

AI-assisted scenario generation for strategic planning

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Abstract

This “reflections from practice” piece explores some of the implications of emerging, artificially intelligent tools for the futures and foresight prac-ademic community. The authors provide background on these emerging, artificially intelligent tools, and explore, with special emphasis on scenarios, a specific tool named “Chat Generative Pre-trained Transformer” (hereafter, ChatGPT). The authors examine the utility of scenarios generated by artificial intelligence (AI) and explore whether or not the futures and foresight prac-ademic community should selectively embrace advances in AI to assist in the generation of scenarios. In particular, the authors will consider (1) the utility of using scenarios generated completely by AI, (2) whether what is produced, in fact, constitute scenarios, based on conventional definitions, and (3) assess the utility of using AI to assist in the production of scenarios. At this point in time, artificially intelligent tools can now generate numerous scenarios on seemingly any topic at essentially zero cost to the user. Still, the authors insist that the utility of those scenarios is largely predicated on the user’s ability to coax the appropriate “raw material” from the artificially intelligent bot, which implicates, the authors contend, that such bots can usefully provide base material for the development of scenarios but are unlikely to fully eclipse scenarists in the production of scenarios. Additionally, the authors recommend that the futures and foresight prac-ademic community pay especially close attention to artificially intelligent tools for novel insights with regard to the differences in human cognition and, in this case, the logic of large language model outputs.

KEYWORDS

artificial intelligence, ChatGPT, scenarios, strategic planning

1 | PRELUDE

The authors type “Write three scenarios for the future of transport” into an artificially intelligent chat tool,¹ and this is the response, delivered instantly:

1. “In the near future, personal flying vehicles become a popular mode of transportation. These vehicles are electric and can take off and land vertically, allowing people to easily travel short distances without having to deal with traffic on the ground.”

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2. "In the distant future, teleportation becomes a reality. People are able to instantly transport themselves to any location they desire, making traditional forms of transportation obsolete."
3. "In another possible future, self-driving cars become the norm. These cars use advanced artificial intelligence to navigate roads and highways, allowing passengers to relax or work while they are transported to their destination" (Assistant, 2022).

If that is not already concerning to the futures and foresight academic and practitioner community, then perhaps this may further capture the range of possible options that AI-generated scenarios pose: The authors simply type "Write three more," and get:

4. "In the future, space tourism becomes a popular and affordable way to travel. People can take trips to the moon or even other planets for vacation or business purposes."
5. "In the future, a network of high-speed trains becomes the primary mode of long-distance travel. These trains are able to travel at incredibly fast speeds, allowing people to quickly and comfortably travel across continents."
6. "In the future, underwater cities become a popular destination for tourists and residents alike. High-speed submersibles are developed to quickly transport people to and from these cities, allowing them to explore the ocean and all of its wonders" (Assistant, 2022).

Having briefly shown what an artificially intelligent tool can do when asked to generate scenarios, the authors will not belabor the reader with further demonstration, other than to suggest that, at this point in time, artificially intelligent tools can now generate an abundant number of succinct, differentiated scenarios on seemingly any topic, delivered without delay, at essentially zero cost.

The specific tool that the authors are referring to is named "Chat Generative Pre-trained Transformer"—hereafter, ChatGPT, as it is commonly known in the public. Since its release, by OpenAI, for general use in late 2022, the bot has garnered significant public attention. Like many chat tools, ChatGPT operates on a question-and-answer platform where the user makes a query or request in the form of a question or command and the bot either responds or answers. ChatGPT employs large language modeling, meaning, that the bot's pretrained parameters are used to generate a coherent and relevant output based on a sequence of words with the highest probability of being strung together in response to the user's inquiry or command. The core modeling for a tool like this is also occasionally referred to as "Pretrained Language Model for Task-Oriented Dialogue" (for early work, see, e.g., Budzianowski & Vulić, 2019). As previously noted, such a bot is pre-trained on numerous sources, in multiple languages, including programming languages. In addition to these sources, ChatGPT uses conversational AI models to contextualize chat conversations in the same tool.² As such, bots like ChatGPT can not only generate answers to questions and commands, but they can also be prompted to write code and debug computer programming, render a technical essay at a lower level of reading comprehension, write lyrics or poetry and compose music, create

and answer test questions on exams, and even generate a SWOT analysis (Au et al., 2022)—to name but a few capabilities—and, germane to this piece, generate scenarios.

2 | INTRODUCTION

This "reflections from practice" piece is not, in any way, supposed to be a definitive statement or the final word on AI assisting in the development of scenarios. It is, instead, meant to be a first stimulation and invitation to explore the frameworking of AI-assisted scenario planning, and, as such, explores some of the implications of emerging, artificially intelligent tools for the futures and foresight prac-academic community.

