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Enhancing horizon scanning by utilizing pre-developed scenarios: Analysis of current practice and specification of a process improvement to aid the identification of important 'weak signals'

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ABSTRACT

This paper documents the Intuitive Logics scenario planning process and its relationship with horizon scanning activity in order to evaluate the separate and joint usefulness of these methods for anticipating the future. The specific objectives of this paper are to: (i) *identify* and *differentiate* scenario planning and horizon scanning methodologies (ii) *discuss & evaluate* their analytic underpinnings, and (iii) *critically appraise* their separate and combined value and effectiveness in relation to enhancing organizational preparedness for the future. Our analysis culminates with specifications to (iv) *enhance the identification of 'weak signals'* in Horizon Scanning by utilizing a systematically broadened range of both negatively-valenced and positively-valenced scenario storylines.

1. Introduction

Foresight activities are designed to push the boundaries of human perception and engender long-term critical thinking as individuals envision desired states, formulate strategies to address the consequences of current actions, and identify and avoid negative futures (Slaughter, 1995). In order to anticipate important shifts and events, organizations must continuously scrutinize and have deep knowledge of the driving forces that influence environmental changes, and better understand the associations, dynamics and interactions between these (Martelli, 2014). Similarly, they must be able to identify emergent patterns still in the infancy of their emergence, separating out those considered to signal important future changes from those merely representative of randomness or 'noise'. However, while it is therefore essential to consider and prepare for futures for which there is some present evidence, and for which presently-existing driving forces might therefore be identified, it is also important to consider potential futures which are *not* leaving any evidential trace in the present – the latter being the most profound source of uncertainty, representing so-called 'unknown unknowns'.

Scenario Planning (SP) is a strategic foresight tool that is designed to explore and anticipate change, by challenging planners' beliefs and perceptions (Ringland, 2006; Schwartz, 1996; Van Der Heijden et al., 2002). It is claimed that the approach has many cognitive, strategic and competitive advantages (Meissner and Wulf, 2013; Postma and Liebl, 2005; Ramirez et al., 2013). SP facilitates a consideration of the future that is embedded in present evidential circumstances, but does not confine consideration of the future to a straightforward projection of these present developments as, for example, forecasting might. Instead, it facilitates consideration of how developments that begin in present evidential circumstances might play out in different ways such that present circumstances are transformed in some way, leading to a future that is very different from the present (Derbyshire and Wright, 2017).

Horizon Scanning (HS) also eschews the attempt to create *projections* of the future; it instead aims to continuously and objectively explore, monitor and assess current developments and their potential implications for the future (Miles and Saritas, 2012). The HS approach has been integrated with the scenario planning approach to engender continuity and give on-going purpose to scenario narratives (Ramirez et al., 2013; Schoemaker et al., 2013). Practitioners argue that their integration provides greater benefits, enhances preparedness and increases value for organizations, than does either in isolation. The present paper seeks to evaluate these claims by providing a review of scenario planning and horizon-scanning processes in order to determine their individual and combined success and value in practice.

The paper concludes by setting out an approach to enhance the

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identification of 'weak signals' in Horizon Scanning by utilizing a systematically broadened range of both negatively-valenced and positively-valenced scenario storylines, leading to a fully combined and integrated scenario planning and horizon scanning approach to consideration of the future. Essentially, the scenario process is used to identify potential weak signals that might be presently evidenced through horizon scanning if the scenario were indeed representative of an emergent, potential future.

2. Scenario planning

2.1. Intuitive Logics

Scenario planning (SP) is a collaborative process to envision alternative future environments, articulate their implications, test the logic of long term plans, strategies and policies (O'Brien et al., 2007; Ringland, 2002; Schwartz, 1996) and, ultimately, prepare for impending change, using plausible and consistent narratives about the future (Porter, 1998). In this view, a single scenario gives one view of the future - whereas multiple scenarios depict a number of prospects and deepen the focus, expression and understanding of possible changes and developments (Fotr et al., 2015; O'Brien et al., 2007; Schwartz, 1996). By considering multiple possible scenarios, recognition is given to the indeterminate and emergent nature of the future, in contrast to forecasting-based approaches to consideration of the future, which often simply extrapolate on the basis of present and past trends.

The Intuitive Logics (IL) approach to SP is without dispute the most used and documented scenario approach. According to Martelli (2001), the majority of practitioners favour this approach as it is flexible, capable of identifying emergent patterns, generates new ideas, makes use of any available information about the future, and can be used in any organization, context or setting. In its many methodological variations, the approach can be conducted in as few as six steps (Ringland, 1998; Ringland, 2002; Ringland, 2006; Schwartz, 1996), or as many as fourteen (Godet, 2000; O'Brien et al., 2007), with some activities focusing purely on scenario development and others emphasizing the additional development of strategies that are robust against the range of constructed scenarios.

The IL approach is usually conducted in a workshop setting and, according to Martelli (2014), there are as many ways to conduct the IL approach as there are practitioners. Despite this, there are some common activities that are performed in the process (O'Brien et al., 2007; Ringland, 2002; Schwartz, 1996). These are graphically depicted in Fig. 1:

Problem definition: In this stage, the purpose of the SP exercise is defined and participants brain-storm to identify key uncertainties and pre-determined elements of the future.

Scenario development: In this stage, planners derive themes to outline scenario logics and develop reliable and credible descriptions of events by causally linking the driving forces in a plausible and consistent manner. This is seen as the heart of the scenario process, since strategy development and future plans hinge on the credibility of scenario narratives.

Strategy development: After scenario development, planners evaluate current and in-development strategy against the developed scenarios. The entire process is designed so that, at every stage, participants' perceptions are challenged.

2.2. Perspective-broadening effects from scenario planning

Practitioners and academics imply a host of cognitive, communicative and cultural benefits that result from the use of scenarios, arguing that it encourages organizational change by leveraging different opinions to create a shared view of the present and future (Mason and Herman, 2014; Schoemaker, 1995; Van Der Heijden, 2005). SP is professed to improve awareness as it promotes strategic thinking in terms of systems and interactions (Martelli, 2001), raises complex questions and discussions (Fink et al., 2004; Van Der Heijden, 2005), fosters creative foresight to rethink strategies and plans; especially in times of accelerated or anticipated changes (O'Brien et al., 2007), helps organizations cope with sudden shifts by accumulating knowledge and integrating it into the future actions (Peterson et al., 2003; Vacík et al., 2014); by allowing them to leverage internal resources, competencies and capabilities, especially if an unfavorable future were to materialize, reduce cognitive biases, enhance organizational learning, and improve the quality of decision making (Bradfield, 2008; Haeffner et al., 2012; Meissner and Wulf, 2013; Schoemaker, 1993) by emphasizing the need for flexibility in uncertain environments.

