

# Opening the 'black box' of scenario planning through realist synthesis

## Abstract

Most of the scenario literature describes how to undertake scenario planning and it asserts its effectiveness as an aid to strategic planning in uncertain conditions. Rarely, however, does the literature exhibit a robust or standardised approach to evidencing how the various recommended features of a scenario planning process might lead to specific outcomes, and therefore why they should form part of that process. This perspective paper examines this gap, seeking to open up the 'black box' between scenario process and scenario outcome. We explore how realist epistemology can enhance the design and utilisation of scenario planning through the provision of an evidence-based framework. This research explores the 'mechanisms' and 'contextual factors' that contribute to the generation of cognitive change within scenario participants. It takes advantage of personal reflections from recent scenario planning interventions to provide an iterative framework for constructing a 'programme theory' of how a social intervention generates its effects. We describe here the use of such a framework to develop a programme theory of how scenario planning works. We conclude that the realist synthesis method supports the development of an evidence-based framework through which researchers and practitioners alike can collaborate in improving the practice of scenario planning.

## 1. Introduction

Management decisions are affected by cognitive bias and inertia (Hodgkinson and Wright, 2002; Kahneman, 2003; Meissner and Wulf, 2013). These effects are magnified in contexts of uncertainty (Jarzabkowski and Kaplan, 2015). Management tools are designed to improve decision-making, and scenario planning is a management tool that is held to be especially effective in conditions that are turbulent, uncertain, novel or ambiguous (Ramirez and Wilkinson, 2016).

The discipline of strategic management can count behavioural and cognitive science amongst its academic foundations,. Hodgkinson (2007) describes how the discipline has shifted from a simple behaviouristic analysis focusing on stimulus and response to a more nuanced understanding of the various intervening mental processes that mediate responses to the environment. At the same time, the scenario planning field has been exploring its link to behavioural science and neuroscience (McKiernan, 2017). The question that arises in relation to scenario practice is, 'What are the intervening factors between the stimulus of a scenario planning intervention and the expected response or desired outcome of the process?' A method founded within

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realist epistemology (Booth et al., 2018) is well-suited to researching this question because realism acknowledges that all enquiry and observation are shaped and filtered through the human brain and because it offers a particular understanding of how causation works (Westhorp, 2014). The realist review method, for example, seeks to understand the intervening psycho-social mechanisms and contextual factors that generate an outcome in response to a stimulus. ‘Realistic evaluation’ (Cooke et al., 2018) offers an increasingly common approach to understanding how social interventions work, based on explanatory principles derived from the realist philosophy of science (Pawson and Tilley, 1997; Astbury & Leeuw, 2010).

Notwithstanding a substantive practitioner evidence base concerning the outcomes of scenario planning, academic evidence identifying the mechanisms and contextual factors contributing to those outcomes proves notably lacking (Chermack, 2011; Glick et al., 2012; Wright et al., 2013a). This paper seeks to address that gap by:

- a) Hypothesising<sup>1</sup> a ‘programme theory’ for how scenario planning works; and
- b) Testing and refining that programme theory through extracting and synthesising data from the scenario planning literature.

In realist method, a programme theory (Pawson et al., 2004) describes what it is about an intervention that enables it to ‘work’. Programme theories are “purposefully practical and accessible; they are also specific to each programme or intervention, even if they share much in common with other, similar, programmes and interventions” (Davidoff et al., 2015). Used in this sense, it describes a theory that is sufficiently detailed and close to the data to enable testable hypotheses to be derived from it, but abstract enough to apply to other situations as well (Wong et al., 2013). Our concern here is how, rather than whether, scenario planning works. Nevertheless, whilst ‘works’ might be taken to refer to a final outcome such as an organisation becoming demonstrably more successful, we use it here to refer to a particular proximal outcome that is frequently referenced in the literature (Wack, 1985; Schoemaker, 1993; Rieley, 1997; O’Brien, 2004; Bradfield et al., 2005; Korte and Chermack, 2007; Meissner and Wulf, 2013): that is, the potential for scenario planning to change how managers<sup>2</sup> think about the issues before them (their mental models), thus mitigating cognitive bias and inertia (McKiernan, 2017).

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<sup>1</sup> Following the realist evaluation tradition (Pawson & Tilley, 1997), in this paper we are using terminology which is associated, in social science, with quantitative research, despite the fact that our paper is not quantitative. It is standard terminology in the realist evaluation literature (Westhorp, et al., 2016) to investigate qualitatively hypotheses.

<sup>2</sup> In this paper, we consider the cognitive impact of scenario planning only on those managers who participate in a scenario development and/or scenario deployment workshop. We do not explore whether or how ‘second-hand’ effects may be generated in managers whose exposure to scenarios is limited to reports of scenario findings generated by others).

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There are multiple types and variants of scenario planning (Amer et al., 2013; Bradfield et al., 2005; Chermack et al., 2001; Varum and Melo, 2010). Our focus here is on approaches that are commonly described as belonging to the Intuitive Logics School (ILS) of scenario planning (Derbyshire and Wright, 2016).

Our paper's structure reflects the realist synthesis method (Pawson, et al., 2005). After first reviewing the literature related to scenario planning processes and outcomes, and discussing the applicability of realist synthesis to scenario planning, we describe the variant of the realist synthesis method employed in conducting our research. This is followed by the establishment of a programme theory for scenario planning conceptually, drawing from an iterative analysis of scenario process descriptions in the literature, supported by personal practitioner reflections. The paper concludes with some remarks on how the realist synthesis method is able to offer a common framework through which researchers and practitioners alike can continue to develop and enhance an evidence-base for effective scenario planning practice.

## **2. Literature Review**

### *2.1 Scenario processes and outcomes*

Scenario planning encompasses a variety of approaches to strategic planning that involve the development and/or use of a number of plausible, internally-consistent future scenarios (Tapinos, 2012). Bradfield et al. (2005) distinguish between the largely qualitative approach of the ILS method, the quantitative focus of the Probabilistic Modified Trends (PMT) method and the mixed-method outputs of La Prospective methods. Chermack (2011) defines ten approaches to scenario planning, although these might be seen as different centres of practice rather than fundamentally different approaches: for example, he separates the approaches of Schoemaker, Wilson and Ralston, and Shell, whereas for Bradfield et al. (2005) these three would be grouped under the ILS approach. More recently, a Scenario Improvisation (SI) methodology has been proposed (Cairns et al., 2016) which combines the ILS approach with a Backwards Logic Method (BLM). ILS is held to embody a 'forward-chaining', inductive method, and BLM a deductive, 'backcasting' method. By contrast, others place both inductive and deductive approaches within the ILS method (Pfeffer, 2005; van der Heijden, 2005; Chermack, 2011), a judgement that we accept here.

A key point of difference between methods is that some offer an almost mechanical, technical approach suitable for one-off use, while others emphasise the practitioner art involved in an ongoing, iterative process. Advocates of the latter artistic approach are largely those with direct experience within Shell whilst the technicians appear to be mindful of how scenario planning can be deployed in other settings. The table below (Table 1) presents a synoptic view of methods reflecting both approaches. As it can

be seen from Table 1 there are four key phases in scenario planning: *project preparation*; *environmental analysis*; *scenario development*; *scenario utilisation*. Each phase can take place in a number of different 'steps' depending on the level of prescriptiveness of the method. The variations between the various methods proposed have been created by the different outcomes envisioned by each author. Schwartz's (1998) main concern, for example, is to enhance organisational learning and thus the emphasis is on strategic conversations. Similar conclusions about the variety of scenario planning approaches were reached by Hussain et al (2017) who observed that scenarios methods are influenced by the context of the case.

A number of authors have attempted to distil from the literature the possible outcomes of scenario planning. Table 2 below categorises these outcomes as being focused either on '*opening up*' strategic thinking or on decision-making '*closure*' (van der Heijden, 2004). The majority of 'opening up' outcomes are intrinsically related to cognition: to how and what individuals think and learn. Ramirez and Wilkinson (2016; p. 88) explain that "[m]inds are not like clothing: much of what is in the mind remains intangible, and it is not easy to take off what one has been minding and put that – or indeed, something else – back on. Scenario planning is designed to help learners in TUNA<sup>3</sup> conditions to surface, guide and make productive such changes of their minds."

