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Monterey, California, Naval Postgraduate School

<http://hdl.handle.net/10945/34083>



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Global Scenarios: Their Current State and Future

Prepared for the Global Public Policy Academic Group, Naval Postgraduate School

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According to the *Oxford English Dictionary*, the word "scenario" first appeared in English in the late 1800s, to describe "a sketch or outline of the plot of a play, ballet, novel, opera, [or] story." It was first applied to the study of the future by Herman Kahn in his 1962 book *On Thermonuclear Warfare*. Since the 1970s, and the growth of scenario planning for corporations and governments, scenarios have featured a few key concepts. As Shell's scenario planning group described it in 2008,

A scenario is a story that describes a possible future. It identifies some significant events, the main actors and their motivations, and it conveys how the world functions. Building and using scenarios can help people explore what the future might look like and the likely challenges of living in it.

Decision makers can use scenarios to think about the uncertain aspects of the future that most worry them—or to discover the aspects about which they should be concerned—and to explore the ways in which these might unfold....

Scenarios are based on intuition, but crafted as analytical structures. They are written as stories that make potential futures seem vivid and compelling. They do not provide a consensus view of the future, nor are they predictions: they may describe a context and how it may change, but they do not describe the implications of the scenarios for potential users nor dictate how they must respond....

Scenarios are intended to form a basis for strategic conversation... considering potential implications of and possible responses to different events. They provide their users with a common language and concepts for thinking and talking

about current events, and a shared basis for exploring future uncertainties and making more successful decisions.¹

In the last few years, the contexts in which scenarios have been developed, used, and informed decision-making have expanded considerably. As a result, the practice of scenarios has become both more interesting and more complex, with new types of scenarios challenging old assumptions about how to think about and plan for the future.

The purpose of this essay is to survey the current state and future prospects for scenarios: to describe how scenario practices have evolved in the last few years; present an overview of the forces pushing scenarios in new directions; and suggest how the production, communication, audience, and service roles for scenarios may change. It begins with a history of scenarios, with a focus on their use in corporate strategy and decision-making. It then surveys the use of scenarios in two newer contexts have raised practical and theoretical questions about how scenarios can be developed and used: environmental and global change modeling, and national security and intelligence. Finally, it looks at the future of scenarios, suggests how the development and use of

¹ Shell Scenario Group, *Scenarios: An Explorer's Guide* (The Hague: Shell International, 2008), 8.

scenarios will evolve in the next few years. These experiments suggest that the fundamentals of scenarios is changing, and this opens up opportunities for new organizations to take the lead in developing the next generation of scenarios. I conclude with some suggestions about how GPPAG could position itself to become a leader in this new form of scenario practice, and in so doing carve out a unique and high-profile niche for itself in the world of academic studies of globalization and national security.

The History of Scenarios

Scenarios as a tool for planning and strategy emerged as a formal body of practice at the Hudson Institute, RAND, and SRI. Military war games; the rise of computer modeling in economics, operations research, and game theory; and science fiction all provided inspiration for futurists. In the 1970s, Shell Oil's forecasting group crystallized modern scenario planning. In a now-famous scenario, Shell forecasters described a future in which oil supplies and prices became highly unstable, thanks mainly to manipulation by OPEC. This anticipated the oil shock of 1973; Shell's prior planning for this contingency helped it respond vigorously to the crisis.

That experience was the paradigm-defining moment for scenario planning, and it established the way corporate scenario planning has been done since. Shell's experience crystallized the idea scenarios as plausible, internally consistent futures, illustrating how current trends and "wild cards" might shape the future. It established the core practices that scenario planners now follow (e.g., producing three or four scenarios that focus on two or three key trends). It developed the argument that forecasts did not need to be accurate to be useful-- that their value was in preparing companies to face a range of futures, not THE future. Finally, it defined the service role for scenarios as helping strategists and senior executives prepare for a variety of contingencies.²

As a set of practices and products, scenarios fall into three major types. Most scenarios are explorative scenarios, which either seek to describe possible futures that emerge from the intersection of different trends, or the futures that can result from different strategies. Normative scenarios describe

