



## Connecting adaptation and strategy: The role of evolutionary theory in scenario planning

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### ABSTRACT

In this study, evolutionary theory is used to analyze and critique the strategic process of scenario planning. We argue that scenario planning can be strengthened as a theory- and practice-oriented process through the incorporation of evolutionary theory in the scenario narrative process, and in the subsequent implementation phases in response to environmental change. First, this paper addresses scenario planning in relation to theoretical perspectives on strategic planning and forecasting. Then, the concepts of variation, selection, retention, organizational learning and inertia are used to analyze scenario planning as a strategic process. This study argues that because scenario planning mirrors modes of variation and selection at the organizational level, evolutionary theory is a useful approach for assessing the plausibility of scenario narratives and strengthening the theoretical foundation of scenario planning as a process. By utilizing an evolutionary framework throughout the scenario planning process, this method has a better chance of encouraging exploratory strategic thinking without reinforcing non-blind variation or inertial practices. Concepts including inertia can also be used to better address bias and myopia in the scenario planning process. Additionally, evolutionary theory can be used to assess how entities learn from the outcomes of scenario planning as the environment changes over time.

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### 1. Introduction

Many organizational entities from corporations, to nonprofits, to governmental bodies employ strategic planning and forecasting methods, yet these methods are rarely evaluated in theoretical terms. In this study, evolutionary theory is used to analyze and critique the strategic process known as scenario planning [1]. The central components of evolutionary theory are variation, selection, retention and competition for resources. Ecological theory similarly deals with the evolution of organizations or populations, but also focuses on demographic processes, the liability or advantage of age, niche width dynamics, and community interdependence [2]. Evolutionary theory can be used to examine organizational change at multiple levels including the organizational level, the population level, and the community level. This study assesses evolutionary theory at the organizational level because scenario planning often takes place at this level though it is not restricted to this alone.

This study asks how can evolutionary theory be used to analyze strategic planning processes? To address this question, this theoretical study reviewed literature on evolutionary theory and focused on scenario planning as an example of a strategic method with features that parallel evolutionary theory concepts. Though topics related to strategy, such as search,

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are addressed in some ecological and evolutionary literature, as Fombrun [3] argued, more research still needs to be conducted to assess the strengths and weaknesses of both strategy and ecological theories. For example, strategy researchers have often lacked a framework for assessing how organizations adapt, whereas ecological and evolutionary theorists lacked a strong framework for identifying competition or other components of strategy [3]. While research on scenario planning has become more prevalent in peer-reviewed journals in recent years, much of this research has focused on the process of scenario planning itself and on decision-making; little research has used an evolutionary or ecological framework for analyzing scenario planning [4–6].

Evolutionary theory can be used to question strategic planning and forecasting processes. Many strategic management processes lack strong theoretical underpinnings that could be critical for adapting to environmental changes. Carroll and Harrison [7] argued that strategic thinking was frequently based on historical efficiency in which people assumed that cause-and-effect decision-making based on historical knowledge would lead to a stable equilibrium. Similarly, Barnett and Burgelman [8] argued that strategic management processes did not allow for conceptualizations of variation in forecasting strategies because of the emphasis on predicting and selecting a singular course of action. Van Der Merwe [9] described the challenges that could arise in a large command-and-control organization in which “deviation from the norm” reflected disloyalty, that thinking and decision-making took place at the top level, that learning was limited to the top, and that reaction to changing environments could be slow.

Some aspects of evolutionary theory have been addressed in strategic planning literature [10,11]; however, there is little literature that assesses scenario planning in relation to evolutionary change theory. We argue that there is a strong connection between evolutionary change theory and scenario planning processes in particular. For example, how variation emerges from strategic planning and forecasting processes can impact performance at an organizational and population level. The emphasis in scenario planning on including multiple stakeholders rather than only leaders or experts can foster the incorporation of multiple environmental perspectives and can potentially lead to better approaches to adaptation and organizational change. The challenges and limitations involved in scenario planning can also lead to the propagation of inertia due to the potential restriction of both organizational learning and the benefits of haphazard variation.

