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Defining scenario

Matthew J. Spaniol[1] | Nicholas J. Rowland[2]

[1]Aarhus Universitet, Århus V, Jylland, Denmark

[2]Pennsylvania State University, Altoona, Pennsylvania

Correspondence
Nicholas J. Rowland, Pennsylvania State University, Altoona, PA.
Email: njr12@psu.edu

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Abstract

Scholars claim that futures and foresight science should overcome "confusion" regarding the definition of core concepts, for example, the scenario. Admittedly, defining scenario has been a challenge. Current practice, which results in repeated attempts to clarify said confusion with yet another new definition of scenario, has apparently not advanced the field. An alternative option is not to redefine scenario, but to, instead, create a shared definition composed of component parts of pre-existing definitions. The result is an operant or synthesized definition based on analysis of claims indicating what "a scenario is…" and "scenarios are…" in the literature on scenario planning. The authors find that scenarios have a temporal property rooted in the future and reference external forces in that context; scenarios should be possible and plausible while taking the proper form of a story or narrative description; and that scenarios exist in sets that are systematically prepared to coexist as meaningful alternatives to one another. Despite claims to the contrary, the authors find that the academic community of futures and foresight science does not seem to suffer from so-called confusion over the definition of scenario, and thus, it is time to sunset the use of claims to this end.

KEYWORDS
definition confusion, futures and foresight science, intuitive logics, scenario, scenario planning

1 | INTRODUCTION

The scenario has become an essential part of futures and foresight science. Scenario planning, established as a method of inquiry more than half a century ago, has grown in practice; while many aspects of it are contested, the exceptional utility of the scenario is not. As such, the authors are compelled to concur with Bell (2003, p. 317);

> [n]o matter how it is constructed, how full and rich or meager and lean, how factual or fictional, how particularistic or universalistic, the 'scenario' gives methodological unity to futures studies … [and, moreover, it] is used by all futurists in some form or another and is, thus, by far the most widely shared methodological tool of the futures field.

And yet, among scholars there is considerable self-avowed confusion regarding the definition of scenario. To be specific, there is "so much confusion" and this concern can be traced back to Khakee's (1991, p. 460) often-repeated remark that "[f]ew techniques in futures studies have given rise to so much confusion as scenarios." Khakee (1991) is not alone in characterizing the definition of scenario as deficient and a major barrier to future progress in futures and foresight science (see, e.g., Millet, 2003; Bradfield et al., 2005; Wright et al., 2013; Randt, 2015; Bishop et al., 2007).

Admittedly, gaining clarity and consensus on core concepts is a challenge for any field of study. In social and political science, for example, concepts such as "the state," "sovereignty," and "globalization" have caused much consternation among scholars (see, e.g., Bartelson, 1995; 2000; 2001). As definitions change over time, in subtle and not so subtle ways, the net effect may destabilize the ontological foundations upon which shared, scholarly imagination is based, which is why periodic assessment of core concepts is vital for reflexive fields of inquiry.

Defining core concepts is, unsurprisingly, a persistent challenge for futures studies too. Current practice, which results in repeated

attempts to clarify definition confusion with yet one more new definition of scenario, has not been successful. After all, gaining consensus on any one definition is less achievable with each new definition contributed to the literature. An alternative option is to not redefine scenario yet again, and, instead, search to achieve a greater degree of consensus with a synthesized definition that is composed of component parts of extant definitions. The result is a composite definition based on claims of "a scenario is…" and "scenarios are…" in the literature on scenario planning, primarily drawing from the Intuitive Logics (IL) tradition. The approach taken is a "scoping review," which involves the search, extraction, appraisal, synthesis, and analysis of vocabulary associated, in this case, with definitions of scenario (Grant & Booth, 2009; Weeks & Strudsholm, 2008). The authors empirically assess more than 400 full and partial definitions of scenario and find that shared terminology exists with regard to what a scenario is. Despite claims to the contrary, the authors find that the academic community of futures and foresight science does not seem to suffer from so-called confusion over the definition of scenario.

In what follows, the authors establish the definition confusion claim in its original context and then provide background information with regard to how futures and foresight science got to this point. Then, after outlining the scoping review technique used for data analysis, the authors provide a results section and a discussion section, which also includes reflective remarks and speculation on how the shared, synthesized definition may also be used as a question-based diagnostic (and possibly pedagogic) tool to differentiate scenarios from non-scenarios. In the conclusion, the authors suggest that it is time to sunset the definition confusion claim.

1.1 | Definition confusion, dismal theory, and methodological chaos

While definition confusion undoubtedly predates Khakee's (1991, p. 460) remark, the claim that "[f]ew techniques in futures studies have given rise to so much confusion as scenarios" is now a landmark in futures and foresight science. It is prominently featured alongside other iconic claims about futures theory and methodology. In fact, the claims appear to operate as a formulaic, readymade bundle in academic accounts that are critical of the conduct of science in futures and foresight scholarship. The confusion claim is, thus, worthy of further consideration.

The "so much confusion" claim is now so prevalent that readers rarely encounter it with any of its original context. To refresh readers, in "Scenario construction for urban planning," published in *OMEGA*, *Journal of International Management*, Khakee (1991, p. 459) positions the scenario as an alternative to conventional urban planning techniques based on "visionary urban futures" thinking. Until the 1970s, most urban planning techniques were developed during "rapid development of the welfare state and decentralization of a large number of public activities," and, thus, were ill equipped to "adapt to rapidly changing situations without loosing [sic] the sight of broad societal goals" (p. 460). In response to financial exigencies and uncertainties of the 1970s and 1980s, the urban government of Viisterks, Sweden, adopted insights from futures studies and integrated scenarios into their urban planning practices, which Khakee (1991) reports on. In section three of the article, "Techniques for Scenario Construction," urban planning and international management scholars are introduced to scenarios in the following manner:

> Few techniques in futures studies have given rise to so much confusion as scenarios. The literature reveals a large number of different definitions, characteristics and methodological ideas about scenarios. At the same time, it is a technique most frequently used in futures studies (Khakee, 1991, p. 460-461)

Khakee then describes Kahn and Weiner's (1967) definition of scenario, and then Wilson's (1978) definition and Ducot and Lubben's (1980) too. After delineating six methodological implications of scenarios, based on "[t]hese and other definitions," Khakee's (1991, p. 461) aim is revealed:

> The diversity in methodological ideas means that there is no set of rules for constructing scenarios. … [Therefore,] [d]espite the availability of this wide variety of approaches, there is clearly no developed technique for constructing scenarios for urban future under uncertainty.

In the sentence that follows, Khakee (1991, p. 460) provides readers with three "methodological requirements" for, unsurprisingly, "constructing scenarios for urban future under uncertainty." In sum, Khakee (1991, p. 460) warns readers about the dangerous confusion fueled by so many different ideas about the definition and methodology associated with scenarios, and then, immediately thereafter, generates multiple "methodological requirements" for urban planning with scenarios based on "[t]hese and other definitions."

There is an implicit lesson in Khakee's (1991) article that futures studies scholars have learned only too well: Bemoan confusion; attribute confusion to variety of ideas about definitions and methodology; use it to justify contribution; and, in the end, contribute to confusion that justified inquiry in the first place. Khakee's (1991) example has been closely followed ever since. For instance, Bradfield et al. (2005, p. 795) closely paraphrase Khakee's (1991) claim, stating that the "literature reveals an abundance of different and at times contradictory definitions, characteristics, principles and methodological ideas about scenarios." Consider Bradfield et al.'s (2005, p. 795) claim in its full context:

> Scenario Planning has been around for more than 30 years and during this period a multitude of techniques and methodologies have developed, resulting in what has been described as a "methodological chaos" which is unlikely to disappear in the near future … This is reflected in the fact that literature reveals an abundance of different and at times contradictory

> definitions, characteristics, principles and methodological ideas about scenarios. It has been suggested that a pressing need for the future of scenarios is amongst other things, to resolve the confusion over 'the definitions and methods of scenarios'.

Bradfield et al. (2005) bundle Khakee's (1991) claim with Martelli's (2001) now also iconic claim that futures studies, especially scenario planning, suffers from a multitude of methods that ultimately result in methodological chaos. Additionally, Bradfield et al. (2005) also suggest that the future of futures and foresight science hinges on "resolving the confusion" and establishing consensus over the definition of a core concept, in this case, the scenario.