2.3. Potential perspective-narrowing effects from scenario planning

According to Mintzberg (2003), and in contrast to the implied positive effects discussed above, SP can limit an organization's ability to be responsive as it encourages managers to observe and wait for preconceived events to unfold; thus an organization and its managers may be unable to recognize and act on unexpected changes that have not been considered, limiting ability to prepare for the future. If the organization perceives that the future will only unfold according to their derived scenarios, then there may be increased vulnerability to surprise events (Mason and Herman, 2014; Ringland, 2002), which is the opposite of SP's intended purpose. Here, the organizational focus may be on the most likely or favored scenario. So, instead of opening minds and perceptions, SP interventions can act to narrow views of the future (Derbyshire and Wright, 2014; Neugarten, 2006). Further, the identification of essential components of the scenarios (driving forces, uncertainties and trends) can be influenced by the scenario developers' most recent experiences (Derbyshire and Wright, 2014; O'Brien et al., 2007; Ringland, 2002; Schoemaker, 1995; Wright and Cairns, 2011; Wright et al., 2013), leading to so-called 'recency bias'. The result may be easily-conceived but unsurprising scenarios that do not consider a broad range of futures. Indeed, most writers agree that a quality SP process is dependent on the facilitator's skills (Giaoutzi and Sapoio, 2013; Martelli, 2001) and the ability to recognize when bias from recent experiences will influence SP activities.

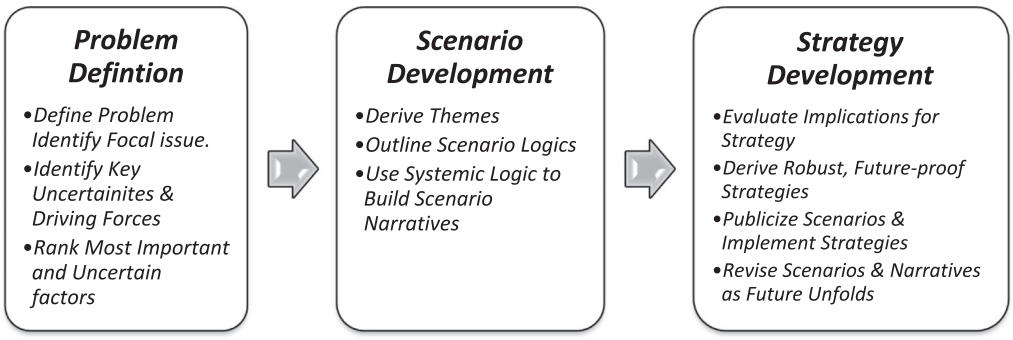

Fig. 1. Intuitive Logics process (Adapted from O'Brien et al., 2007; Ringland, 2006; Schwartz, 1996).

In an effort to address some of the aforementioned issues, practitioners have sought to combine the SP method with other techniques. The focus in recent times has been on those techniques that can enhance the purpose and continuity of SP initiatives. One such technique is horizon scanning, to which we now turn.

3. Horizon scanning

3.1. The strategic early warning system and weak signals

The use of Horizon Scanning (HS) is intended to develop an organization's capability for identifying subtle environmental changes, allowing organizations to cultivate a high awareness and understanding of their environment, leading to a quick and effective response to changes and events (Miles and Saritas, 2012). While there is no current consensus on the exact meaning of the term 'horizon scanning', Garnett et al. (2016) describe HS as the comprehensive and systematic examination of risk, uncertainty and emerging trends, in order to reframe perceptions and identify implicit and explicit assumptions about the future.

The origins of HS lie in environmental scanning, strategic foresight and Ansoff's (1975) Strategic Early Warning System (SEW). Strategic foresight activities aim to envision future states, and identify emergent trends at an early stage of their emergence, as-well-as giving consideration to the implications of present actions and decisions on future events (Slaughter, 1995). In particular, the SEW system is intended to aid strategic foresight activities by identifying 'weak signals'. A 'weak signal' is an ambiguous, seemingly unimportant or unexceptional trend that can considerably impact an organization's aims and objectives, but requires correct interpretation (Godet, 1994); after interpretation it then becomes an early warning signal (Lesca and Lesca, 2011). Weak signals are not easily identified or appropriately interpreted (Derbyshire, 2016; Fink et al., 2004; Tessun, 1997). It follows, then, that the ability to identify and correctly interpret the implications of weak signals is crucial to horizon scanning, its efficacy as a tool to aid consideration of the future being dependent on this ability.

Authors sometimes use the terms 'environmental scanning' (ES) and 'horizon scanning' synonymously, or view the latter as a subset of the former (Miles and Saritas, 2012); however, there are some key differences between the two. ES is concerned with monitoring and perusing an institution's *current* macro-level environment - i.e., the political, economic, social, technological, natural and legal, and competitive landscape - for changes, trends, opportunities and threats (Choo, 2002). ES is an ongoing process, where departments uncover and share recent or upcoming developments with the wider group. ES usually supports short-term decision making as its primary objective is usually to acquire industry specific and competitive information (Choo, 2002; Miles and Saritas, 2012; Ramírez and Selsky, 2014).

By contrast, HS adopts a *long-term* orientation to probe novel concerns and emerging driving forces within a future context (Miles and Saritas, 2012); for this reason it is considered a foresight activity (Schoemaker et al., 2013). Like SP, practitioners claim its true value lies in enhancing the 'cognitive agility' of planners by extending long-term thinking and exploring future developments (Marsh et al., 2014).

3.2. The horizon scanning process

The HS process is mostly data driven and entails noticing changes (Neugarten, 2006), gathering information and evidence on these developments, interpreting and validating the findings and using them to make informed decisions and policies (Marsh et al., 2014). HS practitioners employ bespoke means of organizing and interpreting the information they gather to enhance organizational knowledge. As with SP, there is no agreed-upon standard methodology. However, even with the differing approaches, there are common activities that are performed within the process and these activities are depicted in Fig. 2:

Exploration: The first phase and entire process involves exploration via continuous information gathering, monitoring and scanning of the external environment. This activity can be automated, web-based or manually conducted in workshops or brainstorming sessions. Upon noticing changes, developments or perceived weak signals, managers will focus their attention on the organization's concerns associated with these changes, organizing, prioritizing and managing information to determine what is pertinent to the perceived issues. During this process, relevant information is transformed into evidence that is used to assess the key issues and concerns.

Assessment: In this second phase, planners must go beyond what is known or assumed about the issue to clearly assess the value of the evidence and its implications for the future.

Application: This phase involves disseminating the outcome of the assessment phase to aid in foresight activities, strategy and policy creation or revision, risk analysis and decision making. The results of HS are often used in periodic updates or annual reports to inform the organization of drivers of change, inhibitors and enablers of future objectives, emerging research themes and research topics that lead to new areas of enquiry (Garnett et al., 2016).

The final stage requires the organization to continue the HS activities to continually enhance organizational knowledge and the decision-making process. But, as Cunha et al. (2006) explain, as time passes, organizational knowledge has temporary validity and so contemporary strategic plans and understandings of the environment can become unrelated. As such, all planning and monitoring needs to be a continuous, integrated process so that current strategies and decisions reflect current and probable developments.

