

Use of scenario planning as a theory-driven evaluation tool

James Derbyshire*

Abstract

Theory-driven evaluation (TDE) is an approach for prescribing an evaluation's purposes, users and uses, general activities, strategies and methods in the form of a 'program theory'. While widely-used, the literature highlights a number of common deficiencies in TDEs, among which is the tendency for underdeveloped program theories because of a lack of specificity on the theory-creation process, and because the emergent nature of change renders it difficult to identify relevant theory a priori, leading to uncertainty. Theoretical underdevelopment may reduce the effectiveness of change initiatives and make their evaluation problematic due to a lack of clarity regarding what the program was originally expected to achieve, and how. The paper addresses this issue by showing that scenario planning can assist TDE by 1) making explicit initial causal logic and theory 2) facilitating useful debate and discussion among multiple stakeholders 3) facilitating consideration of how contingent and complex causation may lead to unexpected outcomes, allowing for consideration of adaptations that may be needed as a program unfolds. The paper shows that scenario planning is highly congruent with a complex-realist understanding of evaluation that emphasises causal indeterminism. In sum, we show how scenario planning can be used as a theory-driven evaluation tool.

Keywords: scenario planning; theory-driven evaluation; uncertainty; theory of change; Intuitive Logics

*Middlesex University, Email: J.Derbyshire@mdx.ac.uk

1 Introduction

Theory-driven evaluation (TDE) is widely employed by governments and NGOs in fields as varied as agriculture, health, climate change, youth offending and international aid, among many others (Bours et al., 2014; Davies, 2002; Mayne and Johnson, 2015; Sullivan et al., 2002). Its popularity can be attributed to a number of factors, including its resonance with the view that experimental methods for the evaluation of complex social-change initiatives are of limited value (Mason and Barnes, 2007). TDE is therefore commonly employed as an alternative

to randomised experiments (Coryn et al., 2011) and, as such, provides an alternative, ‘realist’ philosophical foundation for evaluation that contrasts with the positivism of experimental methods (Pawson and Tilley, 1997). Yet, at the same time, TDE recognises the value of evidence for learning ‘what works’ in particular contexts. This makes it useful to policymakers who must attempt to learn and improve based on past initiatives and the lessons drawn from them.

TDE is referred to using many alternative names, including program-theory evaluation, theory-based evaluation, theory-guided evaluation, theory of action, theory of change, program logic, logical frameworks, outcomes hierarchies and realist or realistic evaluation (Coryn et al., 2011; Mark et al., 1998; Pawson and Tilley, 1997). While these many different names reflect nuances in terms of interpretation, emphasis (on different aspects of TDE), and practice, what is common across approaches is the use of ‘program theories’ to specify relationships between actions, outcomes and other factors (Coryn et al., 2011; Chen, 1990). Where experimental approaches attribute by isolating variables, TDE approaches deal with attribution by making the change program stakeholder-led. This overcomes the ‘attribution dilemma’ by linking outcomes explicitly to stakeholder actions as specified in the intervention’s program theory (Sullivan and Stewart, 2006, p.180).

However, in a review of evaluations employing the Theory of Change (ToC) variant of TDE, Sullivan and Stewart (2006) show that, in reality, stakeholder-leadership is hard to achieve. Associated with this difficulty, Mason and Barnes (2007) have shown TDE evaluations often to be hampered by ‘underdeveloped’ program theories. This renders evaluation highly problematic since it is unclear what the program was expected to achieve in the first place, or how it was expected to achieve it. Moreover, while accurate evaluation might require theoretical clarity from the outset, in a complex social world the detail of relevant program theory, and how it can be implemented to bring about change, is often emergent, only becoming clear as a change program unfolds (Byrne, 2013). This emergence places importance on adaptability, over time, of program theories - an adaptability which may run counter to the a priori clarity of program theory required to ease evaluation, since theories of change must inevitably be refined, or could even be subject to wholesale change, as a program proceeds.

In this vein, Coryn et al. (2011, p.202) note a recent turn towards systems thinking in TDE, representing a move away from simplistic and deterministic program theories, towards more contextualized, comprehensive and ‘ecological’ models. This ‘systems thinking’ perspective is highly congruent with the complex-realist approach to evaluation advocated by Byrne (2013), drawing on Barnes et al. (2003), Callaghan (2008), Pawson and Tilley (1997), Reed and Harvey (1992) and Sanderson (2000). This complex-realist perspective emphasises contingent

causation and indeterminism, placing a premium on adaptability, and recognising that there are multiple possible outcomes from a change initiative, thereby emphasising a key distinction between TDE and experimental evaluation approaches that, in their simplest form, imply ‘If you do A, then B will result’ (Dahler-Larsen, 2001, p.331; Prior and Mason, 2010, p.220-221). A central problem with experimental evaluation approaches is that an initiative’s implementation process is viewed as something separate from the change program itself, and is therefore viewed as a ‘neutral and controllable means of getting from A to B’ (Prior and Mason, 2010, p.221). What is instead needed from a realist perspective is a ‘theory of technique’ which accounts for contextual implementation factors in the production of outcomes (Smith, 2006, p.85; Prior and Mason, 2010). This would treat implementation factors not simply as controllable variables, as in positivist experimental approaches, but as dynamic, contextually embedded, constructed on an ongoing basis, and therefore liable to change.

This paper addresses this need by showing that the tool for dealing with uncertainty commonly known as ‘scenario planning’ (Schwarz, 1991; Wack, 1985) can provide a well-structured, stakeholder-led process to assist TDE evaluations. It can assist, in particular, in the formative stages of TDE by making a program’s underlying theory explicit, and also by allowing consideration of a program’s adaptability over time as it is implemented. In so doing, scenario planning can ease evaluation, but not at the expense of determinism as in experimental approaches. Specifically, scenario planning can assist TDE programs by: 1) making formative program theory explicit 2) acting as an ongoing ‘sense check’ for the logical soundness of program theories, both as initially set out and as they may be adapted over time 3) facilitating debate and discussion among multiple stakeholders 4) facilitating consideration of how contingent and complex causation may lead to unexpected outcomes, allowing for consideration of adaptations that may be needed as a program unfolds.

The plan for the paper is as follows. In the next section we provide a brief introduction to TDE, discuss its deficiencies as highlighted in the literature, and outline the complex-realist perspective on evaluation. In the subsequent section we then discuss common approaches to scenario planning, describing the many ways scenario planning can assist in overcoming the outlined deficiencies in TDE, and providing a detailed discussion that shows scenario planning to be congruent with a ‘complex-realist’ perspective on evaluation (Byrne, 2013). We conclude by emphasising the important role scenario planning can play as a theory-driven evaluation tool.

2 Theory-driven evaluation: An introduction and critique

2.1 The origins and increasing popularity of theory-driven evaluation

Coryn et al. (2011) provide a useful overview of TDE and its development over time, showing its origins to be traceable to the 1930s, to Tyler's work on formulating and testing program theories. After a period in hiatus, it reappeared in varying guises in the 1960s, 1970s and 1980s but did not become a specific field of study until the publication of Chen's seminal book 'Theory-Driven Evaluations' in 1990 (Chen, 1990). TDE, in the form of one-or-other of its many variants, has since then been very widely adopted in fields as diverse as health, regional economic development, climate change, crime, disease control and international development, to name but a few. Among the most prominent organisations to have employed it are the Overseas Development Institute, the United Nations, and the World Bank. TDE has become a 'standard' approach to evaluation - one which is perhaps only matched in terms of frequency of use by experimental approaches based on a Randomised Control Trial (RCT), to which many of its proponents view TDE as a more realistic alternative.