As we shall see, Bradfield et al. (2005) are not alone. Stewart (2008, p. 161) also follows the established formula:

> Given the diversity of methods in practice, creating an overview of scenario methods continues to prove problematic. Despite scenarios being regarded by some as future studies' "foundational method" … scenarios are considered by others to be in a [state of] "methodological chaos" … with no consistent definition appropriate or accurate across the breadth of their practice.

Varum and Melo (2010) closely paraphrase Bradfield et al.'s (2005) restatement of Khakee's (1991) and Martelli's (2001) concerns, echoing Stewart (2008); Bradfield et al. (2005) want "resolution of the 'methodological chaos' of contradictory definitions, characteristics, principles and methodological ideas found throughout the literature," Varum and Melo (2010, p. 356) write. A few years later, Gordon (2013, p. 88) adds typologies to the formula: "many academic authors have attempted to determine a classificatory system or "typology" of scenario work, to bring order to the methodological "chaos" of contested definitions." Bradfield et al. (2016, p. 60) stick close to Bradfield et al. (2005), but add that the "paucity of theory" also contributes to the confusion:

> Scenario planning has been around for more than 50 years and during this period a multitude of techniques and methodologies have developed, resulting in what has been described by Martelli (2001) as "methodological chaos." The literature reveals an abundance of different and at times contradictory definitions, characteristics, principles and methodological ideas about scenarios. The consequence, according to Khakee (1991), is that 'few techniques in futures studies have given rise to so much confusion as scenarios' (p. 52 [sic]). This 'confusion' results from the fact that there is a paucity of theory underpinning the use of scenarios as a means to consider the future, leading Chermack (2002) to conclude that 'the status of theory development in the area of scenario planning is dismal' (p. 25). This is equally true of futures studies in general, which Miller (2006) contends, lacks a coherent and commonly accepted foundation when compared to other well-established academic disciplines.

Definition confusion, methodological chaos, and dismal theory, all now iconic claims, are thusly bundled together in the conventional account (Spaniol & Rowland, 2018a, 2018b). In the following section, the authors unearth how futures studies got to this point.

1.2 | Origins of definition confusion

Defining the scenario is a problem as old as futures studies. In the 1960s, Brown (1968, p. 299), writing for RAND Corporation, warns readers that "[t]here are many notions floating around of what a scenario is or ought to be." Expert specialization plays a role. "More often than not," Brown (1968, p. 299) writes, "these notions, or attempted definitions, are the product of the specialist's acquaintance with those things which are called scenarios in his [or her] special field of work, and exclude those things which other specialists choose to label scenarios in their own fields." Depending upon specialization, in this way of thinking, experts simply mistake a scenario for something it is not. This happens, Brown (1968, p. 299) states,

> [o]ften with great conviction[;] the champions of various definitions try to convince others that their particular notion is the correct one; that the other animals that may be presented to them bearing the label "scenario" are really something else in disguise—possibly "contexts," "situations," "plans," "assumptions," "parameter values," but "certainly nothing you ought to be calling a scenario".

At the same time, scholars and practitioners were establishing academic journals such as *Futures* to, in their words, distill some "confidence from [the] chaos" implicated in Brown's (1968) warning (Editorial, 1969, p. 2). Early research in foundational journals like these drove the development of futures and foresight science, and, gradually, began to shape the work of practitioners and planners operating in organizational strategy capacities (Slaughter, 2002). Currently, more than two-dozen methods are linked to building scenarios (Bishop et al., 2007), and scenarios are applied in issue-, area-, or institution-based inquiry to inform future exploration or support decision-making (van Notten et al., 2003). The most prominent scenario planning method is Intuitive Logics (IL) (Bradfield et al., 2005; Postma & Liebl, 2005). For context, in this tradition, scenarios were first described by Wack (1985a; 1985b) and developed in practice by Shell and the Global Business Network (Schwartz, 1991; Wilkinson & Kupers, 2013). An alternative to computer simulations, IL planning methods rely on interpretation and systems analysis in interactive group settings to think about futures (Huss, 1988; Jungermann & Thüring, 1987). IL values plausibility as a measure of rigor, whereas other schools of scenario thinking, such as la prospective and probabilistic modified trends, are based on preferred futures and

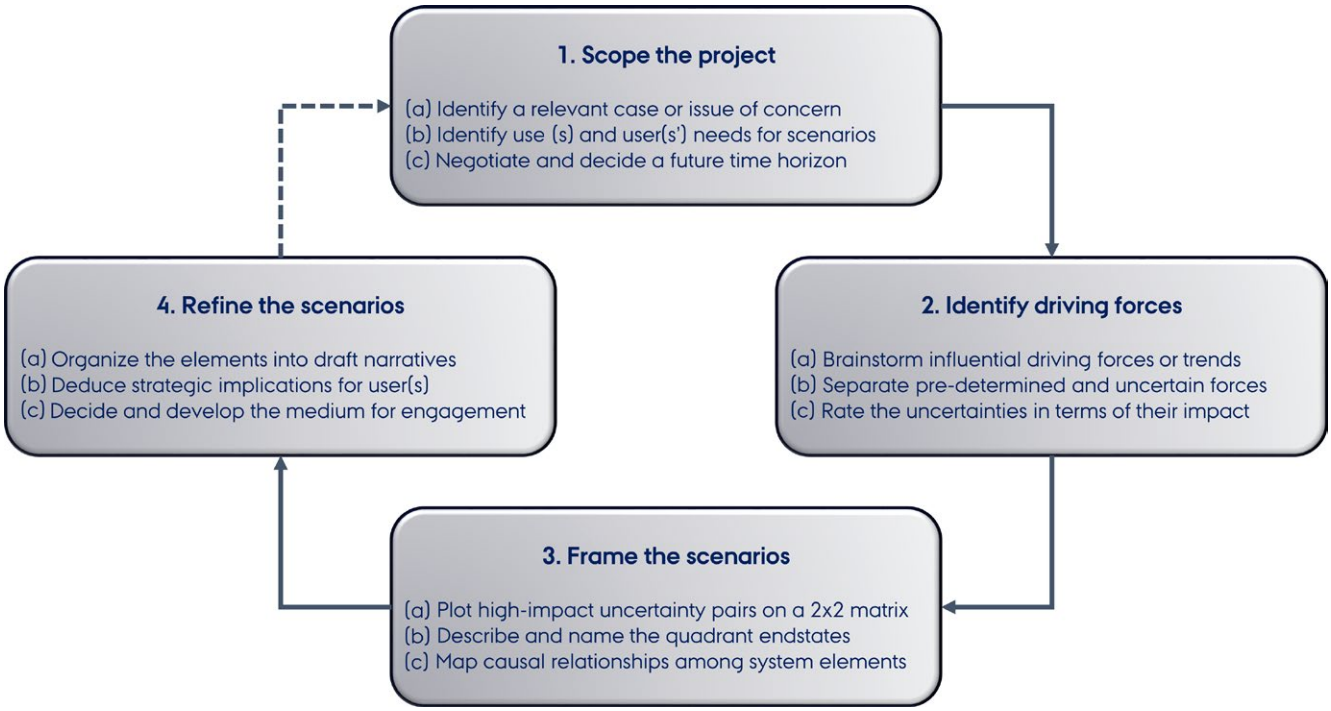

FIGURE 1 Intuitive Logics scenario development process

probable futures, respectively (Ramírez & Wilkinson, 2014). Scenario planning in the IL literature is frequently depicted as a sequence of stages, phases, or steps (Ramírez & Selin, 2014; Rowland & Spaniol, 2017). To wit, Figure 1 is a typical scenario planning process. In diagrams like these, the scenarios are often encountered as texts and come into existence after a phase that "drafts," "develops," "writes," "identifies," "builds," "names," and/or "composes" the scenarios. Scenario development is followed by a phase to "use," "rehearse," "develop strategy," "establish implications," "analyze implications," or "evaluate" the scenarios (see, e.g., Linneman & Kennell, 1977, p. 143; Bradfield, 2008, p. 207).