3.3. Criticisms of the horizon scanning approach

A criticism that has been levelled at HS is that it is an unsystematic process that eventually leads to information overload and so, in actuality, adds little in value to organizational knowledge (Schoemaker et al., 2013). Herbert Simon noted that a wealth of information inevitably means a dearth of something else - a scarcity of whatever information consumes; and what information consumes is attention (Simon, 1971). Large amounts of information do not necessarily translate into a higher-level of knowledge for this reason; the production of knowledge from information requires that a signal is sifted out from meaningless 'noise' (Silver, 2012). The more information available, the more difficult this becomes. Kahneman (2011, p.241) has shown how humans are not very good at this sifting task, and that statistical algorithms 'greatly outdo' humans at it, especially in information-rich environments. Statistical algorithms are more likely than humans to identify 'weakly valid clues' (Kahneman, 2011, p.241; Makridakis and Bakas, 2016). Taleb (2001) similarly noted the human tendency to identify patterns in data, even where none exist.

How, then, can important but, at present, weakly-indicated signals be recognised? And how can the human tendency to see spurious patterns in information be avoided? Postma and Liebl (2005) suggest searching for something without knowing what it is and where to find it. Based on Postma and Liebl's (2005) view, this is like finding a legendary artefact; it may be valuable, but that value can only be appraised by those with the skill, knowledge and expertise to do so. Yet, such an approach is likely to exacerbate the tendency to identify spurious and meaningless patterns. Schultz (2006) contends that the identification of a weak signal is an 'entirely judgemental pursuit' with little or no guidance to justify identification, yet this too is likely to leave us susceptible to the same danger of misidentification. Furthermore, even if correctly identified, the importance of, and actions towards the signal need to be understood and initiated within an organizational context that is, in any event, likely to be concerned with current day-to-day problems and issues (Hodgkinson and Wright, 2002; Wright and Cairns, 2011).

Indeed, what may be referred to as 'organizational receptiveness' is

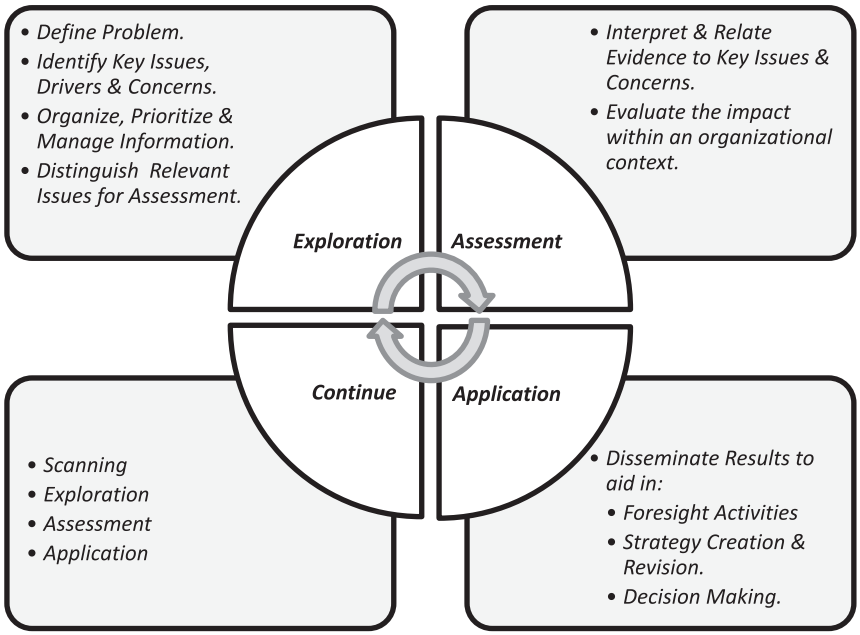

Fig. 2. Horizon scanning process.
Adapted from Miles and Saritas (2012), Neugarten (2006) and Marsh et al. (2014).

a fundamental problem, and one that renders the *correct* identification of weak signals highly problematic. The *information gathering* component of the HS process is quite straightforward; but organizations must develop capabilities to sort through the noise surrounding the key information that is generated. Ramirez et al. (2013) explain that as informational sources increase, so do the number of 'potentially relevant' issues and concerns identified within it. Moreover, conflicting information renders it challenging to justify strategic and operational adjustments (Ilmola and Kuusi, 2006). The result can be 'information paralysis' – either over-analysis of trivial findings or under-analysis of important findings (Schoemaker et al., 2013).

The *exploration and assessment phases* in HS are also highly subjective, and are prone to the cognitive bias of selectively discarding or retaining information that either support current beliefs or disconfirm other's beliefs about future developments (Cunha et al., 2006; Meissner and Wulf, 2013; Wright and Cairns, 2011). HS operatives tend to be low in the organizational hierarchy and may face issues of lack of insight into, and awareness of, senior managers' concerns.

What these many difficulties bring into question is the ease with which the signal and the noise can be separated in HS, so as to identify important weak signals. Day and Schoemaker (2004) suggest the solution to this problem to be strong 'peripheral vision'. The notion was introduced to management theory in 2003 and has since amassed a great deal of attention in strategic planning and foresight.

Conceptually, these authors argue that in order to understand relevant developments and become more responsive to the ever-changing business environment, organizations need to 'immerse themselves in the periphery', since events that are outside of an organization's focal interests may have the greatest impact on its survival (Haeckel, 2004; Neugarten, 2006). Authors emphasize parallels between human visual capabilities and those of an organization, referring to blind-spots, 20/20 vision, active and passive vision and attentional blindness (Neugarten, 2006). It is important to recognize that objects in the visual periphery are ambiguous, blurred and distorted; however, when attention is directed towards the object, it becomes clear and more easily interpreted. The theory espouses that this is also applicable to organizations, since shifting their focus towards events on the periphery brings them into focus, but creates blind spots and obscurities in other directions (Day and Schoemaker, 2004). However, this viewpoint, especially with respect to 'blind-spots' which are a key theme in peripheral theory, assumes that an organization is like an individual with limited attentional capabilities. Attentional resources are always bounded and never infinite (Simon, 1971), meaning that focus applied in one direction inevitably reduces focus applied in another. Indeed, Herbert Simon's concept of 'bounded rationality' is a key one in this regard.

Practically, the organization must scan and evaluate distant or seemingly unrelated external events, that are beyond their traditional environment – events that may lead to potentially advantageous or problematic situations (Neugarten, 2006; Sarpong and Amankwah-Amoah, 2015). The objective is to broaden an organization's awareness, an activity that requires practise and relies on judgement (Day and Schoemaker, 2004; Day and Schoemaker, 2005). In organizations, peripheral visioning can entail engaging in seemingly unrelated, non-standard activities. For example, the US Army developed a free online computer game to gain insight into identifying, screening and training potential candidates. At the time, the method was questioned as it was, at first, seen to be a trivial and unrealistic means of adding knowledge to the army; but the programme had several unforeseen benefits. Tens of thousands of players passed the virtual bootcamp and completed more than one hundred million tactical missions that allowed strategists to observe the tactics of the best players and use them to develop new strategies for street warfare or close combat situations (Brown, 2004). Thus, this peripheral activity and its resultant benefits became salient to the US Army. It is, though, unknown whether such peripherally-focused concern and activity is a standard procedure within the US Army. In our view, identification of such peripheral signals – even when observers are sensitized to the importance of the underlying issue - requires creativity and often, perhaps, luck. We will return to this issue in the Section 6.1 of this paper.