As such, government interventions worth billions are commonly formed and evaluated using TDE. For example, a large-scale intervention for which TDE is currently being used is that to evaluate the European Regional Development Fund (ERDF), which over the intervention period 2014-2020 amounts to some €352bn of EU expenditure. The central role of TDE in setting up - i.e. forming the logic of - the intervention 'ex ante', as-well-as its role in 'ex post' evaluation and impact assessment at the end of the program's period, is captured in the European Commission's guidance on evaluation of the ERDF (European Commission, 2014), which states: 'The ex ante evaluation of programmes can be understood also as a theory-based analysis, assessing the strength of the theory of change and the logical framework before the programme is implemented' (European Commission, 2014, p.7).

2.2 Theory-driven evaluation: An illustration using the example of Theory of Change

Fig. 1 provides a simple summary of a program theory model taken from Coryn et al. (2011, p.201); see Coryn et al. (2011, p.202) for a diagrammatic example of a more sophisticated summary of a non-linear program-theory model. As evident in Fig. 1, a concept central to TDE, including the ToC variant used for illustration herein, is that of 'program theory'. A program theory specifies the relationship between actions, outcomes, and other factors (Coryn et al., 2011). As in Fig. 1, the elements used to describe a program theory commonly comprise inputs, activities and outputs, which together form a change program's process, followed by expected initial and intermediate outcomes, and long-term outcomes representing its expected impact (Coryn et al., 2011, p.201; Donaldson and Lipsey, 2006; Donaldson, 2007). Inputs represent the types of resource needed to implement the

program, activities represent the actions needed to bring about desired outcomes, and outcomes are the anticipated changes that result from inputs, activities and outputs.

INSERT FIG. 1 ABOUT HERE

Because there are numerous variants of TDE, the approach adopted varies between interventions. There can also be variation *within* particular approaches, which can be implemented in a number of different ways, and tweaked to suit particular circumstances and contexts. There is, then, no standard way ‘to do’ TDE, but a wide variety of practical approaches that exhibit the basic commonalities illustrated in Fig. 1, and which can be mixed-and-matched as deemed appropriate. As with scenario planning’s similar eclecticism (Spaniol and Rowland, 2018), because it allows adaptation to numerous different contexts, this should be viewed as a strength rather than a weakness of TDE.

Drawing on explanations and examples provided by the Centre for Theory of Change (Centre for Theory of Change, 2018a), the steps commonly undertaken as part of the ToC variant of TDE are set out below. In so doing, the crossover with scenario planning should start to become obvious for readers familiar with the latter; this crossover is made explicit in subsequent sections of this paper. ToC is commonly implemented using a six-stage process that can be described as follows (Centre for Theory of Change, 2018a):

Stage 1: Identifying long-term goals

In this initial stage, participants discuss, make specific, and agree on the long-term outcome(s) of the change initiative. They then start to create a map, which is essentially a logic diagram, which illustrates in a simple way an initial change framework, or chain of causation, showing the ‘pre-conditions’ needed to bring about the agreed long-term outcome(s).

Stage 2: Backwards mapping and connecting outcomes

This represents a more detailed stage of the mapping process in which the initial change framework, or ‘program theory’, is fleshed out by mapping backwards to produce a full ‘story’, representing the logic by which the change outcome(s) is realised. This may require creation of a highly-detailed diagram because stakeholders seek to identify what they perceive to be the root causes of the problem they hope to resolve; in simpler instances however, the map will illustrate just three-or-four ‘levels of change’, which display a reasonably simple set of early-and-intermediate steps toward the identified long-term goal. This second stage is therefore that in which participants

are required to make fully-explicit, and to agree upon, the underlying logic of the change initiative, in the form of a diagram.

Stage 3: Completing the outcomes framework

The 'pre-conditions', or causal steps, leading to the desired change outcome, are fully fleshed out working backwards all the way to initial conditions, representing the present situation which it is desired to change. This use of backwards logic is something we return to as a specific example in which scenario planning can assist TDE.

Stage 4: Identifying assumptions

This stage sets out the underlying assumptions on which the logic of the intervention is based. It makes explicit why participants believe the change framework can work (i.e. the reasons why they think the identified causes can combine in the way outlined to resolve the identified problem, leading to the desired long-term goal).

Stage 5: Developing indicators

This stage focuses on how to measure the implementation and effectiveness of the initiative. By collecting data on each outcome for a set of identified indicators, the initiative can specify what is or isn't happening sufficiently at any time, allowing for real-time assessment of progress towards long-term goals. In this way, details are added to the change framework to allow for accurate evaluation of the progress towards, and realisation of, change. This can be done by asking questions such as: Who is supposed to be changing? What size of change is good enough to have the desired effect? By when does it need to happen? etc. etc.

Stage 6: Identifying interventions:

After laying out the near complete change framework, the focus now shifts to the role of interventions (those things that the program (or initiative) must do to bring about outcomes). Some of the arrows included in the change framework diagram have solid lines while others are dashed. The solid lines represent connections that will occur without the need for intervention, since as long as the prior preconditions are met, these outcomes will be met automatically. Whereas outcomes requiring interventions, which are essentially the change initiative's program activities, are represented by arrows with dashed lines.

The above six-stage process is that used by Centre for Theory of Change (2018a); other evaluation practitioners and theoreticians will emphasise different aspects of this process, will have fewer or a larger number of stages,

and may include additional methods and concerns not covered herein. Nevertheless, the six-outlined stages represent a useful basic outline of a TDE process in its ToC variant. Fig. 2 illustrates a completed change framework, or program theory, for an actual ToC initiative related to improving the employment prospects for women who have suffered domestic abuse (Centre for Theory of Change, 2018b). Centre for Theory of Change (2018b) outlines the above-described process in greater detail. Relating Fig. 2 to the simple outline of a TDE in Fig. 1, the top three rows of boxes in Fig. 2 represent ‘initial outcomes’, ‘intermediate outcomes’ and, ultimately, the ‘long-term outcome’ for this intervention. The prior rows of boxes, to the bottom of Fig. 2, represent ‘Inputs/Activities/Outputs’ to be undertaken as part of the process of implementation. To provide an initial indication of the crossover with scenario planning, Fig. 3 illustrates an ‘influence’ or ‘logic’ diagram from an actual scenario-planning exercise to consider the future of a rundown part of the city of Glasgow, taken from Derbyshire and Wright (2017). Note, in particular, that the above-described ToC process, in stage 3, requires a description of initial conditions, and the scenario process outlined by Derbyshire and Wright (2017) provides exactly this, as illustrated to the left-hand side of Fig. 3.

INSERT FIG. 2 ABOUT HERE

INSERT FIG. 3 ABOUT HERE

2.3 Criticisms and deficiencies of theory-driven evaluation

As noted by Weiss (1997a), the idea of theory-driven evaluation, as typically manifest in the above-described elements, is a compelling one. The use of program theories to evaluate is ‘plausible and cogent, and it promises to bring greater explanatory power to evaluation’ (Weiss, 1997a, p.501). Yet, as Coryn et al. (2011, p.200) note more recently, Weiss (1997a, p.501) also goes on to comment that, despite this promise, ‘problems beset its use’. Coryn et al. (2011) imply that this remains true today.