² Shell's use of scenarios has not prevented it from avoiding some problems, such as the controversy after the sinking of the Brent Spar platform in the North Sea: see John Elkington and Alex Trisoglio, "Developing Realistic Scenarios for the Environment: Lessons from Brent Spar," *Long Range Planning* 29:6 (1996), 762-769. See also Alex Wright, "A Social constructionist's deconstruction of Royal Dutch Shell's scenario planning process," University of Wolverhampton Working Paper Series WP004/04 (2004).

desireable futures and how to reach them. Predictive scenarios seek to forecast, with some degree of certainty, how the future will unfold.³ Most corporate scenarios explorative, and are what Angela Wilkinson refers to as "actor-focused:" they place a single organization at their center, and demonstrate how current trends could affect its future. Often scenarios processes are driven by a need to inform specific large decisions, programs, or investments. Shell developed scenarios to better understand the future in which long-term investments would or would not pay off-- whether to begin a program for oil exploration that would yield results in a decade, for example. Other organizations use scenarios in long-term strategic plans, to better understand the environments they'll be operating in over the next several years. For a few, scenarios help prepare for a future that seems fundamentally uncertain: in rapidly-evolving markets and industries, scenario processes are treated more like martial arts training, promoting mental flexibility and organizational agility.⁴

³ This typology follows Lena Borjeson, Mattias Hojer, Karl-Henrik Dreborg, Tomas Ekvall, Goran Finnveden, "Scenario types and techniques: Towards a user's guide," *Futures* 38 (2006) 723–739.

⁴ On the current use of scenarios, see Russell F. Korte and Thomas J. Chermack, "Changing organizational culture with scenario planning," *Futures* 39:6 (August 2007), 645-656. The broader use of futures methods in management is discussed in Jan Oliver Schwarz, "Assessing the future of futures studies in management," *Futures* 40:3 (April 2008), 237-246.

The purpose of scenarios is not to describe a future that is most likely to happen, but to describe " a limited set of examples of possible futures that provide a valuable point of reference when evaluating current strategies or formulating new ones."⁵ Much of the value of scenarios has come from not from the products-- the specific visions or futures contained within scenarios-- but from the process of scenario creation. Just as the Space Race was justified on the basis of the civilian technological spinoffs and enhancement of America's global status, scenario-building exercises are valuable for the social and cognitive benefits it brings. When done with small groups of executives, scenarios planning become an exercise in community-building, an experience in which people bond by developing a common vision of the future. Scenario-building serves as a "trading zone" for the sharing of different bodies of technical knowledge. It widens participants' perspectives on the future.⁶

⁵ Alun Rhydderch, et al, *Scenario Planning: Guidance Note* (London: Foresight Horizon Scanning Centre, Government Office for Science, 2009), 5.

⁶ A good user's guide to scenarios is Wahid Bhimji, *Guidance on the use of strategic futures analysis for policy development in government* (London: Foresight Horizon Scanning Centre, 2009).

Practical problems

For all of their utility and longevity-- scenarios have been used for decades, a very long time in modern strategic planning-- there are practical problems in the development and use of scenarios, and deeper questions about the continued utility of scenarios in today's world.⁷

As a practical matter, rather than serving as a source of inspiration or new thinking, scenarios can reinforce conventional thinking.⁸ Scenario processes are quite sensitive to a company's current issues, and recent news events, which makes it harder to recognize and explore the implications of potential discontinuities.⁹ Even when the process does succeed in describing a variety of potential futures, McKinsey strategist Charles Roxburgh warns, "In the face of a wide range of possible outcomes, there is a risk of acting like the proverbial deer in the headlights: the organization becomes confused and

⁷ Brad MacKay and Peter McKiernan, "Creativity and dysfunction in strategic processes: The case of scenario planning," *Futures* (2009), doi:10.1016/j.futures.2009.11.013.

⁸ David Mercer, "Simpler scenarios," *Management Decision* 33:4 (1995), 32-40; Thomas J. Chermack, "Studying scenario planning: Theory, research suggestions, and hypotheses," *Technological Forecasting and Social Change* 72:1 (January 2005), 59-73.