4. Comparative analysis of scenario planning and horizon scanning processes

When the SP & HS processes are juxtaposed similarities become apparent (see Fig. 3). Both the IL approach to SP and the HS activity typically commence with a brainstorming session in which stakeholders share ideas and views to define the focal issue. This is often the viability of the focal organization over a pre-defined time-period in the case of the IL approach to SP or, for HS, is often a key revenue-generating activity of the focal organization. Both SP and HS approaches identify/consider the drivers (i.e., trends or critical uncertainties) in the external

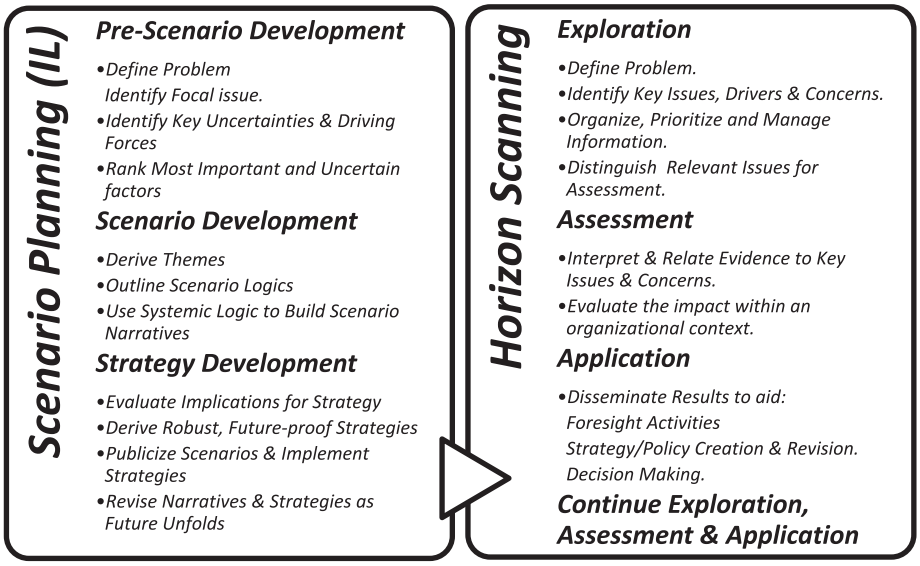

Fig. 3. Comparison of methodologies.

environment that can impact the focal issue, and then use these drivers as the basis for identifying particular signals of change (Garnett et al., 2016). Within the IL SP process, the identified uncertainties are organized according to both degree of importance and degree of predictability and then used as the framework for scenario development. In the HS process, a stage occurs in which particular change-related information is gathered, over time, on particular set of driving forces.

The second phase of both activities involves using perceptions and judgement to consider the impact of possible future events on the focal issue of concern. HS uses perceptions as a means of interpreting current developments and their implications for the future, whereas the IL SP approach can be characterized by thinking-through the relationships between driving forces in order to develop relatively independent clusters that preserve both time precedence and causal influence/impact. An important difference here might therefore be that the basis for thinking about the future in HS is *current* developments in terms of how identified driving forces are *presently* playing out and bringing change, albeit they are still at an early stage of their unfolding. In SP, by contrast, the uncertain way in which driving forces are assumed to interact and play out is not *necessarily* based on current developments, and how the identified driving forces are playing presently, thereby giving freer range to consider future possibilities not currently manifest in present empirical trends or causal patterns. The implication is that HS used in isolation only allows for consideration of those parts of the state space of all possible futures currently leaving an empirical trail in the forms of weak signals and emergent combinations of causes. SP, by contrast, allows for a broader consideration of this state space, giving free range to imagine causes that are not manifesting themselves empirically in the present.

In the third phase, those facilitating scenario interventions in organizations often turn to aid the development of robust strategies - strategies that perform well across the range of constructed scenarios. By contrast, in this phase, horizon scanners disseminate what they deem as relevant findings to others (often more senior) in the organization - perhaps to be utilized in other foresight activities, which could, in fact, include a scenario planning exercise or could simply be giving consideration to policy/strategy in a less-structured way. Thus, HS is explicitly expected to be an on-going process; whereas SP activities can have varying agendas and may be a one-off rather than continuous process.

We turn now to a consideration of how SP and HS can be better integrated so as to provide a holistic consideration of the future that allows room for both consideration of possibilities *not* presently based on empirically-observable trends or causes, leading to a more global robustness, *and* consideration of potential futures that *are* leaving a present empirical trace in the form of weak signals and sets of observable causes. By combining SP and HS, a combined local and more global robustness can be better achieved than is achievable through the use of either one in isolation (Fig. 4).

5. Integration of scenario planning and horizon scanning

Fink et al. (2004) claim that SP can play a significant role in organizing and prioritizing HS processes, since SP can (i) set the context for subsequent HS, and (ii) define the scope and extent of the environmental monitoring system. Conversely, HS activities provide scenario interventions with a continuing organizational purpose – allowing SP to become an organizational activity that is used to integrate HS activity outputs (Schoemaker et al., 2013). Furthermore, HS can act as a means to evidence created scenarios, ensuring they have relevance to current circumstances and strategy, rather than simply providing an opportunity for blue-sky thinking about a distant future devoid of any present applicability.

HS is, after the stage of selecting particular weak signals to be monitored, often focused on the collection of objective data that is linked to these signals, in comparison to the largely judgmental approach of IL SP. HS therefore allows for the empirical evidencing of the possibility for created scenarios to transpire, based on changes already underway, which can be useful for galvanising the attention and resource needed to action any important insights that may have emerged.

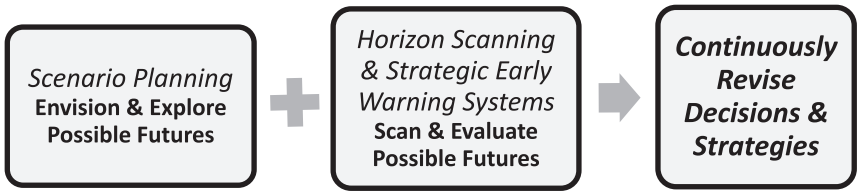

Fig. 4. Integration of approaches.

Table 1
Existing research on the integration of SP & HS in practice.