As noted earlier, TDE in its many variants emphasises stakeholder-leadership of theory-creation and change-evaluation (Coryn et al., 2011). This stakeholder leadership is a central factor rendering TDE an alternative to the positivist, experimental approach to evaluation, which seeks to attribute by isolating variables, leading to the identification of linear ‘If A then B’ causal relationships (Prior and Mason, 2010; Coryn et al., 2011; Byrne, 2013). TDE approaches that emphasise stakeholder-ownership of the program and its evaluation, such as Theory of Change (ToC), instead deal with attribution by making the intervention stakeholder-led. It is stakeholders who identify desired outcomes and the actions needed to achieve these outcomes, thereby allowing for the attribution

of any long-term goals achieved to these stakeholder actions (Sullivan and Stewart, 2006). Indeed, that stakeholder-ownership is designed to facilitate attribution has been made explicit in relation to ToC in particular: ToC was originated in order to be a ‘systematic and cumulative study of the links between activities, outcomes and contexts’, so as to diminish the ‘attribution dilemma’ through prior stakeholder specification of the ‘various links in an intervention’ (Sullivan and Stewart, 2006, p.179-180; Connell and Kubisch, 1998, p. 16).

However, a problem with this stakeholder-led approach to attribution is that there is often little guidance for stakeholders in terms of how to specify the ‘various links in an intervention’ at the outset. There is little specificity regarding how program theories are identified and articulated, or by whom (Mason and Barnes, 2007, p.152; Sullivan and Stewart, 2006). For example, Van Belle et al. (2010, p.2) explicitly state that in one particular domain in which TDE is often applied - health - that ‘guidance on how to apply the principles of theory-driven evaluation in the domain of health systems research is scarce’. This applies, in particular, to the initial formation of program theories in terms of the setting out, by working backwards in the way described above, of the logic by which desired changes are expected to occur. While in theory the TDE stakeholder-led approach is highly appealing then, there is a lack of specificity as to how such ownership can be achieved, how initial theories are to be constructed by stakeholders, and who the relevant stakeholders are to construct them (Sullivan and Stewart, 2006; Mason and Barnes, 2007).

As a result, program theories can be constructed in an ad hoc manner leading to a program’s ‘theoretical underdevelopment’ (Mason and Barnes, 2007). This can result in problems later on, either in terms of expected changes not transpiring because of weak underlying logic/theory, or in terms of rendering evaluation highly difficult due to insufficient initial clarity as to what the initiative was expected to achieve and how. Indeed, Chen (1990, p.41) noted some time ago that the construction of theories in TDE is often based on ‘common sense or a hunch’, reflecting the ad hoc nature that Mason and Barnes (2007) highlight in their discussion of ‘theoretical underdevelopment’.

Here we begin to see why, then, TDE’s practical application can be ‘beset by problems’, as noted by Weiss (1997a) and Coryn et al. (2011). Indeed, Stufflebeam (2001) similarly makes specific reference to the problem of ad hoc theory development in TDE in a review of evaluation practices. And on a related theme, Coryn (2005, 2007 and 2008) suggests that evaluation questions are often descriptive rather than evaluative, and are often only tangentially related to the a priori constructed program theory (Coryn et al., 2011, p.206), both of which reflect the problem of a lack of clarity in relation to a program’s initial theory.

As shown in later sections of this paper, it is exactly herein, in relation to the setting out of clear initial program theories, where the use of scenario planning can provide TDE with a substantial benefit. It can provide a well-structured, widely-tested and relatively simple procedure for constructing program theories and setting them out explicitly. However, beyond this, an important further criticism of TDE noted by Coryn et al. (2011, p.207) is the difficulty of logically identifying and testing the unintended outcomes and side-effects of change initiatives, since these are not normally considered in the formative theory-creation process. We subsequently show how scenario planning is able to assist in this regard too. Scenario planning, because of its recognition of indeterminism and uncertainty, and its emphasis on contingent causation, would have the specific benefit of allowing consideration of just such unintended outcomes and side-effects if used as part of TDE.

2.4 The turn towards complexity in Theory-driven Evaluation

Coryn et al. (2011, p.202) imply that early conceptualisations of TDE, such as that of Weiss (1997a, 1997b) and Wholey (1979), tended to use simple linear models, such as that set out for illustrative purposes in Fig.1, to describe program theories. More recently however, as exemplified in Chen (2005a, 2005b, 2005c) and Rogers (2008), there is a move towards more contextualised and holistic program theory models, which represent an attempt to integrate ‘systems thinking’ in the theory-creation process. This is a subject which Byrne (2013), Sanderson (2000), Barnes et al. (2003), Callaghan (2008) and Byrne and Callaghan (2014) have all explored, leading to a perspective on evaluation that combines insights from complexity science and realism (Pawson and Tilley, 1997), drawing on the tradition of ‘complex-realism’ developed by Reed and Harvey (1992).

The view that the social world is comprised of complex systems to now be commonplace (Byrne, 2013). A central feature of complexity emergence, which creates problems for evaluation understood in experimental terms, and in terms of the need for explicit theories of change. The provenance of complexity’s ‘emergence’ concept is usefully highlighted by Byrne (2013, p.218) by reference to Lewes (1875, p.412), who states that ‘...with [the] emergent, when, instead of adding measurable motion to measurable motion, or things of one kind to other individuals of their kind, there is a co-operation of things of unlike kinds. The emergent is unlike its components insofar as these are incommensurable and it cannot be reduced to their sum or their differences’. In other words, in the presence of emergence, systems cannot be understood by disaggregating their component parts, and examining the effect of these in isolation as in experimental evaluation approaches (Byrne, 2013).

The focus when viewing evaluation through a complex-realist lens is on understanding in terms of holistic systems comprised of parts, wholes, hierarchies and the interaction between different levels of the system - the latter

interaction, between different hierarchic levels of a focal system, being a central source of emergence (Derbyshire, 2016). This understanding implies that causality does not run in any one direction, as it is assumed to under the 'If A then B' assumption that underlies experimental evaluation approaches (Prior and Mason, 2010). Instead, 'parts have causal implications for the whole, interactions among parts have causal implications for the whole, parts have causal implications for each other, and the whole has causal implications for the parts' (Byrne, 2013, p.218). In other words, the micro and the macro levels of a system both affect and are affected by each other, and are themselves comprised of multiple levels that also interact and affect and are affected by each other, such that complex social systems are multi-layered, nested and hierarchical. It is in the context of this turn towards systems thinking and complexity in evaluation, as highlighted by Coryn et al. (2011), that scenario planning becomes particularly useful if used as part of TDE. The remainder of this paper sets out the usefulness for, and crossover with, TDE of scenario planning, highlighting how it can be used to overcome some of TDE's deficiencies, as well-as to assist the turn towards complexity in TDE, as outlined above.

3 Scenario planning as a theory-driven evaluation tool

3.1 Scenario planning: A basic outline

Scenario planning is widely-used by governments, NGOs and business organisations as a means to consider the future, development strategy, and mitigate uncertainty (Bowman, 2016, p.79). Among the most prominent of the many organisations that have contributed to its development and popularisation are RAND Corporation and Royal Dutch Shell (Bradfield et al., 2005). As noted earlier, there is a lot of similarity between the proliferation of practical approaches to TDE and a similar proliferation of scenario-planning approaches over recent years, probably reflecting both tools' emphasis on real-world practicality and adaptability to context. As with TDE, there is no single, dominant scenario-planning approach but, rather, a whole raft of approaches that tend to get mixed-and-matched as appropriate to the context in which it is implemented. Nevertheless, it is still possible, as it was through use of ToC to describe TDE, to identify central themes and stages commonly-employed in scenario planning by reference to a 'typical' implementation - that known as 'Intuitive Logics' (IL) - which has its origins in Schwarz (1991). IL consists of an eight-stage procedure, as described by Wright et al. (2013, p.634) and set out in Table 1. This eight-stage procedure is usually conducted in a workshop setting over the course of several days. The outputs are detailed, thick descriptions of potential future outcomes, based on a deep analysis of causality and logic.

