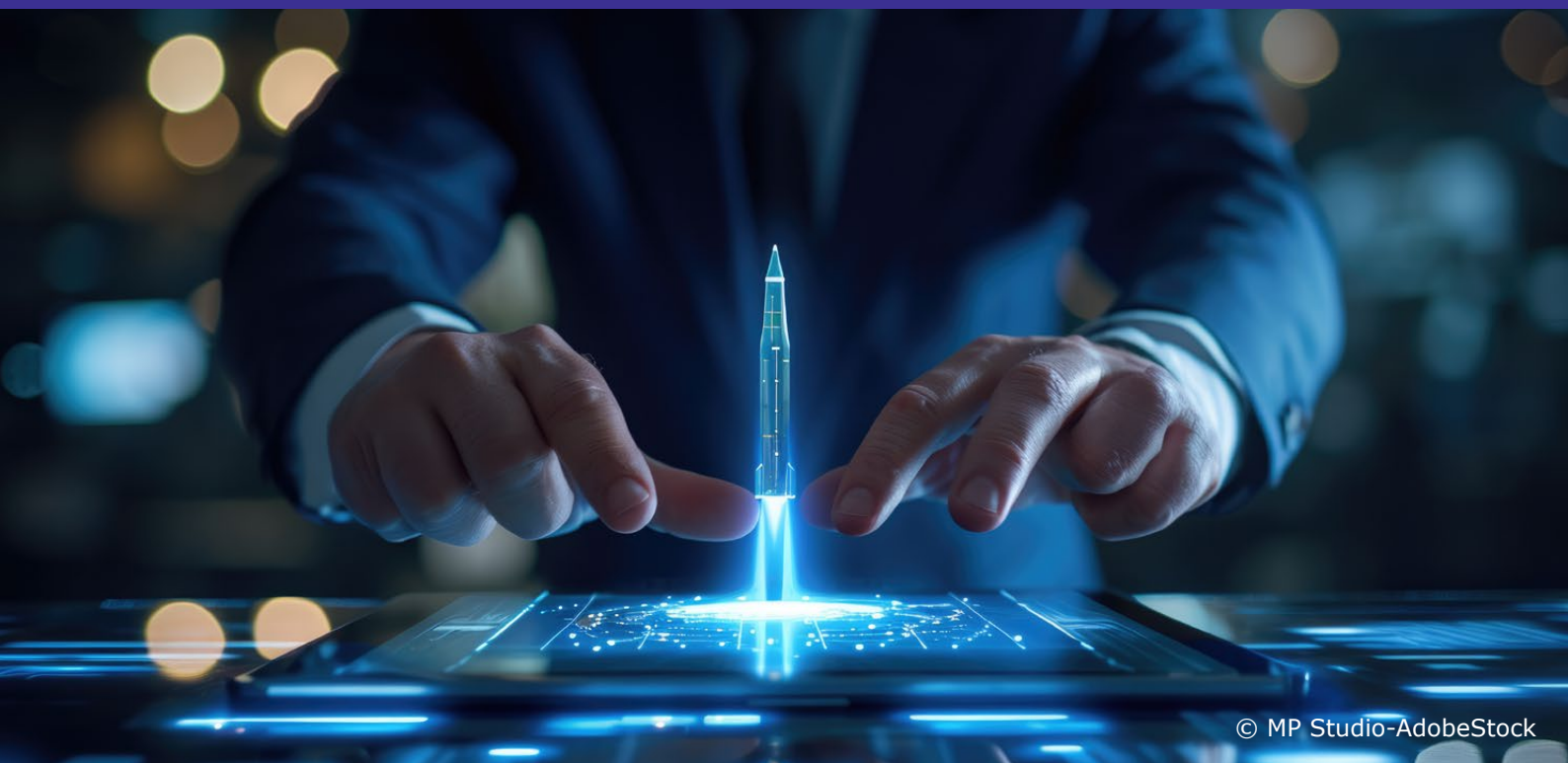




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Abstract

In today's era of permacrisis, the need for innovative methods has never been more critical. Traditional approaches to strategy and decision-making cannot be scaled up and are insufficient to keep pace with the rapid changes and complexities that organizations face today. While scenario planning represents an already powerful tool, it must evolve beyond merely serving as a source of inspiration and transition into a foundation for actionable decision-making. AI plays a crucial role in this transformation, as it offers the capacity to analyze vast amounts of data and generate insights at unprecedented speed. However, AI alone is not a panacea. Human intervention remains essential, and any real progress requires a deep organizational and cultural shift. This new vision of strategy development emphasizes the synergy between AI and human expertise, moving beyond short-term tactical responses to cultivate adaptive, long-term strategic frameworks.