Thus, we argue that scenario planning can be strengthened as both a practical tool and a theory-oriented process through the incorporation of evolutionary theory in the scenario narrative development process, and in the subsequent reaction and implementation phases in response to environmental changes. First, this paper addresses scenario planning in relation to theoretical perspectives on strategic planning and forecasting. Second, the concepts of variation, selection, retention, organizational learning and inertia will be used to analyze scenario planning as a strategic process. Third, this theoretical paper will close with ideas for how these arguments can be tested in future empirical research. Examples of scenario planning exercises will also be used to demonstrate this relationship between evolutionary change theory and scenario planning practices. The examples chosen include those conducted by Royal Dutch Shell and the Mont Fleur Scenarios in South Africa.

## 2. Scenario planning

### 2.1. About scenario planning

Scenario planning is a process that brings stakeholders together to construct possible narratives about the future of their environment. This process has been used as a strategic exercise by a range of entities including corporations, non-profit organizations, and non-governmental agencies. The purpose of scenario planning is to utilize a narrative process to create several possible environmental and organizational change scenarios in order to assess strategic options and capabilities [12].

Scenario planning is not a strategic planning mechanism that charts a single path forward, and it is not a process that attempts to predict future events—both functions that could counter aspects of evolutionary theory such as variation [13]. Strategic planning methods are prominent in organizations and scenario planning practices in particular are increasingly common in the private sector and within academic research [14]. It is important to use theory to analyze practice-based strategies like scenario planning in order to better understand the valid and generalizable features, as well as problematic features of these methods.

Scenario planning is a strategic tool that is used to assess potential environmental factors through the development of narratives. The United States military began using this process after World War II, and scenario planning has since been used in a variety of contexts including crisis management, scientific research and modeling, public policy, futurist research institutions, education, and business [15].

Schoemaker [12] argued that scenario planning could be useful for avoiding two common managerial mistakes: underpredicting and overpredicting change. The scenario planning process can be broken down into the following steps: (1) define the scope of analysis (e.g. time frame or product timeline), (2) identify major stakeholders, (3) identify basic trends, (4) identify key uncertainties, (5) construct initial scenario themes, (6) check for consistency and plausibility, (7) develop learning scenarios, (8) identify areas for further research, (9) develop quantitative models if applicable, (10) move toward decision scenarios by repeating steps 1–9 in order to refine or create new scenario narratives [12]. This list of steps incorporates knowledge of key issues and variables, it identifies areas for additional research, and it attempts to incorporate uncertainty into a narrative framework.

Scenario narratives are then evaluated based on whether the narrative is relevant, perceived to be internally consistent and effective, archetypal, and demonstrative of a state of equilibrium [13]. Scenario narratives should not be variations on a single theme, and should describe a consistent environmental state rather than a temporary issue. The scenario narrative process also attempts to focus on what is plausible rather than what is possible [16]. This conceptual distinction between plausible and possible underscores how variables are taken into account without formulating direct predictions.

## 2.2. Examples of scenario planning

Shell has been using scenario planning since 1972 [9]. They have received much attention for the use of scenario planning because information about their scenario planning processes has been publically available, and because Shell survived the energy crisis of the 1970s (an environmental shock) better than its competitors [12]. A recent scenario exercise on the global energy environment from 2005 to 2050 assessed factors including changes in energy usage, growing populations, changes in the energy supply, and environmental stresses like increasing carbon dioxide [17]. According to Shell:

“Shell has developed the Global Scenarios to help deepen our understanding of the business environment in which the Group operates, to identify emerging challenges and to foster adaptability to change. The scenarios are used to help review and assess Group strategy. The scenarios themselves are not forecasts of the future but rather are credible alternative views of the future global business environment that can challenge assumptions or established views.” [18]

This depiction of scenario planning demonstrates a connection between this method of strategic planning and concepts used in evolutionary theory including adaptation, change and environmental conditions. Scenario planning has been used by Shell for both internal and external audiences, and not all data are publically available such as its list of participating stakeholders, but the scenario narratives and rationale for the use of scenario planning are featured heavily in Shell's public materials [19].

