelibrary.wiley.com/store/10.1111/1759-5436.12119/asset/idsb12119.pdf;jsessionid=D79CC0AFAA80A1BD7404A7C36E4B2C5B.f01t04?v=1&t=i4ni5drk&s=2c41cf187da6c48620ed985610c052f1d9ea66d0>

Gerrits, L. and S. Verweij (2015). "Taking stock of complexity in evaluation: A discussion of three recent publications." *Evaluation* 21(4): 481-491.

James, C. (2011). *Theory of Change Review. A report commissioned by Comic Relief*: Comic Relief. Available at <http://mande.co.uk/blog/wp-content/uploads/2012/03/2012-Comic-Relief-Theory-of-Change-Review-FINAL.pdf>.

Koleros, A. and J. Mayne (2019). "Using Actor-Based Theories Of Change to Conduct Robust Contribution Analysis in Complex Settings." *Canadian Journal of Program Evaluation* 33(3): 292-315. Available at https://journalhosting.ucalgary.ca/index.php/cjpe/article/view/52946/pdf

Mayne, J. (2011). Contribution Analysis: Addressing Cause and Effect. In *Evaluating the Complex*. R. Schwartz, K. Forss and M. Marra, Eds. New Brunswick, NJ, Transaction Publishers**:** 53-96.

Mayne, J. (2012). "Contribution Analysis: Coming of Age?" *Evaluation* 18(3): 270-280.

Mayne, J. (2015). "Useful Theory of Change Models." *Canadian Journal of Program Evaluation* 30(2): 119-142. Available at https://evaluationcanada.ca/system/files/cjpe-entries/30-2-119\_0.pdf

Mayne, J. (2017a). "Theory of Change Analysis: Building Robust Theories of Change." *Canadian Journal of Program Evaluation* 32(2): 155-173. Available at https://evaluationcanada.ca/system/files/cjpe-entries/32-2-155.pdf

Mayne, J. (2017b). *Theory of Change Analysis: Working with Robust Theories of Change*. Available at https://<http://www.researchgate.net/publication/312286099_Theory_of_Change_Analysis_Working_with_Robust_Theories_of_Change>.

Mayne, J. (2018). *The COM-B Theory of Change Model*. Available at https://<http://www.researchgate.net/publication/323868561_The_COMB_ToC_Model4>.

Mayne, J. (forthcoming). Realistic Commissioning of Impact Evaluations: Getting What You Ask For? In *Evaluation and the Pursuit of Impact*. A. Paulson and M. Palenberg, Eds, Taylor and Francis.

Mayne, J. and N. Johnson (2015). "Using Theories of Change in the Agriculture for Nutrition and Health CGIAR Research Program." *Evaluation* 21(4): 407-428.

Michie, S., M. M. v. Stralen and R. West (2011). "The behaviour change wheel: A new method for characterising and designing behaviour change interventions." *Implementation Science* 6(42): 11 pages. Available at <http://www.implementationscience.com/content/pdf/1748-5908-6-42.pdf>

Montague, S. and N. Porteous (2013). "The case for including reach as a key element of program theory." *Evaluation and Program Planning* 36: 177-183.

Pawson, R. and N. Tilley (2004). *Realist Evaluation*. Available at <http://www.communitymatters.com.au/RE_chapter.pdf>.

Ramalingam, B. (2013). *Aid on the Edge of Chaos: Rethinking International Cooperation in a Complex World*. Oxford University press.

Ramalingam, B. and H. Jones (2008). *Exploring the science of complexity: Ideas and implications for development and humanitarian efforts*, Working Paper 285: ODI.

Rogers, P. (2007). "Theory-based Evaluations: Reflections Ten Years On." *New Directions for Evaluation* 114: 63-67.

Silva, M. J. D., E. Breuer, L. Lee, L. Asher, N. Chowdhary, C. Lund and V. Patel (2014). "Theory of Change: a theory-driven approach to enhance the Medical Research Council's framework for complex interventions." *Trials* 15(1): 267. Available at <http://www.trialsjournal.com/content/15/1/267>

Stein, D. and C. Valters (2012). *Understanding 'Theory of Change' in International Development: A review of Existing Knowledge*: The Asian Institute and the Justice and Security Research Programme. Available at <http://www.theoryofchange.org/wp-content/uploads/toco_library/pdf/UNDERSTANDINGTHEORYOFChangeSteinValtersPN.pdf>.

Vogel, I. (2012). *Review of the use of ‘Theory of Change’ in international development*: Department for International Development (DFID). Available at <http://www.oxfamblogs.org/fp2p/wp-content/uploads/DFID-ToC-Review_VogelV4.pdf>.

1. I am using deterministic language here. One can also think probabilistically, and define these assumptions as *likely necessary* events and conditions. [↑](#footnote-ref-1)
2. This would only be the case if the intervention had had no influence at all on the observed results. [↑](#footnote-ref-2)
3. Thanks to Steve Montague for alerting me to Pawson’s 4Is. Steve has used this structure in helping to build ToCs. [↑](#footnote-ref-3)