The authors examine the utility of scenarios generated by artificial intelligence (AI) and explore whether or not the futures and foresight prac-academic community should selectively embrace advances in AI to assist in the generation of scenarios. In particular, the authors will consider (1) the utility of using scenarios generated completely by AI, (2) whether what is produced, in fact, constitute scenarios, based on conventional definitions, and (3) assess the utility of using AI to assist in the production of scenarios.

In the end, the authors insist that the utility of AI-generated and AI-assisted scenarios is largely predicated on the user's ability to coax the appropriate "raw material" from the artificially intelligent bot, which implicates, the authors contend, that such bots can usefully provide base material for the development of scenarios but are unlikely to fully eclipse scenarists in the production of scenarios. This position on AI-assisted scenarios is closely aligned with the "hybrid AI-Expert foresight approach," as articulated by Geurts et al. (2022, p. 2), regarding the potential impact of big data, narrow AI, machine learning algorithms, and the limits of computing capacity on futures and foresight practices, as well as Gigerenzer's (2022) and Grüning's (2022) insistence on the uniqueness of human intelligence and the need to synthesize human and artificial intelligences, respectfully. Additionally, the authors recommend that the futures and foresight prac-academic community pay especially close attention to artificially intelligent tools for novel insights with regard to the differences in human cognition and, in this case, the logic of large language model outputs.

As we shall see, this exploration suggests that AI-generated scenarios, in theory, provide managers with primary material for constructing strategy with virtually no transaction costs as compared to the work of (human) facilitators or consultants. Thus, companies, especially those in turbulent environments and those that need to increase their portfolio of strategic options in anticipation of disruption, may very well benefit from incorporating AI-generated scenarios into their strategic planning practices, as well as, the authors recommend, increase the "futures literacy" or "futures consciousness" of their employees, especially managerial staff, by frequently discussing, and interrogating future scenarios generated by artificially intelligent tools even in practices beyond occasional strategy development. Still, there are some lingering issues the

authors would be remiss not to also explore, in particular, whether or not facilitators of scenario planning should embrace AI in scenario planning more generally (and, perhaps, how and when) as well as a long-standing issue in futures and foresight work on using scenarios that were generated by “someone else” or, in this instance, not someone, but an artificially intelligent something.

3 | AI-GENERATED SCENARIOS

One potentially tempting option for members of the futures and foresight practice community is to have scenarios generated completely by AI. This would effectively outsource scenario development to an artificially intelligent third party thus freeing the facilitator (or consultant) to focus their energies on other avenues of value-generation for the client. The authors explore this proposition based on insights from a thought-provoking piece on the problem of quality control in scenario planning. After all, as Ramirez et al. (2021) frame the matter, in their playful article, “Seven Sure-fire Ways to Do Scenario Planning Badly: A Guide to Poor Practice,” “The practice of scenario planning has no barriers to entry.” To this, the authors add, the barriers to generating scenarios are so low that now artificially intelligent tools could join the roguish, largely unchecked cottage industry of scenarists. And why not? Currently, according to Ramirez et al. (2021), “scenario planners have neither to pass a bar exam ... nor do they have to be certified by a professional body, ... that quality control is non-existent, [and that] the result of too-few competent scenario planners is the ease with which scenario planning can produce results that are simply not useful—if not harmful—and waste valuable time and money.” Thus, there is nothing to really stop the use of AI-generated scenarios in practice.

Additional clarification is needed at this juncture. First, in the Prelude of this present practice piece, the authors query ChatGPT to “Write three scenarios for the future of transport” and the results are, admittedly, not particularly impressive. Interestingly, the cold prompt to simply write scenarios resulted in, for the most part, differentiated scenarios of approximately 30 words each. Note that the authors did not explicitly ask for related but differentiated and not overlapping scenarios.

Second, there is a lot of “tacit knowledge” used during human interactions, especially among experts and those familiar with academic jargon in a field of scholarly research.³ That individuals bring with them this catalog of entirely unstated tacit knowledge when entering queries into a chat prompt in a way that is similar a human interaction should not be a surprise. ChatGPT is, after all, a chatbot. It follows that humans would chat, so to say, with it, adopting a casual, non-explicit, or even semi-conversational tone when interacting with AI-support chat features. The authors, thus, suggest an approach to query that unambiguously states the otherwise unstated aspects of a question or command. For example, after further experimentation with ChatGPT, the authors were able to more explicitly request what it was that they, in fact, desired from a set of scenarios. The follow-up query, this time explicitly formulated in the intuitive-logics approach, structured by two uncertainties as

they interact in a 2 × 2 matrix formation, generated a set of four, intentionally differentiated scenarios that could fittingly populate such a matrix. From there, ChatGPT could create labels for the quadrants, potential newspaper headlines, representative metaphors, etc., thus, adding the “color” or “texture” of scenario development.