⁹ Ph. W.F. van Notten, A.M. Slegers, and M.B.A. van Asselt, "The future shocks: On discontinuity and scenario development," *Technological Forecasting & Social Change* 72 (2005), 175-194.

lacking in direction, and it changes nothing in its behavior as an uncertain future bears down upon it."¹⁰ One reason organizations can fall prey to inaction is that vividly-written scenarios may be more engaging and make the future seem more tangible, but that very engagement make it harder to extract more general lessons that can inform strategic thinking and preparedness. As psychologists have found, readers tend to rate stories that have more detail as more likely, even though those details make stories less likely to happen; unfortunately, it's the details that make a story compelling.¹¹

There's also a structural disincentive to producing radical scenarios: scenario planners must balance their mandate to provide organizations with an outsider's view of the future and to shake up their preconceptions, against the need to maintain long-term relationships with their clients. This can encourage futurists to adopt their employer's language and world-views, and to be susceptible to the consultant's version of cognitive regulatory capture, a

¹⁰ Charles Roxburgh, "The use and abuse of scenarios," *McKinsey Quarterly* (November 2009), online at https://www.mckinseyquarterly.com:443/The_use_and_abuse_of_scenarios_2463.

¹¹ George Wright and Paul Goodwin, "Decision making and planning under low levels of predictability: Enhancing the scenario method," *International Journal of Forecasting* 25:4 (2009), 813-825.

process that "is not achieved by... [clients] buying, blackmailing or bribing their way towards control" of consultants, but the latter's "internalising, as if by osmosis, the [client's] objectives, interests and perception of reality."¹²

More broadly, there is a growing sense that the future is now wilder and more unpredictable than in the past. Anxiety over long-term global problems like climate change (and worries about our inability to effectively address them); rapid technological and social change; the rise of China and India as economic powers; and the failure of mainstream economists to sound warnings about the current global recession, have created a sense that that tools we've used in the past to make sense of the future no longer work. At the same time, there is a parallel sense that new technologies and social trends-- the rise of Web 2.0, ever-more powerful expert systems, real-time monitoring technologies, etc.-- could serve as a foundation for new scenario techniques that work in this more complex and unpredictable environment.

The nature and location of strategic action are different. Strategy is being pushed downwards in organizations, and the demand for more regular

¹² William H. Buitter, "Lessons from the North Atlantic financial crisis," paper prepared for the conference "The Role of Money Markets," May 29-30, 2008.

strategic reviews is increasing. The concept of the "strategic corporal" illustrates this sense. As Kevin Stringer explains, "In an increasingly complex interagency, joint, and multinational world that oscillates between conventional and nonconventional military missions," the noncommissioned officer has become "the most conspicuous symbol of American foreign policy and influenced not only the immediate tactical situation but also the operational and strategic levels as well."¹³ This is an environment that characterized by complexity, high stakes, uncomfortable levels of transparency (thanks in part to the strategic corporal's media complement, the "strategic cameraman"), and rapid feedback on decisions.¹⁴ In a highly fluid environment, it has become more important for field officers to think about the longer-term, strategic implications of tactical decisions; and to recognize that they're operating in much more complex environments than before. As Mark Carlton warns, "Because of the nature of future wars, the

¹³ The concept was first described in Gen. Charles C. Krulak, "The Strategic Corporal: Leadership in the Three Block War," *Marines Magazine* (January 1999); Lynda Liddy, "The Strategic Corporal: Some Requirements in Training and Education," *Australian Army Journal* 11:2 139-148; Kevin Stringer, "Educating the Strategic Corporal," *Military Review* (September-October 2009), 87-95, quote on 87.

¹⁴ Josh Manchester, "The Strategic Corporal vs. The Strategic Cameraman," *Small Wars Journal* (May 8, 2007), online at <http://smallwarsjournal.com/blog/2007/05/the-strategic-corporal-vs-the/>. The challenges of these environments are described by Silvio Funtowicz and Jerome Ravetz, "Science for the post-normal age," *Futures* 25:7 (1993), 735-755; Ravetz, "Post-normal science and the complexity of transitions towards sustainability," *Ecological Complexity*, 3:4 (2006), 275-84.

ability of the tactical commander to fight beyond the physical realm will determine success. The tactical commander's ability to employ nontraditional methods will be the difference between operational success or never-ending insurgency."