The Mont Fleur scenarios were normative scenario planning exercises that took place when apartheid was ended in South Africa [20]. These strategic planning rounds brought together 22 individuals from political, civil society, business and academic backgrounds. These scenarios suggested three problematic narratives (Ostrich, Lame Duck, Icarus) and one positive scenario (Flight of the Flamingos). The results of this scenario planning process were publicized in national newspapers, an informational video was distributed, and dozens of presentations were made around the country presenting the results [20].

## 3. Explaining scenario planning with evolutionary theory

The scenario planning process can be analyzed in the context evolutionary and ecological theory by applying concepts including variation, selection, retention, and organizational learning. First, we provide an overview of recent literature on evolutionary theory in relation to scenario planning, then we will then define and contextualize each concept, and finally, we apply these concepts to scenario planning as an example of a strategic planning process [21].

### 3.1. An underutilized theoretical framework

Little research has addressed strategic methods like scenario planning in the context of evolutionary and ecological theory. In a 2010 meta-analysis of scenario planning peer-reviewed research, Varum and Melo [6] demonstrated that most recent research on scenario planning has focused on defining scenario planning processes and on decision-making. They argued that there seemed to be a consensus that scenario planning led to improved learning processes in general, better identification of issues, and improved decision-making, however there was still relatively little research on scenario planning in relation to performance outcomes [6]. This review did not point toward research being conducted on scenario planning processes in relation to evolutionary or ecological theory.

In a 2005 study, Walsh [22] adopted an evolutionary perspective on scenario planning, arguing that it was necessary to assess environmental factors. In this study he asserted that scenario planning could be used to assess organizational change in relation to the adaptation of firms. However, Walsh focused mainly on exploring scenario planning as a strategic process by defining components of this process such as drivers of change, and the creation of a framework for analyzing change variables and strategy development. The theoretical elements of evolutionary theory played a minimal role in this analysis of the process dynamics of scenario planning as a method for developing and evaluating strategy [22].

A 2001 review of scenario planning literature [23] described schools of scenario planning including an evolutionary perspective, however the sources chosen to reflect this school (e.g. [24]) focused more on the role of retrospection and memory for evaluation of past strategy and the imagining of new opportunities—a limited interpretation of a possible evolutionary approach to scenario planning processes. The framework that we construct through the comparison of evolutionary theory and scenario planning contributes to the theoretical development of scenario narrative processes in relation to organizational change.

Evolutionary theory can contribute to the study of strategic planning processes. For example, the confidence placed in a unidirectional strategic plan can be viewed as potentially problematic. The *illusion of control* argument asserts that the higher

the perception of control, the greater the likelihood that individuals will underestimate risks [10]. Levinthal and Posen [11] addressed this assumption of control by arguing that search strategies are fundamentally myopic and that decision-makers are blind to correctly observing future effects. To address this dilemma between search and inherent myopia, these authors examined the effect of reliability on the efficacy of selection at the population level. This study found that search strategies led to varying performance trajectories and survival rates, and that there was dynamic tension between the benefit of reliability (which relates to legitimacy) in the long-term and exploration search strategies that can potentially improve performance. They argued that although a high variance strategy could be the best choice for an individual firm, it was a poor strategy at the industry or population level. These studies exemplify how strategy has been studied and critiqued in context of management and evolutionary theory.

