

quantqual.net

OLCA 101: a primer

OLCA: Outcome Likelihood and Causal Analysis

October 2020

By Stuart Astill and Simon Henderson

OLCA 101: a primer



OLCA estimates the likelihoods of outcomes

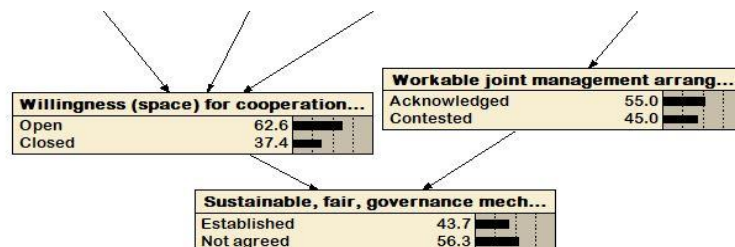
Maps of causality, beliefs about influence and success feed advanced quantitative methods

Analysing strategy based on a better understanding about causality

OLCA combines structured mapping with expert beliefs about the causal relationships underpinning a programme strategy. Innovative quantitative approaches and software compile this evidence – using the Bayes algorithm – to provide insight.

This insight can then be stress-tested in an easy to understand visual format and ‘what if’ and ‘why’ questions can be interrogated live in the interface.

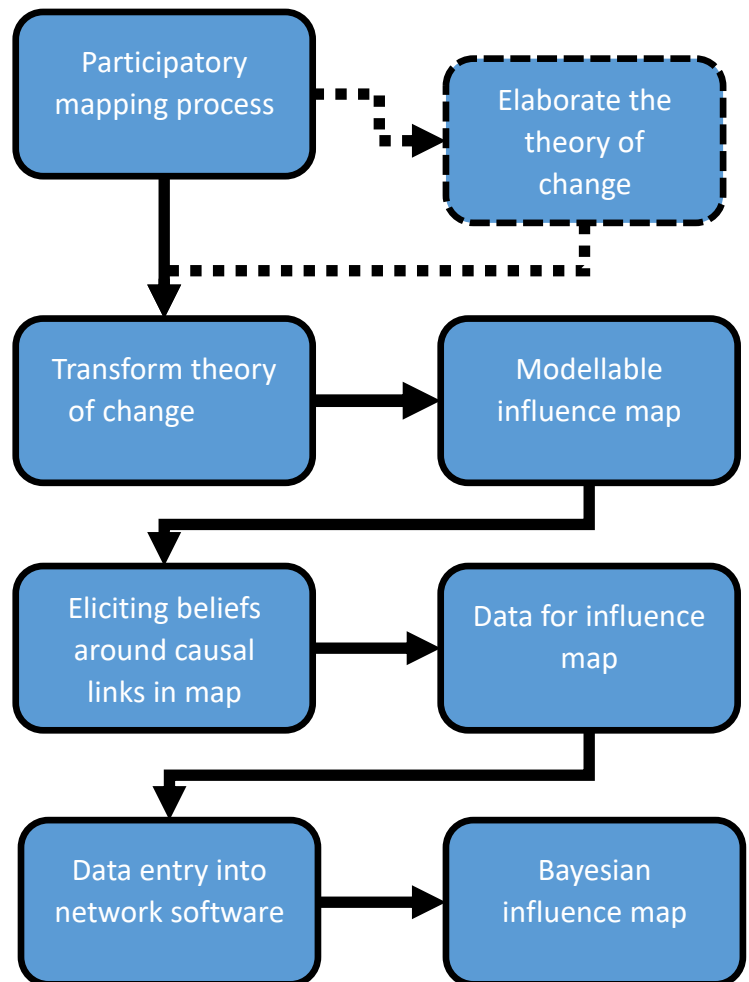
- What’s the likelihood that the activity will have the planned effects?
- If an activity does (or doesn’t) succeed, how does that affect prospects of other critical steps on the way to the final outcome?
- What are the chances for overall success – achieving the ‘last step’ – and how are changes in the operating environment affecting them?



In complex contexts, OLCA is an interactive tool for managers to test the sensitivity of their strategy to key assumptions.

The OLCA recipe card

OLCA follows a simple set of steps to create an interactive tool that provides insights about strategy



Starting out with OLCA

OLCA can make a breakthrough contribution to strategic management

OLCA creates a robust causal model of how change is believed to happen

How is OLCA innovative?