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Tapinos and Pyper (2018) showed that mental models are the basis for anticipating the future in individual foresight. The wider scenario planning literature also evidences a focus on changing participant mental models (Wack, 1985; Schoemaker, 1993; Rieley, 1997; O'Brien, 2004; Bradfield et al., 2005; Korte and Chermack, 2007; Meissner and Wulf, 2013). The literature on mental models reveals two contrasting perspectives: one focuses on mental models as representing the content of a person's thoughts whilst another focuses on a person's style of thinking (Glick et al., 2012). For de Geus (1988), mental models are the microcosms managers carry in their heads that represent their understanding of their company, its competitors and its markets, and there is a strand in the human resource development literature that relates the construction and revision of mental models to processes of institutional learning (Korte & Chermack, 2007; Bradfield, 2008; Chermack et al., 2012; Grenier and Dudzinska-Przesmitzki, 2015). This content-focused perspective is shared across systems dynamics and cognitive psychology traditions. In the former, mental models are

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<sup>3</sup> Turbulent, uncertain, novel, ambiguous.

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internal representations that can be expressed externally as system flow diagrams, causal loop diagrams, etc. (Doyle et al., 2008); in the latter, they are psychological representations of some domain or situation (Johnson-Laird, 1980) or cognitive maps (Doyle and Ford, 1999). From a social and organisational sciences standpoint, Hodgkinson and Healey (2008) also consider mental models to represent managers' thinking about an organisation's strategic position, priorities and competitive environment. Similarly, from a cognitive science standpoint, Johnson-Laird uses the term to denote an internal representation of entities that "*mirror the relevant aspects of the corresponding state of affairs in the world*" (Johnson-Laird, 1980, p. 98). Subsequently, Doyle and Ford (1999, p.414) have attempted to produce a comprehensive definition: "*A mental model of a dynamic system is a relatively enduring and accessible, but limited, internal conceptual representation of an external system (historical, existing or projected) whose structure is analogous to the perceived structure of that system.*" Rooted in systems dynamics thinking, this definition lacks reference to the style-focused perspective. By contrast, Glick and colleagues (2012) explicitly recognise both perspectives, noting the greater difficulty in eliciting internal mental models than in identifying testable styles of thinking. In studies measuring mental model styles, Chermack and colleagues (2012, p. 490) state that mental models are "*lenses through which we see the world as well as being cognitive structures representing knowledge and beliefs*". Bradfield (2008, p. 207), writing from a cognitive psychology standpoint, refers to mental models as "*unique and interacting ontological and epistemological lenses*" and personal "*frames of reference linked to how people think*". Similarly, Pfeffer (2005) focuses on mental models as how people think, describing them as mind sets and ways of viewing people and organisations.

Whichever perspective is emphasised, the literature observes that managers' use of mental models as decision heuristics (Glick et al., 2012; MacKay and McKiernan, 2004; McKiernan, 2017) can impede as well as enable their thinking because of bounded rationality (Kahneman, 2003). Grenier and Dudzinska-Przesmitzki (2015, p.164) note that, because mental models are "*deeply held ciphers [that are] deeply ingrained and accepted, they often go untested or unrecognised leading to potential errors in learning, reasoning, problem solving and decision making*". The scenario literature suggests the need to address diverse limiting factors within participants' cognitive processes, including: cognitive inertia (Hodgkinson and Wright, 2002); managers' confidence and certainty levels with respect to their existing mental models (Kuhn and Snizek, 1996); heuristics associated with representativeness, availability and anchoring, and adjustment (Bradfield, 2008); framing, overconfidence and confirmation biases (Meissner and Wulf, 2013); overconfidence, intellectual arrogance and anchoring and availability bias (Rieley, 1997); and overconfidence, under- and over-prediction, and the tendency to look for confirming evidence (Schoemaker, 1995).

## 2.2 Realist synthesis and scenario planning

According to Wong et al. (2013), realism sits, epistemologically, between objectivism and constructivism, holding both that there is a real world and that this reality itself constrains our ability to know and interpret it. Its theoretical perspective is held to be a post-positivist one, “*whose task is to steer a path between empiricist and constructivist accounts of scientific explanation*” (Pawson et al., 2004, p. 2). The realist approach to research combines three principles: “*causal explanations are achievable; social reality is mainly an interpretative reality of social actors; and social actors evaluate their social reality*” (Rycroft-Malone et al., 2012, p. 2).

The fundamental building blocks of a realistic causal explanation are two linked concepts: mechanisms and contexts. The relationship between these concepts, and the role they play in bringing about certain outcomes, is illustrated in Figure 1 below (Pawson and Tilley, 1997, p.58). For our purposes, and reflecting the realist’s desire to seek causal explanations, scenario planning is the action, and a change in participant mental models is the outcome. We are seeking here to identify the mechanisms and contexts associated with that action and that outcome, and to bring them together in a programme theory, visualised (after Pawson & Tilley, 1997) as a context-mechanism-outcome configuration (CMOC) (Wong et al., 2013).

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INSERT FIGURE 1

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This approach, known as generative causation, can be contrasted with the successionist approach to causality employed in other methods (Pawson, et al., 2004). Rather than seeking the direct cause and effect relationship as in, for example, a clinical trial, generative causation holds that “*to infer a causal outcome (O) between two events (X and Y), one needs to understand the underlying mechanisms (M) that connect them and the context (C) in which the relationship occurs*” (Pawson et al., 2005, p.21f).

There are varying definitions of what constitutes a mechanism (Wong et al., 2013). Astbury and Leeuw (2010) define three essential features: mechanisms are usually hidden; they are sensitive to variations in context; and they generate outcomes. Pawson and Tilley (1997) associate mechanisms with human reasoning and resources because they lead to an individual making reasoned choices, subject to the individual’s capacity to act on those choices. To illustrate, they cite the example of how the introduction of CCTV in a car park might reduce car crime, arguing that there is no simple relationship of cause and effect. They posit a range of mechanisms including

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(in the mind of the criminal) “*I might get caught here so I should seek a car park without CCTV*” and (in the mind of the potential victim) “*CCTV reminds me of the risk to my car so I will ensure it is securely locked and valuables are hidden*”. Mechanisms are the hidden workings of the ‘black box’ exposed to the light.

In seeking to understand what it is about a scenario planning intervention that leads to outcomes associated with changes in how and what participants think, realist mechanisms offer explanations about how a particular action might influence human reasoning. Moreover, this understanding can inform the way in which future actions (scenario planning) can be implemented so that they are more likely to generate the desired change in human reasoning: “*a realist review results in findings that are theoretically transferable; ideas (“theories”) that can be tested in different contexts with different stakeholders*” (Rycroft-Malone et al., 2012, p. 9).

The same action does not always lead to the same result, however, and this is because of variability in contextual factors. To use Pawson and Tilley’s (1997, p. 69) illustration, “*gunpowder has within it the potential to explode, but whether it does so depends on it being in the right conditions*”. In realist analysis, it is contexts that represent those contingent, enabling conditions. We seek here to understand the contextual conditions that contribute to scenario planning being effective, not least through generating changes in participant mental models.

This present research explores the ‘black box’ that, in programme theory terms, sits between a scenario planning intervention and its outcome (Astbury and Leeuw, 2010). Existing work in this area has preferred a positivist approach that controls for variables (Doyle et al., 2008; Glick et al., 2012; Chermack and Nimon, 2013). Working instead from a realist perspective, the potential is created not simply to assess whether scenario planning works in certain controlled circumstances but also to understand more about how scenario planning works, for whom, in what respects and in what circumstances (Rycroft-Malone et al., 2012). Realism may offer a particularly appropriate approach, epistemologically, for use with scenario planning, since scenario planning is essentially a social intervention. Derbyshire (2018, p.11), exploring the use of realism within the dynamics of a scenario rather than in relation to how scenarios are developed, observes that “*scenario planning is highly congruent with a complex-realist perspective on evaluation. Complex-realism emphasizes hierarchy, agency, complex causation, and emergence, and so does scenario planning. Scenario planning places human motivations at the heart of the analysis.*”

The evidence from the scenario process and outcomes literature suggests that impacting participant thinking should be seen as a meta-outcome of scenario planning, and that understanding how participant cognition is affected could be key to the success of scenario planning. Glick and colleagues (2012) have explored this using

an experimental, quantitative methodology, but this does not inform an understanding of the mechanisms and contextual factors through which scenario planning affects mental models. A further significant contribution comes from Chermack and Nimon (2013) who highlight the need to examine these underlying factors.