### 3.2. Variation

Within organizations, variation entails changes to routines, such as the introduction of formal programs, adjustments to incentives for personnel, or other formal or informal modifications [1]. In evolutionary theory, components for effective variation include blind variation, equiprobability, unrestrainedness, statistical independence, and the need for failure or the possibility of failure [25]. Aldrich and Ruef [1] delineated between blind and intentional variation. Intentional variation occurs when individuals attempt to resolve a problem or situation via actions such as planning. Blind variation occurs due to random chance or luck rather than action. According to Romanelli [25], with blind variation outcomes based on variations cannot be known in advance. This concept of blind variation counters assumptions about managerial preferences for best practices or benchmarking—mimetic practices that can limit the potential benefit of the novelty of variation [25].

Weick's [26] conceptualization of evolutionary theory paralleled intentional variation by accounting for adaptation to environmental change through enactment. Enactment is a term that describes how people construct reality by perception, selection and interpersonally negotiated actions [26]. Weick [26] used the term enactment to describe variation because he argued that organizational actors took on active rather than passive roles in creating and engaging with their external environment.

Conceptualizations of variation can be used to analyze scenario planning. The scenario planning narrative process reflects aspects of variation demonstrative of agency rather than those concepts that rely only on environmental forces. For example, scenario planning reflects intentional variation and enactment more than blind variation. Scenario planning processes attempt to compensate for issues such as overconfidence, bias and tunnel vision in organizations—issues that can limit variation. The scenario planning process also takes into account both known variables and uncertainties. Thus, variations are not selected in or out through this process, and the outcomes of possible variations are not known in advance; rather, possible intentional variations and selections are imagined by scenario participants.

The Shell 2005–2025 scenarios reflected aspects of variation including intentional variation and equiprobability. These narratives did not reflect blind variation, the characteristics of unrestrainedness, nor the possibility of failure. This scenario planning exercise led to the development of three narratives: Low Trust Globalization, Open Doors, and Flags. These scenarios dealt with environmental variables including the legal and regulatory environment, market culture, corporate governance, global forces of integration and fragmentation, and the interplay between these factors.

They also focused on environmental uncertainties of security and trust in light of the September 11th attacks and the collapse of Enron. In these scenarios, known environmental variables included demographic projections (an increase in global population), continued globalization due to past market liberalization and changing technology, and dominant geopolitical actors (the US and China). Uncertainties included concerns about security (terrorism) and trust (in the marketplace and in institutions).

These scenarios reflected intentional variation because they encompassed a form of strategic thinking that did not filter to a single chosen path but emphasized the equivalent plausibility of each scenario [18]. Equiprobability and statistical independence factored into this scenario process because no single scenario was to be viewed as more likely than any other [18,12]. Also, as these scenarios demonstrated, scenarios are supposed to be distinct environmental stories, or imagined variations, not tangents on one theme such as a consistently low regulatory environment [12]. These scenario narratives did not reflect blind variation because the stakeholder involvement in the narratives fit more closely with the concept of planning and intentional action that could lead to variation rather than random variation.

These scenarios were developed under some organizational constraints and did not incorporate the possibility of organizational failure. Constraints can stem from external forces like industry structures, or internal constraints such as an organization's history or set patterns of resource allocation [8]. In this example, constraints could have stemmed from the type of stakeholders involved, and the audiences (both internal and external). For example, according to Shell [17,27], during the narrative development process “senior stakeholders” in Shell were consulted frequently. The scenarios were also presented periodically to the Committee of Managing Directors, at “high-level business-and regional-specific meeting,” and internal approval was then required from the Chairman of Shell prior to presenting the scenarios to a group of 300 Shell leaders [28]. These high-level, powerful audiences would likely have had an impact on how scenarios were developed and presented due to organizational politics and possible bias resulting from stakeholder interests [29]. Therefore, it seems unlikely that complete unrestrainedness would be possible in this type of top-down, consensus-oriented environment.

