Improving scenario methodology: theory and practice

Introduction to the Special Issue

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Abstract

In this Introduction, we review the logic that underpinned our earlier call for papers and compare and contrast the papers selected with those selected for a similarly-themed special issue of this journal that was published in 2013. We demonstrate changing research emphases and concerns and then go on to review the contents of the eighteen selected papers that comprise the current special issue.

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1. Introduction

In the call for papers for this special issue, we invited papers that focused on the scenario method in its widest sense, that documented the current status of its application and use, and that analyzed its future potential and prospects. Specifically we invited papers that considered the scenario method with a focus such as:

* Critical theoretical considerations of the method and its rationale

* Review of the use of the technique in specific applied areas, including evidence of impact on decision making and policy making

* Analysis and critical evaluation of variations in applications of the scenario method in different contexts, e.g., moving beyond the typical application of exploring the external environment for large

corporations to applications that encompass scenario planning for, say, governments, industries, or smaller-scale organizations

* Empirical studies comparing scenario method variants, or comparing some variant of scenario method with alternative approaches (e.g., forecasting)

* Novel elaborations of the method and critical appraisal of these - for example combinations with the Delphi technique and combinations with inputs from social media

* Consideration of future prospects for the technique

Our call for papers for the special issue was underpinned by the conference on "*Improving scenario methodology: theory and practice*" held at Warwick Business School, Coventry, UK on the 14th and 15th December, 2015. At that conference, sixty papers were presented and some were submitted for consideration for inclusion in this special issue. Other papers were submitted for consideration in response to the call for papers that appeared in TFSC at around the same time.

We received a variety of papers that responded to these methodological considerations and also provided critical reflection on the application of scenario methods across a variety of organizational and business contexts. In selecting the papers that we present here, we have sought to provide a broad and inclusive overview of current "hot topics" in academic research. In addition, many of the papers include case study analyses of practical applications of the new methodological improvements. The papers include those focused on: explicating aspects of the scenario development process; scenario method enhancement; combination of scenario method with other future-orientated or decision-focussed methodologies, and; improving decision making. These foci contrast with the foci that were prevalent in the earlier special issue of this journal on scenario methodology that appeared in 2013. In that special issue, the foci were on combination of scenario method with the Delphi technique, the role of scenarios in strategy development and evaluation, the interplay of actor motivations and behaviors within scenario storylines, best practice in scenario interventions within organizations, and use of scenarios in horizon scanning for weak but important signals of the future. Only one of the current papers (see Cairns et al.) uses Delphi as a component of the scenario development process and the use made is now seen as somewhat matter-of-fact - rather than as ground-breaking, as it would have been seen in 2013. In fact, the section of this special issue on "*Method Combination*" now illustrates the extent of effort expended in seeking useful combinations of methodologies. Combination topics include real options (see Favato and Vecchiato), systems dynamics modelling of an organization's capabilities and resources (see Kunc and O'Brien), and technology road-mapping (see Hussain et al.). Similarly, the topic of using scenarios to aid strategy development and analysis has, since 2013, received the attention of much research and is only dealt with here in the paper by Lehr et al. Attention now is on the use of scenarios to prompt decision making in multi-organizational interventions (see Cairns et al., Bourgeois et al., and Rhisiart et al. in the Section on "*Scenarios and Decision Making*"). The previous special issue's section on actor motivations and behaviours is taken up, in part, by two current special issue papers (see MacKay and Soyanova, and Heinonen et al.). Best practice issues are taken up by the Section on *"The Scenario Development Process"* (see the papers by Rowland and Spaniol, Burt et al., O'Brien et al., Fuller et al., Lang et al., and McKiernan) but the practice issues raised are now somewhat broader and more process–oriented than the papers that appeared in the earlier special issue. Horizon scanning is not a topic within the current issue and this area of interest has

been replaced, in part, by a focus on other types of scenario *"Method Enhancement"* – including expanding scenario content/coverage in energy use scenarios (see Kishita et al., Samadi et al.) and, importantly, development of an axiom-base for what has been, to date, a practitioner-derived tool (see Derbyshire).

We hope that you find our selection of paper interesting, informative and challenging.

2. The Scenario Development Process

The papers in this Section are practice focussed and provide insights into: required facilitation skills; indicators of the likely success of an ongoing intervention process; appreciation of the organizational context; importance of relationships between those involved in the intervention process, and; the cognitive requirements of scenario thinking.