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Despite the lack of any research linking explicitly scenario planning and realist synthesis<sup>4</sup>, we have detected three papers that reflect, albeit implicitly, elements of realist perspective. First, Hodgkinson and Healey (2008) test the impact of scenario planning on a set of pre-determined design propositions such as the optimal personality traits of participants. They deduce that “*since the evidence base primarily comprises anecdotal case accounts authored by practitioners, it has been more effective in legitimizing and justifying scenario planning than in scrutinizing rigorously the behavioural conditions and causal mechanisms that might enable scenario-based techniques to yield positive outcomes.*” Secondly, Chermack (2011) describes ‘dialogue’, ‘conversation quality’ and ‘engagement’ as the mechanisms through which scenario planning happens. Finally, Lang and Ramirez (2017) identify a range of factors (mechanisms, in realist terms) that contributed to building the cognitive dimension of new social capital in three in-depth cases.

### 3. Methodology

In the realist synthesis method, a number of steps are proposed for identifying the contexts and mechanisms that bring about a certain ‘regularity’ in which an action generates an outcome (Pawson et al., 2004; Pawson et al., 2005; Rycroft-Malone et al., 2012). To fulfil the main purpose of this paper, testing the potential of the realist synthesis method to provide an evidence-based framework for understanding and improving scenario practice, this study broadly follows those steps (see Figure 2) which are “overlapping and iterative because the methodology is about refining theories and second thoughts can (and should) occur at any stage” (Pawson et al., 2005, p. 24). The steps include: finding and articulating programme theories; searching for further evidence and extracting and synthesising data; and drawing conclusions. The realist approach “sees merit in multiple methods... so that both the

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<sup>4</sup> Extensive literature searches using the terms ‘scenario planning’ and ‘realist review’ or ‘realist synthesis’ via established databases found no relevant results.

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processes and impacts of interventions may be investigated” (Pawson et al., 2005, p. 22).

### *3.1 Finding Programme Theories*

Following Pawson and colleagues (Pawson et al., 2004; Pawson et al., 2005; Wong et al., 2013; Pawson et al., 2016), existing programme theories were identified through a realist synthesis of key sources. This was done by returning to the four sources identified in the literature review as presenting a summary of potential outcomes from scenario planning (van der Heijden, 2004; Volkery and Ribeiro, 2009; Chermack, 2011; Wright et al., 2013b), the assumption being that these were the sources most likely to suggest theories for how those outcomes are generated. The sources were reviewed in turn. Where authors cited evidence or made observations that fitted the realist descriptions of mechanisms or contexts, data were extracted and recorded as descriptors of mechanisms or contexts. This information included any data referencing relationships between particular mechanisms and contexts. Synthesising these data then enabled the development of an initial overarching programme theory for how scenario planning affects participant mental models.

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### *3.2 Further Data Extraction and Synthesis*

#### *3.2.1 Conceptual development*

A search was undertaken for evidence in the wider scenario literature that might confirm or contradict the mechanisms, contexts and configurations identified from the initial four sources. Employing search terms including combinations of ‘scenario planning’, ‘mechanisms’ and ‘contexts’, sources selected were those that reflected the ILS approach and which appeared, from an initial appraisal, to contain data relating to scenario planning mechanisms and contexts. The same data extraction and synthesis procedure was used as when developing the initial programme theory.

#### *3.2.2 Personal practitioner reflections*

In addition to the published sources, practitioner reflections were generated from scenario workshops, the design of which was informed by the initial programme theory described here. The first author of the paper is an internal consultant in the NHS. As part of his job he facilitates scenario planning interventions with individual NHS

organisations and partnerships. Each of the interventions is different depending on the requirements and resources available but they are typically undertaken with a combination of initial research, and a small number of workshops with less than 20 participants. These interventions aim at creating awareness of emerging issues, reframing participant thinking and developing practical strategic responses. The NHS operates an evidence-based approach (NHS, 2019), and this informs both its health-related (Dobson and Fitzgerald, 2005) and its management practices (Hewison, 2004). Thus, it was observed that there was an opportunity to reflect upon the intersection between scenario planning and the realist method. The reflection took part in two stages (Grey, 2007): firstly the practitioner took personal notes on the context and mechanisms in the workshops and then had reflexive conversations with the second author<sup>5</sup> (for more information on reflective practice within scenario planning see Tapinos (2013)). A total of three workshops were facilitated by the lead author with different NHS departments/organisations. There was individual reflection and reflective conversations at the end of each workshop and collectively at the end, during the preparation of this paper. These reflections were additionally informed by post-workshop surveys that explored the contexts and mechanisms which participants saw as contributing to effecting changed cognition. We have attached, in the appendix, the questionnaire used in these surveys. The data from these surveys are utilised later in this paper.

### 3.3 *Drawing Conclusions*

The resulting data extraction and synthesis enabled conclusions to be drawn about the comprehensiveness and accuracy of the initial programme theory developed from the four key sources. This led, in turn, to the development of revised programme theory of how scenario planning works.

## **4. Towards the development of an evidence-based scenario planning approach**

### *4.1 Initial Programme Theory Development*

The following contexts and mechanisms were identified through analysis of the four key outcomes sources.

#### *4.1.1 Contexts*

Contexts are the environmental contingencies affecting the relationship between causal mechanisms and their associated outcomes (Pawson and Tilley, 1997). They

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<sup>5</sup> The second author is an academic with long experience on scenario planning workshops facilitation in contexts which did not require evidence based management from a realist method perspective.

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enable or disable the mechanism for change. An initial review of the four key sources revealed the following six contextual factors (Table 3):

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#### 4.1.2 *Mechanisms*

The following ten mechanisms are likewise described in the key sources. They offer descriptions of the hidden cognitive dynamics that may be triggered by scenario planning, when relevant contextual factors are also active (Table 4):

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#### 4.1.3 *Initial programme theory*

None of the sources used at this point sought to present their findings in realist terms, so it is not surprising that, with the exception of Chermack (2011), they do not use the language of CMOC. Nevertheless, by combining the Pawson and Tilley (1997) model of generative causation with elements of the context and the mechanisms identified within the scenario planning literature, we are able to establish a new model of scenario planning practice, based on realist evaluation theory (see Figure 3 below).

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It appears that not only is scenario planning a particularly helpful tool in contexts of uncertainty (Ramirez and Wilkinson, 2016) but also that uncertainty is, itself, an essential enabler of all the initially identified mechanisms for generating an impact on

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participant mental models. Where there is no uncertainty, there is no reason why mechanisms for thinking differently should 'fire', to use Pawson and Tilley's term (1997), whereas the greater the uncertainty, the more participants would be expected to be searching for new ways of seeing things. To a lesser degree, the same is true of contexts in which there is strong leader support for scenario planning or an established learning culture. The lack of these things might not prevent mechanisms from firing, as certainty could, but they provide conditions amenable to the mechanisms being triggered. The enabling effects of having adequate time and a safe space, and of being part of an ongoing process are more mixed. This may partly reflect the differences between the artistic and technical approaches to scenario planning. van der Heijden (2004), an advocate of the artistic approach, explicitly links M1-3 and 7 with C5 and 6. For more technical approaches, these contexts appear to be less critical.