In the futures and foresight science literature, the word "scenario" is most often found immediately preceding the word "planning," but not always. As a noun, scenario is deliberately used as a modifier for the verbs "to think" and "to learn" too, as elaborated upon in texts on scenario thinking (Ogilvy & Schwartz, 1998; Sarpong, 2011) and scenario learning (Ellis, Feinstein, & Stearns, 2000; Fahey, 2000; Fahey & Randall, 1998). This label distinguishes activities accomplished explicitly with the use of scenarios from activities undertaken without the use of scenarios. Scenario is also used as a compound modifier with "-based," for instance, scenario-based exercises, which emphasizes the role of scenarios as used in activities such as scenario-based conversations, scenario-based deliberations, scenario-based discussions, scenario-based modeling, scenario-based discovery, and the scenario-based thinking/learning/planning.

Numerous scholars have sought a modicum of clarity about the meaning of scenario through the use of distinctions. For example, Bishop et al. (2007, p. 6), after consultation about definition confusion with members of the Association of Professional Futurists, conclude that the most common problem is conflating development with planning; "'scenario planning' has more to do with a complete foresight study," and "scenario development is concerned more specifically with creating actual stories about the future." Martelli (2001, p. 57) draws a similar distinction, adding the insight that although development could exist without planning, "the latter could not exist without the former as its necessary and logical premise." Moriarty (2012, p. 782) draws a line between analysis and planning, where the analysis is the praxis of scenario development and planning describes implications for users. MacKay and McKiernan (2004) emphasize that thinking and planning are to be separated to highlight the cognitive benefits of building scenarios from their use later on. Tapinos (2012, p. 339) suggests a distinction between scenario development and strategy development because "existing scenario planning processes do not provide adequate explanation as to how scenarios are used in strategy making." Gausemeier et al. (1998, p. 113) distinguish one-dimensional scenario "writing" from the bringing of diverse tools and heuristics to bear on futures in scenario "management." The general approach of utilizing distinctions does not appear to illuminate the definition of scenario.

To date, the simplest strategy adopted by scholars is to define scenario with aid of a dictionary. Coates (2000), for example, examined definitions of scenario provided by *Webster's Ninth New Collegiate Dictionary*. The "closest" definition available of what a scenario is to futurists, Coates (2000, p.115) claims, is "[a]n imagined sequence of events, esp. any of several detailed plans or possibilities." As a point of comparison, the *Oxford Living Dictionary* defines scenario as "[a] written outline of a film, novel, or stage work giving details of the plot and individual scenes;" additional specification

includes "[a] postulated sequence or development of events" and "[a] setting, in particular for a work of art or literature."

Dictionary definitions, in fact, often include reference to the theatrical etymology of scenario (i.e., "stage or setting"), drawn from the Latin scæna (Kidd, 1957, as cited by Moriarty, 2012, p. 782). According to Dressler (2010), the use of scenario was expanded upon in Italian theater's *commedia dell'arte* to include not only what is presented to the audience, including the plot, scenery, the dramatis personae, and their props, but also the behind-the-scene instructions on technical devices and scene transitions to make the theatrical performance flow. In this way of thinking, a scenario is not merely the play consumed by the audience, but also relevant information structured as a guide for the actors, stage hands, and the director.

Theatric origins underpin what is probably the most accepted definition of scenario posited by forerunners to scenario planning, Kahn and Wiener (1967), some five decades ago. According to Chermack and Lynham (2002, p. 367), in his efforts working for RAND Corporation, Kahn appropriated the term after Hollywood replaced scenario with "screenplay." According to Ringland (2006, p.13-14), American humorist and writer Leo Rosten is responsible for labeling Kahn's hypothetical stories scenarios; apparently Rosten "didn't think that the more current term "screenplay" sounded dignified enough," while Kahn purportedly "adopted the term because he liked the emphasis it gave, not so much on forecasting, but on creating a story or myth." In a dramatic portrayal, Abella (2009, p. 100) depicts Kahn furiously splicing "the possibility of war into sections and subsections, contingencies and sub-contingencies, and ladders of aggression escalation," meanwhile Kahn is pictured as "joking about the possibilities of death on a scale that had never been conceived, much less declared in public before."

Of course, Kahn and Wiener's (1967) repurposing of "scenario" for military and defense application dovetails with the far older metaphor of the "military theatre." For the purpose of illustration, consider the theater of war depicted in von Clausewitz's *On War* (1873, Book 1, Chapter 4, On Danger in War):

> … even the bravest is at least to some degree confused. Now, a step further into the battle which is raging before us like a scene in a theatre, we get to the nearest General of Division; here [cannon] ball follows [cannon] ball, and the noise of our own guns increases the confusion.

By displacing the reader in time and space, passages like von Clausewitz's afford opportunity for what some contemporary futures and foresight science scholars call "mental time travel" (Suddendorf & Corballis, 2007), a phrase that belongs with a group of rhetorical devices in futures studies that include "artificial case histories" (Aligica, 2007), "disciplined imagination" (Schoemaker, 1997), "existence theorems" (Aligica, 2007), "future history" (Lindgren & Bandhold, 2003), "historical anecdotes" (Aligica, 2007), "memory of the future" (Ingvar, 1985), "mental maps of the future" (Wilson, 1998), "past futures" (Urry, 2016), and either "mental leaps" (Lehr et al., 2017) or "mental jumps" (Ringland, 2006) into the future.

Beyond academia, scenario is a term that is widely used but seldom defined. After finding scenarios used in "sport, war, business, economics, international relations, climate change science, movie making, and so on," Ramírez and Wilkinson (2016, p. xiii) devote *Strategic Reframing: The Oxford Scenario Planning Approach* "to sort out an intellectually coherent and practical definition that can be shared across different communities of practice. The authors, in response, have little choice but to agree with Godet (2000, p. 11) that, in both public and academic use of the term, "[t]he word scenario is often abused."

2 | METHOD

The authors searched a digital library of extant scholarly literature consisting of reports, books, and peer-reviewed journal articles, primarily in the IL tradition dating back to 1967. The search for phrases "a scenario is …" and "scenarios are …" in the complete library of texts yielded 405 references for extraction. After extraction, each definition was individually appraised for relevance to the study according to the following parameters:

1. Exclude statements that raise but do not define scenario. For example, exclude statements like scenarios are "a central element in" scenario planning (Balarezo, 2015, p. 38).
2. Exclude negative definitions; include positive definitions. For example, scenarios are "…different from forecasts, prognoses and visions" is a negative definition of what scenarios are not, and, thus, excluded (Lindgren & Bandhold, 2003, p. 22). The reason is to avoid false-positives during analysis. For example, if claims like those made by Lindgren and Bandhold (2003, p. 22) were regularly repeated, then terms like "forecasts" and "prognoses" may pile-up, giving the analyst the false-positive that scenarios are partly defined by exactly being "forecasts" and "prognoses" rather than the other way around. If the statement contains both a negative and positive definition, then the negative portion is eliminated and the positive included in further analysis. For example, in the definition by van der Heijden (2005, p. 27) "[s]cenarios are not seen as quasi-forecasts but as perception devices," "scenarios are not seen as quasi-forecasts" is excluded while "[s]cenarios are … perception devices" is included.
3. Include original, paraphrased, and quoted definitions. For example, Chermack and Lynham's (2002, p. 376) definition—scenarios are "several informed, plausible, and imagined alternative future environments in which decisions about the future may be played out"—is included. Likewise, Aligica's (2007, p. 295) definition, which includes quotations from Kahn's work, is also included.

Scoping review is appropriate for this article's aims for a number of reasons. First, in the context of Grant and Booth's (2009, p. 91) methods, namely, "[f]ollowing scoping searches," the

authors conducted "an examination … [of] vocabulary associated with the literature of review and synthesis," the purpose of which was to overcome a particular problem, which was that "the diversity of terminology used [in a given literature] means that the full potential of … reviews may be lost amongst a confusion of indistinct and misapplied terms." Second, the authors acknowledge that in the practice of scenario planning there is a preponderance of definitions for scenario. In fact, it might be defensible to argue that there is possibly a definition of scenario unique to every scenarist in the field (Martelli, 2001, p. 62). That in mind, the authors considered alternative data collection methods to be untenable, namely, surveying or interviewing vast numbers of scenarists in search of definitions—many of which would undoubtedly be only implicit, bound to transform over time, or even contrived in the act of the authors simply asking for a definition in the first place. Result would be interesting, but unwieldy and, ultimately, unverifiable. On balance, however, Bishop et al. (2007, p. 6) have already surveyed futures studies experts on the definition of scenario, but "decided that it does not make sense to fight the battle for a narrower definition" of scenario, and thus, their "list of [scenario] methods is based on current practice and includes the incorporation of forecasting methods whether or not they produce a story." In contrast, published, peer-reviewed claims about what a scenario is and how it should be defined can be reproduced by unconvinced readers or those who wish to repeat the analysis at a later date as more definitions are posited among scholars in the field.