INSERT TABLE 1 HERE

3.2 Scenario planning and theory-driven evaluation's common purpose

Reviewing the scenario planning literature, Wright et al. (2013) show there to be three common purposes for organisations' use of scenario planning: (i) to enhance understanding of the causal processes, connections and logical sequences underlying events, thus uncovering how a future state of the world may unfold (ii) to challenge conventional thinking, thereby reframing perceptions and changing mind-sets, and (iii) to improve decision-making so as to inform strategy development. All three purposes are highly salient to TDE.

As shown in the example of ToC earlier, a crucial part of TDE is the identification of the causal logic and 'various links' of the program (Sullivan and Stewart, 2006, p.180), which is very much aligned with the first common purpose of scenario planning. With regards to the second purpose, as was also noted earlier, the programs evaluated using TDE are designed to bring about *change*, commonly to 'perceptions and mind-sets' and behaviours among a particular targeted group, such as the unemployed or young offenders. With regards to the third purpose for conducting scenario planning, TDE requires decisions to be made about approaches, actions and strategies in an intervention's formative stages. Unless the logic of these are fully-thought through and 'sense checked', the intervention will have little chance of success. In sum then, the purposes for which scenario planning is commonly implemented are highly relevant to TDE and there is considerable crossover between these purposes and the requirements of TDE.

3.3 Scenario planning as a means to build a detailed understanding of causality

A prominent feature of scenario planning is its emphasis on creating a detailed understanding of causality for a focal system of interest. Relevant 'driving forces of change' (causes) within the focal system are often initially identified using a PESTEL analysis (Wright et al., 2013), in which salient causal factors are listed under the headings Political, Economic, Social, Technological, Environmental and Legal. In a typical scenario exercise these identified causal factors can often number 200 or more (Wright et al., 2009; Wright et al., 2013), evidencing the detail and extensiveness of the causal analysis undertaken. The causal factors are then recomposed into clusters of related forces that cut across the PESTEL dimensions, providing a holistic perspective on cause within the system under scrutiny. This clustering is achieved by linking individual causal factors using 'arrows of influence', which simply represent an arrow that starts from one causal factor and points at another. The result is an 'influence diagram', which illustrates the assumed complex causal logic.

If proper attention has been given to this part of the scenario process, this diagram is likely to be highly complex, to contain non-linear relationships resulting from feedback loops, and to cover a range of causes, such as human motivations, not just causes that are 'efficient' and based on constant conjunction (see Fig.3 taken from Derbyshire and Wright, 2017). Several such influence diagrams will be created, each setting out in detail the workshop groups' understanding of causality for one particular aspect of the focal system under scrutiny, in which change is expected to occur. These 'influence diagrams' go on to form the causal framework of the subsequent narrative scenarios that describe how change may occur within the focal system, leading to particular, specific outcomes.

A key benefit of scenario planning for TDE, then, would be the provision of a clear procedure leading to the stakeholder creation of a detailed diagram representing causal logic for the focal system of interest. The causal diagrams created as part of this process are able to function as, and are not dissimilar to, the 'logic diagram' or 'change framework' that is used to set out program theory under TDE (see Fig. 2). Creation of these causal-logic diagrams through scenario planning can play a significant role in ensuring that the logic of the intervention is fully-thought through, can act as a 'sense check' of this logic, and can provide the opportunity to consider alternative outcomes that may transpire instead of the desired long-term outcome(s). In sum, the use of scenario planning as part of TDE, especially in the formative stages, would provide the opportunity for a highly-detailed consideration of cause and the creation of logic diagrams of use for setting out program theory - theory which would be explicit, detailed and stakeholder-led.

3.4 Use of scenario planning for fleshing out the change framework using backwards mapping

It was previously noted when setting out an example of TDE based on ToC that a central part of the formative stages of a TDE process is the fleshing out of the change framework, or diagram representing the intervention's program-theory logic, using so-called 'backward mapping'. This essentially implies working backwards to ascertain, logically, the 'pre-conditions' that need to be met for the program's long-term goals, or desired changes, to be achieved. A recent augmentation to standard scenario-planning approaches, in which the scenarios are commonly created by mapping forwards, is highly useful in this regard because it employs exactly the backwards logic TDE herein requires.

The Backwards Logic Method (Wright and Goodwin, 2009) for scenario planning is designed to assist in identifying multiple different paths through which the same future outcome (or long-term goal) might occur. It achieves this by taking this ultimate outcome, or goal, as the starting point and working backwards through multiple different chains of logic. This backwards-running scenario process can therefore assist in the formative

stages of TDE by allowing stakeholders to consider the alternative paths by which the change program's long-term goal(s) might be achieved, helping them to flesh out the logic of the change framework.

3.5 Scenario planning as a means to consider systemness, hierarchy and emergence in an intervention

Complex social change does not result merely from changes in macro-level conditions; change can be brought about 'bottom-up', endogenously from within. Indeed, complexity places a good deal of emphasis on this sort of change (Wilkinson et al., 2013). The cause-identification process in scenario planning, described above, can be used to consider *both* the micro-level drivers of change from within a particular context at a local level, *and* the macro-level environmental factors that impinge upon that context, bounding the possibilities for change within it - as-well-as the feedback between these micro-and-macro levels. Wilkinson and Kupers (2013, 2014) show through detailed qualitative analysis of extensive records held by Royal Dutch Shell - the organisation that has perhaps done most to popularise scenario planning's use (Jefferson, 2012, 2014) - that scenario planning was originally conceived of as a tool for exploring complex systems holistically. By viewing scenario planning in this way as a tool for exploring complex change, through consideration of systemness and the co-influencing and emergence between micro-and-macro levels of analysis, scenario planning becomes a tool with considerable potential for use as part of TDE viewed through a complex-realist lens (Byrne, 2013). In short, scenario planning is highly salient to the complex-realist turn in TDE, as outlined earlier

3.6 Scenario planning for uncovering the path dependence of complex social systems

One reason that complex social programs can fail to bring about desired changes is because of 'path dependence' (Byrne and Callaghan, 2014). In the complex social world the past weighs heavily on the future. Indeed, if this were not so, initiatives to bring about change would not be necessary, since change would be much more easily generated automatically, without the need for complex interventions. Put very simply, path dependence means that the process through which a system has come to be as it is presently continues to affect its future development, often with the result that the future looks similar to the past (Derbyshire, 2016; Byrne, 2013).

Since path dependence is a central factor in terms of why complex social programs are necessary, as-well-as in terms of their potential failure to bring about desired change, it is essential to take account of path dependence when developing program theories in TDE. The theory developed must take into consideration the factors stemming from present conditions, which are in turn a reflection of past developments, which constrain outcomes and reinforce the status quo. Scenario planning does exactly that by placing strong emphasis on consideration of

how a focal system of interest has come to be as it is presently, in terms of its journey through the past to the present, prior to consideration of what the future may hold (Bradfield et al., 2016). One way in which the past is incorporated in scenario planning is through identification of so-called 'pre-determined elements' of the future (Wright et al., 2013). This is highly salient to TDE because, as illustrated using the ToC variant earlier, TDE also differentiates between changes that occur automatically over time - which are equivalent to scenario planning's 'pre-determined elements' - and changes which will require intervention.