### 3.3. Selection and retention

Selection processes entail the choosing or elimination of variations. Retention involves the maintenance of variations that have positively impact a firm [1]. These aspects of organizational theory demonstrate that firms will attempt to adapt to their environment through these processes, however, not all selection and retention processes result in inherently positive changes to routines and organizational processes. Scenario planning processes specifically avoid direct selection and retention of variations because this method entails assessing a range of possible narratives rather than the selection of a strategic path.

In this way, scenario planning differs from other forms of strategic planning and forecasting processes such as the Delphi method, a technique that brings together a range of expert opinions to reach a consensus on a strategic plan [30]. Forecasting and strategic planning methods may be able to chart a productive course for an organization, but by narrowing future steps to a defined path, these modes can limit the possibility of variation based on exploration. That said, scenario planning as a narrative process does encompass imagined selection processes.

#### 3.3.1. Weick's conception of agency in relation to selection and retention

Weick's approach to evolutionary theory can be applied to scenario planning in terms of equivocality and enactment. Weick addressed Campbell's [31] model of evolutionary theory and transformed the concepts of variation, selection and retention into enactment, equivocality and an enactable environment based on sensemaking. Weick's [32] concept of sensemaking described the process of making sense of reality, for example through retrospective meaning-making. According to Campbell's [31] model of evolution, mutations that improve adaptation and reproduction are selected and possibly retained, though not all changes are beneficial. These processes are not planned through the actions of individuals or organizations but rather occur based on random genetic or behavioral mutations.

Weick's work on evolution connects scenario planning and evolutionary theory by placing greater agency on actors in terms of variation, selection and retention processes. Weick [26] argued that ecological change created an enactable environment in which the ways that people dealt with change led to evolutionary processes of variation, selection and retention. An enacted environment was an output of organizing activities based on assumptions and actions stemming from previous events [26]. Selection occurred when actors attempted to reduce equivocality by creating structures such as routines or rules based on past experiences. Retention was defined as an enacted environment, which was the result of the sensemaking process in which routines and processes were stored and reproduced.

According to Weick [26], the resulting organizing process consisted of the trilateral relationship between enactment, selection and retention. This process emphasized how ecological or environmental change cycled with equivocality and enactment processes in a deviation-amplifying loop, and how enactment processes led to selection and retention via sensemaking. In scenario planning, this sensemaking loop is reflected in how narratives are constructed to deal with imagined environmental variables and how these narratives are then referenced by organizations over time.

#### 3.3.2. Selection and implementation

The implementation and follow-up phases of scenario planning are also central to how entities can effectively employ this strategic method. Selection and retention do not map onto scenario planning directly because the scenario planning process is an exercise in imagining multiple, distinct future narratives. However, while this open narrative process distinguishes scenario planning from other search methods, how scenario narratives are recalled and implemented by entities after the narrative development process can be analyzed through the lenses of selection and retention. According to Campbell [31], selection can take the form of selective survival of social organizations, diffusion between social groups, propagation of temporal variations, imitation of inter-individual variations, promotion to leadership or education roles, or rational selection. Selection involves the selection or elimination of variations based on criteria used to optimize fitness. In the context of organizations, selection criteria can be based on environmental factors such as market forces, competition, the impact of institutionalized norms, formalized industry controls or regulations, and others [1].

In Shell's scenario planning process, equivocality and enactment functioned as imagined conceptualizations. The possibility of failure (for example, the financial collapse of the company) was not addressed in these scenarios directly. However, negative environmental possibilities were addressed in the context of specified uncertainties such as poor global security and a lack of trust in institutions. This scenario process reflected imagined equivocality and enactment by envisioning plausible environmental factors like increased or decreased regulation, stronger versus weaker nationalism (where strong nationalism implies a nation-state oriented business environment that favors insiders), and the increased versus decreased role of corporate reputation (see Table 1 in Appendix A).

Like several scenario planning case studies [33,34], even when outcomes are discussed, such as the outreach efforts by the Mont Fleur participants (see Table 2 in Appendix A), there are few details about how and when (or whether) entities refer back to scenarios and make decisions as the environment changes. We argue that imagined enactment and sensemaking scenario narratives influence the enacted environment over time, and that more research should be conducted on this process.