OLCA relies on well-established components but it is innovative in how it combines and applies these. Participatory mapping has been around for some time, as a rigorous method to help better understand people's beliefs about causal systems. Similarly, Bayesian nets aren't new. They have been used and proven in diverse fields such as medicine, IT or natural resources management, for diagnosis of problems and prediction of likely outcomes.

OLCA's innovation is in combining best practice elicitation, analytical practice and communication from these two approaches and systematically applying the whole to the assessment of complex social programmes, systems and organisations.

Where do we begin?

Developing (or refining) the logical causal mechanisms (sometimes called a Theory of Change).

This is a crisp structured description of relevant aspects of the real world and what *you* are doing, or plan to do, to achieve your desired strategic outcomes. It is about the whole 'system' and things apart from your actions are very much in scope. But always the key focus is on how your activity interacts with this system.

OLCA uses participatory processes as the starting point. Then, taking the initial mapping a step further, OLCA creates your causal model in a graphical and interactive form that you can re-examine, kick around and prod to see if it makes sense.

People we work with find this a valuable and enlightening step in its own right: a structured reflection about cause and effect, the chain of consequences - and where their actions touch the real world and what that implies.

Mapping for analysis

The design and content of OLCA's map needs to be technically fit-for-purpose.

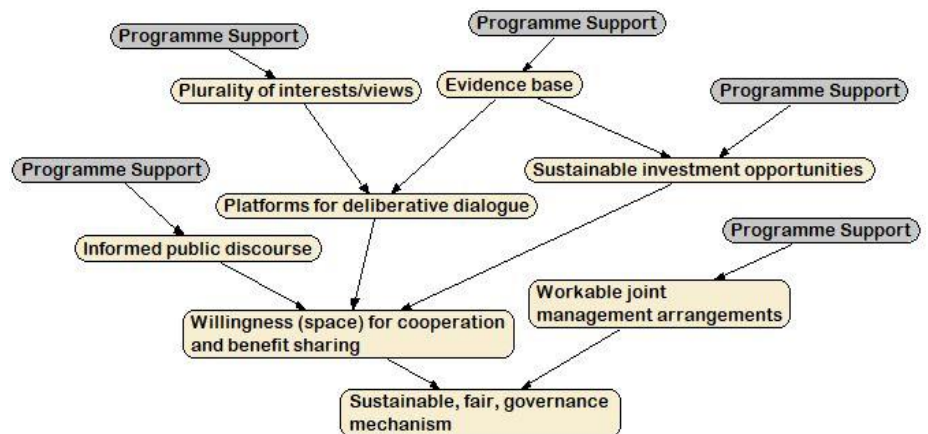
Names and nodes must be framed appropriately for the elicitation phase to be meaningful and robust

Prepping your map for the model

OLCA unpacks and analyses underlying beliefs about causal influences and assumptions, using probabilistic algorithms and data to leverage incomplete knowledge (uncertainty).

While the causal structure obtained from the previous stage is comprehensive, it needs to be transformed into a modellable 'map'. The map retains the relevant causal linkages and allows the likelihood evidence and significance of the different elements to be incorporated. This is where experience and understanding of the method comes in. In particular, to make sure the next stage (elicitation) works well, names of the nodes (bubbles on the map) and their potential outcomes (their 'states') must be framed appropriately to enable probabilities to be attached.

And when we have created the initial model-map we test



this with experts (very likely you!) to make sure it still reflects their view of the reality on the ground.