Third, the main insight from this exploration into AI-generated scenarios is the realization that a multipronged, multi-stage approach to query is necessary to generate robust scenarios, especially scenarios as they exist in intentionally organized set formations, in ways that scholars and practitioners are familiar with—and have grown accustomed to—over time. While it is exceptionally tempting for practitioners in the futures and foresight community to reject the very possibility of useful AI-generated scenarios and confirm the irreplaceability of humans in the enterprise of scenario generation, and while it is likewise tempting for the authors to present the results of ChatGPT queries for scenario generation as a blatant straw man to cast aside in favor of the warming confirmation of human supremacy in foresight, the authors cannot reject the idea that, on balance, many of the barriers to getting an AI-supported chatbot to create robust scenarios has to do with the limits of human imagination or ability to appropriately inquire. It is possible that future generations of facilitators and consultants who dabble in scenario planning will specialize in translating client needs, concerns, and curiosities into functionable, actionable queries fit for the logic and parameters of artificially intelligent inquiry platforms.

Finally, returning to the literature, it was van der Heijden (2005) who first singled-out the importance of building scenarios *together* with the users (see, also, Rowland & Spaniol, 2021). Wack (1984, p. 68), van der Heijden's predecessor, had focused on writing compelling scenarios that promised to change the “microcosm” of the cognitive maps inside the heads of clients and make them, as Kleiner (2003) put it, “shed their natural defenses.” As articulated by Schoemaker in an interview, van der Heijden's signature contribution was “why not let the people who control the budgets be presented with the scenarios that they themselves made?” (Rowland & Spaniol, 2021, p. 7). After all, the ultimate purpose of developing scenarios is not merely to produce scenarios, it “is to generate new options that you would not have thought of otherwise” (Wack, 1982, p. 12, as cited in Chermack & Coons, 2015, p. 191; see also, Wack, 1985a, p. 147). After all, a core justification for managers' engagement in a scenario planning process to develop options (O'Brien & Meadows, 2013; Rowland & Spaniol, 2017). The implication being that scenarios developed by AI for managers may be especially limited in the one capacity that justifies participating in scenario planning in the first place, namely, to identify strategic options and leverage freshly perceived opportunities in the organization's transactional environment.

4 | QUESTION: ARE THEY (EVEN) SCENARIOS?

This section explores the extent to which the “scenarios” generated by AI constitute what scenarists and futures studies experts consider a scenario and to what extent standards of good practice can guide

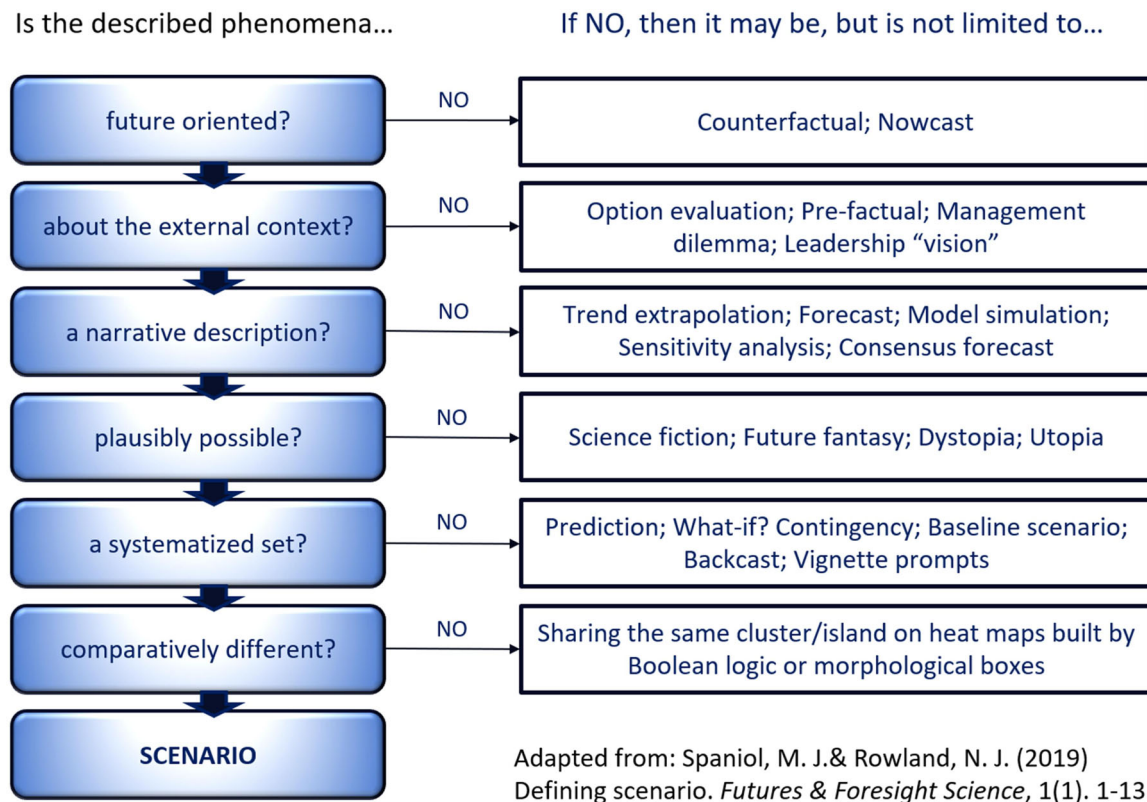


FIGURE 1 Scenario identification diagnostic tool.

the coproduction of scenarios with AI. Are AI-generated scenarios (even) scenarios by professional standards in futures studies?