3.7 Scenario planning as a means to make interventions stakeholder-led

It was earlier noted that a key difference between TDE and the experimental evaluation method is that TDE uses stakeholder-leadership of the change program to attribute. Stakeholder-leadership is designed to diminish the 'attribution dilemma' by linking outcomes to prior stakeholder specification of the 'various links in an intervention' (Sullivan and Stewart, 2006, p.180). Yet, it was also shown that this stakeholder-leadership is very hard to achieve in reality; TDE provides little guidance to stakeholders regarding how they can specify the 'various links in an intervention' (Mason and Barnes, 2007, p.152; Sullivan and Stewart, 2006; Van Belle et al., 2010). Scenario planning can provide very specific assistance in relation to this problem with TDE since it is, by its very nature, stakeholder-led. Scenario planning provides stakeholders with a clear and structured set of steps by which to think through potential change and can therefore counter the lack of guidance on operationalisation that is a deficiency of TDE (Mason and Barnes, 2007, p.152; Sullivan and Stewart, 2006).

Recent developments in scenario planning have seen emphasis placed on increased stakeholder involvement (Wright and Goodwin, 2009). Wright and Goodwin (2009) argue for a more intense focus on stakeholder analysis within the scenario development process, as the actions of stakeholders are likely to be central to any future change that emerges within a focal system of interest. In light of this, Cairns et al. (2010) have set out an augmentation to the standard approaches to scenario planning, which they name 'Critical Scenario Method' (CSM). CSM is designed to enable evaluation of both the interest and power of stakeholders to take self-interested actions within an unfolding future. The salience of this for TDE, the very basis of which is making stakeholders responsible for bringing about change, is clear. CSM makes explicit the instrumental role of stakeholders in determining why one scenario outcome may unfold rather than another, yet acknowledges the unpredictability of human behaviour. CSM can be usefully implemented either as a new stage near the beginning of a standard scenario process, or as an additional stage towards the end of the process Wright et al. (2013, p.637). It can be used to understand the tensions between various groups and stakeholders in terms of the focal change under consideration, and can be

used to interrogate the logic of developed scenarios (and, therefore, of developed program theory if scenario planning is used as part of TDE) using questions such as (Wright et al., 2013):

- Who has high levels of power and interest in each scenario?
- What concerns them?
- How do their concerns relate to those of other stakeholders?
- How would they exercise their power?
- How would they react to the unfolding of events within a particular scenario?

These questions are self-evidently salient to complex social-change programs. By linking outcomes to stakeholder-generated actions the ‘attribution dilemma’ is overcome (Sullivan and Stewart, 2006). Scenario planning - especially that incorporating CSM as described above - can provide very useful assistance in this regard.

3.8 Scenario planning for considering indeterminism, uncertainty and adaptability of complex interventions

Scenario planning is a tool for dealing with uncertainty that rejects the determinism that was earlier identified as inherent in the experimental evaluation perspective, such as in RCTs, in which the focus is on identifying the ‘As that cause Bs’. Uncertainty in scenario planning is not merely viewed as of the aleatory type, stemming from natural variability as in the econometric modelling that is used in RCTs; uncertainty is instead viewed as stemming from multiple sources, including from individuals’ essentially unpredictable behaviour and reflexivity, which is in turn related to their free will and agency - their ability to originate their own action, but not in circumstances of their own choosing (Derbyshire, 2017). Scenario planning therefore recognises the tension between agency and structure that Callaghan (2008) shows to be at the heart of a complex-realist perspective on evaluation; and scenario planning views this tension as a central source of uncertainty in the social realm.

A typical scenario-planning exercise results in four narratives describing distinctly different future outcomes, based on identified causal factors playing out in different possible ways. In the context of TDE, one of these outcomes can represent the complete success of the change initiative, in which it leads to exactly the desired change envisaged. This scenario would describe the causal logic that is expected to result in this successful outcome, and the actors, actions and ordering of events leading to success. Another narrative scenario would likely examine and describe the causal logic that might mean the initiative fails to achieve the desired and envisaged outcome, essentially resulting in no change and a continuation of path dependence. These two scenarios related to success and failure of the focal initiative, and the causal logic, including feedbacks, non-linearity and multiple

types of cause that might result in these outcomes, therefore provide the opportunity to consider the enablers and inhibitors of the initiative's success and failure.

However, scenario planning, because it results in the creation of multiple scenarios, would enable further consideration of still other outcomes, beyond success or failure. It was earlier noted that a central problem with complex social interventions is their tendency to be emergent over time, it only becoming clear what the real 'long-term goals' are, and how (i.e. the causal logic) they might be achieved, as the program unfolds. This implies a need for initial program theories to be adaptable in recognition that things could turn out in rather unexpected ways. Scenario planning facilitates consideration of this adaptability in that the scenario process is explicitly designed to bring about consideration of unexpected outcomes, and the adaptations to strategy that may have to be made on the hoof as a result. The detailed examination of cause and the consideration of multiple outcomes in scenario planning, including but not exclusively focused on complete success or failure, allows for exactly this.

4 Summary of scenario planning's usefulness as a theory-driven evaluation tool

It is clear from the above discussion that scenario planning has much to contribute as a TDE tool. While these contributions are manifold and multifaceted making them difficult to summarise, they can nevertheless be usefully summed up, to a degree, by referring back to the basic outline of one particular variant of TDE - ToC - set out in section two. Table 2 provides a summary of how scenario planning might assist with ToC described in this way, based on detail provided by the Centre for Theory of Change (2018a).

INSERT TABLE 2 HERE

What is particularly evident from this is scenario planning's ability to contribute to the ex ante formation of program logic. This, as emphasised in this paper, is an area in which TDE is often deficient. This deficiency is highly problematic because, if the logic of a program theory is not sufficiently thought through at the start of an intervention, actions undertaken subsequently are not likely to bring about desired goals, and it can later become unclear what exactly it was the program was supposed to achieve and how, thereby rendering evaluation of it problematic. It is in this ex ante formation of program logic that scenario planning can be of most benefit to TDE. However, a second-and-related benefit lies in its ability to truly render TDE-based interventions stakeholder-led, by providing stakeholders with clear guidance about how to come up with, and think through, relevant program logic. These are clear and highly-useful benefits that would be accrued to TDE if scenario planning were used as part of it.

5 Conclusion

Theory-driven evaluation - an umbrella term covering a range of very similar approaches to evaluation based on creating and employing 'program theories' - offers a more realistic, cogent and plausible approach to evaluation that, if implemented well, has greater explanatory power than do experimental evaluation approaches, based on RCTs, which are inherently deterministic. Yet, there are a number of problems which beset TDE's implementation. In particular, TDEs attribute through stakeholder-leadership, but this stakeholder-leadership is difficult to achieve, one reason for which is the lack of guidance provided to stakeholders as to how to create program theories in the formative stages of an initiative, leading to ad hoc theories of change which lack explicitness.

This renders subsequent evaluation problematic, and results in change programs that are based on shaky theoretical foundations, leading to the failure to bring about desired long-term goals. Furthermore, in complex social systems change is emergent, rendering it questionable how useful it is to create explicit program theories a priori - or, at least, making it essential to consider how complex and contingent causes may lead to unexpected outcomes, leading to a need for adaptable program theories.

This paper has shown that scenario planning - a tool which is already widely used by government, business and NGOs - can assist in overcoming these problems if used as part of TDE. It can especially be of benefit if used in the initial, formative stages of a TDE. Scenario planning is a truly stakeholder-led process, leading to a detailed consideration of cause in a focal system, allowing for the making explicit of causal assumptions associated with particular outcomes that are desirable or less desirable, and which enables consideration of unexpected outcomes resulting from emergence and complex-and-contingent causation, in turn allowing for consideration of adaptive strategies to mitigate negative outcomes and enable positive ones. Scenario planning can therefore provide stakeholders with a clear procedure for making explicit the assumed causal logic by which a desired change is expected to be brought about, leading to the creation of an 'influence diagram' and narrative in which this logic is set out explicitly.