Study	Case example	Context	Method	Conducted
Amanatidou et al. (2012)	Emerging Science and Technology project	Public policy	Case study	Both
Boe-Lillegraven and Monterde (2015)	Cisco Systems Inc.	Technological	Case study	Both
Day and Schoemaker (2005)	Multiple contexts	Business strategy	Conceptual framework/ proposition	Both
Garnett et al. (2016)	Department for Environment, Food and Rural Affairs (Defra)	Public policy	Case study	Academic
Habegger (2010)	Three EU countries	Public policy	Comparative case study	Review
Ilmola and Kuusi (2006)	Energy company	Business strategy	Case study	Academic
Kayser and Bierwisch (2016)	Social media	Foresight practices	Empirical	Academic
Kováříková & Grosová (2014)	Metal processing industry	Foresight practices	Empirical	Academic
Miles and Saritas (2012)	Multiple contexts	Health policy	Literature review/critique	Academic
Oliver Schwarz (2005)	Anonymous Company & Industry	Business strategy	Case study	Academic
Palomino et al. (2012a, b)	Multiple contexts	Foresight practices	Literature review/critique	Both
Palomino, Taylor, Owen & McBridge (2012b)	Multiple contexts	Health policy	Literature review/critique	Academic
Pang (2010)	Social Media	Foresight practices	Literature review/critique	Academic
Ramírez, Österman & Grönquist (2013)	Technology & Oil Industry	Business strategy	Case study	Academic
Rossel (2011)	Multiple contexts	Business strategy	Literature review/critique	Practitioner
Saritas and Smith (2011)	National context	Public policy	Survey	Both
Schoemaker et al. (2013)	Security & Defence	Business strategy	Case study	Academic
Schultz (2006)	Multiple contexts	Business strategy	Conceptual framework/ proposition	Practitioner
Tessun (1997)	Competition in the automotive industry	Business strategy	Case study	Practitioner
van Rij (2012)	Multiple contexts	Foresight practices	Literature review/critique	Academic
van Rij (2010)	UK, Netherlands & Denmark	Public policy	Case study	Practitioner
Weber et al. (2012)	Future-oriented technology analysis (FTA)	Technological	Conceptual framework/ proposition	Practitioner

Often, HS web-based systems allow continuous data and information retrieval so organizations can capture and monitor developments in real-time, and adjust policies and strategies in light of those changes (Garnett et al., 2016; Miles and Saritas, 2012). Such web-based systems can assist in dealing with the problem, highlighted earlier by reference to Kahneman (2011), in which there is clear superiority for statistical algorithms in terms of identifying still weakly-emergent patterns in comparison to human judgement. Where human judgement still prevails over machine-learning, however, is in the ability to conceive of futures which are completely different to that which presently exists, and which may not, therefore, have any evidential basis in the present. The SP approach is more organic and subjective and provides a context for discussion and interpretation of perceived changes and developments, allowing for consideration of just such futures, but the SP process does not, by itself, establish a system to monitor current or likely developments in relation to these imagined futures, in order to monitor if they represent genuine future possibilities. This can be a factor that hinders SP, as an isolated intervention, from being an on-going process.

Indeed, SP's judgement and subjective approach and its limited empirical basis - albeit incorporating identification of plausible causal chains - represents an important advantage over HS. As noted earlier, Mintzberg (2003) suggests that SP encourages managers to observe and wait for identified, pre-conceived events to unfold, meaning they may be unable to recognize and act on unexpected changes, limiting their ability to prepare for the future. The implication is that SP can have a perspective-narrowing effect that is the opposite of that intended. However, based on the above discussion, it is clear that this tendency is perhaps even more likely in relation to HS than SP; SP, because of its partly non-empirical, subjective and judgmental basis, allows greater opportunity to consider futures that have less basis in current information, but for which an internally-consistent and plausible set of causes can be described.

The problem with HS' empirical basis, in which identified trends in the form of weak signals are then interpreted and become early warnings, is the likelihood that such an exercise will focus attention on the identified potential futures which can be evidenced, at the expense of those left unconsidered, which cannot be evidenced because they do not have any present objective basis. HS places emphasis on the identification of pre-existing futures, by which is meant futures which are already partly emergent, such that they are leaving an evidential trace which is presently detectable, albeit in only weak form. Whereas a characteristic of many focal systems of interest on which HS and SP is carried out is the tendency for disjuncture or step changes to occur, which represent a break from the past and current trajectory. By contrast, the trends identified in HS represent exactly that – the *current* trajectory of a system, and are not, therefore, necessarily representative of the system's trajectory subsequent to a step change. IL SP, when enhanced by the use of recent augmentations designed to deal with the problem of determinism, can assist with this problem. We later highlight how one such augmentation, the Backwards Logic Method, can be particularly useful in this regard when combined with HS.

5.1. Integration of scenario planning and horizon scanning in practice

A review of extant literature was conducted to identify studies that suggest or illustrate the integration of SP & HS in practice. The first step was to gather and survey existing scholarly work on SP, HS, weak signals and EWS. This involved an extensive search for scholarly peer-reviewed journal articles from the Business Source Complete, Emerald Insight, Science Direct and ProQuest databases. The search covered a twenty-year time period, however, during the search it was discovered that the bulk of horizon scanning literature emerged between 2004 and 2013, with the most popular years of SP & HS joint initiatives being 2011 and 2012. Specific search terms included horizon scanning, scenario planning, weak signals and variations such as, scenario thinking, scenario-based approach, strategic planning and early warning, to name a few. A total of one hundred and thirty-six papers met this criteria and were in the subject areas of business and management, technology, health and public policy. A number of the articles are from the journals of Futures, Long Range Planning, Foresight, Technological Forecasting & Social Change and Science & Public Policy.

The second step was to determine whether the article was relevant to the review by excluding articles that did not contain keywords in the body of the text, as some were only mentioned in the references, footnotes and appendices, or discuss HS or SP, or use SP methods in HS activities. During this process, the articles were coded and classified

Table 2
Extant advice on the identification of weak signals.

Advice on the identification of weak signals	Study
Environmental scanning	
"Detecting weak signals is achieved by scanning the organizational environment"	Oliver Schwarz (2005)
Scenario-based identification & environmental scanning	
"A good way to select a signal and fast-forward its development is through scanning the environment and the use of scenario planning or other future-mapping techniques (pg. 139)"	Schoemaker et al. (2013); Kovarikova and Grosova (2014)
Diversity, discontinuity and disturbance	
Require diverse opinions and backgrounds to identify discontinuity & disruptive dynamics	van Rij (2010); Miles and Saritas, 2012; Habegger (2010); Weber et al. (2012); van Rij (2012); Schultz (2006); Saritas and Smith (2011), Boe-Lillegraven and Monterde (2015)
Web-based scanning, diverse & expert opinion multiple	
"The identification of weak signals and emerging issues requires the help of various levels of automation… and professional scanners"	Amanatidou et al. (2012)
"Emerging trends, opportunities and constraints are identified via formal meetings, such as conferences and workshops, and informal networking, supplemented by material obtained from the literature and media… these are put into the web-based Horizon Scanning System (HSS) (pg. 140)"	Palomino et al. (2012b)
"Collect and track qualitative and quantitative signals, from various sources such as the internet, news, company reports, consumer surveys and employee opinions, which are then continuously monitored and also compiled into periodical reports (pg. 832)."	Ramirez et al. (2013)
Network analysis and web-based approaches to derive potential weak signals.	Garnett et al. (2016)
Social media, online networks & crowdsourcing	
Twitter and online networks such as FutureMonitor to crowdsource potential future trends.	Pang (2010), Kayser and Bierwisch (2016) Schoemaker et al. (2013)
Assume weak signals previously known	
Provide no advice or assume weak signals are previously known	Ilmola and Kuusi (2006) Tessun (1997), Rossel (2011), Palomino et al. (2012a, 2012b)

based on their context, research type, methods, profession of the authors, mode of analysis, information sources, whether they contained all the primary keywords and whether they provided advice on the identification of forward indicators, weak signals or any potential future trends in HS.