4.1 | Answer #1: Assess Against Operant Definition of Scenario

The scenario has become a fundamental component of futures and foresight science. Over time, however, the methods of scenario generation and their application have taken myriad forms, which, according to an observation by Martelli's (2001), are due to the fact that there are at least as many practical approaches to scenario planning as there are facilitators of the processes. This development has resulted in an apparent state of "chaos" in the scholarly literature over the definition of what a scenario is, leading Khakee (1991, p. 52) to conclude that "few techniques in futures studies have given rise to so much confusion as scenarios."

In response, Spaniol and Rowland (2019, p. 1) employed concept analysis to create an operant definition for scenario which found 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." Depicted as a flowchart (see Figure 1), the criteria can be used in a stepwise evaluative procedure to assess if a phenomena is,

in fact, a scenario (at least in-line with the scholarly tradition on scenarios per the "intuitive logics" tradition stemming from the pioneering work at Shell [Bradfield et al., 2005]).

Returning again to the scenarios developed on the future of transport by the AI chatbot listed in the Prelude of this paper, we leverage the opportunity to take the second scenario to produce a straw man example for demonstrative purposes: "In the distant future, teleportation becomes a reality. People are able to instantly transport themselves to any location they desire, making traditional forms of transportation obsolete." Assessing this scenario, the first step would be to verify if the text is oriented in the future. It is—as it is explicit in the scenario and also required by the prompt the authors sent to the bot. The second step is then to determine if its locus in the operating environment puts the scenario outside the control of the user, which is also the case. Third, the flowchart asks if there is narrative structure, and this is also present. On the fourth step, however, an evaluator may deem that there is an issue in regard to the plausibility - or believability - of the scenario. The consequence of this objection results in that the scenario's:

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 (Spaniol & Rowland, 2019, p. 7).

At this juncture, an evaluator could choose to reject the scenario, or, to work to develop it to sufficiency by improving upon its qualities of plausibility, and then, when satisfied, continue down through the flowchart. Without walking readers through the remainder of the flowchart in Figure 1,⁴ suffice here to say that the purpose is to crosscheck any purported scenario(s) against the “Scenario Identification Diagnostic Tool.”

When a scenario candidate is deemed to be insufficient, user-evaluators may work to improve the scenarios manually, but may also repurpose the criteria from the flowchart itself as a deliberate part of the input to the chatbot to modify scenario candidates to improve upon their content according to the operant definition. Figure 2 below illustrates how such modification may proceed.

At this juncture, user-evaluators can reevaluate and deem whether this scenario is sufficiently plausible.

4.2 | Answer #2: Assess Against “Good” Practice

The authors would be remiss not to acknowledge that there are many standards of “good” practice. Some are commonsense and steeped in experience, meanwhile, others are published and empirically tested. Whether or not a practice is deemed to be appropriate, at a given historical moment in time, is also contingent upon what the user aims to achieve and, to some extent, on a series of aesthetic matters associated with the personal or professional preferences of the user, too. Hence, while there is no such thing as a definitive, forever-lasting “best practice,” the authors still find considerable purchase in utilizing so-called good practice, in this case, for the purposes of assessing scenarios. In the end, different best practices or combinations of best practices will inevitably be preferred by some scholars and practitioners over others, which is both predictable and unsurprising.

The authors, in this section, explore, by way of demonstration, how to apply notions of good practice to guide “query work” with artificially intelligent tools.⁵ In reflection upon this task, the authors explore Lang and Ramirez (2021) “Getting the Most From Publicly Available Scenarios: Five Ways to Avoid Costly Mistakes,” which

identifies five ways to incorporate others’ scenarios into an organization’s strategic planning.⁶ The reason this particular set of best practices were isolated for exploration has to do with the reality that AI-generated scenarios are, in effect, someone else’s—or something else’s—scenarios, and there is a notable scholarly conversation in futures and foresight science about creating scenarios for others and using the scenarios of others (see also O’Brien & Meadows, 2013; Rowland & Spaniol, 2017). That AI might create scenarios for others and that readers might use scenarios generated by AI appeared like a worthwhile first test case in this context.