#### *4.2 Revisions to the Programme Theory*

In line with the realist synthesis method, having established the initial programme theory, we proceeded to synthesise it with in-depth considerations drawn from both the existing literature and personal practitioner reflections. As noted previously, whilst our research found no evidence of existing realist analyses of scenario planning interventions, Hodgkinson and Healey (2008), drawing on social and organisational science theory, are explicit about the role of mechanisms and contexts in designing an effective scenario planning intervention. They note, for example, that effective design science requires a scientific understanding of general causal mechanisms and a knowledge of how these apply in specific contexts, and they illustrate how controllable design features influence the causal mechanisms that bring about desired outcomes. It is perhaps not surprising, therefore, that their study is one of the more fruitful sources of further evidence for CMOC.

##### *4.2.1 Contexts*

A number of Hodgkinson and Healey's 'design propositions' are material to the context of scenario planning activities. Providing support for the enabling value of safe space (C5), for example, their 'Design Proposition 3' advocates an emphasis on the shared fate of participants and on establishing common goals in order to stimulate superordinate re-categorisation. Schwartz (2011, p.10) also supports the importance of a safe context, noting that: "You need to create a safe space for the free flow of ideas. If someone in a position of power has been brought into the room unwillingly, and/or believes strongly in an Official Future, that should set alarm bells ringing".

Such safe space is also held to dissolve zero-sum strategic framing contests and enable institutional learning (Ramirez and Wilkinson, 2016). A clear example of the disabling effect of an unsafe context is provided in Hodgkinson and Wright's reflections on a scenario planning intervention that did not yield the expected benefits because

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“the psychodynamic basis of the behaviour of the CEO and her relationship to her team of senior managers militated against our best efforts” (Hodgkinson and Wright, 2002, p.972). The evidence from both Schwartz and Hodgkinson and Wright also illustrates the close linkage between safe space (C5) and leader support (C3), where an absence of the latter naturally undermines the former. The need to gain top level support (Hodgkinson and Wright, 2002) is also a lesson learnt from experience at British Airways, as is the need for adequate time (C4) (Moyer, 1996).

Hodgkinson and Healey’s work suggests the need to add two further enabling contexts: ‘Design Propositions 1 and 2’ point to a need for group diversity amongst scenario participants, without which the tendency may be to reinforce silo working and the ‘connection deficit’ (Ramirez and Wilkinson, 2016); and ‘Design Propositions 4-8’ make the case for the enabling impact of certain participant personality types. These are therefore added to our CMOC as C7 and C8:

- Group diversity (C7). Involving participants with greater intrapersonal functional diversity and divergent task-related background characteristics enables better group information processing; and
- Personality types (C8). Having participants with particular personality traits provides a more productive context. Those traits are derived from the Five Factor Model of personality and are:
  - High openness to experience,
  - Moderate extraversion or a moderate proportion with high extraversion,
  - Low neuroticism or a limited number with high neuroticism,
  - Moderately high agreeableness, and
  - High conscientiousness.

Of the remaining contexts, further evidence was found for only one, learning culture (C2), where Hodgkinson and Wright’s account of an antagonistic CEO notes the disabling effect this had on the learning orientation of other participants.

No additional support was found for uncertainty (C1), despite the emphasis of Ramirez and Wilkinson (2016) on the significance of conditions that are turbulent, uncertain, novel and ambiguous (TUNA), and perhaps indicating that scenario planning might be a tool for affecting mental models even where participants do not feel uncertain about the future. Indeed, Ramirez and Wilkinson themselves make this clear in citing an example from Shell in which getting executives to articulate their assumptions (M5) around an expected future (which then appeared to them to be incredible) helped them to free up their minds to other possibilities. A distinction might be made, however,

between actual uncertainty and felt uncertainty, recognising that the two will not always coincide.

There was also no further support identified for the value of an ongoing process (C6), although this might reflect the lack of longitudinal studies of the impact of scenario planning (Bowman et al., 2013, provides a rare example). There is relevant evidence concerning the limited benefits of single-event interventions in the wider strategic management literature (MacIntosh et al., 2008; Johnson et al., 2010; Healey et al., 2015).

#### 4.2.2 *Mechanisms*

Hodgkinson and Healey (2008) provide support for the conversation mechanism (M3) and contrasting scenarios mechanism (M7). For the former (M3), they hold that: “Dialogue regarding different interpretations of cause-and-effect relations under varying plausible futures helps individuals appreciate the assumptions and beliefs of others and reflect on their own understanding of the dynamics of the strategic problems they face”

They see this as leading to the challenging of participant mental models. Likewise, scenarios support the development of a shared language across diverse participants (Lang and Ramirez, 2018). Bood and Postma (1997) give further support, noting how sharing experiences stimulates accommodation in mental models and counteracts cognitive inertia. In relation to M7, Hodgkinson and Healey (2008, p. 440) claim that: “it is vital that the scenarios developed are sufficiently plausible to foster meaningful engagement, while being sufficiently challenging to test decision makers’ assumptions”.

Given that the presentation of contrasting and plausible scenarios is key to the ILS method, it is unsurprising to find multiple sources evidencing this mechanism. Meissner and Wulf (2013) record how research with postgraduate students demonstrated that multiple frames of reference reduce framing bias; Kuhn and Sniezek (1996) argue that conflicting information either within or between scenarios increases subjective uncertainty (though, contra Schoemaker, they found no reduction in confidence); Lang and Ramirez (2018) propose that the provision of multiple frames allows a range of perspectives to be explored in depth; and Bood and Postma (1997, p. 645) observe that: “By presenting alternative stories as valid ways of thinking, scenarios show [managers] how biased and subjective their perceptions and opinions are”.

Of the remaining mechanisms, further evidence was identified as follows:

- Avoiding fragmentation (M1). Schoemaker (1993) holds that presenting scenarios as possibilities makes them psychologically less threatening to those

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holding different views, perhaps because they function as boundary or transitional objects (Ramirez and Wilkinson, 2016; Lang and Ramirez, 2018). Wright and colleagues (2008) observe how the ability to express dissenting opinions can challenge potentially inappropriate overconfidence in a particular future. It is also suggested that the development of such 'value-free' scenarios reduces the emotional charge around strategic debates (van der Heijden, 2005) and projects the 'enemy' outside, moving the conversation from the advocative debate to a substantive sharing of views. At Royal Dutch Shell, the scenario planning process enabled the pet initiatives of individual executives to be safely and constructively challenged and checked (Ramirez and Wilkinson, 2016). This aligns with the evidence from Lang and Ramirez (2018) where they observe that scenario planning provides a safe space for different or conflicting perspectives to be explored<sup>6</sup>;

- Making issues explicit (M2). Nonaka theorises how knowledge is created within an organisation. This includes the process of externalisation through which tacit knowledge becomes explicit (Nonaka et al., 2000). For Ramirez and Wilkinson (2016, p. 131), "scenarios involve a social process of knowledge co-production, which renders intuitive and tacit knowledge into an explicit and contestable form". They also describe how the creation of systems diagrams and events maps can facilitate this process of making explicit, a function fulfilled in this present research through the analysis of interview transcripts and the completion by participants of key forces templates.
- Memorable stories (M4). Lang and Ramirez (2018) observe that the creation and sharing of scenarios as stories enables people to make sense of uncertainty and to develop new, shared understandings.
- Articulating assumptions (M5). Bood and Postma (1997) argue that the careful extraction of mental models can counter both groupthink and inaction due to conflict, and this is evidenced in Wright et al. (2008).
- Detailed analysis (M6). From an intervention with a drinks manufacturer, Wright et al. (2008, p. 226) note that: "Structural patterns begin to emerge as participants began to causally link factors, previously regarded as inconsequential or not applicable within their domain, and developments by other organizations not previously recognised, both of which resulted in a new understanding and new insights".

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<sup>6</sup> This is to be distinguished from the mechanism 'safe space' which concerns the nature of the environment in which scenario work is undertaken rather than, as here, internal cognitive processes.