Twenty-two studies met the inclusion and exclusion criteria and explicitly suggest or illustrate the use or integration of SP & HS. Table 1 provides a brief summary of the findings, their case example, suggested or applied context, methodology and whether they were conducted by an academic, practitioner or a joint venture between the two. They provide varying degrees of advice on the identification of weak signals in HS, ranging from simply acknowledging this step must occur before evaluating future plans, strategies or policies, to detailed descriptions and protocols on how to facilitate this process (Table 2).

Oliver Schwarz (2005) and Schoemaker et al. (2013) argue that detecting weak signals is achieved by scanning the organizational environment; where Schoemaker et al. (2013) add that 'a good way to select a signal and fast-forward its development is through scanning the environment and the use of scenario planning or other future-mapping techniques (pg. 139)'. Kovarikova and Grosova (2014) also affirm scenario-based identification, but highlight that the identification of weak signals is based on the scenarios created and how they are influenced by personnel and the perception of the analyst; therefore, they emphasize that different attributes must also be recognised which are both in line with and beyond their own knowledge and experience (pg. 35).

Most scholars follow a line of argument which suggests that diversity, discontinuity and environmental disturbances are key to identifying weak signals. They contend that the process of identification should be conducted in a participatory environment that represents a variety of competences or viewpoints, but that it more importantly draws on several diverse sources of information to accurately anticipate discontinuities or disruptive dynamics (Habegger, 2010; Miles and Saritas, 2012; Schultz, 2006; van Rij, 2012, 2010; Weber et al., 2012). Accordingly, in the Big Picture study, Saritas and Smith (2011) conducted a survey at the 2008 Future-oriented Technology Analysis (FTA) Conference of foresight practitioners with varying degrees of experience about potential and existing weak signals; and in Boe-Lillegraven and Monterde's (2015) case study on Cisco Systems Inc., the idea was to establish a 'network of technology scouts to provide early identification of novel technologies and trends and to enable informed strategic decision-making and to help stimulate innovation (pg. 71)'.

Out of the twenty-two studies, six provided some level of detail on the identification of weak signals, where each of them suggested or used web-based approaches combined with expert opinions, collaborative workshops, crowdsourcing, network analysis and interviews which are all underpinned by scenario narratives. Amanatidou et al. (2012) suggests that prior to the identification of weak signals, planners must differentiate between exploratory and issue-centred modes of HS; where exploratory scanning focuses on 'emerging issues from a wide variety of data and different signal sources and expert interviews, while the issue-centred approach concentrates on identifying core documents and narratives (pg. 213)'. They advocate a primarily web-based approach, since 'the identification, processing and analysis of weak signals and emerging issues requires the help of various levels of automation… a well-defined methodological framework… and professional scanners' who are assisted by expert panels and reviewers.

Palomino et al. (2012b) and Ramirez et al. (2013) follow a similar approach. The former states 'that emerging trends, opportunities and constraints are identified via formal meetings, such as conferences and workshops, and informal networking, supplemented by material obtained from the literature and media…these are put into the web-based Horizon Scanning System (HSS) (pg. 140)', monitored, and the outputs are then periodically communicated in the form of newsletters or reports. The latter conducted a comparative case study between Nokia and Statoil, they directly link HS with the output of a prior SP activity which is taken to drive the subsequent identification and monitoring of weak signals. They derived pre-set categories from the scenarios and used them to collect and track qualitative and quantitative signals, from various sources such as the internet, news, company reports, consumer surveys and employee opinions, which are then continuously monitored

and also compiled into periodical reports. In their study, they stressed that the changes and developments in each category must be systematically tracked and interpreted to determine which 'scenarios had become more likely as a result of the signals (pg. 832)'. Garnett et al. (2016) compiled a database from workshop sessions, as this was 'critical to arriving at a shared view of potential drivers of change within the policy environment (pg. 85)' and combined this with network analysis and web-based approaches to derive potential weak signals.

Pang (2010) and Kayser and Bierwisch (2016) look to social media and suggest that Twitter is a rich data source for capturing, identifying and analysing future changes and disruptions, especially by targeting the monitoring of futurists' tweets. Schoemaker et al. (2013) are more informative about the details of the mechanics of their approach as they also use online networks such as FutureMonitor to crowdsource potential future trends; however, they are vague on the focal identification issue and simply state that the 'radar system is continuously fed by organizational sensors that monitor known indicators as well as by scanning for unexpected signals (Pg. 818)'.

Finally, Tessun (1997), Rossel (2011) Palomino et al. (2012a, 2012b) do not provide any details on the identification of weak signals in HS activities, they simply acknowledge that organizations must identify these subtle trends; and Ilmola and Kuusi (2006) present a framework and case study for filtering weak signals in strategic decision making, but do not address the identification of weak signals; their research assumes that they are previously known. Table 3 summarises the extant advice on the identification of weak signals.

To summarize, the need to consider both potential futures that *do* currently have an evidential basis in the present on the one hand, alongside the need to consider futures that *do not* have such a presently-existing evidential basis, implies that HS and SP are more powerful when used in combination than in isolation. But, to revert to our discussion and analysis above, all of the current invectives and recommendations will lead to either (i) an unfocussed or (ii) a focussed but naive assessment of possible futures – since the identification of weak signals will either be happenstance or limited to those prompted by the already-developed scenarios.

In the final section of this paper, we show how using SP to imagine particular futures without reference to whether they have any current evidential basis, but then thinking in a backwards fashion to the implied present-day evidence that would suggest their plausibility, followed by a gathering of this evidence through HS, can provide for both an open and unconstrained (by current circumstances) consideration of the future. We set out our recommended combined approach to HS and SP through adaptation of the Backwards Logic Method for SP, followed by incorporation of aspects of HS.

6. The Backwards Logic Method (BLM) for scenario development and its use with horizon scanning

The BLM method, first explicated by Wright and Goodwin (2009), stands in marked contrast to the basic IL scenario development method. In the conventional IL scenario development method, the process of scenario development is 'forward chaining'. By this we mean that the process requires workshop participants to generate driving forces (using the PESTEL dimensions of Politics, Economics, Societal, Technological, Environmental and Legal) that may impact the issue of concern – often the viability or continued survival of an organization. Once these driving forces have been elicited, the IL process goes on to aid the identification of causal linkages between these forces – represented by arrows of influence. Each arrow acts to mark time precedence and causality – in that a driving force that is placed at the start of an arrow of influence comes earlier in time and exerts a causal influence on the outcome of the subsequent driving force. The next step in the IL process is to identify those clusters of driving forces that are most significant – in terms of both the impact of the out-turns of a cluster on the focal organization and in terms of the degree of predictability of the outcome of a particular cluster. The two clusters that are rated as the most uncertain and the most impactful become the basis for the development of the subsequent set of scenarios. Wright and Cairns (2011) give full, step-by-step, detail on the IL scenario development process. Note at this point that the scenarios that are developed have a causal, time precedence basis within the two significant clusters but note also that the earlier-in-time stating points of a cluster - that initiate a cluster's subsequent unfolding - cannot be identified before the IL scenario development process is initiated. As such, the scenarios that are developed follow no particular prescription – beyond a requirement that the out-turns of each focal driving force are different from one another, yet plausible.