Rowland and Spaniol focus on the phases of a scenario process – specifically on the transition between scenario creation and scenario use in decision making. These authors argue that the transition between phases can be managed by a facilitator and that linear phase/step/stage diagrams of the management process dominate the scenario literature. Nevertheless, in practice, the transition between phases is commonly an iterative process that is a product of explicit or implicit negotiation between facilitator and scenario team participants. Using a detailed case analysis, these authors document this negotiated process of co-production.

Burt et al. analyze the ongoing "strategic conversions" that can be facilitated by a scenario intervention within a single organization, as participants make sense of the future. Tensions and divergence between scenario team participants can act to facilitate or preclude changes in perceptions. These authors develop the concept of an "openness disposition" – which is defined as an individual or organizational ability to engage with multiple views of the future, rather than retain a singular viewpoint or seek early closure on an issue. The recognition and acknowledgment of "not knowing" in the face of ambiguity and uncertainty can be uncomfortable for some managers. These authors use a case study analysis to illustrate their conceptualizations.

O'Brien et al. focus on how to facilitate between-workshop activities in a case study of food futures for the geographical region around the city of Birmingham in the UK. They analyse the use made of social media - in particular "Twitter" – to facilitate both the live reporting of workshop activity and conversations between workshops. In many public sector scenario interventions, the workshop activity can be interspersed and take place over several months of elapsed time and, in such cases, social media can aid the development and communication of scenario content to both participants and outsiders. Their case analysis revealed that social media was utilised most by those involved in the core scenario team but can encourage wider participation and enhance the salience of a scenario project – but that the achievement of success in such outreach needs to be carefully thought-through by the central team.

Fuller argues that scenario planning activity in an organization is an example of an often intermittent intervention, whereas other "anticipatory" systems are in continuous use, in parallel, but may remain un-integrated, e.g., material and human procurement, new product development, borrowing and saving, etc. All these systems and activities both anticipate future states and change the current

state based on their anticipations – so called reflexivity. Individuals and organizations make decisions in the present, based on their predictions of the future. In short, predictions and imaginations of the future have a causal impact on present-day decisions. As such, any thought about the external future cannot, in Fuller's analysis, be treated as separate from consideration of an organization's present-day options and activities. Anticipation of the future is already implicit in an organization's everyday practices.

Lang et al. analyse the ability of scenario interventions to prompt the development of new "social capital" both within and between organizations. By social capital is meant novel networks and trusting relationships that bring new information and shared systems of meaning amongst the network's membership. The authors argue that scenario activity is a learning process, through which new social capital is built. Further, scenario activities (e.g., scenario team membership) can be deliberately structured so that social capital building is enhanced. The authors analyze the building of social capital links in three case studies - with a particular focus on the impact of scenario activities that reach beyond those directly involved. They demonstrate that the building of scenarios enables participants to learn about and accept the alternative perspectives of others in a "safe" learning space. Shared language is developed and the different functional area of an organization can become more connected and so provide future points-of-contact. Within scenario team participants, trust can develop and lasting relationships established. Learning together enables the creation of this social capital.

McKiernan focuses his paper on the Intuitive Logics scenario development method and argues that this approach shapes most futures work. His conceptual paper provides a rigorous analysis of current research in neuroscience that could underpin process improvements in scenario development methods. This research has shown that different regions of the brain are activated in the acts of remembering and in future imagining – episodic recall and mental simulation, respectively. Scenario thinking involves both types of cognitive activity at different stages of scenario development. McKiernan pays particular attention to likely individual and age-related differences between scenario team members, in terms of such mental capabilities and the practical development of scenario storylines. One key issue is the degree to which detailed, near-term, scenarios that are based on the cognitively easier recollection of the past may, inappropriately, seem more plausible than those scenarios with longer time-horizons.

3. Method enhancement

The papers in this Section provide an axiom base for scenario development, show the importance of understanding the perspectives of actors who are part of the scenario storylines, and demonstrate how extant energy scenarios can be improved.

Derbyshire demonstrates that the axiom-base of Shackle's (1979) 'Potential Surprise Theory' (PST) directly supports normative use of the Intuitive Logics scenario development method. By "normative", is meant that that use of the Intuitive Logics method is the optimal way of making decisions in the face of uncertainty – given each of the underpinning axioms are accepted as reasonable by the focal decision maker. This axiom-base thus promotes the Intuitive Logics scenario method to become a head-to-head competitor with Decision Analysis, with the latter's alternative

axiom base within Subjective Expected Utility Theory. Derbyshire links his conceptual analysis to the growing practitioner and academic interest in dealing with "deep uncertainty" and he notes that Shackle argued that, once time is taken into account, accurate forecasting is impossible because of the reflexivity noted in Fuller's (this issue) review. Shackle also makes reference to the importance of "constant elements" of the future - such as important prevailing trends and conditions (see also MacKay and Stoyanova, this issue). Notably, demonstrations of the "conjunction fallacy" in the subjective assessment of probability (Tversky and Kahneman, 1982) support Shackle's view that plausibility is the key underpinning of both intuitive and normative decision making - rather than the less-natural assessment of subjective probability constrained by the probability laws.