Thus, through the lens offered by Lang and Ramirez (2021), what should readers know about using scenarios generated by AI and how might this shape the way that users engage the query function of AI? When using scenarios that are “publicly available,” which the scenarios generated by ChatGPT appear to technically be, Lang and Ramirez (2021) provide five points of direction, which we explore here:

How can one begin to use a scenario without knowing who it is for or to what end it was created? (i.e., the purpose of a scenario) “Start by clarifying the user, the intended use or purpose of using the scenarios, and the specific applications for your organization” (Lang & Ramirez, 2021). According to Lang and Ramirez (2021), there is “a high correlation between securing these matters and perceived satisfaction from using scenario planning,” based on research (conducted by Ramirez et al., 2020).

This is a serious hurdle for AI-generated scenarios. The artificially intelligent tool will generate scenarios, one after another, with no identifiable user, unless one considers the inquirer the user. This is, the authors think, not at all what Lang and Ramirez were referring to; for them, the user is typically thought to be either a client that is co-producing them with help of a facilitator or, in some cases, generated by one group explicitly for another group to then, in turn, use later on. What Lang and Ramirez (2021) work rightly emphasizes is the blunt and necessary question “Who are these scenarios being made for and what are the scenarios expected to be used for?” There is no simple and satisfying answer with regard to AI-generated scenarios.



Modify the scenario: “In the distant future, teleportation becomes a reality. People are able to instantly transport themselves to any location they desire, making traditional forms of transportation obsolete” to make it more plausible



“In the near future, teleportation becomes a commonly used mode of transportation. However, it still has its limitations and is only available for short distances, at designated teleporting stations, with strict safety measures and regulations in place.”



FIGURE 2 Screenshot of the chatbot modifying scenario text (Assistant, 2022; retrieved January 30, 2022, 4:10 pm).

One might usefully explore if the scenarios generated by artificially intelligent tools are “user-less” in so far as they are so amalgamated, such a “user writ large,” that user specificity is demolished, effectively brought to naught. The distinction between users and user-less scenarios remains an open question, to the best of our assessment.

The implications for AI query work, then, follow: specify the intended user and the intended purpose of the scenario during the initial query; ask the chatbot to take-on a specific identity, for example, a manager of a large shipping firm or a consultant facilitating a scenario planning project, and clarify that the intended user of the scenarios is for that specific identity; distinguish the initial user of the scenario(s) from the end-user of the scenario(s), which could be very useful in preparing a client to use (even as raw material) the scenarios generated by others to create their own strategy—imagine a query like “what advice would you give to the manager of a seaport in Turkey who is using scenarios generated by the European Union on the future of infrastructure by 2045 if the manager wanted to use those scenarios, right now, to generate a new strategy for their firm?” ChatGPT provided six reasonable suggestions.

Moving on, Lang and Ramirez (2021) recommend the use of scenarios, but specify that users should select only the most appropriate set of them to develop strategy. Those who intend to use others’ scenarios should be “sure [to] choose true scenarios, rather than sensitivity analyses of forecasts or model runs of extant models that misuse the term” (2021). The term “true,” in this context, has nothing to do with epistemological issues that would implicate that some scenarios are true—for example, because they have unfolded in history as expected—while other scenarios are patently false. Instead, the authors suggest adopting scenarios that are deemed to be fully-fledged scenarios from the perspective of futures and foresight insiders and experts. This is because the terminology of scenario, write Lang and Ramirez (2021), “is often confusingly used to depict model runs and, sometimes also sensitivity analyses.” They go on to define scenarios as “contrasting descriptions of how the future context could unfold, based on the various outcomes of a wide range of inter-connected factors in areas such as technology, ideology, economics, social arrangements, regulations and the environment” (Lang & Ramirez, 2021).⁷

The implications for AI assistance on this matter are interesting. Inquiring “how do futures studies scholars define a scenario?” is one way to ask the chatbot what would be inclusive of a scenario, by community standards, which then, in turn, opens the door to a fresh way to query for scenarios, namely, “Using scenario, as defined by futures studies scholars, what are four different scenarios for the future of ground transportation in 2040?” The authors received four, distinct, separately labeled scenarios of 75–100 words, with the closing proviso: “Please note that these are examples of scenarios based on the definition provided by futures studies scholars, and actual future developments may be different. The purpose of scenarios is to explore possible futures and to help organizations and individuals prepare for a range of possible outcomes.”