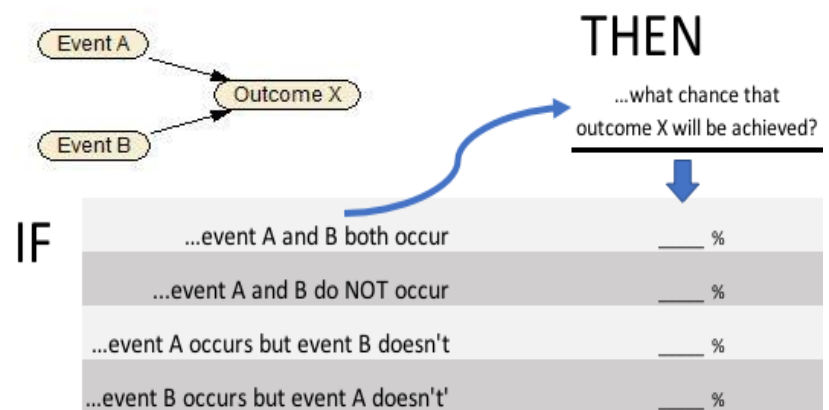
Eliciting probabilities

OLCA creates a robust causal model of how change is believed to happen

Breaking it down

A great strength of the OLCA approach is that it creates a replicable result using objective analysis and compilation of subjective views, even from experts who have a close relationship to - or a hand in - the activities that are being examined. This is possible, in part, because in the elicitation step we atomise the map and ask directed specific questions about each stage. Then, only at the end are these responses compiled to create the analytical conclusion.

These sessions are ideally face-to-face but can be remote or even a guided step-by-step 'offline' process.



This process means that it is virtually impossible for experts to tailor their individual responses to create the overall answer they would prefer to see.

As the
method steps
through to
produce the
concrete
result it also
helps to
develop a rich
qualitative
view

Feedback on the elicitation sessions tell us that stakeholders build knowledge and create new insights from the guided reflection on the strength of causal relationships. The result of this elicitation stage is a set of conditional probabilities which assess, for each given scenario, what the probability is that the next step will be achieved.

An important point to note here: while elicitation focuses on the causal relations within the model, these are conditioned by many other factors not explicitly referenced. As experts work through and explain their judgements, we obtain valuable insights into key factors in the broader system. This helps develop a rich qualitative understanding that surrounds and contextualises the model and its results.

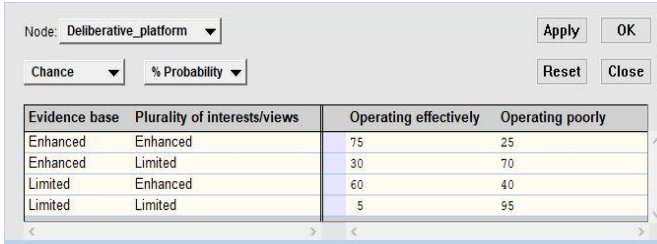
Model and algorithm

Building a visual model

The initial model in the software shows straight away the experts' views and the outcome likelihood

The dedicated software we use for OLCA is not only smart but good-looking.

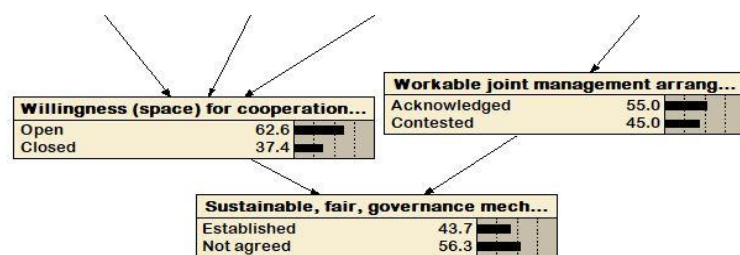
Using the refined map structure, appropriately framed, we enter the elicited experts' probabilities.



Evidence base	Plurality of interests/views	Operating effectively	Operating poorly
Enhanced	Enhanced	75	25
Enhanced	Limited	30	70
Limited	Enhanced	60	40
Limited	Limited	5	95

Generally, we will have reviewed these elicited probabilities, spotted anomalies and revisited with the experts. Discussions are recorded so that if questions arise or views change in the future we can revisit the underlying reasoning and evidence.

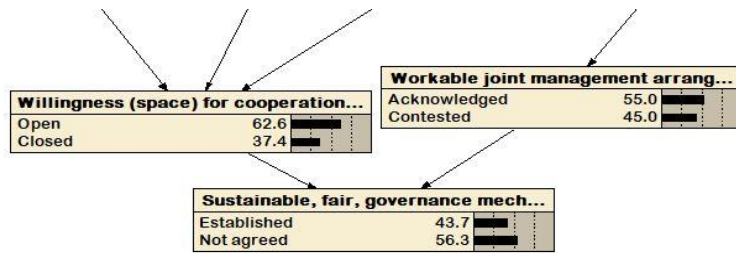
With the model complete we can then produce an 'as is' view of the whole system – external context and the planned strategy – that leads to the estimated likelihood of overall success.