By contrast, the Backwards Logic Method for scenario development starts with a focus on the objectives of the focal organization and asks workshop participants to imagine both an extreme (but plausible) negative achievement and an extreme (but plausible) positive achievement of these objectives. The next step in the process is to ask workshop participants to imagine, by "backward chaining", the causes, and causal chaining, of these extreme developments. Table 3 compares and contrast the basic IL method with the BLM.

This BLM process can be easily adapted to aid identification of important - in terms of the viability of the focal organization – early warning signals of extreme negative or positive futures. In short, an augmentation of the backwards Logic Method (BLM) for scenario development, set out in step-by-step fashion below, gives us a solution to the difficulty of identifying weak signals of important futures:

Step 1 - Identify the objectives that the organization wishes to achieve through its activities. For profit-seeking organizations, commonly-held objectives are: improved market share, improved short-term profitability, improved cash-flow, improved long-term profitability, improved return on investments, etc. For non-profit-seeking organizations, commonly-held objectives might include: enhanced public awareness of issues, greater access to the political arena, long-term commitment to action, etc.

Step 2 - Imagine the range of extreme – but still plausible – achievement of each of the objectives of importance to the organization. The extremes should be high and low, under- and over-achievement, poor and good performance, etc.

Step 3 - List the factors that could cause these changes in levels of achievement of the organization's key objectives. For example, an extremely negative cash-flow could be caused by public concern over the safety of one of the organization's key products or services which results in a step-change downwards in sales of the product or

Table 3
Comparison of standard and backwards logic scenario methods.

	Conventional Intuitive Logics method	Backwards Logic Method
Underpinning basis for scenario development	Causality	Causality
Starting point for scenario development and focus of subsequent HS activity	Components of the chosen two high-impact high-uncertainty clusters.	The (non-) achievement of an extreme in an organization's key objective.
Number of scenarios that are developed in detail	Four	One or more
Focus on stakeholder behaviour/reactions in relation to unfolding scenario events	Low	High

service. Conversely, an extremely positive cash-flow could be caused by public concern about a competitor's product or service. A line of questioning should be enacted that identifies the causal chain that results in the extreme achievement, or non-achievement, of a particular key objective.

Step 4 - Consider the extreme achievement of each of the objectives that you have identified. Could another plausible causal chain of events result in an equivalent outcome? If so, pursue a separate line of questioning to fully identify that separate causal chain. For example, an extremely negative cash-flow could also be caused by a labour force strike which results in a step-change downwards in the production (and therefore sales) of the product or service.

Step 5 - Investigate if the achievement and non-achievement of a particular key objective could now, with re-consideration, be plausibly made more extreme than that identified at Step 2. If so, Steps 3 and 4 should be repeated for the more-extreme achievement of the organization's objectives. If not, the scenario team participants should be encouraged to write down explicit reasons as to why this is viewed to be the case.

Step 6 - Inspect each of the causal chains that were created at Steps 3 and 4 and identify the earliest-in-time driving forces in each of the chains that are identified. Designate each of these 'initiator' driving forces with the title of an 'early warning signal' or 'flag'. Note that these flags might designate either (i) particular resolved uncertainties, (ii) particular change to heighten or dampen trends that are already taking place, or (ii) the actions of powerful stakeholders who act to preserve or enhance their own interests in the light of unfolding events.

As an example of our BLM HS method in practice, consider the following detailed example of its application within the UK education system.

6.1. Integration of the Backwards Logic Method of scenario planning and horizon scanning in practice

Recently, many changes have occurred to the strategic landscape in the Higher Education (HE) sector in the UK, resulting in increased uncertainty. As a result of this, a UK university wished to consider what may trigger potential extreme outcomes for the university in the future, so as to develop contingencies and form mitigating strategies. As such, a BLM scenario planning exercise to identify Early Warning Signals of potential extreme outcomes was conducted. In step 1 of the process a number of objectives were identified relating to the university's most recent strategic review. These included improvement in the university's standing on a number of national and global university rankings, increased recruitment of students, an improved research rating, and generation of a financial surplus that can be used for reinvestment.

In step 2 of the process extreme outcomes were imagined for these objectives. In terms of positive outcomes deemed to represent extremely good performance, the considered outcomes were, for example i) entering the top 50 on a particular university ranking considered to be prestigious, and on which the university was currently ranked a lot lower than 50 ii) increasing registered student numbers by 25%, representing a very large increase, and iii) generating a large financial surplus of 8% for reinvestment in new buildings and infrastructure. In terms of negative outcomes deemed to represent extremely bad performance the considered outcomes were, for example: i) the university's place on the identified prestigious ranking slipping to lower than 130, which is considerably lower than its current ranking ii) the number of registered students falling by more than 10%, and iii) the university making a financial loss of greater than 5% of its present turnover.

In step 3, factors that might result in these outcomes were identified. These included i) factors related to recent, already-implemented government policy changes specific to the HE sector ii) changes that *might* take place in the future but which have not yet taken place, and (iii) broader and longer-standing issues and trends related to the UK economy and demography. An example of a recent policy change specific to the UK HE sector was the very recent introduction of a Teaching Excellence Framework (TEF) through which to monitor teaching quality in UK universities, and which directly impacts university funding by affecting the size of tuition fee the university is allowed to charge. An example of broader issues and trends that could impact HE is, to cite the most obvious example raised by participants, the UK's forthcoming departure from the EU, which raises questions in terms of future overseas student numbers, as-well-as UK universities' ability to recruit staff from the EU.

The line of questioning that was used in relation to the extreme outcomes identified in step 2, and how the factors identified in step 3 were combined by the participants to consider the causal-chain logic by which the extreme outcome might come about, can be illustrated by reference to the extreme outcome of a financial loss of greater than 8%. Participants identified a combination of causal factors that might occur simultaneously and compound the effect of each other, thereby greatly undermining the university's financial position. So, for example, the recent introduction of the Teaching Excellence Framework was considered to place greater emphasis on quality of teaching, requiring that it be allocated more attention and resource, and thereby reducing the amount of resource available for conducting large-scale research, which had previously been a source of significant income for the university. Furthermore, because of relatively lower-levels of attention paid to teaching quality previously, a concern expressed was that the university might receive a poor rating for teaching quality in the then forthcoming first TEF assessment. This would reduce its attractiveness to students, who would opt to go to alternative universities instead, thereby reducing the level of tuition fees received by the university. These factors were then considered to be compounded by the UK's departure from the EU and the UK government's renewed emphasis on reducing immigration, which resulted in a parallel reduction in the number of overseas postgraduate students – presently a key source of the university's income. The identified chain of logic therefore comprised several interacting factors which, when combined, could result in the considered extreme outcome – in this case, a negative one related to the university performing very badly financially.