Scoping review implies an analytical framework consisting of search, extraction, appraisal, synthesis, and analysis of literature and vocabulary associated with the definition of relevant terminology, in this case, definitions of scenario (Grant & Booth, 2009; Weeks & Strudsholm, 2008). Chermack and Lynham (2002) and Varum and Melo (2010) have both done similar but qualitatively different analyses. Chermack and Lynham (2002, p. 367) also searched "scholarly literature available through electronic databases," but used the "search criteria of "scenario planning"" such that "[t]he final selection criterion was whether the article contained an explicit definition of scenario planning." Of the 83 resources found, 18 were suitable for their analysis. Similar to Chermack and Lynham (2002, p. 367), the authors also omit "book reviews and editorials" and include "scholarly articles from refereed journals," but the primary difference is that Chermack and Lynham (2002) search for a definition of scenario planning rather than the definition of scenario. In comparison, Varum and Melo (2010) appear to search for a definition of scenario, but the ultimate analysis and concluding remarks drift from this purpose. Consider Varum and Melo's (2010, p. 361) table 3, "What it is and why use it," wherein "it" refers to both scenario and scenario planning; while "[w]hat it is" would imply that statements lend insight into the definition of scenario, close review reveal the statements do not. For example, statements such as "[s]cenarios help to identify, exercise, and evaluate real options in the future" and "[s] enarios support strategy related action" admittedly appear to provide direction with regard to what a scenario is; however, these statements do not function as workable definitions. It appears that what a scenario is is nearly coterminous with what a scenario can be used to do. This applies to both Chermack and Lynham (2002) and Varum and Melo (2010), and their respective lists of 18 and 32 definitions of what "scenario planning" and a "scenario" are. As a distinguishing feature of the analysis in this article, the authors take an additional step, as compared to previous researchers, in order to separate and de-link the "scenario" from the process that includes the inputs and techniques for scenario development and their later use.

2.1 | Data

The appraisal yielded 77 definitions for scenario. Because the stated aim of this article is to generate a definition that is composed of component parts of other extant definitions, the logical next step toward greater synthesis of the definition of scenario is to analyze the roster of definitions according to word frequency. For this, the authors utilized "WordSift," an online, publicly-available software program developed by Stanford University to "manage the demands of vocabulary and academic language in … text materials." The 77 definitions yield 880 unique words, the vast majority of which have a word count of 1 or are excluded from the outset (words like "the" or "and"), from of a total count of 2,872 words.

The most frequently used 25 terms, not including "scenario," result in the following list of 26 terms total:

1. Future (85);
2. Description (28);
3. Possible (26);
4. Plausible (19);
5. Story (18);
6. Event (17);
7. Consistent (16);
8. Present (15);
9. Set (13);
10. Narrative (12);
11. State (12);
12. Environment (11);
13. Alternative (10);
14. System (10);
15. Internally (9),
16. Uncertain (9);
17. Different (8);
18. Element (8);
19. Several (8);
20. Condition (7);
21. Situation (7);
22. Part (7);
23. World (7);
24. Number (6);

25. Model (5); and
26. Range (5)

"Model" (5) and "Range" (5) tied for last place, and, thus, are both included in the final analysis of 378 total relevant terms. Also, if a term appears in both single and plural form (e.g., "future" and "futures"), then all mentions of the term appear in the count for the term in the singular.

2.2 | Analysis

The authors cluster high-frequency words into overarching categories that were not preconceived before the authors initiated analysis. Categories include:

2.2.1 | Future oriented

The first category is "future oriented" and contains mention of "future" (85) and "present" (15) for 100 total references. Analysis demonstrates that scenarios, as conceived of in scenario planning literature, especially in the IL tradition, have a temporal quality and are explicitly viewed as an extension of the present embedded in the future. For example, Martelli (2007, p. 7) characterizes a scenario as "the description of a possible future" while Moriarty (2012, p. 782) claims "scenarios are possible representations of future … affairs." Temporal terminology associated with the "present" is used, for example, by Heinecke and Schwager (1995, n.p.) claiming that scenarios are "description of development paths of possible futures built on the present situation." As a point of contrast, temporal terminology associated with the "past" (3) was relatively infrequent; when present, the past was exclusively included with reference the "future" and "present," for example, as observed in van Notten et al.'s (2003, p. 424) characterization of scenarios as "descriptions of possible futures that reflect different perspectives on the past, the present and the future."

2.2.2 | External context

The second category is "external context" and contains mention of "event" (17), "state" (12), "environment" (11), "uncertain" (9), "condition" (7), "situation" (7), and "world" (7) for 70 total references. Definitions repeatedly refer to external forces, fashions, and trends that are typically outside of or beyond the immediate control of the developers and users of scenarios. Situational or environmental events out in the world generate precisely the sort of uncertainties that scenarios are designed to probe. Perhaps no scholar is clearer about this distinction as van der Heijden (2005, p. 114) when stating that "[e]xternal scenarios are derived from shared and agreed upon mental models of how the external world works," which "is the part of the environment where we have little or no influence, but which impacts on us in a major way." Reference to events in the external environment typically render them as sequences of events, as in Kahn and Weiner's (1967, p. 6) view of scenarios as "hypothetical sequences of events," or as a course of events, as in Dyner and Larsen's (2001, p. 1,152) references to dictionary definitions of scenarios as "stories about how the future could be or, as one dictionary describes it: "an outline of a natural or expected course of events."" Reference to conditions is varied, but is always contextual, and includes "current conditions" (Swart et al., 2004, p. 139), "test conditions" (van der Heijden, 2005, p. 114), or, more generally, "the conditions under which the systems … are assumed to be performing" (Brown, 1968, p. 299-300). Similarly, situation is varied but contextually-oriented (Aligica, 2007, p. 309; Durance & Godet, 2010, p. 1,488); situations can be "anticipated" (Gordon, 2013, p. 3), "current" (van der Heijden, 2004, p. 153), in the "present" (Heinecke, & Schwager, 1995, n.p.), or "possible" (Gracht & Darkow, 2010, p. 47).

2.2.3 | Plausibly possible

The third category is "plausibly possible" and contains mention of "possible" (26), "plausible" (19), "consistent" (16) and "internally" (9) for 70 total references. Definitions repeatedly refer to the internal qualities that a scenario either must or ought to have, and cardinal criteria are being possible not impossible, plausible not implausible, and internally coherent not self-contradictory, or, in Swart et al.'s (2004, p. 139) simple summary, scenarios should be "coherent and plausible." The notion of possibility takes a number of forms. For example, van Notten et al. (2003, p. 424) pair possible with futures, stating scenarios are "descriptions of possible futures," and so does Martelli (2001, p. 17), claiming scenarios are "the description of a possible future state of a system," and so do others (Eisenhardt, 1999, p. 68; Foster, 1993, p. 124; Godet, 2001, p. 63), meanwhile Moriarty et al. (2012, p. 782) pair possible with representations, stating "scenarios are possible representations of future states of affairs." Gracht and Darkow (2010, p. 47) also summarize the point nicely; scenarios are "defined as internally consistent, [and] plausible … descriptions of possible situations in the future." However, plausibility, possibility, and probability are still topics of contention in the scenario planning literature (Ramírez & Selin, 2014). Plausibility is differentiated from probability in the planning process in so far as scenarios are "conceived through a process of causal rather than probabilistic thinking" (van der Heijden, 2005, p. 27). If the described situation is not plausible, then its function as a planning device breaks down, as belief must be adequately suspended or postponed to be "entertained" by an inquiring mind. While scenarios are necessarily fiction, establishing them as neither too obvious nor too strange is expected to maximize their utility (Ramírez & Selin, 2014).