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- Remarkable people (M8). Schwartz (2011) advocates the benefits of involving participants whose views make others feel uncomfortable, and Bood and Postma (1997) argue for the inclusion of outsiders on the basis that it is almost impossible to pull yourself out of a swamp. Similarly, Bodwell and Chermack (2010), noting that part of the purpose of scenario planning is to get senior managers to share their mental models and to challenge ‘the conventional mindset’, highlight that “scenario planning is designed specifically to counter the “groupthink” phenomenon through the use of external experts not related to the content under question” (p.199).
- Inductive development (M9). Whilst van der Heijden suggests that a deductive methodology is best suited to countering groupthink because its structure provokes thinking in new areas (2005), he also observes that a divergent group [C7], or a group with a high degree of tolerance for ambiguity [C1], often does well with the inductive approach. Examples of the successful use of an inductive method are cited by Ramirez and Wilkinson (2016) and supported by Bowman and colleagues (2013). For balance, deductive development was added as a distinct mechanism (M15).
- Internal generation (M10). The value of participants being involved in the generation, not just use, of scenarios is supported by experiments with MBA students demonstrating that scenario building can expand people’s thinking and stretch subjective confidence ranges (Schoemaker, 1993); by research with other postgraduate students which demonstrated that a reduction in bias resulted from active participation in all of Schoemaker’s ten steps (Meissner and Wulf, 2013); by an intervention in British Airways from which it was concluded that participation in the development process enabled ownership of the final product (Moyer, 1996); and by an intervention in the whisky industry (Wright et al., 2008).

Three additional mechanisms are also indicated in the evidence:

- Conjunction fallacy (M11). Examining a confluence of factors rather than single contingencies enhances a scenario’s credibility, overcoming overconfidence, anchoring and availability biases (Schoemaker, 1993). Elsewhere this is referred to as the ‘simulation heuristic’ because the simulation in a person’s mind of a conjunction of events is held to lead to them crediting those events with a greater probability than a single event (Derbyshire and Wright, 2016), notwithstanding how the heuristic is undermined by the realities of statistical probability.

- Consequences (M12). Through testing strategic options against scenarios, the future can be rehearsed, and organisational learning accelerated (Bood and Postma, 1997).
- Backwards logic method (M13). Creating scenarios by working backwards from key organisational objectives to successive levels of the underlying drivers of those objectives, thereby avoiding the potential mental constraints of forward causal reasoning, challenges mental frames (Wright and Goodwin, 2009b).

#### 4.2.3 *Personal practitioner reflections*

As explained in the Methodology section, the first author of the paper has been involved in several scenario planning exercises for the English NHS. The reflections and participants' feedback received from the workshops were coded/organised according to the 'contexts' (table 3) and 'mechanisms' identified in earlier stages of the realist synthesis (table 4). These interventions took place following the development of the initial programme theory, and this was used to shape their delivery.

In terms of significant contextual factors, participants in these interventions evidently valued the safety of the space that was created (C5), facilitated by clear executive support (C3), and these factors helped to generate more fruitful conversations (M3) than they were accustomed to having about strategic issues. Whilst the interventions did not take place over an extended period (C4 and 6), it still seemed 'adequate' from the participant point of view. The benefits of one intervention were likely to be limited, however, because it had, in part, been seen as an assurance process rather than a future planning process, and it took place in a context of organisational instability. One would expect that a more extended process would generate richer reflection and greater cognitive impact but, even if so, this does not preclude a limited intervention from having real and valuable impact. It is possible, of course, that a shortfall in any one enabling contextual factor might be mitigated by the strength of other contextual factors, and that did appear to be the case in interventions where the level of uncertainty was very high (C1), as was the sense of there being a learning culture (C2). In addition, a participant in one intervention notably remarked that "the fact that there were very different perspectives in the group really helped challenge my thinking" (C7 and 8).

In terms of cognitive mechanisms that appeared to operate in the interventions, the following were particularly noticeable: firstly, the participants highlighted the value of openness and transparency in scenario conversations, along with having "space to think the unthinkable" (M1); the participants from one scenario planning workshop mentioned that the overall process provided them the opportunity to '*broaden my thinking*' and to realise that '*nothing is impossible and such massive change is plausible*'. In addition, it has been observed that there are benefits in making issues

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explicit (M2), something that was supported by participants being guided to: i) focus on external forces, ii) bring together key challenges with key decisions, iii) think beyond usual time horizons, and iv) identify key forces with other participants. Participants also commented on the fruitfulness of the conversation had (M3), valuing the time for discussion and the ability to exchange and debate views, and the value of narratives that they perceived to be well-written, surprising and plausible (M4). It is characteristic that the majority of the participants agreed that '*exploring future scenarios affected how [they] see the forces that could shape the future [of their unit]*'. In the most of the interventions, it had not been possible to involve 'remarkable people' (M8) but preparatory work undertaken for that intervention did appear to demonstrate that this lack can at least partially be mitigated by the provision of prepared inputs with examples from beyond the experience of participants. In one notable exception, two 'remarkable people' were included amongst the participants, both of which had expertise central to the scope of the scenarios being developed (an Artificial Intelligence scientist and a social scientist specialising in public attitudes). It was observed that their contribution within the scenario development was very impactful as their expertise provided greater legitimacy than the second-hand presentation of outputs of desktop research.

In terms of the debate about the relative merits of inductive and deductive processes (M9 and 15), participants in the one of the interventions were guided to use the common two-by-two matrix (Ramirez and Wilkinson, 2014) as part of a deductive process. They reflected, without prompting, that they would have found it more useful to think how events might evolve from the present rather than trying to think backwards from an imaginary future. One participant had been struck by a reference to the approach used in developing the Mont Fleur scenarios (le Roux, et al., 1992). Subsequent interventions reflected an inductive approach as this seemed to be more amenable to the mindsets of participants, most of whom were in operational rather than strategic roles and so were not accustomed to thinking longer term. There is, of course, a risk that an inductive approach might not generate such diverse thinking as could be created through the frame of a well-constructed matrix, but this has to be balanced against the risk of alienating participants from engaging at all. Moreover, it is generally regarded that the internal generation of scenarios (M10) is more beneficial to participants than is the use of 'ready-made' narratives. Whilst internal generation is likely, logically, to engender richer reflections that are themselves more internalised, participants in the second NHS intervention had chosen to be supplied with a set of scenarios developed by an external consultancy instead (Frith, et al., 2018). Though, of course, they had no comparator, participants reported that they did not feel that internal generation would have been more valuable. At the same time, the fact scenario participants recognise there are significant consequences (M12) to the

strategic decisions they are involved in making (and that they explore those consequences as a result of a scenario intervention) appears to trigger an openness to new ways of thinking. In one intervention, it was clear that exposing participants to considering how external forces might affect what business they should be in helped them to see their choices differently; and, in a separate intervention, there was a clear motivation to explore the consequences of how a multi-billion strategic initiative might play out. Finally, it was through reflecting on these interventions and participant responses to them that led to the addition of the 'structured approach' mechanism (M14). Even when senior managers are deploying 'slow' rather than 'fast' thinking (Kahnemann, 2011), that thinking is still prone to bias. The rational, structured approach to strategic thinking that scenario planning facilitates provides an external framework that stretches participant cognition further than would a simple invitation to think in an unstructured manner about how the future might evolve.

#### 4.2.4 *Revised programme theory*

As a result of the evidence gathered from the wider literature supported by scenario personal practitioner reflection, a revised programme theory can be set out established (see Figure 4).

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INSERT FIGURE 4 ABOUT HERE

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## 5. Concluding remarks

In the course of this realist synthesis, we have unpacked the 'black box' of scenario planning to reveal a set of underlying mechanisms that generate one of the key outcomes claimed for the method, a change in participant cognition, alongside the contextual factors that enable those mechanisms to 'fire'. But what is the nature of the relationship between those constituent mechanisms and the method that they support? Could scenario planning successfully deliver outcomes without them, and could they be used independently of scenario planning to deliver similar outcomes? Of the mechanisms identified, only a small minority can perhaps be deemed intrinsic to the method, and these because they are fundamentally linked to the use and impact of scenario narratives. These are the development of memorable stories (M4); contrasting scenarios (M7); the triggering of the conjunction fallacy (M11); and the exploration of scenario consequences (M12). This is not to ignore the dependency that the impact of scenario narratives might be expected to have on the analysis and conversation that informs their development, or the manner in which they are

subsequently communicated, but these are elements that are distinct components of scenario analysis and are generally found in other strategic planning tools.