## 4. Organizational learning

The evolutionary and ecological perspectives on organizational learning can provide further theoretical structure to scenario planning because scenario planning is situated in an exploratory learning framework. Organizational learning is an

approach that focuses on how individuals, groups or organizations process information to affect fitness within their environment [1]. According to Chermack and Van Der Merwe [35], a successful scenario planning process leads to organizational learning, meaning that the mindsets and assumptions of decision-makers have been shifted. This learning at the organizational level then entails better adaptation.

The *knowledge development perspective* and *adaptive learning perspective* are two approaches to organizational learning, and each can be used to analyze scenario planning in different ways. The knowledge development perspective relates to Weick's concepts of sensemaking and enactment. This view asserts that unlike a trial-and-error approach, learning is based on shared patterns of cognition that are institutionalized within an organization. This view also allows for vicarious learning and experimentation, which are both agent-oriented learning processes [1]. According to Bradfield et al. [15], scenario planning reflected the goals of making sense of a situation, developing a strategy, anticipation and adaptive organizational learning. Scenarios thus functioned as the process through which actors made sense of imagined future narratives. Bradfield et al. [15] tied together the concepts of strategy and adaptive organizational learning, which contributes to our argument that organizational learning theories can be applied to scenario planning.

Because scenario planning explores possible responses and strategies in relation to environmental factors, there are parallels between the adaptive learning perspective and scenario planning, particularly in the context of exploration. The adaptive learning perspective addressed an organization's ability to learn from experience, and dealt with the role of exploration and exploitation as strategies for adaptation and change [1,26]. Exploration and exploitation are rational search strategies based on information accumulated over time and choices about future alternatives [36].

Exploration reflects an organizational-level variation process that can have long-term returns but is therefore less certain and not short-term oriented [36]. Exploration entails elements such as risk-taking, experimentation, flexibility, innovation, and discovery. According to March [36], organizational learning often addresses exploration and exploitation by assessing whether there has been a product refinement or innovation such as a new technology. Scenario planning narratives utilize exploration-based strategies in the attempt to institute flexibility, discovery and innovation into a strategic process. By avoiding the development of a single strategic path, scenario planning encourages the exploration of different narratives composed of diverse variables in the attempt to avoid a situation in which intentional variation leads to a relatively known or predicted outcome, thereby limiting the possibility of other positive variation outcomes [25].

The scenario planning process is situated nearer to the exploratory end of this organizational learning spectrum. However, the referral and implementation processes based on scenario planning results can be explored further by assessing the role of exploitation. Exploitation is a mode of selection that entails refinement, production, selection, implementation and execution [36]. March [36, p. 71] argued that an organization that chose only one mode – exploration or exploitation – would end up in “suboptimal stable equilibria” and would be less successful in adapting to the environment. According to Van Der Merwe [9], optimal learning during a scenario planning process stemmed from both the act of building scenarios, and from instituting scenario thinking into the strategic processes of an organization. Thus, exploitation is not central to the narrative development process but can be analyzed in subsequent organizational actions.

## 5. Inertia

The scenario planning process entails limitations, challenges and the potential for poorly implemented outcomes in the context of evolutionary theory. For example, challenges stemming from the process of scenario planning can lead to inertia. Inertia has been described in different ways: in managerial literature, strategic inertia can be defined as the commitment to current strategies and routines within an organization, and resistance to breaking from the status quo [37]. Structural inertia is the failure of an entity to align with changes in the environment due to structural rather than strategic or cognitive issues [38]. Hannan and Freeman [38] described two types of structural inertia: internal, such as sunk costs into equipment or the possibility for precedents to become norms; and external, which can include legal or regulatory barriers or relationships between organizations. These strategic and structural aspects of inertia can stem from the failure to balance accountable performance and reliability with environmental turbulence and the need for adaptation [38].