Scenario planning is highly congruent with a complex-realist perspective on evaluation. Complex-realism emphasises hierarchy, agency, complex causation and emergence, and so does scenario planning. Scenario planning places human motivations at the heart of the analysis, and views systems as holistic, and change as emergent from the interaction between multiple causes operating within and feeding back between different hierarchical levels of a focal system. It places emphasis on context, and allows for consideration of path

dependence and the role this may have in pulling a focal system along the same path it has adhered to over the long term, thereby preventing change, and the extent and nature of measures that might therefore be needed to break this inertia. We recommend the use of scenario planning as part of TDE and recognise the need for further research that sets out the most useful means the two can be combined.

References

Barnes, M., Matka, E. and Sullivan, H. (2003) Evidence, understanding and complexity: evaluation in non-linear systems, *Evaluation* 9, 265–84.

Bours, D., McGinn, C., and Pringle, P. (2014). The Theory of Change approach to climate change adaptation programming. SEA Change CoP, Phnom Penh and UKCIP, Oxford.

Bowman, G. (2016) The practice of scenario planning: An analysis of inter- and intra-organizational strategizing, *British Journal of Management* 27, 77-96.

Bradfield, R., Wright, G., Burt, G., Cairns, G., Van Der Heijden, K.. (2005) The origins and evolution of scenario techniques in long range business planning, *Futures* 37, 795–812.

Bradfield, R., Cairns, G. and Wright, G. (2015) Teaching scenario analysis — an action learning pedagogy. *Technological Forecasting & Social Change* 100, 44–52.

Bradfield, R., Derbyshire, J. and Wright, G. (2016) The Critical Role of History in Scenario Thinking: Augmenting Causal Analysis within the Intuitive Logics Scenario Development Methodology, *Futures* 77, 56-66.

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

Byrne, D. and Callaghan, G. (2014) Complexity theory and the social sciences: the state of the art. London: Routledge.

Cairns, G., Śliwa, M. and Wright, G. (2010) Problematizing international business futures through a ‘critical scenario method’, *Futures* 42, 971-979.

Callaghan, G. D. (2008) Evaluation and negotiated order, *Evaluation* 14, 399–411.

Centre for Theory of Change (2018a) <http://www.theoryofchange.org/>, accessed 10/07/2018.

Centre for Theory of Change (2018b) Guided example: Project superwoman: http://www.theoryofchange.org/wp-content/uploads/toco_library/pdf/Superwomen_Example.pdf, accessed 10/07/18

Chen, H. T. (1990). *Theory-driven evaluations*. Thousand Oaks, CA: Sage.

Chen, H. T. (2005a). *Practical program evaluation: Assessing and improving planning, implementation, and effectiveness*. Thousand Oaks, CA: Sage.

Chen, H. T. (2005b). Theory-driven evaluation. In S. Mathison (Ed.), *Encyclopedia of evaluation* (pp. 415-419). Thousand Oaks, CA: Sage.

Chen, H. T. (2005c). Program theory. In S. Mathison (Ed.), *Encyclopedia of evaluation* (pp. 340-342). Thousand Oaks, CA: Sage.

Connell, J. P. and A. C. Kubisch (1998) 'Applying a Theory of Change Approach to the Evaluation of Comprehensive Community Initiatives: Progress, Prospects and Problems', in K. Fulbright-Anderson, A. C. Kubisch and J. P. Connell (eds) *New Approaches to Evaluating Community Initiatives*, vol. 2, *Theory, Measurement and Analysis*, pp. 15–44. Washington, DC: Aspen Institute.

Coryn, C. L. S. (2005). Practical program evaluation: Assessing and improving planning, implementation, and effectiveness [Review of the book *Practical program evaluation: Assessing and improving planning, implementation, and effectiveness*, by H. T. Chen], *American Journal of Evaluation* 26, 405–407.

Coryn, C. L. S. (2007). *Evaluation of researchers and their research: Toward making the implicit explicit* (Unpublished doctoral dissertation). Western Michigan University, Kalamazoo, MI, USA.

Coryn, C. L. S. (2008). Program theory-driven evaluation science [Review of the book *Program theory-driven evaluation science*, by S. I. Donaldson], *American Journal of Evaluation* 29, 215–220.

Coryn, C. L. S., Noakes, L. A., Westine, C. D. and Schröter, D. C. (2011) A systematic review of theory-driven evaluation practice from 1990 to 2009, *American Journal of Evaluation* 32, 199-226.

Dahler-Larsen P (2001) From programme theory to constructivism: On tragic, magic and competing programmes, *Evaluation* 7(3): 331-349.

Davies, R. (2002) Scale, complexity and the representation of Theories of Change, *Evaluation* 10, 101-121.

- Derbyshire, J. (2016) The implications, challenges and benefits of a complexity-orientated Futures Studies. *Futures* 77, 45-55.
- Derbyshire, J. (2017) Potential surprise theory as a theoretical foundation for scenario planning, *Technological Forecasting & Social Change* 124, 77-87.
- Derbyshire, J and Wright, G. (2017) Augmenting the Intuitive Logics scenario planning method for a more comprehensive analysis of causation, *International Journal of Forecasting* 33, 254-266
- Donaldson, S. I. (2007) *Program theory-driven evaluation science*. New York, NY: Lawrence Erlbaum.
- Donaldson, S. I., & Lipsey, M. W. (2006). Roles for theory in contemporary evaluation practice: Developing practical knowledge. In I. Shaw, J. C. Greene, & M. M. Mark (Eds.), *The handbook of evaluation: Policies, programs, and practices* (pp. 56-75). London, UK: Sage.
- European Commission (2014) Guidance Document on Monitoring and Evaluation: European Cohesion Fund & European Regional Development Fund: Concepts and Recommendations, European Commission, March 2014.
- Jefferson, M. (2012) Shell scenarios: what really happened in the 1970s and what may be learned for current world prospects. *Technol. Forecast. Soc. Chang.* 79, 186–197.
- Jefferson, M. (2014) In: Earl, P.E., Littleboy, B., Shackle, G.L.S. (Eds.), *The passage of time: Shackle, Shell and scenarios*. Palgrave Macmillan, Basingstoke, pp. 198–214.
- Lewes, G. H. (1875) *Problems of Life and Mind (First Series)*, London, Trübner.
- Mark, M. M., Henry, G. T., & Julnes, G. (1998). A realist theory of evaluation practice. In G. T. Henry, G. Julnes, & M. M. Mark (Eds.), *Realist evaluation: An emerging theory in support of practice* (pp. 3–31). *New Directions for Evaluation*, No. 78. San Francisco, CA: Jossey-Bass.
- Mason, P. and Barnes, M. (2007) Constructing theories of change, *Evaluation* 13, 151-170.
- Mayne, J. and Johnson, N. (2015) Using theories of change in the CGIAR Research Program on Agriculture for Nutrition and Health, *Evaluation* 21, 407-428.
- Pawson, R. and Tilley, N. (1997) *Realistic Evaluation*. London: SAGE.