From the evidence extracted, generated and synthesised above, it is not possible to state a set of components that would be essential to all scenario planning interventions. Nevertheless, our research demonstrates the potential of the realist method to enhance evidence-based scenario planning practice. That potential could be further realised through developing a standardised realist approach to any scenario-based planning exercise so that the evidence base can continue to be extended in a coherent manner that is both academically robust and of benefit to practitioners in the field.

Another reflection arising from the findings above relates to the relative merits of deductive and inductive approaches to scenario planning (Bowman et al., 2013). It might be asked whether it is necessary to maintain a separation between these approaches (Bradfield, 2008) when there may be merit in allowing for a combination of both approaches. For example, a deductive approach might be used up to the point of identifying the key forces (the inherently structured approach supporting participants as they acclimatise to the method), after which an inductive approach might be used to explore how each of the identified forces might unfurl and interact. This 'embedded method', so long as it was allocated adequate time, could thus support a detailed analysis of key forces before any scenarios are defined, its combination of initial structure followed by freedom to explore potentially proving more amenable to operational managers. It might also be compared with the scenario improvisation method described by Cairns et al. (2016) in which the initial deductive development of two extreme scenarios using the Backwards Logic Method that were subsequently refined and expanded by means of an inductive process.

We set out to explore how scenario planning works, particularly in terms of how it generates effects on participant cognition. This involved the development and refining, using a realist methodology, of a programme theory of scenario planning. The theory states that when certain contextual factors are in place (MacKay, 2006; Sandberg and Tsoukas, 2015), they enable the triggering of a number of mechanisms associated with scenario planning, and that it is through these mechanisms that scenario planning generates a change in participant mental models (the regularity). Prior to our research, the vast majority of the academic and practitioner literature treated the conduct of scenario planning interventions as a 'black box'. The focus has been on evidencing the outcomes of scenario planning rather than on evidencing what generates those outcomes. The 'black box' has sometimes been acknowledged but rarely exposed to the light (Hodgkinson and Healey, 2008; Chermack, 2011; Lang and Ramirez, 2017) and never as comprehensively or by means of such an effective and epistemologically

appropriate research tool as realist synthesis. It contains cognitive mechanisms and enabling contextual factors such as those we have described above. What we have presented here, as a model for future research as much as a record of research to date, is an example of 'white (or clear) box evaluation' through which the "inner workings are fully revealed" (Scriven, 1994). We have not considered how positivist or constructivist approaches might also shed light on how scenario planning works.

Further realist research could be considered in relation to other schools and methods of scenario planning to explore the extent to which the same contextual factors and/or mechanisms apply, including where qualitative scenarios are enhanced with the quantification of their key features. There would be value in refining an approach to testing the CMOC detailed here so that it could be used in a standardised way across a range of scenario planning interventions in various sectors. This may also enable an evaluation of the relative merits of each approach. Further research might also explore whether the programme theory holds true regardless of the main desired outcome of a scenario intervention. Such approaches could maximise the potential opened up by the realist methodology and could also go a significant way to filling some of the gaps in the evidence base for scenario thinking, as highlighted, for example, by Wright et al. (2013a, p.564) who observe that: "scenario interventions in organizations are becoming more informed by social-science based research and will thus move a step forward from being based on practitioner advice. In the future, discussions of the advantages and disadvantages of particular methodological approaches – including combinations of futures methods - will become evidence-based."

## **Appendix**

Linkert Scales 1-5 (1-disagree; 5-fully agree)

The future of this [department/division] is uncertain

The board demonstrates a learning culture

There was executive support for undertaking the scenario planning exercise

There was adequate time in the workshop to explore future uncertainties

The scenario planning is likely to be continued

Workshop participants represented a range of professional backgrounds

The scenario narratives are a memorable set of stories

The workshop provided a safe space for expressing divergent views

The process has helped to articulate the assumptions underlying this [department/division]

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The detailed analysis of environmental factors helped me to see things differently

Having a set of contrasting scenarios broadened my view of what is plausible

The workshop left me more uncertain about this [department/division] future would be like

Exploring plausible future scenarios affected how I see the forces that could shape this [department/division] future

Open Ended Questions:

If you found that the workshop affected how you see the future environment of this [department/division] and what local partners should do in response, please describe up to three aspects of the workshop that contributed to this

In what specific ways has your thinking about the MCP and its environment changed as a result of the scenario work?

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	<b>Chermack, 2011</b>	<b>Wilson and Ralston, 2006</b>	<b>Linneman and Kennell, 1977</b>	<b>Schwenker and Wulf, 2013</b>	<b>O'Brien, 2004</b>	<b>Schoemaker, 1993</b>	<b>Ramirez and Wilkinson, 2016</b>	<b>van der Heijden, 2005</b>	<b>Schwartz, 1998</b>
<b>Project Preparation</b>	<ul style="list-style-type: none"> <li>Articulate the purpose</li> <li>Define scope and timeframe</li> <li>Build team and determine roles</li> <li>Articulate expected outcomes</li> <li>Construct the project proposal</li> </ul>	<ul style="list-style-type: none"> <li>Develop the case for scenarios</li> <li>Gain executive understanding, support and participation</li> <li>Define the decision focus</li> <li>Design the process</li> <li>Select the facilitator</li> <li>Form the scenario team</li> </ul>	<ul style="list-style-type: none"> <li>Determining the planning premises</li> <li>Pick a time horizon</li> </ul>	<ul style="list-style-type: none"> <li>Definition of scope</li> </ul>	<ul style="list-style-type: none"> <li>Set the scene</li> </ul>	<ul style="list-style-type: none"> <li>Define the issues (time frame, scope, decision variables)</li> </ul>	<ul style="list-style-type: none"> <li>Defining the purpose and intended use of the scenario planning engagement</li> </ul>	<ul style="list-style-type: none"> <li>The practitioner's art</li> </ul>	<ul style="list-style-type: none"> <li>Identify focal issues or decision</li> </ul>
<b>Scenario Exploration</b>	<ul style="list-style-type: none"> <li>External and internal analysis</li> </ul>	<ul style="list-style-type: none"> <li>Gather available data, views and projections</li> </ul>	<ul style="list-style-type: none"> <li>Take a hard look at the past</li> </ul>	<ul style="list-style-type: none"> <li>Perception Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Generate uncertain and predetermined factors</li> </ul>	<ul style="list-style-type: none"> <li>Identify major stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Designing and scoping the engagement</li> </ul>	<ul style="list-style-type: none"> <li>Articulation of the business idea</li> </ul>	<ul style="list-style-type: none"> <li>Key forces in the local environment</li> </ul>
	<ul style="list-style-type: none"> <li>Analyse the business idea</li> </ul>	<ul style="list-style-type: none"> <li>Identify and assess key decision factors</li> </ul>	<ul style="list-style-type: none"> <li>State assumptions</li> </ul>	<ul style="list-style-type: none"> <li>Trend and Uncertainty Analysis</li> </ul>		<ul style="list-style-type: none"> <li>List current trends or predetermined elements</li> </ul>		<ul style="list-style-type: none"> <li>Competitive positioning</li> </ul>	
<b>Scenario Development</b>	<ul style="list-style-type: none"> <li>Brainstorm the major forces</li> </ul>	<ul style="list-style-type: none"> <li>Identify the critical forces and drivers</li> </ul>	<ul style="list-style-type: none"> <li>Determine key variables</li> </ul>	<ul style="list-style-type: none"> <li>Scenario Building</li> </ul>	<ul style="list-style-type: none"> <li>Reduce factors and specify factor ranges</li> </ul>	<ul style="list-style-type: none"> <li>Identify key uncertainties</li> </ul>	<ul style="list-style-type: none"> <li>Defining and sketching the scenario drafts</li> </ul>	<ul style="list-style-type: none"> <li>Scenario development</li> </ul>	<ul style="list-style-type: none"> <li>Driving forces</li> </ul>
	<ul style="list-style-type: none"> <li>Rank by impact and uncertainty</li> </ul>	<ul style="list-style-type: none"> <li>Conduct focused research on key issues, forces and drivers</li> </ul>							<ul style="list-style-type: none"> <li>Determine plausible ranges for variables</li> </ul>
	<ul style="list-style-type: none"> <li>Develop scenario logics</li> </ul>	<ul style="list-style-type: none"> <li>Assess the importance and uncertainty of forces and drivers</li> </ul>	<ul style="list-style-type: none"> <li>Choose themes and develop</li> </ul>						