2.2.4 | Narrative description

The fourth category is "narrative description" and contains mention of "description" (28), "story" (18), and "narrative" (13) for 59 total references. Apart from "future," "description" is the most commonly utilized terminology demarcating scenario. Descriptions can be "challenging" (van der Heijden, 1997, p. 5), "focused" (Schoemaker, 1993, p. 195), or "vivid" (Lindgren & Bandhold, 2003, p. 22), and

are often specified as "narrative" in form (Gracht & Darkow, 2010, p. 47; Ramírez et al., 2015, p. 71; Stone & Redmer, 2006, p. 8; van der Hiejden, 2005, p. 114). The proper form of a scenario is, thus, a narrative description or story wherein the scenarist "paint[s] a vivid picture of a future state in words" (Neilson & Stouffer, 2004, p. 5).

2.2.5 | Systematized set

The fifth category is "systematized set" and contains mention of "set" (13), "system" (10), "element" (8), "several" (8), "part" (7), "model" (5), and "number" (6) and for 57 total references. The implication of this category is that scenarios exist as groups, or, best put by Sharpe and van der Heijden (2007, p. 57), that "[s]cenarios always come in sets." "Number" does a fine job of communicating that scenarios are rarely alone; "scenarios are a number of stories," van der Heijden (2005, p. 121) writes, which are, in turn, "based on analysis of the interaction of a number of environmental variables" (Kloss, 1999, p. 73) and a "number of [other] hypothetical developments as resulting in part from the decisions and actions of various actors" (Khakee, 1991, p. 460-461). Numbers of scenarios combine to become a "set of shared and contrasting narratives" (Lang & Ramírez, 2017, p. 57) or even multiple "sets of narratives about the future" (Linneman & Klein, 1983, p. 94-95). While "system" can refer to a network of actors or even "value systems" (Selin, 2003, as cited in Ramírez & Selin, 2014, p. 65), the relevant use in terminology defining scenario is in characterizing scenarios as "systematized visions" (Andersen & Rasmussen, 2014, p. 25) and "systematic and internally consistent visions of plausible future states of affairs" (Popper, 2008, p. 88) that lead to "systemically plausible emergent futures" (Burt & van der Heijden, 2008, p. 1,117).

2.2.6 | Comparatively different

The sixth and final category is "comparatively different" and contains mention of "alternative" (10), "different" (8), and "range" (5) for 23 total references. While scenarios are systematically created in sets, scenarios that populate those sets should be, in some meaningful way, comparatively different from one another. "[A]lternative scenarios" (Curry & Hodgson, 2008, p. 8) describe various "alternative futures" (Andersen & Rasmussen, 2014, p. 25) and, thus, feature "alternative future environments" (Chermack & Lynham, 2002, p. 376; Schwartz, 1991, p. 45) based on "alternative plausibilities" (Staley, 2002, p. 72), "alternative images of the future" (Durance & Godet, 2010, p. 1,488), and even "alternative projections of a specific part of the future" (Fahey & Randall, 1998, p. 6), all of which must contain different "logics" (Curry & Hodgson, 2008, p. 8), "stories" (MacKay & McKiernan, 2004, p. 163), "futures" (van der Heijden, 1997, p. 27-28), "perspectives" (van Notten, et al., 2003, p. 424), "paths" (Roubelat, 2000, p. 4), and so on.

In sum, based on word count and analysis, the authors find that scenarios primarily have a temporal property rooted in the future and reference external forces in that context; scenarios should also be possible and internally plausible while taking the proper form of a story or narrative description; scenarios seem to exist in sets and the scenarios that inhabit those sets are systematically prepared to co-exist as meaningfully different alternatives to one another.

While not intended by the authors, the categories appear to pair together into a series of clusters, allowing for an additional layer of abstraction from the details of any one definition or category:

2.2.7 | Scenario purview

The first two categories, "future oriented" (100) and "external context" (70), define scenario by the "purview" of a typical scenario, meaning, a scenario occurs or takes place in a future which is shaped by uncertain structural or contextual factors. With 170 references combined, the purview of a scenario is the primary way scholars define scenario. As we shall see, references with a distinctly temporal property oriented to external referents are approximately equal in count to all other terminology commonly used to define the scenario in future studies over the past half century or so (170/378 or 45% of all terminology the authors analyzed). With regard to the purview of scenarios, it seems there is a paucity of confusion rather than an abundance.

2.2.8 | Normative qualities

The next categories, "plausibly possible" (70) and "narrative description" (59), define scenario by the qualities of a normatively "good" scenario, in this case, the internally consistent and plausible scenario, which is properly formatted as a coherent narrative. This is the preferred form that a good scenario must take in order to be recognized in the scholarly community as legitimate. With 129 references combined, the prominent qualities of the good or legitimate scenario is a prominent way scholars define scenario, occupying approximately one third of scholarly imagination on the character of scenarios (129/378 or 34% of all terminology the authors analyzed).

2.2.9 | Differentiated set

The final categories, "systematized set" (57) and "comparatively different" (23), define the scenario in relation to other scenarios, namely, that scenarios are systematically produced in sets that contain individual scenarios that have limited overlap and, thus, are meaningfully different. With 80 references combined, the idea that scenarios constitute a differentiated set is the least frequent while still prominent way that scholars define scenario, occupying approximately one fifth of the definitionary word count (80/378 or 21% of all terminology the authors analyzed).

3 | DISCUSSION

In what follows, the authors reflect on each of the higher order clusters and offer readers another version of results in a simplified table

and take-away flowchart that functions as a question-based diagnostic tool.

3.1 | Reflection on overall purview

The most frequently used term associated with scenario, "future," appears in 53 of the 77 total definitions the authors analyzed. In fact, with 85 total references, future is actually repeated in 32 of the 53 definitions that feature the term at all. In cases where future is not referenced, it is alluded to. For example, Kahn and Weiner (1967, p. 6) do not reference the future other than to characterize scenarios as hypothetical; scenarios are, they write, "hypothetical sequences of events, built with the intent of attracting attention to causal processes and points of decision." Kahn (1973, p. 199) later repeats this pattern of omission, stating that "[s]cenarios attempt to describe in more or less detail with more or less explanatory acumen some hypothetical sequence of events." Unless "hypothetical" occasionally operates as a loose synonym or shorthand for "the future," seminal thinking on scenarios lacks the explicit temporal property common to contemporary definitions. So common is future terminology in contemporary definitions that definitions often feature the term more than once. For example, in defining scenario, Godet (2001, p. 63) repeats future, stating that a scenario is "simply a means to represent a future reality in order to shed light on current action in view of possible and desirable futures." Andersen and Rasmussen (2014, p. 25) repeat future too; they write:

> Scenarios are characterized by: focusing on elements in the future that are unforeseeable (or difficult to foresee); structuring presently existing knowledge in a systematic way; identifying plausible alternative futures; ability to contain discontinuities; ability to be both qualitative and quantitative.

Bennet et al. (2016, p. 445) also repeat futures; they write:

> Scenarios are sets of narratives about the future; they have been employed by decision makers in the business community and elsewhere for several decades as an alternative to predictions, forecasts, and other single-future strategic planning processes.

The most abundant repetitiveness is found in Rowland and Spaniol (2015, p. 560); they write:

> … futures that inhabit scenarios are representations; they do not exist other than as referents to something that, in principle, does not yet exist on account of being in the future. Scenarios may be in the present, but, the logic goes, the future is—now and forever—in the future.

Most scholars only mention future once in their definitions. Popper (2008, p. 88), for example, defines scenario this way: "systematic and internally consistent visions of plausible future states of affairs." Mentioned once or mentioned twice, the "future" it is still the most salient quality of a scenario for scholars in the IL tradition in futures studies.

3.2 | Reflection on normative qualities

The use of "normative" in this article is not identical or coterminous with the term "normative" utilized by a particular set of scholars in futures studies, especially scholars writing about "normative scenarios." For example, notice the use of "normative" in Durance and Godet's (2010, p. 1488–1490) differentiation of "exploratory scenarios" from "normative scenarios;" they write:

> Exploratory scenarios are concerned with past and present trends and lead to likely futures. Normative scenarios are constructed from alternative images of the future which may be both desirable and feared, and are conceived in a retro-projective way. Thus, exploratory scenarios are devoid of human values, whereas normative scenarios are the expression of human values.