Keywords: artificial intelligence, scenario planning, strategic agility, decision-making

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AI-powered scenario planning to foster strategic agility

Permanent uncertainty has become the only certainty in today's world... and strategic agility is becoming paramount

There is a general feeling that the world is facing a series of interlinked crises without respite, making it difficult for individuals, organizations, and governments to find stability or predictability. This is encapsulated in the term "permacrisis," originating from polycrisis, first defined by the French philosopher Edgar Morin in the 1990s as "interwoven and overlapping crises." However, it has gained broader recognition and usage in recent years due to the accumulation of global challenges. The term describes an extended period of instability and insecurity, characterized by a series of ongoing and overlapping crises. In 2022, the Collins English Dictionary named "permacrisis" as its word of the year, reflecting the turbulent state of the world due to events such as Brexit, the COVID-19 pandemic, the war in Ukraine, political instability, technological acceleration and frequent disruptions, environmental change and induced climate disasters, in addition to the cost-of-living crisis. These events have contributed to a pervasive sense of continuous crisis, where individuals and organizations face an ongoing state of uncertainty and stress.

Multiple factors explain the rise of uncertainty today, and this is not expected to come to an end (Mishra and Sen, 2024). The famous PESTEL framework in strategy is used by most C-level executives when designing or updating their strategies. It is meant to identify external drivers that might impact all players, scanning Political, Economic, Sociocultural, Technological, Environmental, and Legal dimensions. Until recently, only one or two dimensions would incur some level of uncertainty, with a limited probability of truly disrupting anything. The level of resulting environmental change would be considered "business as usual." But today, most dimensions are likely to generate risk. Simply looking at geopolitics, economic tensions, AI, and climate change, none of these factors is expected to disappear in the short term.

This is currently reflected in CEOs' views on what they consider key priorities. In a recent survey by McKinsey, which included responses from hundreds of CEOs, the most cited challenges were coping with GenAI, technology, the energy transition, geopolitics, and macroeconomic uncertainty. All PESTEL dimensions are impacted. The Deloitte 2024 CEO Priorities Survey similarly notes that CEOs are dealing with a myriad of external disruptors such as geopolitical instability, regulatory changes, and inflation. These pressures necessitate a higher volume of strategic decisions to navigate uncertainties and ensure organizational resilience, with evolving corporate objectives that are harder for executives to grasp. As a result, 50% of top leaders are unable to name their organization's top three priorities, a figure that drops to 22% among senior executives, according to research by the MIT Sloan School of Management (Sull, Sull, & Yoder, 2018). Similarly, and perhaps consequently, two out of three strategies fail to be implemented, with 95% of the workforce not understanding what the strategy is, according to research by EY.

The CEO's role is evolving with a new strategy practice

To cope with this evolving paradigm, strategic planning is becoming an ongoing practice, where leading agile organizations seriously update their strategies every year (some do it every six months) with a mindset of possibly curbing, accelerating, or phasing out strategic initiatives. Microsoft is a good example, having taken early bets on OpenAI, opportunistically

acquiring video game leader Activision Blizzard, accelerating the development of Teams when COVID-19 surged, and quickly stopping the development of Windows for smartphones. The world becomes discontinuous, and strategy as a discipline becomes continuous, though one should not fall into the trap of transforming strategy development into permanent tactics. Tactics only work as a short-term reaction to real-time events. Strategy ensures the resilience of a company over a longer timeline, where more fundamental and deeper transformations of external conditions reshape a market and impact a company at scale.