- Prior, D. and Mason, P. (2010) A different kind of evidence? Looking for what works in engaging young offenders, *Youth Justice* 10, 211-226.
- Reed, M. and Harvey, D. L. (1992) The new science and the old: complexity and realism in the social sciences. *Journal for the Theory of Social Behaviour* 22, 356–79.
- Rogers, P. J. (2008). Using programme theory to evaluate complicated and complex aspects of interventions, *Evaluation* 14, 29-48.
- Sanderson, I. (2000) Evaluation in complex policy systems, *Evaluation* 6, 433–54.
- Schwarz, P. (1991) *The art of the long view: Planning for the future in an uncertain world*, New York, Doubleday.
- Smith, D. (2006) Youth crime and justice: Research, evaluation and ‘evidence’. In: Goldson B and Muncie J (eds) *Youth Crime and Justice*. London: SAGE.
- Spaniol, M. and Rowland, N. J. (2018) The scenario planning paradox, *Futures* 95, 33-43.
- Stufflebeam, D. L. (2001). Evaluation models. *New Directions for Evaluation*, No. 89. San Francisco, CA: Jossey-Bass.
- Sullivan, H., Barnes, M. and Matka, E. (2002) Building Collaborative Capacity through ‘Theories of Change’: Early Lessons from the Evaluation of Health Action Zones in England, *Evaluation* 8, 205-226.
- Sullivan H. and Stewart M. (2006) Who owns the Theory of Change?, *Evaluation* 12, 179-199.
- Van Belle, S. B., Marchal, B., Dubourg, D and Kegels, G. (2010) How to develop a theory-driven evaluation design? Lessons learned from an adolescent sexual and reproductive health programme in West Africa, *bmc Public Health* 10, 1-10.
- Wack, P. (1985) Scenarios: shooting the rapids, *Harvard Business Review* 63, 135-150.
- Weiss, C. H. (1997a) How can theory-based evaluation make greater headway? *Evaluation Review* 21, 501-524.
- Weiss, C. H. (1997b). Theory-based evaluation: Past, present and future. In D. J. Rog & D. Fournier (Eds.), *Progress and future directions in evaluation: Perspectives on theory, practice and methods* (pp. 55-41). *New Directions for Evaluation*, No. 76. San Francisco, CA: Jossey-Bass.

- Wholey, J. S. (1979). *Evaluation: Promise and performance*. Washington, DC: The Urban Institute.
- Wilkinson, A. and Kupers, R. (2013) Living in the futures: How scenario planning changed corporate strategy, *Harvard Business Review*, May 2013.
- Wilkinson, A. and Kupers, R. (2014) *The essence of scenarios: Learning from the Shell experience*, Amsterdam, Amsterdam University Press, 2014.
- Wilkinson, A., Kupers, R. and Mangalagiu, D. (2013). How plausibility-based scenario practices are grappling with complexity to appreciate and address 21st century challenges, *Technological Forecasting and Social Change* 80, 699–710.
- Wright, G., Bradfield, R. and Cairns, G. (2013) Does the intuitive logics method—and its recent enhancements—produce ‘effective’ scenarios? *Technological Forecasting & Social Change*, 80, 631–642.
- Wright, G., Cairns, G. and Goodwin, P. (2009) Teaching scenario planning: lessons from practice in academe and business, *European Journal of Operational Research* 194, 323–335.
- Wright, G., & Goodwin, P. (2009). Decision making and planning under low levels of predictability: enhancing the scenario method, *International Journal of Forecasting* 25, 813–825.

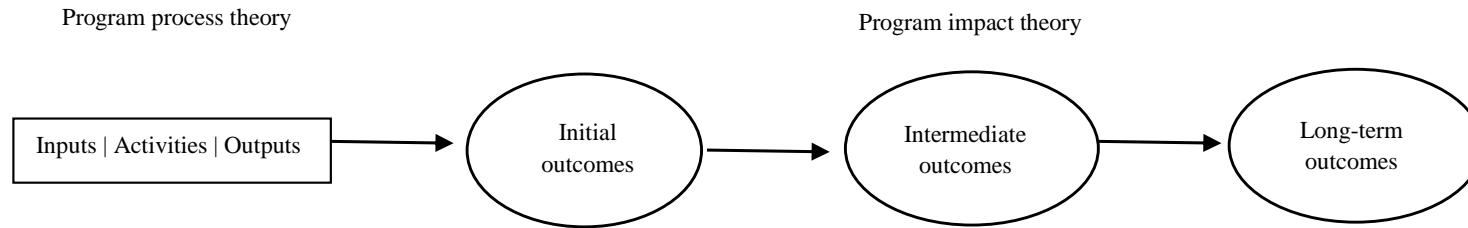
Table 1: Summary of the Intuitive Logics scenario planning approach

Stage	Description
Stage 1: Setting the agenda	Defining the issue of concern and process, and setting the scenario timescale
Stage 2: Determining the driving forces of change in the focal system	Working first individually, and then as a group, the causal factors thought to drive change in the focal system of interest are identified - often, but not exclusively, through use of a PESTEL analysis.
Stage 3: Clustering the driving forces of change	The driving forces are clustered to form logic diagrams that resolve into future outcomes. A group discussion ensues to develop, test and name the clusters.
Stage 4: Defining the cluster outcomes	Two extreme, but yet highly plausible - and hence, possible - outcomes for each of the clusters over the scenario timescale are defined.
Stage 5: Impact/uncertainty matrix	Determining the key scenario factors, A and B - i.e., those which have both the most impact on the issue of concern and also the highest degree of uncertainty as to their resolution as outcomes.
Stage 6: Framing the scenarios	The extreme outcomes of the key factors, A1/A2 and B1/B2 are defined.
Stage 7: Scoping the scenarios	The set of broad descriptors for four scenarios is built.
Stage 8: Developing the scenarios	Working in sub-groups scenario storylines are developed, including key events, their chronological structure, and the 'who and why' of what happens.

Table 2: Summary of the usefulness of scenario planning for theory-driven evaluation