MacKay and Stoyanova focus on the treatment of causality and causal understanding within the scenario development process. They draw on sociology-based theory and separate out agent-structure interactions, showing how this focus can enhance understanding of the causal forces impacting the unfolding of future events. Here, powerful actors have no choice but to engage with extant social structures as they attempt to influence the future. These social structures can impede or facilitate actions. MacKay and Stoyanova then apply their conceptualization to a case analysis of a study of the "Future of the UK and Scotland". In the case of Scotland, social structuring of the future is already present in: the consistently high rates of spending on social welfare; the modest rates of entrepreneurial activity; and the social deprivation around centres of previously successful, but now lost, heavy industry.

Heinonen et al. apply a Causal Layered Analysis (CLA) game to aid the development of transformative energy scenarios in order to provide conditions for social learning in a workshop setting. The authors argue that their use of CLA gaming allows "immersion" in depicted futures, in a similar way to virtual reality simulations. During a 3-hour session, participants engage in a role-playing exercise by adopting the roles of "winners", "losers", etc. Relationships and conflicts emerge between the characters within a particular scenario and in-role worldviews develop and crystalize. Subsequent social network analysis enables the facilitators to understand a particular scenario's systemic logic – with its internal tensions and pressures for change, due to actor motivations. As such, emergent conflicts and alliances between actors can be anticipated. Heinonen et al. provide a new method for testing in-development scenarios for plausibility and for evaluating the potential of a particular part-unfolded scenario to underpin a radical transformation of the future.

Kishita et al. note that most existing energy scenarios are limited in their treatment of "resilience" – defined as the capacity recover swiftly from external shocks and/or provide an alternative energy source. Their paper focuses on the identification and development of cause-effect chains to separate plausible futures that are either resilient or fragile (i.e., specify a continuation or collapse in energy provision). Using a fault tree analysis approach, these authors start with an undesired event and, by backward chaining, identify earlier-in-time causation. Importantly, one step of their method is for workshop participants to brainstorm effective countermeasures to the unfolding of "collapse" futures - so that resilience is achieved. In a case study, they demonstrate the power of countermeasures such as the prior diffusion of small-scale, renewable energy generation sources, promotion of energy saving via increased use of public rather than private transportation, etc.

Samadi et al. focus on improving the theory and practice of energy scenario development by incorporating future lifestyle changes in the scenario development process in a way that facilitates

the provision of energy policy advice. Energy sufficiency is, they analyze, about "doing the right things" and they link their analysis to: changes in individual preferences and choices; changes in relative energy prices; and political decisions on energy use. They show that the use of scenarios allows a transparent analysis of the impact of such decisions on energy use. These authors demonstrate that recently-released global energy scenario studies pay little attention to energy sufficiency issues, in that individual/group behavioral change is often limited to change in transportation choices or assumed to be influenced by very extreme policy change. Other, plausible, lifestyle changes such as reduction in room temperatures, sharing/decreased use/ of household appliances, etc are infrequently considered. Samadi et al. end with a discussion of the utilization of a broadened range of energy scenarios to aid policy makers consider a broadened range of policy options.

4. Method combination

The papers in this Section illustrate the benefits of the combination of scenario thinking with: real options analysis; the mapping of the internal resources and capabilities of the organization, and; technology road-mapping.

Favato and Vecchiato provide the first combination of "real options" analysis with scenario method. They note that the qualitative scenario approach and the quantitative real options valuation method can achieve the quantification of the qualitative insights derived from a scenario-based intervention. Using the recently-developed pay-off method for real options analysis, they provide a detailed illustration of this integration in a practical format that only requires skills in simple math. Interestingly, the pay-off method for real options analysis utilises the decision maker's assigned degree of (fuzzy) possibility to extreme outcomes, rather than probability, and, as such, appears well-suited to use with Intuitive Logics scenario method – which is based on plausibility rather than probability. Using a case example from the pharmaceutical industry, these authors detail the steps within their new, integrated method. Notably, their new combination approach does not require calculation of the volatility of investment outcomes – and so transparency of the method is enhanced for non-quantitative users.