This new approach to strategy development is the only way to face not only multiple drivers of persistent uncertainty but also an acceleration of unexpected events combined with an ever-greater scale of impact: disruptive events are happening more frequently in more dimensions, and on a global level. Noticeably, the academic corpus has seen an emergence of publications on strategic agility in the past decade, a stream of research originating after the turn of the century (Doz and Kosonen, 2008). Strategically agile companies create innovative approaches to managing business transformation and renewal, fostering learning and knowledge-sharing capabilities rooted in a flexible and adaptive corporate culture. In order to attain strategic agility, it is important for organizations to develop the key capabilities needed to accelerate the renewal and transformation of their existing business models (Ferraris et al., 2022). One of these capabilities involves determining the optimal integration of AI into scenario planning.

To deal with uncertainty, scenario planning has always been an efficient resource

In today's dynamic environment, where being mentally and strategically prepared for the unexpected each morning is crucial, CEOs interviewed by McKinsey state that they now rely on scenario planning to manage uncertainty. This strategic framework was pioneered by Shell in the 1970s during the first energy crisis and later popularized by consulting firms such as McKinsey and BCG. Scenario planning is indeed a strategic tool used to explore and prepare for multiple possible futures by identifying key uncertainties and constructing plausible, divergent scenarios. Rather than predicting a single outcome, it helps organizations anticipate change, assess strategic options, and build resilience. By imagining different futures, companies can eventually test the robustness of their strategies, uncover hidden risks, and identify new opportunities.

Scenario planning gained popularity in the 1970s and 1980s but fell out of favor in the late 1990s and early 2000s when businesses operated under more predictable conditions; they used long-term, rigid strategic plans due to low levels of disruption across industries and regions. However, in the past five years, management consulting firms have reincorporated scenario planning into their strategic consulting services. Several organizations employed it during the COVID-19 pandemic to simulate various outbreak scenarios, aiding health authorities in deciding interventions such as lockdowns or vaccine distribution strategies. Lately scenario planning has seen a resurgence due to increasing market uncertainty. This demonstrates its role in developing long-term strategies in dynamic environments (Oliver and Parrett, 2018).

For example, a company producing and trading French wines is now exposed to the effects of global warming and extreme weather events, in addition to evolving wine consumption habits coupled with increased health consciousness, geopolitical developments and

exportation bans or import tariffs, the changing macroeconomic climate and slower growth of Chinese family incomes, technological transformation as well as the emergence of more efficient harvesting techniques, yet with a noticeable impact on quality. Some of those factors vary at increasing frequencies: recent data from Resilinc's Event Watch platform indicates that the interval between consecutive extreme weather events disrupting supply chains was frequently less than the 6-day response window.

Traditional scenario planning must evolve to cope with new uncertainty levels

These multiple and fast-evolving levels of uncertainty pose challenges for managers, who are trained to operate tradeoffs between clear and stable options, and one or two resulting scenarios. Today's generation and selection of scenarios has become complex for the human brain to manage. 40 percent of executives surveyed by McKinsey described scenario planning as having little effectiveness. This is often due to manpower and time limitations, especially to analyze and make sense of increasingly larger sets of data. Other limitations are cognitive biases, popularized by the late Nobel prize winner Daniel Kahneman, such as availability bias, probability neglect, stability bias, optimism/overconfidence bias, and social bias. Availability bias and probability neglect are particularly relevant in this new paradigm of high uncertainty.

For example, it is easy to focus only on trends within one's own industry or geography, or on a specific aspect of a problem, simply because that information is more easily obtained. This can lead to significant blind spots. Similarly, low-probability events are often either dismissed as outliers or overly emphasized, resulting in a false sense of precision. This tendency to either overestimate or entirely ignore low-probability events is known as probability neglect. As one can sense, the cost of managerial cognition is rising, especially to avoid the biases described here. At the same time computing power is more easily available and scalable; with AI it can genuinely address the limitations we have discussed.