Environmental and Intelligence Scenarios

Corporate scenario planning was the default in "scenario" work for the two decades after its formalization at Shell. (Of course, there were various sub-school of practice, and numerous internal disagreements over fine details of practice or philosophy, but these were largely invisible to outsiders and clients.) In the last decade, however, the uses of scenarios have expanded once again.¹⁵ Environmental scientists working in the IPCC and other international scientific agencies have built large, complex scenarios aimed at both forecasting the range of likely changes to the earth's atmosphere, and the impacts those changes could have on oceans, ecosystems, and human life. In the intelligence world, interest in scenarios has grown with attempts

¹⁵ On the revival of scenarios, see Celeste Amorim Varum and Carla Melo, "Directions in scenario planning literature: A review of the past decade," *Futures* (in press, 2010).

to forecast disruptions and detect the "weak signals" that indicate the immanent appearance of different futures.

Environmental and Global Change Scenarios

Environmental scenarios present the consequences of large-scale changes to climate, ecosystems, and human habitation.¹⁶ While futurists have long been interested in environmental issues—hardly a surprise given that Rachel Carson's and Paul Erlich's pioneering work appeared at the same time as the first generation of futurists—the formal use of scenario methods to explore the impact of "future emissions of greenhouse gases and other climate forcing agents" on earth systems like oceans, weather patterns, etc. at the global or regional scale is of more recent vintage.¹⁷ In the 1990s, the IPCC began commissioned scenarios to describe the impact of different emissions futures; by the late 1990s, they were joined by the UK's Climate Impacts Program and US National Assessment, as well as scenarios by the WBCSD

¹⁶ A useful overview is Paul Raskin, et al, "Global Scenarios in Historical Perspective," in Carpenter et al, *Ecosystems and Human Well-Being: Scenarios - Findings of the Scenarios Working Group Millennium Ecosystem Assessment Series* (Washington, DC: Island Press, 2005), 35-44.

¹⁷ Mike Hulme and Suraje Dessai, "Predicting, deciding, learning: can one evaluate the 'success' of national climate scenarios?" *Environmental Research Letters* 3 (2008), 1-6.

and Global Scenario Group focused on possible responses to climate change. (See the annotated bibliography for more on these reports.)

Environmental scenarios "draw on science – our understanding of historical patterns, current conditions, and physical and social processes – and on the imagination to conceive, articulate and evaluate alternative pathways of development and the environment... [to] illuminate the links between issues, the relationships between global and regional development, and the role of human actions in shaping the future."¹⁸ Finally, they seek to explain what is scientifically certain; present a range of possibilities in areas that are less certain; and explain how changes will affect human life. As the IPCC explains about its greenhouse gas scenarios, "policy makers need a summary of what is understood about possible future GHG emissions, and given the uncertainties in both emissions models and our understanding of key driving forces, scenarios are an appropriate tool for summarizing both current understanding and current uncertainties."¹⁹

¹⁸ Paul D. Raskin and Eric Kemp-Benedict, *Global Environment Outlook Scenario Framework* (United Nations Environment Programme, 2004), 2.

¹⁹ Nebojsa Nakicenovic and Rob Swart, eds., *Emission Scenarios* (Geneva: IPCC, 2000), available online at <http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=10#anc2>.

They're produced and used in large-scale official assessments of climate change (the IPCC has been a pioneer in the creation of these scenarios); as a result, they're often strongly informed by scientific knowledge—in particular global climate models—than traditional scenarios. They're usually developed to illustrate the impacts of global change on human affairs—how rising sea levels will affect coastal cities and populations, how changes in rainfall and temperature will affect growing seasons and food security, or how smaller glaciers will affect accessibility of fresh water—or how humans and institutions can respond to these challenges.²⁰

Environmental change scenarios differ from traditional scenarios in a couple ways. Most are produced by people outside the futures world: the IPCC scenarios, for example, have only a few citations to futures research.²¹ They are often more quantitative than corporate scenarios, as they seek to establish ranges of possible changes to the global climate in the coming decades, and to explain how severe changes will be under different circumstances. The conditions under which global change scenarios are

²⁰ Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Opportunities and Challenges for Business and Industry* (Washington: World Resources Institute, 2005).