The normative aspect identified by Durance and Godet (2010) is normative with regard to the future itself rather than the scenario despite being explicitly referred to as a normative scenario. The use of normative in this article is in reference to establishing, relating to, or deriving from an enforceable standard of quality associated with the "good" scenario rather than scenarios within which "good" future outcomes unfold. Normative, in this sense, is in reference to the lived conduct of futures and foresight science as well as the practice of scenario planning rather than any sort of judgment with regard to human values, utopian futures, or other positive future affairs. Also, on balance, normative claims are made in the futures studies literature explicitly about the appropriate form of scenarios routinely; Neilson and Stouffer (2004, p. 5), for example, comment on length, candidly noting that "[i]f scenarios are too long, no one reads them."

3.3 | Reflection on differentiated set

Scenarios exist in internally differentiated sets, and this has implications for ontology in futures and foresight science. "After decades characterized by diminishing interest in the theoretical underpinning of futures studies," Poli (2011, p. 67) writes, "the past few years have seen the onset of a new concern with the foundation of futures studies," and "recent discussion has not been limited to the epistemological bases of futures studies but has also begun to address the problem of its ontological grounds" (see also Staley, 2017). Recent research speaks directly to matters of ontology in a field that conspicuously self-identifies with futures (plural) and intentionally distances the scientific enterprise from dated thinking about the future (in the singular) as a straightforward, inevitable tunnel from the present into a time that has still to come (Rowland & Spaniol, 2015). During analysis,

TABLE 1 Summary table of results transformed into questions.

Question	Count (Percent)
1. Is it future oriented?	100/378 (26)
2. Is it about external context?	70/378 (19)
Scenario Purview	*170/378 (45)*
3. Is it a narrative description?	70/378 (19)
4. Is it plausibly possible?	59/378 (16)
Normative Qualities	*129/378 (34)*
5. Is it a systematized set?	57/378 (15)
6. Is it comparatively different?	23/378 (6)
Differentiated Set	*80/378 (21)*

the authors observed repeated use of the "future" (in the singular) and "futures" (plural), as though the terms were interchangeable. Resonating with past research on ontology, the authors see this as additional evidence that futures and foresight science, no matter how pronounced the analytical commitment to the futures concept is, cannot discard the concept of the future completely, which is reflected in the many and varied definitions of scenario in this article.

3.4 | Summary diagnostic

For readers interested in a tangible take-away from this manuscript, the authors prepared a summary table and a diagnostic flowchart that can be utilized individually or as a pair. The summary table includes the frequencies from the previous section, arranged in hierarchical order, each presented in the form of a question (see Table 1).

Arranged in rank order of their salience to the futures and foresight science academic community, the questions then can be transformed into a diagnostic tool for identifying scenarios and differentiating them from non-scenarios (i.e., tools and objects commonly used in the same area or that might be mistaken for scenarios outside of futures studies). The resulting flowchart features questions that flow from the top of the chart to the bottom (see Figure 2).

The questions are numbered for ease of use. If the response to the first question (e.g., "is the described phenomena future oriented?") is "yes," then the reader moves to the next question. Please note, the questions stack. This implies that the second question is asking "is the described phenomena about an external context *and* future oriented?" This then repeats, meaning, question three might be summarized to say "is the described phenomena a narrative description about an external context set in the future?" This continues, but the authors will not belabor the point further. Now, regarding the purpose of the flowchart, the authors consider the chart to be a springboard for conversation and discussion and not something comprehensive or definitively complete. To this end, the diagnostic tool embedded in the flowchart may work effectively in an educational setting as it is a portable and efficient, if incomplete, way to learn and know the scenario.

4 | CONCLUSION

The authors began by uncovering the origins of a now iconic claim in futures and foresight science, namely that the field suffers from confusion with regard to the definition of one of its most central, core concepts, the scenario. This is an important, shared concern to address for the futures and foresight academic community in no small part because fanfare given to arguments like definition confusion frame the field to outside constituents—everything from other disciplines we might collaborate with or funding agencies we seek funding from—but claims like this also provide a view into the prism of practice in the field to curious students who may join the enterprise of futures and foresight science. In either case, repetition of definition confusion is not a productive way to display the field to the outside world or

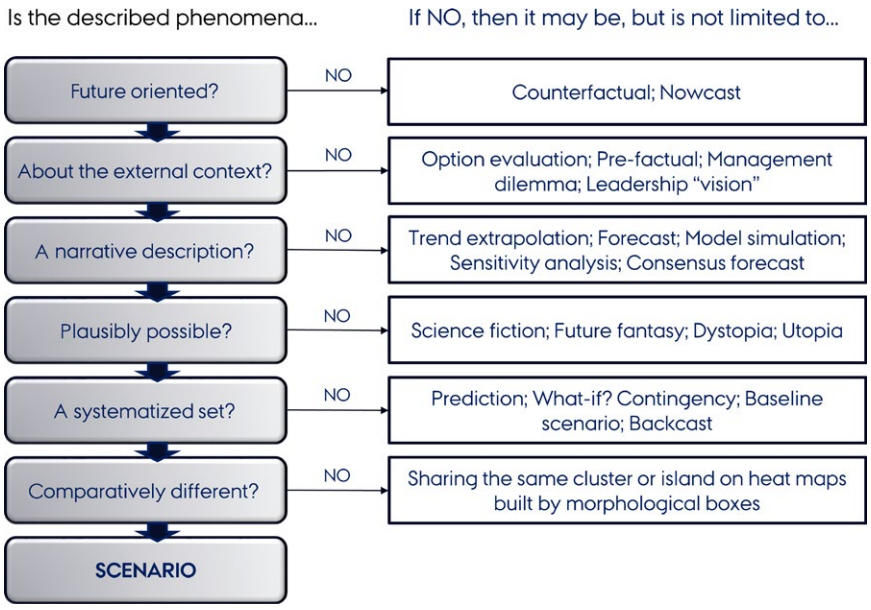

FIGURE 2 Process for classifying a phenomena as a scenario in the Intuitive Logics tradition

showcase our scholarship to those whom may join our ranks. While some scholars and practitioners might reject the definition confusion claim intuitively or based on past professional or personal experience—which we are sympathetic to—the authors chose to seek out evidence with which to assess the matter, finding evidence a more effective way to test intuition and possibly verify past experience. Based on evidence gathered from the field, in this case, definitions of scenario published in scholarly communications in futures and foresight science, the authors conclude that the academic community of futures and foresight science does not suffer from so-called confusion over the definition of scenario, and, thus, it is time to sunset the use of claims that fuel this misconception.

In sum, based on word count and additional analysis, the authors find that data can support the following understanding of scenario: scenarios primarily have a temporal property rooted in the future and reference external forces in that context; scenarios should also be possible and internally plausible while taking the proper form of a story or narrative description; scenarios seem to exist in sets and the scenarios that inhabit those sets are systematically prepared to co-exist as meaningfully different alternatives to one another (see Table 1 and Figure 2).

While it is often said that there is a definition of scenario for every scenarist out there planning in the field, and this may be true, analysis of published material indicates that all those different definitions out in practice have a shared set of qualities. Thus, while the definitions may all be different, these differences appear to confuse neither the practitioners out in the field nor scholars in their communications. In a related vein, the authors sought to reveal how scholars and practitioners have endeavored, over time, to define scenario as a collective group. The result is a definition of no one's and yet everyone's making. Preferences and predilections aside, this is the current, operant, working definition in the field based exclusively on literature in futures and foresight science.

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ORCID

Matthew J. Spaniol http://orcid.org/0000-0002-1216-4630
Nicholas J. Rowland http://orcid.org/0000-0003-2917-578X

REFERENCES

Abella, A. (2009). *Soldiers of reason: The RAND corporation and the rise of the American empire*. Boston, MA: Houghton Mifflin Harcourt.

Aligica, P. D. (2007). Uncertainty, human action and scenarios. *The Review of Austrian Economics*, *20*(4), 293–312.

Andersen, P. D., & Rasmussen, B. (2014). *Introduction to foresight and foresight processes in practice. Course material for Foresight for Engineers*. Lyngby Denmark: DTU. (June).

Balarezo, J. D. (2015). Learning Through Scenario Planning. Copenhagen, Denmark: Copenhagen Business School. Doctoral Thesis.

Bartelson, J. (1995). *A Genealogy of Sovereignty*. Cambridge, UK: Cambridge University Press.

Bartelson, J. (2000). Three Concepts of Globalization. *International Sociology*, *15*(2), 180–196.

Bartelson, J. (2001). *The Critique of the State*. Cambridge, UK: Cambridge University Press.