Kunc and O'Brien focus on combination of scenarios with resource mapping using systems dynamics modelling. They provide a step-by-step method of identifying and utilizing an organization's internal resources and capabilities in order to develop a causally-focused resource map of an organization's strengths and weaknesses. In parallel, the scenarios identify external threats and opportunities. In combination, these components allow evaluation of how the organization's current resources and capabilities interact with the competitive environment and provide suggestions for how the capability/resource base should be changed/developed to enable an improved resource complement. These authors illustrate their method combination within a teaching case example and a business case example.

Hussain et al. propose a revised combination of scenario analysis and technology road-mapping – the latter being widely used to support the development/analysis of new technologies in order to aid management sense-making for technology investment decisions. The authors identify limitations of previous combination efforts – where scenario utilization has been limited. Currently, technology

road-mapping often assumes a single, extrapolation-based, scenario rather than the possibility of multiple future trajectories. Hussain et al. develop the concept of "flex points "to link roadmaps with fully-developed divergent scenarios. Flex points are potential developments within a scenario storyline that would have a major impact on the development of the focal technology. Using a case analysis of a major technology issue within the UK National Health Service, these authors demonstrate the benefits of their integration of exploratory scenario planning with normatively-orientated road-mapping.

5. Scenarios and decision making

The papers in the Section illustrate how scenarios can be utilized to prompt action and decision making in both single organization contexts and in multi-agency contexts.

Bourgeois et al. focus on a "grassroots" foresight initiative within the farming communities of India, Indonesia and the Phillipines. Their concern was to facilitate members of these communities to take a major role in determining their own future – by becoming empowered and so pro-active. As such, forward thinking might enable action to determine the future. In their three case analyses, these authors document the creation of positively- and negatively-valenced futures. The positive futures were, in part, the result of potential actions by the local communities. This potential for action was documented within the local discussion and in the real actions that followed the participants' selection of a preferred scenario from a set of developed scenarios. The authors concluded that "futures literacy" has the capability to instigate local agency empowerment in order to achieve societal transformation.

Cairns et al. focus their case analysis on a scenario intervention in Tasmania, Australia. Their mult-agency intervention attempted to provide an impetus for the economic and social regeneration of the region. Tasmania had, in their analysis become "locked in " to extant structures and outcomes and, so, resistant to change. Well aware of the time constrains of their senior-level participants, Cairns et al. utilised part pre-written scenarios and an asynchronous Delphi process to limit group-based time commitment. Their intervention process was designed to invoke a "jolt" to path-dependent behavior - but the result was less successful than these authors anticipated. The authors analyze the reasons for this outcome and, from this, develop a new, more focused, intervention design to promote local agency to achieve the commonly-held objectives of senior-level participants.

Rhisiart et al. focus on the issue of making a scenario intervention impactful. To achieve this, they tracked how the UK Commission for Employment Skills'(UKES) scenario project on the "Future of Work 2030" used foresight activities for policy making in the two years after the scenario activity ended. These authors found that their project report was the most downloaded of all reports produced by UKES and was widely disseminated and used within Government and educational colleges – but was less widely utilised by employers. They concluded that the reporting of the scenario-based results in attractive, accessible, visually-oriented ways - coupled with the engagement and support of well-known leaders, from both industry and the trades unions, helped to generate this impact.

Lehr et al. focus on the practicalities of scenario-based decision making in top management teams. They develop and document a new method for team-based use that is transparent and requires straightforward judgments. Their approach is based on the decomposition of judgment and subsequent visualisation of the decomposition elements. The first component of their method is that of understanding the organization's key objectives and the degree to which these are attained by particular strategies across the range of constructed scenarios. The second component is an evaluation of the robustness/fragility of a particular strategy – which may perform well across all scenarios or perform well in less. Their "Parmenides Matrix" plots the degree to which a particular strategy performs well - in terms of level of objectives that *could* be attained - against that strategy's degree of robustness across all developed scenarios. In two case analyses, these authors document the acceptability of their approach to top managers.

6. Conclusion

Overall, the eighteen papers in our special issue provide us with insights into the state-of-the-art in current research endeavors. Social-science-based research is informing and underpinning new developments in scenario methodology. As such, scenario methodology is becoming less of a practitioner-based tool and becoming more of a thoroughly-researched and justified approach to making decisions in the face of uncertainty. Derbyshire's paper (this issue) on the axiom base of the Intuitive Logics scenario method is, perhaps, most indicative of this new momentum. The new combinations of scenario thinking with other methodologies illustrate the dynamism of the scenario movement. Concern with method enhancement and concern with process improvements complement this momentum.

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