However, in step 4 of the process, participants considered whether this same extreme outcome could occur through other means. Alternative causal-chain logic was identified, involving some of the same factors, but playing out in a different way, as-well-as incorporating additional causal factors not considered in the initial causal chain described above. An example was a further, snap general election, called because of the collapse of the UK's now minority government, which resulted from its inability to negotiate an acceptable deal for the UK's departure from the EU. The election then resulted in the Labour Party forming a new government with a large majority, with one of their manifesto policies being the abolition of UK tuition fees, which they then implement. However, when doing so, the new Labour government replaces tuition fees with central government funding for HE, but the amount of funding is inadequate and does not fully offset the loss in funding from tuition fees. This results in an extreme financial loss by alternative means to those originally considered.

Interestingly, in step 5 of the process, participants realised that if this alternative causal-logic did indeed play out - and by this point the participants considered it to be highly plausible - it could result in a still *more* extreme outcome than originally conceived in step 2. A significant number of universities could go bankrupt and either disappear, or have to be financially bailed out by the government at great cost in terms of their independence and reputation. The participants considered their own institution potentially to be one of the 'losers', should this scenario transpire.

Indeed, this newly-considered causal logic, resulting in a still more extreme outcome than originally considered, was now deemed so plausible that in the final step of the process - step 6 - it was identified

that UK HE institutions, including the participants' own organization through various existing channels, should already be lobbying the Labour Party to ensure that any central-government funding that might replace tuition fees would more than offset the funding lost by their abolition, and should perhaps even represent an increase in funding, since UK universities should be deemed key to refocusing the UK economy in light of Brexit. Herein we see the identification of a causal factor related to powerful actors, both in the form of a new and highly popular Labour government with a large majority, and in terms of university lobby groups, which might act to both cause a still more extreme outcome in the first instance, or, in the case of university lobby groups, might attempt to pre-empt and mitigate the possibility for such an extreme outcome. Identified early warning causal factors were, then, an increasing stalemate in Brexit negotiations, or a further reduction of the present Conservative government's already fragile coalition (with the DUP) majority, perhaps resulting from a lost bye-election, and leading to a collapse of the government and a further election.

But, even so, will all weak signals of important extreme futures be monitored? As an additional measure, not included in the above case application, we recommend adoption of Meissner et al.'s (2017) approach to 'blind-spot detection'. In our adaptation of their so-called '360° stakeholder feedback', members of an organization and, importantly, outsiders (whom are likely to have different mental models and viewpoints, but at the same time be knowledgeable about the focal organization and its environment) can be asked to identify driving forces that could impact the focal organization's achievement of its key objectives. If the external experts' ratings of both the impact and uncertainty of a particular factor are significantly higher than those of the internal experts then, in Meissner et al.'s analysis, a 'blind spot' is present *within* the organization. Meissner et al.'s innovation essentially provides a means to aggregate elicited knowledge, placing emphasis on bias reduction and, importantly, identifying peripheral views (recall our discussion of the inherent difficulty of this task in Section 3.3, above). But the technique assumes that identified trends and causal factors, currently in their infancy, but which have only been identified by a minority of expert respondents in the first round of a two-round approach, which are then attributed high importance once they have been brought to the attention of the group as a whole in the second round, are representative of weak signals.

Importantly, both the BLM and the 360° stakeholder feedback technique assume that any future which may subsequently prove of importance is currently leaving a trace behind in the present and recent past. HS, by itself, has no method for identifying important weak signals, whilst the IL scenario planning's identification of signals (i.e., early events in particular causal chains) will not, necessarily, be the important precursors of significant futures for a focal organization that can then be monitored in a HS on-going activity. Only the BLM approach to scenario development is likely to direct attention to those *important* signals that may, or may not, already show an evidential base in the present or recent past. But, for an organization to be fully prepared for *any* significant future, all of these methods show weaknesses. In such circumstances we recommend that an 'antifragile' approach is taken by an organization - where the organization actively seeks positions where the down side of events is 'clipped' or limited but the upside is unlimited. Derbyshire and Wright (2014) give more detail on this non-deterministic approach to planning for the future.

The BLM scenario development approach is relatively new but the approach of focused construction of extreme futures has been recently utilized in the developing of scenarios for the future of Botswana (Plakas et al., 2017). Here, one extreme negative scenario was developed and entitled 'Caught between a rock and a hard place' where the key driving force resolutions were a declining income to the country from diamonds and a low level of investment in education. The key weak signals at the beginning of the unfolding of this very negative future were identified as a failure of the Botswanian government to diversify the economy away from diamonds despite efforts towards expanding tourism in the country and foreign direct investment slowing. Another scenario exploration, this time for the future of for Zimbabwe, by Belfrage et al. (2017) created a scenario that was named 'You can't eat policy'. At the beginning of this extremely negative future, early warning signals were identifies as unfavorable climate for crops, instability of rights to land, and insufficient employment to meet demand. In a case study of the use of extreme 'branching scenarios', Cairns et al. (in press) identified early warning signals as a weak Australian economy and rising oil prices – that would lead, eventually, to further lack of progress in the regeneration of the Australian state of Tasmania.

To further clarify the value of the BLM method of identifying weak signals, consider the case study of the top team of a residential mortgage division of a UK-based bank at the end of 2007, as detailed in Wright and Goodwin (2009). At this point in time, residential house prices had continued to rise over the previous 15 years and, intuitively, house price rises were seen to be a pre-determined of the future – so much so that the top team spent time considering seriously the creation of a new mortgage product – a multi-generational mortgage product that could be handed down from parents to children, such that a house purchase could be made with the future payments of future generations of a family. Imagine, if at that time, the bank had been asked to consider its fundamental objects (see step 1 of the process above) and that these were identified as increased market share and increased absolute amount lent to house buyers. At step 2, extreme outcomes would have been developed such as 'a collapse in house prices' and 'a collapse in the confidence of potential purchasers in housing value'. At step 3, the causal factors identified would, likely, have been those linked to 'inability of purchasers to pay their monthly mortgage payment installments' etc. It is easy to see that the latter driving force could be identified, and then utilized, as an early-in-time early warning signal of a very negative scenario for the UK bank. In short, horizon scanning activity around this 'flag' would be worthwhile.

7. Conclusion

In this paper, we have documented the Intuitive Logics approach to scenario development and considered both its perspective-broadening and perspective-narrowing attributes. We also analyzed Horizon Scanning as a foresight activity and demonstrated that the extant practice-based literature is both vague and unfocussed in terms of advice on the identification of important but weak signals. Any integration of already-developed scenarios that are produced by the basic Intuitive Logics method with subsequent Horizon Scanning activities is likely to lead to inappropriate confidence in the comprehensiveness of an organization's preparedness for possible futures. By contrast, integration of Horizon Scanning activities with the outputs of the Backwards Logic Method for scenario development will focus the attention of Horizon Scanning on the precursors of important extreme futures that could impact the organization and its key objectives.

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