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	<b>Chermack, 2011</b>	<b>Wilson and Ralston, 2006</b>	<b>Linneman and Kennell, 1977</b>	<b>Schwenker and Wulf, 2013</b>	<b>O'Brien, 2004</b>	<b>Schoemaker, 1993</b>	<b>Ramirez and Wilkinson, 2016</b>	<b>van der Heijden, 2005</b>	<b>Schwartz, 1998</b>
	Construct the research agenda	Identify key 'axes of uncertainty'			scenario details	Assess internal consistency and plausibility	Developing the scenario set and each scenario		Selecting scenario logics
	Define the plots and titles	Select scenario logics to cover the 'envelope of uncertainty'	Build scenarios		Check consistency	Eliminate non-credible scenarios and create two or more new ones			
	Write the scenario stories	Write the story lines for the scenarios							
<b>Scenario Utilisation</b>	Create communication strategy	Rehearse the future with scenarios	Develop strategies for each scenario	Strategy Definition	Present Scenarios	Assess stakeholder behaviour in scenarios	Translating and transplanting the scenarios to make them usable	Option planning	Implications
	Wind-tunneling, scenario immersion, etc.	Get to the decision recommendations	Check effectiveness of each strategy in each scenario		Assess impact of scenarios	Formalise in quantitative model	Embedding the scenarios to make them part of the organization's routines		
	Develop signals	Identify signposts to monitor		Monitoring	Develop and test strategies	Define decision scenarios	Sustaining the scenario planning effort	Institutionalising scenario-based planning	Selection of leading indicators and signposts
	Build resilience and robustness	Communicate the results to the organization	Select or develop an optimum response strategy						

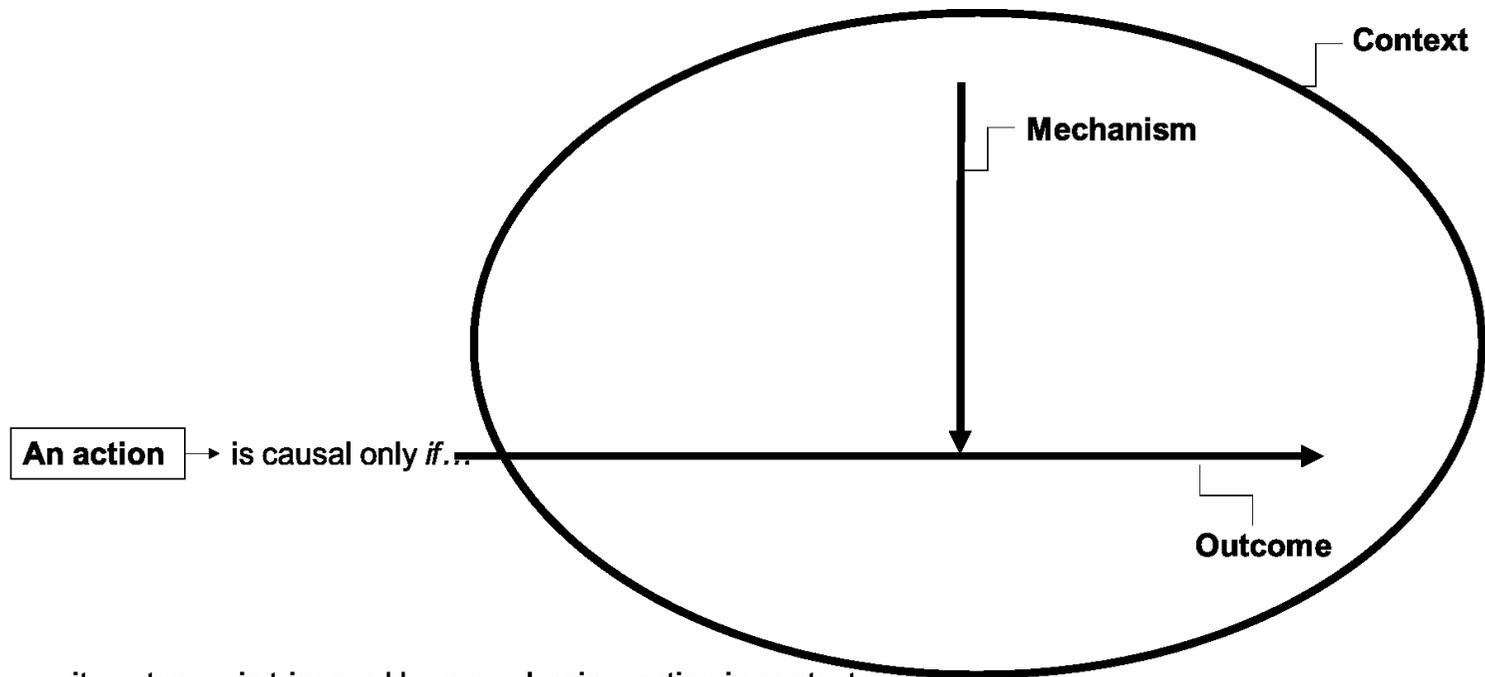
Table 1 - Synoptic View of Scenario Planning Methods

	<b>van der Heijden, 2004</b>	<b>Volkery and Ribeiro, 2009</b>	<b>Chermack, 2011</b>	<b>Wright et al, 2013b</b>
<b>opening up</b>	Making sense	Stimulating wider debate	Changed thinking	Enhancing understanding
	Anticipation	Getting stakeholder buy-in	Informed narratives/stories	

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		Triggering cultural change	Enhanced human and organisational learning	Challenging conventional thinking
closing down	Adaptive learning	Clarifying issue's importance/framing decision-making agenda	Improved decision making	Improving decision making
	Optimal strategy	Generating options	Improved performance	
		Appraising options		

Table 2 - Desired outcomes of scenario planning



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Figure 1 - Model of Generative Causation, based on Pawson & Tilley (1997, p.58)

Code	Context Name	Context Description	Source
C1	Uncertainty	Situations in which participants feel more uncertain about the future provide windows of opportunity for influencing their thinking.	Volkery and Ribeiro, 2009
C2	Learning culture	Organisations/teams that have a learning orientation may be more amenable to thinking differently about the future.	Chermack, 2011
C3	Leader support	Initiatives with strong executive support are more likely to be effective.	Chermack, 2011
C4	Adequate time	Adequate time needs to be allowed in the intervention for the depth of exploration, analysis and conversation that can impact participant thinking	Chermack, 2011
C5	Safe space	Possessing or creating an environment in which participants feels safe enables different views to be expressed and explored.	van der Heijden, 2004 Volkery and Ribeiro, 2009 Wright, 2013b
C6	Ongoing process	One-off interventions are less likely to support changes in individual or organisational perspectives or behaviours.	Volkery and Ribeiro, 2009 van der Heijden, 2004