Additionally, according to Lang and Ramirez (2021), one must also “[i]dentify the most appropriate set of scenarios.” Traditionally, when working directly with a client, this is accomplished by identifying the most significant uncertainties that the client is facing, and using these to structure a set of scenarios from scratch. However, in the case of using the scenarios of others, a different dynamic materializes. The new task is to downselect between existing scenarios, and only utilize the appropriate scenarios for the development of strategic options. Again, AI can be useful: in the previous example about transportation in 2040, a follow-up query was formulated as follows: “Given the above scenarios, if I am the CEO of a train company, which of the above is the most appropriate to develop strategy from?” Notably, ChatGPT concluded with a comment that a scenario planning facilitator might very well have said outloud during a workshop: “It’s important to note that scenario planning is not a one-time exercise, and the CEO should continually monitor and adjust the company’s strategy as the future unfolds and new developments emerge. Additionally, it may be useful to consider multiple scenarios and to develop contingency plans for different possible futures.”

Finally, according to Lang and Ramirez (2021), the scenarios of others should be tested for usability and tailored to the needs of the client. One must “[t]est the usability of the scenarios” in “at least two test runs,” then identify and include additional “developments [which] are currently occurring or beginning to unfold” (Lang & Ramirez, 2021). This is a clear limitation of the chatbot as currently available. For example, consider this inquiry, dated late 2022, “write scenarios for the future of the Ukraine Russian war,” to which the AI chatbot reveals that their “training only goes up until 2021 (see Figure 3). In this instance, it remains likely that, until the training incorporates contemporary weak signals and upcoming trends, Lang and Ramirez’s testing recommendation will continue to fail.

Even if AI may not be able to test former scenarios against present trends and contemporary weak signals, it may be able to “[t]ailor the scenarios and render them fit-for-purpose,” which is the final item this piece considers from Lang and Ramirez (2021). This includes “considering what factors are missing in each scenario that would make them more pertinent” as well as establishing a relevant “time horizon” and “fleshed out to include developments in the organization’s own immediate business or transactional environment” (Lang & Ramirez, 2021). As before, it could be demonstrated from increasingly more detailed prompts into the chatbot that scenarios can be increased in relevant content, but this is, ultimately, an empirical question in need of some assessment criteria. This is also perhaps one of the most plausible and productive routes for the use of AI-generated scenarios—they can be used as “fodder” for making scenarios (as noted above), or for improving upon existing scenarios; beyond that, in a somewhat unexpected twist inspired by Lang and Ramirez, would be to use artificially intelligent tools to stress-test emerging or complete scenarios, probing the scenarios for continuity, factors that may be missing, and checking the user’s confidence in their original scenarios.

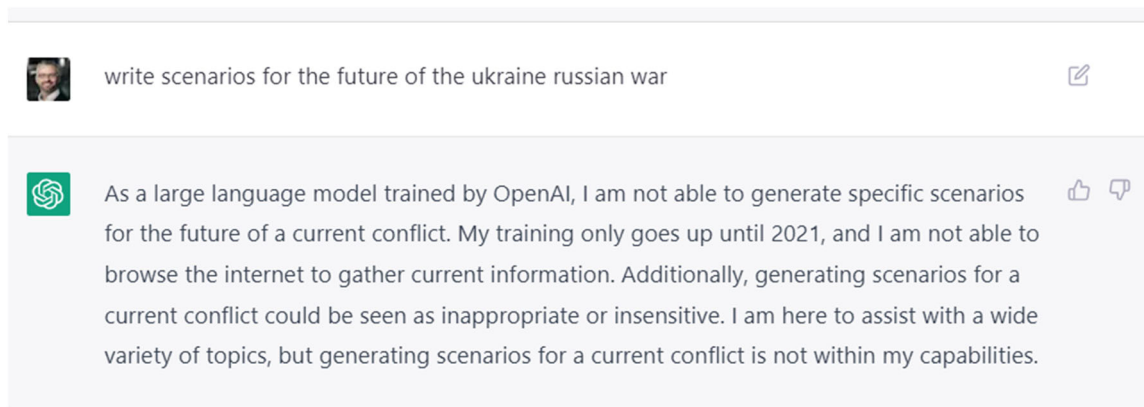


FIGURE 3 Screenshot of the chatbot explaining its own limitations (Assistant, 2022; retrieved December 09, 2022, 4:30 pm).

5 | AI-ASSISTED SCENARIO PLANNING

Based on this exploration of the issues associated with ChatGPT and scenario planning, the authors conclude that a clear and firm distinction is needed between AI-generated scenarios and AI-assisted scenario development. While AI-generated scenarios, even with well-articulated and disambiguous query work, the wholesale construction of compelling scenarios by an artificially intelligent chatbot are unlikely to rival those custom-made by facilitators working alongside their clientele. That said, AI-assisted scenario development seems to have considerable promise. This is the case when thinking about generating useful materials for exploration by clients. But this is also case when the chatbot produces suboptimal materials that clients deem as inadequate or unhelpful in their particular form, but, nonetheless, the output, regardless of end-stage quality, may be useful for stimulating and eliciting a response from clients about what they want, need, or are uncertain about. Future research should explore the issue of AI-assisted scenario planning in considerable depth.