Scenario planning narratives can function as a means to challenge assumptions and break through organizational inertia: for example, instead of permitting only upper management to contribute to strategic decision-making, scenario planning takes into account multiple stakeholder views. However, the process of scenario planning faces challenges such as the potential for bias or the inclusion of an unrepresentative sample of stakeholders. Biases in the scenario planning process can lead to the narrowing of possibilities of variation or the selection of known variations based on specific scenarios, which can negatively impact adaptation [36].

The scenario planning process has the potential to sway organizations toward either exploratory learning and variation, or toward structural inertia. According to Flowers [19, p. 12], a consultant on the Shell scenarios, when faced with a number of narratives, people often attempt to choose “the right one.” This reflects the human instinct to reject ambiguity and pursue sensemaking as a means to resolve equivocality. While scenario planning attempts to avoid this single strategic plan or line of thinking, this impetus to focus on a correct or optimal scenario is a potentially confounding possibility.

O'Keefe and Wright's [29] case study on an engine manufacturing organization's attempt to employ scenario planning demonstrated how bias and resistance from stakeholders, in this case the CEO and a few top managers, could prejudice or even derail the objectives of scenario planning. In this case, despite organization-wide consensus that change was necessary in order for the company to survive its attempted expansion, a segment of key stakeholders dropped out of the scenario

planning exercise midway through due to their desire to control the strategic course of the organization, which reinforced structural inertia. The author's postscript noted that a year later, the planned expansion was halted, resulting in a multi-million dollar loss for the company, a key customer pulled out of their contract, and the CEO was forced to resign [29]. That case study described how the organization failed to adapt to numerous changes in its environment. It also underscored the significant role that openness to and knowledge of stakeholder views (in this case employees, multiple levels of management, and customers) ought to play in strategic development.

The Mont Fleur scenarios in South Africa are another example of how bias can impact scenario planning and adaptation. This normative scenario exercise positioned one narrative as a positive worldview in contrast to other negative options [20]. The participants specified in their report that the sole optimistic narrative was neither a blueprint nor a utopian ideal, but rather an outcome that would be dependent on how each specified condition was met. But at the same time, these narratives reflected how stakeholders' motives (whether good or bad) could impact the narrative process in the context of variation and selection. Though these scenarios functioned as a means to encourage public discourse, they were also reflective of a public relations agenda. This example shows that the positioning of one scenario did have positive social results; however, in terms of how scenario planning can be used in different contexts, this example reflects bias toward known variation and away from blind variation.

Similarly, in a 2006 supplement to the Shell 2005–2025 scenario narratives, additional scenario frameworks were added to the 2005 scenarios. Each one framed regulation as a negative, looming threat. For example, market regulation was described as placing a "heavy burden on small business" and was framed as one of the major environmental variables on the same level as the crises of trust and security (which encompassed the threat of terrorism, failure to find a common response to nuclear proliferation, and NATO expansion causing international security concerns) [18, p. 11]. The rationale for this revised description of regulation was based on the passage of the Sarbanes-Oxley Act, which was portrayed as an "over-reaction" and burden on global corporations by Shell [18, p. 11]. This example demonstrates a bias against regulation that could lead to limiting organizational learning and the possibilities of random variation: for example, by discouraging the construction of a narrative about working within a stronger or more harmonized regulatory framework. This type of biased framing can impact variation and selection and therefore the path of adaptation for an organization.

## 6. Conclusion

### 6.1. *Implications*

Through the analysis of scenario planning, this study attempts to further the theoretical development of scenario planning as both a practice- and theory-oriented process, and also provides practical implications. Because scenario planning mirror modes of variation and selection at the organizational level, evolutionary theory is a useful approach for assessing the plausibility of scenario narratives and strengthening the theoretical foundation of scenario planning as a strategic process. By utilizing an evolutionary framework throughout the scenario planning process, this process has a better chance of encouraging exploratory strategic thinking without reinforcing non-blind variation or inertial practices.