Bell, W. (2003). *Foundations of Futures Studies: History, Purposes, and Knowledge: Human Science for a New Era*, Vol. *1*. New Brunswick and London: Transaction Publishers.

Bennett, E. M., Solan, M., Biggs, R., McPhearson, T., Norström, A. V., Olsson, P., … Carpenter, S. R. (2016). Bright spots: seeds of a good anthropocene. *Frontiers in Ecology and the Environment*, *14*(8), 441–448.

Bishop, P., Hines, A., & Collins, T. (2007). The current state of scenario development: an overview of techniques. *Foresight*, *9*(1), 5–25.

Bradfield, R. M. (2008). Cognitive barriers in the scenario development process. *Advances in Developing Human Resources*, *10*(2), 198–215.

Bradfield, R., Derbyshire, J., & Wright, G. (2016). The critical role of history in scenario thinking: Augmenting causal analysis within the intuitive logics scenario development methodology. *Futures*, *77*, 56–66.

Bradfield, R., Wright, G., Burt, G., Cairns, G., & van der Heijden, K. (2005). The origins and evolution of scenario techniques in long range business planning. *Futures*, *37*(8), 795–812. https://doi.org/10.1016/j.futures.2005.01.003

Brown, S. (1968). Systems analysis and policy planning: Applications in defense, pp. 298–310, E. S. Quade & W. I. Boucher (Eds.). New York, NY: American Elsevier Publishing Company Inc.

Burt, G., & van der Heijden, K. (2008). Towards a framework to understand purpose in Futures Studies: The role of Vickers' Appreciative System. *Technological Forecasting and Social Change*, *75*(8), 1109–1127.

Chermack, T. J. (2002). The mandate for theory in scenario planning. *Futures Research Quarterly*, *18*(2), 25–28.

Chermack, T. J., & Lynham, S. A. (2002). Definitions and outcome variables of scenario planning. *Human Resource Development Review*, *1*(3), 366–383. https://doi.org/10.1177/1534484302013006

Coates, J. F. (2000). Scenario planning. *Technological forecasting & social change*, *65*(1), 115–123. https://doi.org/10.1016/S0040-1625(99)00084-0

Curry, A., & Hodgson, A. (2008). Seeing in multiple horizons: Connecting futures to strategy. *Journal of Futures Studies*, *13*(1), 1–20.

Dressler, W. U. (2010). 'Scenario' as a concept for the functional explanation of language change. In J. Gvozdanovic (Ed.), *Language change and functional explanations* (pp.109–142). Berlin, Federal Republic Germany: Mouton de Gruyter.

Ducot, C., & Lubben, G.J. (1980). A typology for scenarios. *Futures*, *12*(1), 51–57. https://doi.org/10.1016/S0016-3287(80)80007-3

Durance, P., & Godet, M. (2010). Scenario building: Uses and abuses. *Technological Forecasting and Social Change*, *77*(9), 1488–1492. https://doi.org/10.1016/j.techfore.2010.06.007

Dyner, I., & Larsen, E. R. (2001). From planning to strategy in the electricity industry. *EnergyPolicy*, *29*(13), 1145–1154. https://doi.org/10.1016/S0301-4215(01)00040-4

Editorial. (1969). Futures—Confidence from Chaos. *Futures*, *1*(1), 2–3.

Eisenhardt, K. M. (1999). Strategy as strategic decision making. *Sloan Management Review*, *40*(3), 65–72.

Ellis, J., Feinstein, S., & Stearns, D. (2000). Scenario learning: A powerful tool for the 21st century planner. *Journal of Financial Planning*, *13*(4), 82.

Fahey, L. (2000). Scenario learning. *Management Review*, *89*(3), 29–34.

Fahey, L., Randall, R. M. (1998). *Learning from the future: competitive foresight scenarios*. New York, NY: John Wiley & Sons.

Foster, M. J. (1993). Scenario planning for small businesses. *Long Range Planning*, *26*(1), 123–129. https://doi.org/10.1016/0024-6301(93)90240-G

Gausemeier, J., Fink, A., & Schlake, O. (1998). Scenario management: An approach to develop future potentials. *Technological Forecasting and Social Change*, *59*(2), 111–130. https://doi.org/10.1016/S0040-1625(97)00166-2

Godet, M. (2000). The art of scenarios and strategic planning: tools and pitfalls. *Technological Forecasting and Social Change*, *65*(1), 3–22. https://doi.org/10.1016/S0040-1625(99)00120-1

Godet, M. (2001). *Creating futures: Scenario planning as a strategic management tool*. London, UK: Economica.

Gordon, A. (2013). Adaptive vs. visionary-advocacy approaches in scenario planning: Implications of contrasting purposes and constraint conditions. Doctoral thesis, University of Cape Town, Cape Town, South Africa.

Gracht, H. V. D., & Darkow, I. L. (2010). Scenarios for the logistics services industry: A delphi-based analysis for 2025. *International Journal of Production Economics*, *127*(1), 46–59. https://doi.org/10.1016/j.ijpe.2010.04.013

Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, *26*(2), 91–108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Heinecke, A., & Schwager, M. (1995). *Die szenariotechnik als instrument der strategischen planung*. Germany: Braunschweig.

Huss, W. R. (1988). A move toward scenario analysis. *International Journal of Forecasting*, *4*(3), 377–388. https://doi.org/10.1016/0169-2070(88)90105-7

Ingvar, D. H. (1985). "Memory of the future": an essay on the temporal organization of conscious awareness. *Human Neurobiology*, *4*(3), 127–136.

Jungermann, H., & Thüring, M. (1987). The use of mental models for generating scenarios. In G. Wright & P. Ayton (Eds.), *Judgemental Forecasting*. London, UK: Wiley.

Kahn, H. (1973). The alternative world futures approach. In F. Tugwell (Ed.), *Search for alternatives: Public policy and the study of the future*. Cambridge, Massachusetts: Witrop Publishers.

Kahn, H., & Wiener, A. J. (1967). *The year 2000: A framework for speculation on the next thirty-three years*. New York, NY: Hudson Institute.

Khakee, A. (1991). Scenario construction for urban planning. *Omega*, *19*(5), 459–469. https://doi.org/10.1016/0305-0483(91)90062-X

Kidd, D. A. (Ed.) (1957). *Collins GEM Latin Dictionary*. Glasgow: HarperCollins.

Kloss, L. L. (1999). The suitability and application of scenario planning for national professional associations. *Nonprofit Management and Leadership*, *10*(1), 71–83. https://doi.org/10.1002/nml.10106

Lang, T., & Ramírez, R. (2017). Building new social capital with scenario planning. *Technological Forecasting and Social Change*, *124*, 51–65. https://doi.org/10.1016/j.techfore.2017.06.011

Lehr, T., Lorenz, U., Willert, M., & Rohrbeck, R. (2017). Scenario-based strategizing: Advancing the applicability in strategists' teams. *Technological Forecasting and Social Change*, *124*, 214–224. https://doi.org/10.1016/j.techfore.2017.06.026

Lindgren, M., & Bandhold, H. (2003). *Scenario planning: The link between future and Strategy*. London, UK: Palgrave.

Linneman, R. E., & Kennell, J. D. (1977). Shirt-sleeve approach to long-range plans. *Harvard Business Review*, *56*(2), 141–150.

Linneman, R. E., & Klein, H. E. (1983). The use of multiple scenarios by US industrial companies: A comparison study, 1977–1981. *Long Range Planning*, *16*(6), 94–101. https://doi.org/10.1016/0024-6301(83)90013-4

MacKay, R. B., & McKiernan, P. (2004). The role of hindsight in foresight: refining strategic reasoning. *Futures*, *36*(2), 161–179. https://doi.org/10.1016/S0016-3287(03)00147-2

Martelli, A. (2001). Scenario building and scenario planning: state of the art and prospects of evolution. *Futures Research Quarterly*, *17*(2), 57–74.

Martelli, A. (2007). From business intelligence to scenario building. *Futures Research Quarterly*, *23*(4), 5–22.

Miller, R. (2006). Futures studies, scenarios, and the possibility-space approach. Chapter 5 in: Think scenarios, rethink education. OECD Publication. https://www.oecd.org/site/schoolingfortomorrowknowledgebase/futuresthinking/scenarios/futuresstudiesscenariosandthepossibility-spaceapproach.htm. Accessed May 10, 2017.