This first cut of the model can be examined to see what is most influential in the process and whether the effect of the planned activities on overall chances of success is worthwhile.

Bayesian Belief Networks: the background

A Bayesian belief network (BBN) can be seen essentially as a graphical model of causal interactions among a set of variables, represented as a network of nodes that are linked by probabilities.



A BBN is an acyclic graph, that is, a network with no feedback loops, where the "predictor" nodes are direct or indirect causal factors of the outcome variable(s).

The nodes represent factors that affect outcome(s) of interest and the links represent how the factors interact.

A BBN has a **qualitative** and **quantitative** element.

The qualitative element relates to its structure, which involves mapping the factors considered relevant to the outcome(s) of interest and the dependencies or links between them, (including the order or direction of causality. This may be equivalent to the theory-of-change.

The quantitative element is the inclusion of probabilities that quantify the relationships between the factors.

Probabilities need only be specified for factors that are linked (i.e. direct relationship). This makes a BBN efficient in terms of the data required to populate the network and a very powerful reasoning tool for evaluation purposes.

Probabilities that quantify the relationship between a factor and its indirect causes or effects are computed automatically by inference algorithms.

Node: Deliberative_platform

Chance % Probability

Evidence base	Plurality of interests/views	Operating effectively	Operating poorly
Enhanced	Enhanced	75	25
Enhanced	Limited	30	70
Limited	Enhanced	60	40
Limited	Limited	5	95

Depending on the context, probabilities may be derived from observed ('objective') data about the relationship between factors. More commonly, they are subjective probabilities reflecting the beliefs of key informants. A BBN can, however, accommodate both objective and subjective data.

Exploring with OLCA

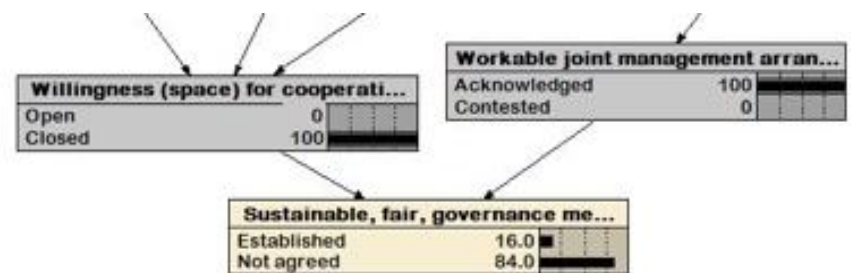
OLCA
augments
existing
adaptive
management
practices

It capturing
beliefs about
the strength
of influence
and levels of
uncertainty,

Understand changing prospects and
communicate your knowledge

Once that initial model has been understood there is scope to explore further 'what if' and 'what does' questions by varying the scenarios examined within the basic model.

Changes frequently occur in the external environment and these can impact the prospects of success. OLCA helps clarify exactly what difference the changes make and why, providing insights for corrective or mitigating action focused on areas likely to have most effect. The results can be tracked over time, helping managers engage stakeholders and communicate performance clearly.



As an interactive tool, OLCA enables managers to test the sensitivity of their strategy to key assumptions.

- is the programme effort focused where it can achieve the greatest traction?
- What are the implications of if support is ineffective at different points of intervention?

Navigating with OLCA

OLCA's key advantage is the ability to incorporate **in-flight learning** in rigorous, informative ways.

Updating beliefs with new evidence and learning

Managers can update the model as they learn and their knowledge becomes more complete. As a result, conclusions become more solid. During implementation, strategic implications of new information can be explored, along with their predicted effect on the prospects for success.

In-flight updating can take different forms:

- Confirming the (previously unknown) status of key events/factors with new evidence
- Revising previous beliefs about the strength of causal influence to reflect learning from experience
- Redesigning the model entirely to reflect a major shift in strategy.

In all three instances, the updating process takes a structured approach to treatment of new information and fosters reflection and learning. In all three, OLCA facilitates assessment of the implications for strategy.

An indicator to track and communicate improving prospects over time

OLCA also provides revised estimates of the likelihood of success over time. With this, managers have an indicator that they can track over time to highlight evolving prospects and engage stakeholders.