Scenario planning differs from other strategic planning processes, such as those that chart a unitary strategic path or those that stem from the advice of experts. At a theoretical level, these evolutionary change concepts can be applied to the analysis of scenario planning processes or similar strategic processes to assess performance and perceptions of organizational change and adaptation. This strategic planning process reflects the role of evolutionary constructs, such as exploratory organizational learning and intentional variation that can be used to enhance its theoretical foundation. Concepts including strategic as well as structural inertia can also be used to better address bias and myopia in the scenario planning process. Additionally, evolutionary theory can be used to assess how entities incorporate and learn from the outcomes of scenario planning as the environment changes over time.

At a practical level, scenario planning processes can be designed to incorporate evolutionary and learning concepts into the narrative development and evaluation phases of scenario planning. Because one cannot imagine or predict future scenarios without some degree of blindness and uncertainty [39], applying a stronger theoretical framework based on the elements that affect adaptation can better enable practitioners to evaluate plausible, alternative futures.

### 6.2. *Directions for future research*

Empirical research should be conducted based on this theoretical framework to assess these connections between theory and practice. First, a content analysis of several scenario planning exercises from a range of organizations could be conducted. This would be a systematic way to assess the relationship between evolutionary theory and scenario planning processes. Evolutionary theory could be applied to the results of a sample of scenario planning exercises to assess the issues covered in this paper.

A second direction for future research could be an experimental study. It is difficult to assess how scenario planning changes or fails to affect variation, selection and retention processes by analyzing past scenario planning efforts without some kind of control group. With an experimental set-up one could compare an entity (or entities) with a control group in a laboratory or practice-based environment. In a quasi-experimental setting for example, one can compare similar groups, such as student clubs at different universities, by instructing some groups to use scenario planning methods while

**Table 1**  
Interpretation of key variables in Shell's scenario narratives.

	Regulation: high	Regulation: low
Nationalism: high	Harmonized international regulation and cross-border integration lead to:  A friendly environment for global corporations Close links between investors and actors such as civil society A need for superior corporate reputation management skills Moderate legal risk	Fragmented international regulation, and gated community-like structures due to strong nationalistic behavior lead to: More careful corporate risk-taking  The slowing of globalization  Challenges in controlling risk  Benefits for those with good connections, but a subsequent weakening of rule of law Conflicting laws, inconsistent, and fast-changing regulation lead to: Short-term strategic planning Limits to global or international integration Complex risk management Actors outside the national framework have more power
Nationalism: low	Less plausible/not discussed	

**Table 2**  
Interpretation of key variables the Mont Fleur scenario narratives.

	Economic and policy growth: sustainable	Economic and policy growth: unsustainable
Legitimate government: established rapidly	Sustainable success is likely in both governing and policy realms	It will be harder to establish the new government  Unsustainable policies could lead to collapse of government
Legitimate government: established slowly	A non-representative government will emerge Policies will be ineffective	Collapse of government and policy is inevitable

maintaining a control group that does not employ scenario planning. This would be one way to test the effectiveness of scenario planning against other modes of strategic planning, or against random, blind variation processes.

A third avenue for research would be to examine how isomorphic processes relate to scenario planning outcomes. Isomorphism is the process in which forces constrain an entity in a way that causes it to resemble other entities in its environment [40]. It seems possible that scenario narratives may reflect preconceived views on how peer organizations have dealt with similar environmental conditions.

Finally, more research can be conducted into analyzing how organizations update and use their scenarios over time. Shell's 2006 addendum to their 2005 scenario exercise is an example of how environmental changes are used to rework scenarios, which could impact adaptation processes. In summary, there are many parallels between scenario planning and evolutionary theory, and there is a great deal of potential for the use of evolutionary theory to enhance the study and practice of scenario planning by incorporating evolutionary theory into the scenario planning process.

## Appendix A

Tables 1 and 2.

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