Capturing more complexity: the power of AI

In many cases, large number of variables can shape the course of futures events. In order to capture more volatile and fast- changing markets, further parameters must be added, to take into account a wider range of possibilities. AI-powered scenario planning can shift from being merely inspirational tool to robust decision-making platform by incorporating quantification and rigorous analysis. Traditional scenario planning often relies on qualitative insights and broad projections, which can lead to inconsistencies and vague recommendations. AI enables a more precise and data-driven approach by quantifying uncertainties and modeling various future scenarios based on comprehensive data inputs.

To ensure the accuracy and reliability of recommendations, it is crucial to establish a consistent measurement system that integrates historical data with future trends. This involves developing metrics and indicators that align with the strategic objectives of the organization while continuously validating these measures against real-world developments. By doing so, organizations can avoid making decisions based on outdated or irrelevant information and instead focus on actionable insights that drive strategic success.

Let's look at global food giant Danone dealt with the Ukraine war. In the past decades, very few conflicts had international-level consequences. However, the war in Ukraine very

quickly escalated into a world crisis, involving both governments and corporations of multiple countries. In the month following the outbreak, supply chains were disrupted and inflation rose. As a result, all types of stakeholders were forced to react and adapt their strategies in a very limited period of time. From access to commodities such as wheat or energy, to dramatic changes in consumer purchasing power, the global landscape of production and consumption was completely redefined. In such a dramatic context, the ability to understand the dynamics of the situation and anticipate possible futures is critical when setting out to build a resilient strategy beyond immediate tactical response. Danone had to reassess their entire value chain, from sourcing and portfolio management to pricing and distribution. Relying on a systemic modeling of the market has been instrumental for the company in order to secure production and maintain market share. What ingredients may be in short supply? Will consumers trade up or down, depending on their location and purchase power? How will touch points of consumption evolve in a context of sanitary crisis? Will regulation define new standards for packaging? Instead of analyzing only a limited number of dimensions (e.g., access to energy or access to milk), Danone was able to use an AI-based systemic model to map all relevant variables that could impact its business, with not just 2 but more than 8,000,000 underlying parameters plotted.

AI: a powerful resource to improve the practice of scenario planning and decouple its impact

Over the past five years, we observed several organizations leveraging advanced AI systems driven by large neural network models to overcome the challenges and limitations of traditional scenario building. Our experiments and recent studies suggest that generative AI can dramatically improve an organization's ability to perform thorough contingency scenario planning more efficiently and cost-effectively compared to traditional methods. Although some Fortune 500 companies are beginning to adopt AI for contingency planning, we believe this technology would also greatly benefit organizations with more limited resources, such as small and medium-sized enterprises (SMEs), particularly those operating in uncertain environments prone to disruption.

With AI, scenario planning can now transition from being an exceptional inspiration tool, towards becoming a decision-making platform, turning narrow, static, past-based projections into a forward-looking, dynamic simulation. There are several areas where AI is enabling scenario planning to become a very powerful decision-making tool.

First factor, its range of exploration: by offering the possibility to process large amounts of data across multiple dimensions, AI unlocks the ability to perform systemic modeling, which means taking into consideration a large number of drivers and variables that lead to a more comprehensive mapping of possible features. By collecting analysis, information and correlations drawn from politics, consumer behavior, economics, the environment, technology, and regulation, we overcome the limitations of manual and limited representations of the world from a limited range of perspectives.

Second advantage, its reliability: where the human brain can only handle a limited number of data points, AI can analyze millions of signals and uncover meaningful links to build robust scenarios. Combined with advanced analytics, it is now possible to create scorecards that sort through the noise and rank options based on timeline, visibility, probability, and impact, to name but a few. An additional benefit of using AI to build virtual twins of market dynamics is that it escapes the effect of biases that inevitably appear whenever markets are analyzed only through the eyes of a few experts, or a small group of decision makers. Biases

are inevitable and emerge from individual opinions, political perspectives, partial access to information, and group thinking.

Last but not least, forward modeling: one of the main issues with traditional data analytics in a highly volatile and fast changing world is the fact that most decision intelligence tools are trained on historical data. However, when managers face unprecedented situations calling for fast adaptation, they need a forward representation of their business in their market that will inform where to play, what risks and opportunities may arise moving forward, enabling effective translation into relevant action plans so they can organize resources accordingly. This requires going beyond time series and analysis, and venturing into simulation. Only a capability that combines AI knowledge modeling, foundational world representation models such as graphs or anthologies, valid market dynamics, and theoretical models based on game theory or machine learning can pave the way for better decisions.