²¹ Göran Nordlund, "Futures research and the IPCC assessment study on the effects of climate change," *Futures* 40:10 (December 2008), 873-876.

produced are also novel: they're more like research projects than consulting: they're not commissioned by clients to address specific strategic or policy-related issues. Ted Parson compares the contexts in which global change scenarios are produced to more traditional scenarios:

In other domains such as corporate strategic planning, scenario users are usually identified, few in number, and fairly similar in perspectives, often situated within one organization or a few related ones. Users or their representatives can be engaged in key stages of scenario creation and application, to provide input on such matters as relevant choices, high-priority uncertainties and their plausible realizations, and criteria for desirable outcomes.... By contrast, potential users of global-change scenarios are vast in number and in the variety of their responsibilities, knowledge, objectives, capabilities, and authority. They... embrace profoundly different views of the nature of the problem (including whether there is one at all), the objectives to be pursued, the criteria for desirable outcomes, the range of appropriate and relevant actions, and the locus of relevant authority. In many cases, relevant decisions and users are unidentified or unknown to those creating scenarios.²²

Intelligence Scenarios

The intelligence community's use of scenarios draws on the tradition of military war games and strategy, which have long been used to sharpen

²² Edward Parson, "Useful global-change scenarios: current issues and challenges," *Environmental Research Letters* 3 (2008), quote on 2.

thinking about how allies and adversaries might behave in different futures or situations, and to prepare one's own forces for and responses to those situations. With the end of the Cold War, the intelligence community began using scenarios to start thinking about new sources of long-run instability, to anticipate specific novel threats, and to deliver assessments about potential futures to a wider range of audiences.

During the Cold War, scenarios assumed a bipolar world whose basic features were assumed to be stable; in the post-Cold War world, scenarios evolved into a tool for thinking about how the basic features of the global order might radically change. Thus the National Intelligence Council and Central Intelligence Agency each produced scenarios describing potential geopolitical landscapes in 2020, and the challenges the United States would face in retaining its status as a superpower in this world. Intelligence scenarios have considered how ecological changes could spark regional conflict over basic resources like water and arable land; how the clearing of summer Arctic polar ice could lead to a "land rush" around the North Pole; how milder winters in Kashmir, combined with shrinking snow-packs and pressures created by natural disasters, could increase opportunities for conflict between India and Pakistan.

In the last several years, in the face of a growing need to rapidly respond to changes in the global threat environment, the intelligence community has also experimented with using scenarios to identify potential new threats.²³ This has become more urgent since 9/11. Many of these scenarios have explored possible new forms of asymmetrical warfare, or "cyberwar" digital attacks on infrastructures like electrical grids and financial networks. They have also been used to isolate the "weak signals" that could help better measure the immanence of potential threats. The Singaporean government, for example, has developed an early warning system that uses scenarios to identify potential threats in the near future, and monitors news and open source intelligence for indications that pandemics, political instability, terrorist threats, or other disruptions are immanent. (This parallels an evolution in the use of weak signals methods-- the practice of scanning for unusual developments that harbinger some new disruptive innovation or trend-- from one mainly used as a research tool and input into scenarios, to a practice for promoting an organization's improvisational ability.)

²³ Global Futures Forum, *Emerging Threats in the 21st Century: Strategic Foresight and Warning, Seminar 3: Warning for Readiness in the New Threat Environment* (Zurich: Center for Security Studies, 2007).

How Environmental and Intelligence Scenarios Push the State of the Field

Like environmental scenarios, intelligence scenarios push the boundaries of scenario practice: in each case they seek to respond to an increasingly complex, contingent world in which disruptions and once-in-a-century events are not the exception but the norm; in which the near-term future is harder and harder to forecast; and where the task is to understand not just how long-term trends may intersect, but to divine what new long-term trends are going to shape the future. But they craft solutions in very different ways, and to some degree are mirror-image twins. Environmental scientists face a challenge of creating scenarios that help readers understand the long-term consequences of actions taken in the present, and to see how the aggregation of small actions can lead to big changes in our environment and climate, or possibly sudden, catastrophic changes caused by the disruption of fundamental environmental processes. Environmental scenarios blur the boundaries between scientific models or simulations on one hand and scenarios on the other. Finally, because they're largely crafted by scientific panels or expert groups, without much guidance from either governments or

corporations, environmental scenarios' connection to decisions has been weak and indirect.