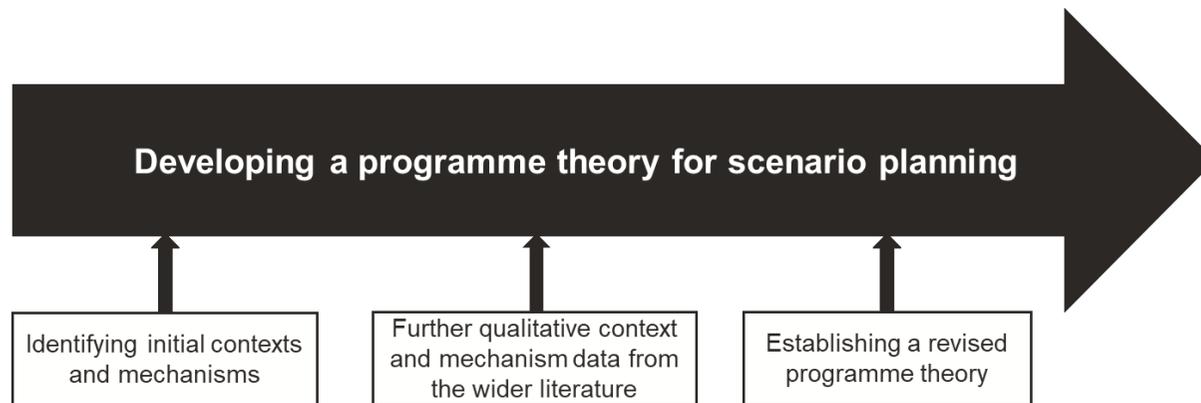
Table 3 Initial contexts

	<b>Mechanism Name</b>	<b>Mechanism Description</b>	<b>Source</b>
<b>M1</b>	Avoiding fragmentation	Not having to commit to/defend a singular view enables participants to explore alternative views of the future without fear of fragmenting their team, extending their mental models.	van der Heijden, 2004
<b>M2</b>	Making issues explicit	Developing multiple scenarios, presenting multiple multi-disciplinary representations of the issues involved, makes research issues explicit, leading to a new understanding of the organisation's environment.	van der Heijden, 2004
<b>M3</b>	Conversation	Through conversation, participant mental models interact and a shared mental model is developed.	Chermack, 2011 van der Heijden, 2004
<b>M4</b>	Memorable stories	The creation and diffusion of memorable scenario stories helps participants to remember and share information that can mitigate individual and corporate bounded rationality.	Volkery and Ribeiro, 2009 Chermack, 2011
<b>M5</b>	Articulating assumptions	Having to articulate existing assumptions about the organisation and its environment enables participants to identify inconsistencies in their thinking, challenging their mental models.	Wright, 2013b
<b>M6</b>	Detailed analysis	Engaging in detailed analysis of environmental driving forces and their causal relationships, forces participants to examine	Wright, 2013b Chermack, 2011

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	<b>Mechanism Name</b>	<b>Mechanism Description</b>	<b>Source</b>
		their existing perceptions, stretching their individual and shared mental models.	
<b>M7</b>	Contrasting scenarios	Developing and/or using multiple contrasting scenarios broadens participants' views of what is plausible, counteracting cognitive bias.	Wright, 2013b Chermack, 2011 van der Heijden, 2004
<b>M8</b>	Remarkable people	The input of 'remarkable people' into the scenario development process provides new information and insights which counter the availability bias.	Chermack, 2011
<b>M9</b>	Inductive development	Spinning stories around brainstormed events leads to novel storylines that would not otherwise have been imagined, challenging existing ways of thinking.	Volkery and Ribeiro, 2009
<b>M10</b>	Internal generation	Involving participants in generating, not just using, scenarios encourages them to own the analysis and engage with it more deeply.	Volkery and Ribeiro, 2009

Table 4 - Initial mechanisms



*Figure 2 - Developing a programme theory for scenario planning*

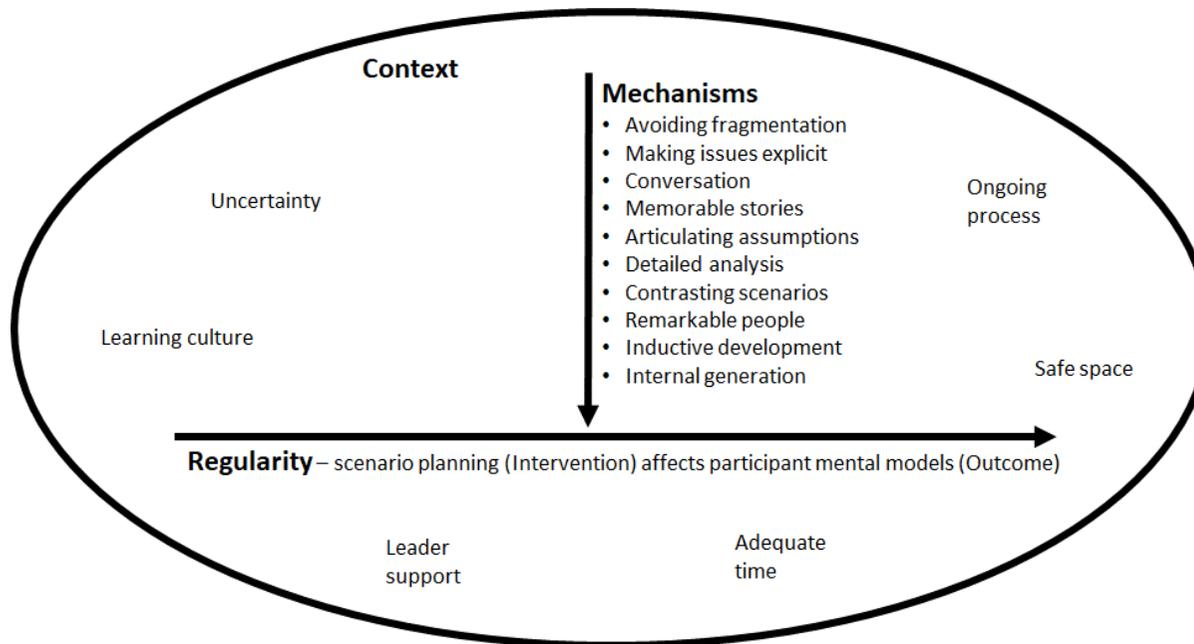


Figure 3 - Initial programme theory

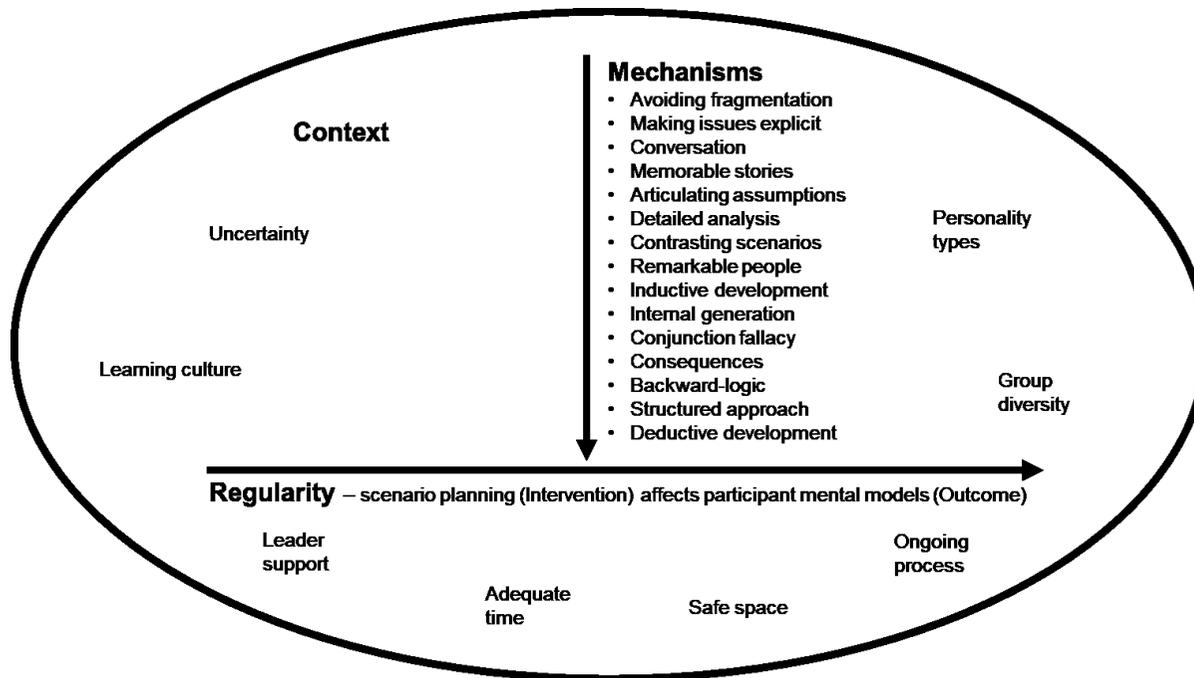


Figure 4 - Revised programme theory