Finally, actionability through granularity and quantification: training models on rich, detailed data sets not only enables better accuracy and comprehensiveness but also brings the ability to keep trace of the sources that were fed into the model and of signals that were used to build it. This means that below the aggregated output giving a general overview of the system, it deep dives are possible in order to make the information available and meaningful at a more granular level i.e., which specific event, product, behavior, or company is potentially driving, or impacted by, a given scenario. This is a key step towards improved actionability of the simulation. Combined with quantification that allows for ranking and prioritization, decision makers can turn a tunnel of options into a funnel of decisions.

In summary:

Traditional Scenario Planning	AI-Powered Scenario Planning
Relies heavily on qualitative judgment and expert opinion	Integrates quantitative analysis using large-scale data and algorithms
Limited to a few scenarios due to cognitive and time constraints	Capable of simulating thousands or millions of scenarios in real time
Subject to human cognitive biases (e.g., availability, optimism bias)	Mitigates biases through data-driven systemic modeling
Static and often backward-looking, based on historical trends	Dynamic and forward-looking, enabling simulation of future uncertainties
Labor-intensive, slow to update, and difficult to scale	Efficient, fast, and scalable with automated data processing capabilities
Hard to translate into concrete actions due to vague outputs	Delivers granular, quantified insights for more actionable decision-making

Some companies such as McDonald's have come to realize the power of systematically leveraging foresights and scenario modeling, not only to inspire their leadership, but also to allow for tangible decision-making. This required a shift from qualitative, isolated thinking to a company-wide cultural evolution that empowers every manager to include thorough analyses of all potential unknowns in their thinking as well as their consequences, and the best next actions to implement, from marketing to supply, and finance to HR. Initiatives such as employee retention programs to mitigate the great resignation wave, or regenerative agriculture to build more resilient supply chains stem from such data modeling of market dynamics and trends combined with human intelligence, enabling the company to anticipate market evolutions, and adapt quickly. The results speak for themselves: a 20% reduction in employee churn rate, the initiation of a \$2 billion program

of restaurant automation, and the identification of a new set of proteins reducing the calories in certain flagship products by 40%.

AI-powered scenario planning is a great step forward, yet not a magic wand and requires careful use and hybridization with human intelligence

Any successful AI implementation requires the careful selection of the appropriate scientific model - be it behavioral, strategic, economic, or financial. This crucial step demands human intelligence to determine which model aligns best with the specific problem at hand. Formulating the right questions as well as defining the scope of exploration are tasks that AI cannot perform autonomously. Human experts are essential in setting the parameters that guide AI, ensuring that it addresses the right problems with the correct context.

The real power of AI is unlocked through blended intelligence, an approach where AI and human expertise are integrated seamlessly. AI can process vast amounts of data at speeds unimaginable for humans, but it lacks the ability to prioritize or weigh the importance of different data sources. This is where human intervention is critical. In a strategic business analysis, AI might suggest a course of action based on an overwhelming amount of data supporting a particular trend. However, a seasoned strategist might recognize that the data fails to account for a critical factor - such as recent changes in market regulations - that AI might overlook.

Another pitfall is the overreliance on AI-generated models without considering the ethical implications. In healthcare, for instance, AI might suggest treatments that are statistically effective but ethically questionable. Introducing technological limits in the coding process that align with ethical guidelines ensures that AI recommendations remain within acceptable moral boundaries. This is especially important in sensitive fields such as healthcare, where the consequences of AI-driven decisions can have profound impacts on human lives.

AI models are typically trained on large, generic datasets, which may not capture the specificities and technicalities of a particular industry. At key stages of the process, human experts must review AI-generated outputs to ensure they align with industry-specific knowledge and business objectives. In scenario planning, AI excels at generating predictions based on historical data, but it struggles with the qualitative aspects of planning for the future. AI can assist by providing data-driven insights, but it is up to human strategists to evaluate these insights and decide which scenarios are most relevant and actionable.

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