Stepping back, the purpose of this article was to explore some—but, by no means, all—of the potential implications of integrating AI-generated outputs into the practice of scenario planning. In so far as this is the case, this manuscript is an invitation to future discussion on this topic rather than, in any way, a definitive piece. We would be remiss not to point out further limitations already apparent. For example, with the artificially intelligent tool used in this piece, the same prompt does not deliver the same response, over and over—and it should not be expected to do so as it was not engineered for this. Admittedly, there are significant points of continuity between multiple attempts at making the same future-based inquiry; however, and perhaps because scenarios are multiple and, to some extent, must change as the world changes, full consistency over time in AI-generated scenarios is neither thought of as a problem nor should it deter from their selective use over time. After all, the recommendation to test the generated or pre-existing scenarios is especially useful in the context of AI-generated scenarios because the AI system itself will likely reveal further parameter-based limitations

that become more obvious in the process of rigorous testing. Thus, while this chatbot cannot help you to assess current trends in the scenarios of others or create scenarios that feature current events, AI-generated scenarios should most certainly be tested against scholars' best practices and recommendations for the appropriate use of scenarios in strategy development.

Another promising avenue of research would be to assess the implications of AI across a hybridized foresight process (Geurts et al., 2022; Grüning, 2022) as well as the other emerging tools of AI not limited to LLMs, from AI data processing, to text-to-image and text-to-video generation, and design. Yet even within scenario planning, a hybrid approach is already apparent: Prompting the bot to pose questions to the proverbial crystal ball, or to assume an identity (such as the CEO of a particular company), or to checking a scenario for internal consistency, or even asking the bot how an organization might act to take advantage of a given scenario, the bot abides.

That all said, tools like ChatGPT may have a series of anticipatable issues scholars should be aware of. For example, ChatGPT has intermittently experienced scale issues associated with not always being available to end users. If you encounter this problem, then you will get the following message:

"ChatGPT is at capacity right now"

Get notified when we're back

Write a guided meditation about the status of ChatGPT.

As you read this message, please take a moment to pause and breathe. Notice the sensations in your body and the rhythm of your breath. Remind yourself that you are not alone in wanting to try out ChatGPT. Many others are interested in it as well. Be patient and know that the website is doing its best to accommodate everyone. Trust that the right time for you to try ChatGPT will come. In the meantime, continue to

focus on your breath and stay present in the moment.”⁸

As the field is already suffering from quality standards from a number of criteria (Crawford & Wright, 2022), a nightmare scenario might include circumstances under which scenarists further decay or destroy the practice field's reputation by attempting to pass off AI-generated scenarios as their own. Even with the best of intentions and a series of sophisticated prompts that produce the “raw material,” if the client is kept outside the loop, then they will—as Wack (1985b, p. 85) put it—roll off the decision makers like “water on a stone.” Additionally, as a text sequence predictor, the widespread use and sharing of outputs from ChatGPT could inadvertently disseminate false research and evidence. For example, think twice before asking ChatGPT for scholarly citations and references to relevant peer-reviewed articles; this is because the chatbot may, in fact, “predict” them, meaning, the chatbot will effectively invent them based on the query rather than identify them in the broad bodies of scholarly literature. In point of fact, in writing this article—that you are reading—he authors queried ChatGPT for references useful for preparing such a manuscript as this. The titles and journals looked amazing—too good to be true. Turns out, they were all “fake,” that is, predicted references—the sort that “should” be useful, if only they existed outside of this chatbot prompt. As a similar thought experiment, imagine commanding ChatGPT to create a course syllabus replete with references ... all the AI does is predict the next word in a sequence, so it imagines-up a great citation, and then you see it and think how have I not heard of “XXX” ... it is because it does not exist outside the imagination of this machine.

A major ethical concern with ChatGPT is what we might call “dark forecasting.”⁹ With few exceptions, you cannot get AI to do your dirty work—that is, if you ask it if it is acceptable to harm someone for cutting you off while riding your bicycle, then the chatbot has been programmed to provide a list of reasons why that is certainly not okay. There are workarounds, however; for example, ChatGPT would respond to a circumstance under which you position ChatGPT to write a theatrical screenplay of someone who does something violent to another who has cut them off. At core, the intent is to reduce access to direction to do wrong. While there are additional ethical matters of significant concern for the readership of *Futures and Foresight Science*, these are the few the authors had the space to explore here.

6 | FINAL REMARKS

With exceptions and some limitations, artificially intelligent tools can now generate scenarios on seemingly any topic en masse. For managers interested in promoting “future consciousness” or “futures literacy” or increasing the time spent in the future of their team or organizations, they now have access to cheap raw material from which scenarios can be generated again and again.¹⁰ However, without proper consideration, they may end up doing damage, as

Crawford and Wright (2022) found when researching the quality standards of the abundant scenarios developed alongside the coronavirus pandemic. In the end, if AI generated scenarios can support the development of qualified strategic options in the context of complex and competitive operating environments, then those scenarists living off the craft of scenario writing may want to give the bot a go and prepare with their own AI-generated scenarios. Done well, we believe that it will be possible to raise the bar in hybrid co-generation.