Millett, S. M. (2003). The future of scenarios: challenges and opportunities. *Strategy & Leadership*, *31*(2), 16–24. https://doi.org/10.1108/10878570310698089

Moriarty, J. P. (2012). Theorising scenario analysis to improve future perspective planning in tourism. *Journal of Sustainable Tourism*, *20*(6), 779–800. https://doi.org/10.1080/09669582.2012.673619

Neilson, R. E., & Stouffer, D. (2004). Scenarios: Futuristic stories with a purpose. *DigitalNet*, 1–7.

Ogilvy, J. & Schwartz, P. (1998). Plotting your scenarios. p. 57–80 in Leaning from the future: Competitive foresight scenarios. L. Fahey & R. Randall (eds.). New York, NY: John Wiley & Sons.

Poli, R. (2011). Steps toward an explicit ontology of the future. *Journal of Futures Studies*, *16*, 67–78.

Popper, R. (2008). How are foresight methods selected? *Foresight*, *10*(6), 62–89.

Postma, T. J., & Liebl, F. (2005). How to improve scenario analysis as a strategic management tool? *Technological Forecasting and Social Change*, *72*(2), 161–173. https://doi.org/10.1016/S0040-1625(03)00152-5

Ramírez, R., Mukherjee, M., Vezzoli, S., & Kramer, A.M. (2015). Scenarios as a scholarly methodology to produce "interesting research". *Futures*, *71*, 70–87. https://doi.org/10.1016/j.futures.2015.06.006

Ramírez, R., & Selin, C. (2014). Plausibility and probability in scenario planning. *Foresight*, *16*(1), 54–74. https://doi.org/10.1108/FS-08-2012-0061

Ramírez, R., & Wilkinson, A. (2014). Rethinking the 2×2 scenario method: grid or frames? *Technological Forecasting and Social Change*, *86*, 254–264. https://doi.org/10.1016/j.techfore.2013.10.020

Ramírez, R., & Wilkinson, A. (2016). *Strategic Reframing: The Oxford Scenario Planning Approach*. Oxford, UK: Oxford University Press.

Randt, N. P. (2015). An approach to product development with scenario planning: The case of aircraft design. *Futures*, *71*, 11–28. https://doi.org/10.1016/j.futures.2015.06.001

Ringland, G. (2006). *Scenario planning: Managing for the future*. Chichester, West Sussex: John Wiley.

Roubelat, F. (2000) 'The prospective approach: contingent and necessary evolution', Future Studies, (4), p. 4, CD Rom.

Rowland, N. J., & Spaniol, M. J. (2015). The future multiple. *Foresight*, *17*(6), 556–573. https://doi.org/10.1108/FS-02-2015-0014

Rowland, N. J., & Spaniol, M. J. (2017). Social foundation of scenario planning. *Technological Forecasting and Social Change*, *124*, 6–15. https://doi.org/10.1016/j.techfore.2017.02.013

Sarpong, D. (2011). Towards a methodological approach: theorising scenario thinking as a social practice. *Foresight*, *13*(2), 4–17. https://doi.org/10.1108/14636681111126210

Schoemaker, P. H. J. (1993). Multiple scenario development: Its conceptual and behavioral foundation. *Strategic Management Journal*, *14*(3), 193–213. https://doi.org/10.1002/smj.4250140304

Schoemaker, P. H. J. (1997). Disciplined imagination: from scenarios to strategic options. *International Studies of Management & Organization*, *27*(2), 43–70. https://doi.org/10.1080/00208825.1997.11656707

Schwartz, P. (1991). *The art of the long view: paths to strategic insight for yourself and your company*. New York, NY: Crown Business.

Selin, C. (2003). "The art and science of scenario planning". In *Danish anthology on research management* (pp. 126–134). Aarhus, Denmark: Danish Institute for Studies in Research and Research Policy.

Sharpe, B., & Heijden, K. V. D. (2007). Scenarios for success: Turning insights into action. In B. Sharpe & K. Van der Heijden (Eds.), Chichester, West Sussex: John Wiley & Sons Ltd.

Slaughter, R. A. (2002). From forecasting and scenarios to social construction: changing methodological paradigms in futures studies. *Foresight*, *4*(3), 26–31. https://doi.org/10.1108/14636680210697731

Spaniol, M. J., & Rowland, N. J. (2018a). The scenario planning paradox. *Futures*, *95*, 33–43. https://doi.org/10.1016/j.futures.2017.09.006

Spaniol, M. J., & Rowland, N. J. (2018b). Dismal theory and methodological chaos in scenario planning. pp. 103–110. In R. Saarimaa & M. Wilenius (Eds.), *Futures of a complex world*. Turku, Finland: Finland Futures Research Centre (FFRC eBOOK 2/2018). Proceedings of the Conference "Futures of a Complex World", 12–13 June 2017, Turku, Finland.

Staley, D. J. (2002). A history of the future. *History and Theory*, *41*(4), 72–89. https://doi.org/10.1111/1468-2303.00221

Staley, D. J. (2017). Time and the ontology of the future. *World Futures Review*, *9*(1), 34–43. https://doi.org/10.1177/1946756717690173

Stewart, C. C. (2008). Integral scenarios: Reframing theory, building from practice. *Futures*, *40*(2), 160–172. https://doi.org/10.1016/j.futures.2007.11.013

Stone, G., & Redmer, T. (2006). The case study approach to scenario planning. *Journal of Practical Consulting*, *1*(1), 7–18.

Suddendorf, T., & Corballis, M. C. (2007). The evolution of foresight: What is mental time travel, and is it unique to humans? *Behavioral and Brain Sciences*, *30*(3), 299–313. https://doi.org/10.1017/S0140525X07001975

Swart, R. J., Raskin, P., & Robinson, J. (2004). The problem of the future: Sustainability science and scenario analysis. *Global Environmental Change*, *14*(2), 137–146. https://doi.org/10.1016/j.gloenvcha.2003.10.002

Tapinos, E. (2012). Perceived environmental uncertainty in scenario planning. *Futures*, *44*(4), 338–345. https://doi.org/10.1016/j.futures.2011.11.002

Urry, J. (2016). *What is the future?* Cambridge & Malden, MA: Polity.

van der Heijden, K. (1997). *Scenarios: The art of the strategic conversation*. New York, NY: John Wiley.

van der Heijden, K. (2004). Can internally generated futures accelerate organizational learning? *Futures*, *36*(2), 145–159. https://doi.org/10.1016/S0016-3287(03)00143-5

van der Heijden, K. (2005). *Scenarios: the art of strategic conversation* (2nd edn.). West Sussex: John Wiley & Sons Ltd.

van Notten, P. W., Rotmans, J., Van Asselt, M. B., & Rothman, D. S. (2003). An updated scenario typology. *Futures*, *35*(5), 423–443. https://doi.org/10.1016/S0016-3287(02)00090-3

Varum, C. A., & Melo, C. (2010). Directions in scenario planning literature – A review of the past decades. *Futures*, *42*(4), 355–369. https://doi.org/10.1016/j.futures.2009.11.021

Von Clausewitz, C., & Graham, J. J. (1873). *On war* (Vol. *1*). London, UK: N. Trübner & Company.

Wack, P. (1985a). Scenarios: Uncharted Waters Ahead. *Harvard Business Review*, *63*(5), 73–89.

Wack, P. (1985b). Scenarios: Shooting the Rapids. *Harvard Business Review*, *63*(6), 139–150.

Weeks, L. C., & Strudsholm, T. (2008). A scoping review of research on complementary and alternative medicine (CAM) and the mass media: Looking back, moving forward. *BMC Complementary and Alternative Medicine*, *8*, 1–9. https://doi.org/10.1186/1472-6882-8-43

Wilkinson, A., & Kupers, R. (2013). Living in the futures. *Harvard Business Review*, *91*(5), 118–127.

Wilson, I. H. (1978). Scenarios. In J. Fowles (Ed.), *Handbook of futures research*. London, UK: Greenwood Publishers.

Wilson, I. (1998). *Mental maps of the future: an intuitive logics approach to scenarios* (pp. 81–108). Learning from the future: Competitive foresight scenarios.

Wright, G., Bradfield, R., & Cairns, G. (2013). Does the intuitive logics method–and its recent enhancements–produce "effective" scenarios? *Technological Forecasting and Social Change*, *80*(4), 631–642. https://doi.org/10.1016/j.techfore.2012.09.003

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