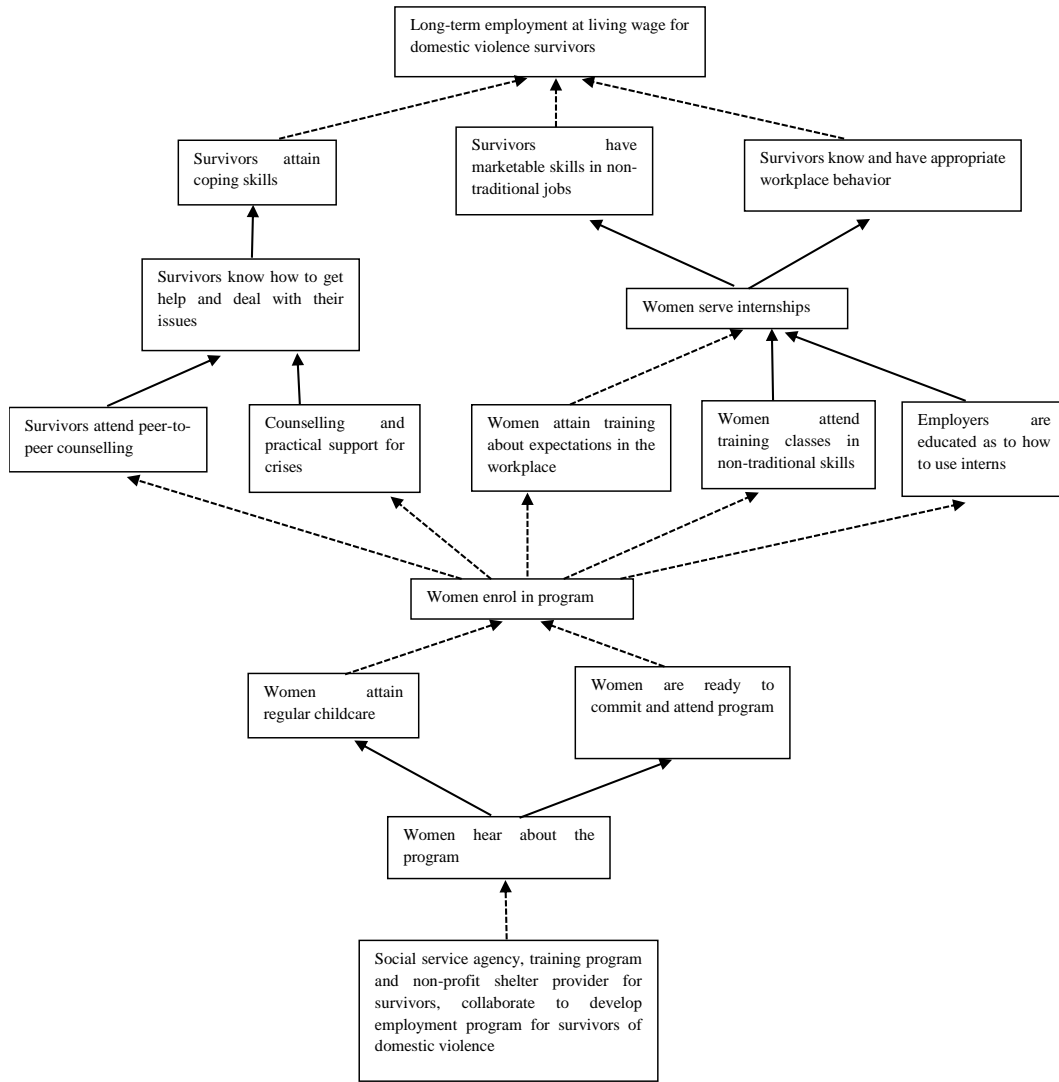
Theory of Change stage	Description	Usefulness of scenario planning
1 Identifying long-term goals	Participants discuss, make specific, and agree on the long-term outcome(s) of the change initiative. They start to create a map - essentially a logic diagram - which illustrates in a simple way an initial change framework, or chain of causation, showing the 'pre-conditions' needed to bring about the agreed long-term outcome(s).	In the early stages of the scenario process a detailed causal analysis of the focal system of interest is conducted, leading to the setting out of chains of causation by which alternative future outcomes may occur. In standard approaches this is done through the use of forward logic, but in the Backwards Logic Method for scenario planning it is done using 'backward mapping' (Wright and Goodwin, 2009). Regardless of the direction in which the logic runs, the created alternative scenarios set out, in detail, the pre-conditions in terms of causal steps thought to resolve into a considered outcome. Scenario planning thereby provides a clear and structured set of steps by which stakeholders can create detailed program theories in TDE. Furthermore, the scenario process can be used to set out the initial conditions, representing the present situation (Derbyshire and Wright, 2017) it is desired to change, as is also a requirement of TDE.
2 Backwards mapping and connecting outcomes	A more detailed stage of the mapping process, in which the initial change framework in logic-diagram form, is fleshed out by mapping backwards to produce a full 'story', representing the logic by which the change outcome(s) is to be realised.	
3 Completing the outcomes framework	The 'pre-conditions', or causal steps, leading to the desired change outcome, are fully fleshed out working backwards all the way to initial conditions, representing the present situation which it is desired to change.	
4 Identifying assumptions	Setting out the underlying assumptions on which the logic of the intervention is based, making explicit why the change framework can work (i.e. the reasons why stakeholders think the identified causes can combine in the way outlined to resolve the identified problem, leading to the desired long-term goal).	In scenario planning, stakeholders usually work in groups to list causes, to cluster these causes and to render them into an 'arrows of influence' logic diagram. Alternative clusterings are considered, providing an opportunity for a detailed 'sense checking' of alternative program-theory logic, its soundness and potential to resolve into unexpected outcomes.
5 Developing indicators	Describing how to measure the implementation and effectiveness of the initiative.	Augmentations to the scenario process allow for consideration of strategies that may be implemented to catalyse the bringing about of desired futures, or mitigate the negative effects of alternative, undesirable outcomes. This strategy making can form basis of indicator-development.
6 Identifying interventions	The focus now shifts to the role of interventions (those things that the program must do to bring about outcomes). Some of the arrows included in the change framework diagram have solid lines while others are dashed. The solid lines represent connections that will occur without the need for intervention, since as long as the prior preconditions are met, these outcomes will be met automatically. Whereas outcomes requiring interventions, which are essentially the change initiative's program activities, are represented by arrows with dashed lines.	Scenario planning facilitates consideration of pre-determined causes, the unfolding of which is considered to be automatic, alongside consideration of causes thought to be subject to change and disruption. This distinction is often made in the early stages of a scenario-planning exercise, when driving forces of change are being listed and clustered.

Fig. 1: A simple model of program theory*



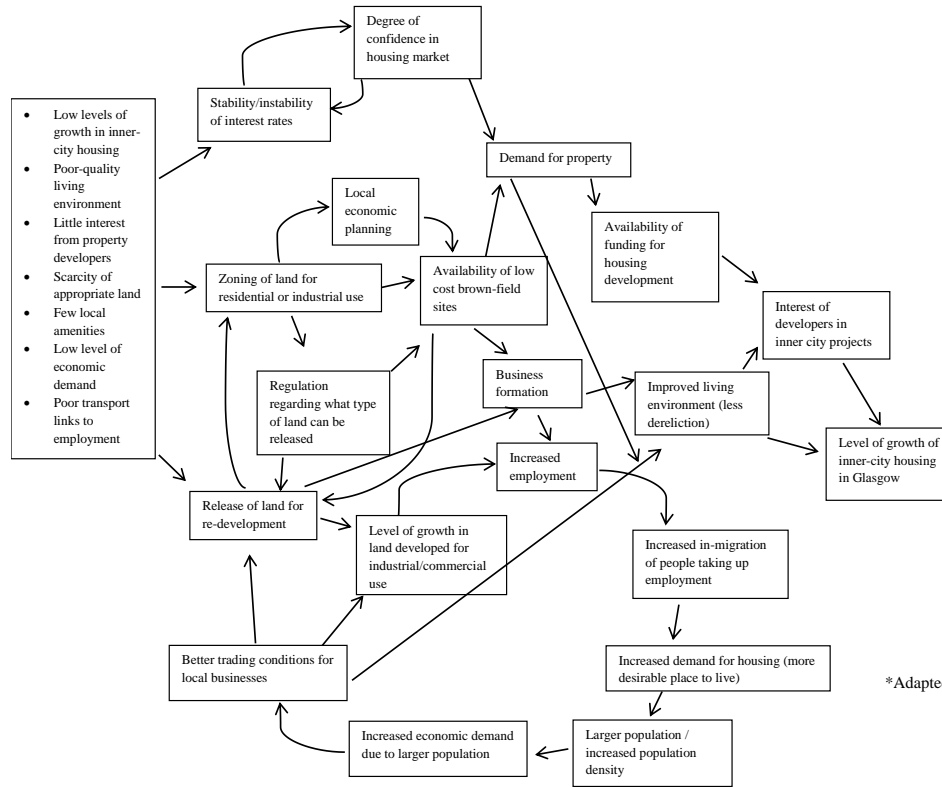
*Adapted from Coryn et al. (2011, p. 201)

Fig. 2: A program theory model for a theory of change intervention*



*Adapted from the Centre for Theory of Change (2018b)

Fig. 3 A logic diagram from a scenario-planning exercise*



*Adapted from Derbyshire and Wright (2017)