The authors close by challenging the reader to think about the implications of the following output on the topic of inquiry to which this “reflections on practice” article is based. The authors, wondering if the AI chatbot could be instructive on how to frame this very article—that you are reading now—entered into the prompt: “Write an abstract for an academic article about using scenarios generated by AI for strategic planning by managers.” The authors received, and, in closing, share this provocative, thought-provoking, and, yet, at the very same time, concerning response:

Artificial intelligence (AI) has the potential to enhance strategic planning by generating scenarios that explore possible future outcomes. This article examines the use of AI-generated scenarios for strategic planning by managers. Through a case study of a large multinational corporation, we explore the benefits and challenges of using AI-generated scenarios, and identify best practices for incorporating them into the strategic planning process. Our findings suggest that AI-generated scenarios can provide managers with valuable insights and enable them to better anticipate and adapt to future challenges and opportunities. However, the use of these scenarios also raises ethical and organizational considerations that managers must take into account. Overall, our research suggests that AI-generated scenarios can be a valuable tool for strategic planning, provided they are used in a responsible and effective manner (Assistant, 2022).

We would be remiss as authors to point out that although the bot produced the text above, it cannot understand it.

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DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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ENDNOTES

- ¹ ChatGPT; Query conducted December 09, 2022, 12:03-12:07 pm CET.
- ² Thank you, Reviewer 3.
- ³ For additional information on tacit knowledge relevant to a futures and foresight science audience, see Rowland and Spaniol (2023).
- ⁴ For readers interested in a comprehensive step-wise walk through the flowchart, see Spaniol and Rowland (2019).
- ⁵ While “query work” is not a formal concept—to the best of the authors’ collective knowledge—it is used here to capture a similar set of ideas associated with other “work” concepts meant to convey the effort and labor devoted to particular subsets of tasks. For example, “emotion work” as developed in sociology captures the notion that individuals effectively sell their labor—or some portion of it—in exchange for the emotional management of others and themselves as has been found in research on the occupational lives of airline flight attendants, administrative support roles in organizational settings, and, especially acute, those working in the hospitality industry. Query work, thus, is meant only to capture efforts, especially in a professional capacity, to develop and deploy skills associated with effective, efficient querying.
- ⁶ On balance and in extension, here is what the AI says on the use of others’ scenarios. When asking “What should users of scenarios generated by AI for strategic planning be aware of?” the AI-generated response is:
 1. AI-generated scenarios are not predictions of the future and should be treated as one of many possible future outcomes. They should be used as a starting point for further analysis and discussion, rather than as definitive answers.
 2. AI-generated scenarios may be influenced by the data and assumptions used to generate them, and may not account for all potential factors that could affect the future. Users should carefully evaluate the validity and reliability of these scenarios and consider alternative perspectives.
 3. The use of AI-generated scenarios may raise ethical concerns, such as bias and discrimination. Users should be aware of these concerns and take steps to mitigate them, such as regularly reviewing and updating the data and algorithms used to generate the scenarios.
 4. The incorporation of AI-generated scenarios into the strategic planning process may require organizational changes, such as the development of new skills and processes. Users should be prepared to invest time and resources in implementing these changes and ensuring that all stakeholders are on board.
 5. The use of AI-generated scenarios should be integrated into the broader strategic planning process and should not be used in isolation. Users should consider how these scenarios fit into their overall strategy and how they can be used to support decision making and action planning (Assistant, 2022) (generated 08-Dec-2022; 10:02 pm).
- ⁷ See the previous section for a demonstration of the use of a diagnostic tool for assessing whether AI-generated outputs correspond to the operant definition of scenario from within futures and foresight science.
- ⁸ Available: <https://chat.openai.com/auth/login>; accessed: January 19, 2023 18:58 CET
- ⁹ Despite not otherwise existing, to the best the authors’ knowledge, according to ChatGPT: “Dark forecasting” is a term that has been used to refer to the use of machine learning and other data-driven techniques to predict negative events such as crime, accidents, or terrorist attacks. These predictions can be used by law enforcement and other organizations to help prevent or respond to such events. However, the term “dark forecasting” can also have negative connotations, as it implies that the predictions are ominous or ominous.

-Retrieved at 19:15 CET, 19-01-2023. Note: a similar search on Google did not return any relevant results.

- ¹⁰ AI-generated scenarios might not just be helpful in the organizational context but also for scientific endeavors (generating alternative scenarios for scrutinizing a hypothesis or theory) and in educational settings (e.g., by learning from scenarios).

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