The intelligence community, in contrast, is creating scenarios that help readers respond to immediate threats, see where threats may emerge in the near future, and explore how to defuse them before they become unstoppable. As a result, intelligence scenarios have blurred the lines between scenarios and surveillance or intelligence-gathering systems. If environmental scenarios are influenced by climate models and scientific information, intelligence scenarios influence information-gathering and threat models. Finally, intelligence scenarios are very closely monitored by clients.

The Future of Scenarios

Environmental and intelligence scenarios represent two important departures from the corporate scenario tradition. Despite the fact that they operate at very different time-scales, deal with very different kinds of problems, and are used by entirely different communities, they confront two common challenges. Both are trying to identify the most important new sources of turbulence-- the things you really have to worry about, versus the things you

just have to worry about. And both are concerned with connecting scenarios to everyday action, with either seeing the long-term environmental consequences of decisions made in the present, or developing the tools to anticipate terrorist attacks and other kinds of threats.

How to Improve Scenario Development

A number of authors have proposed way to improve scenario development, to allow scenarios to do a better job of dealing with the wider demands presented by today's world.²⁴

First, scenario practice should be more reflexive. Very few scenario processes have formal review stages, or are structured to encourage participants to look back on their work after a few months or a year. Too often, being forward-looking translates into failing to learn from the past.

²⁴ These recommendations draw on Brian O'Neill and Nebojsa Nakicenovic, "Learning from global emissions scenarios," *Environmental Research Letters* 3 (2008); Simone Pulver and Stacy VanDeveer, "Futurology and Futurizing: A Research Agenda on the Practice and Politics of Global Environmental Scenarios," paper presented at the Amsterdam Conference on the Human Dimensions of Global Environmental Change (May 24- 26, 2007); Simone Pulver and Stacy D. VanDeveer, "'Thinking About Tomorrows': Scenarios, Global Environmental Politics, and Social Science Scholarship," *Global Environmental Politics* 9:2 (May 2009), 1-13.

But building learning (and feedback and reviews) into scenario processes would be useful for participants, clients, and futurists alike.

Scenario processes should also become more open-ended and continuous. Scenarios traditionally have informed long-term strategic processes, multi-year business plans, or big policy initiatives. As a consequence, they've been treated by consumers and producers alike as one-off projects. However, in an environment in which changes can happen rapidly, and strategic insight needs to be generated to inform more everyday decisions (strategic corporals need help making good decisions in the field), scenarios cannot remain static: they need to be dynamic, regularly revised and updated. This requires changing the relationship between scenarios, scenario creators, and scenario consumers: rather than structuring scenario projects as works for hire with fixed deliverables and deadlines, they need to be structured more like ongoing research projects.

Third, scenarios should be designed to be fractal. In principle, scenarios are intended to be open-ended; in reality, they tend to be used once, and the task of applying their insights in other, more specific contexts is left to others.

Building in opportunities for "localizing" scenarios either by their original

creators or by other users would give them a greater utility, expose issues or possible futures that the original project was not able to explore, and provide material for subsequently revisions of the original scenarios.²⁵

Finally, scenarios need to be more transparent: the underlying data used to create scenarios should be visible and accessible to readers. This would make scenarios and the scenario process more credible; transparency would also promote sharing and reuse of underlying data, allow different groups of forecaster to pool tools and datasets, and make it easier to compare competing scenarios or build on predecessors' work.²⁶

How to Make Scenarios More Useful

Making scenario processes more reflexive, continuous, fractal, and transparent would improve the quality of scenario research and development. But according to many practitioners, for many clients the

²⁵ An example of a regional ecosystem scenario informed by IPCC and Millennium Assessment scenarios is Erin Bohensky, Belinda Reyers, and Albert Van Jaarsveld, "Future Ecosystem Services in a Southern African River Basin: a Scenario Planning Approach to Uncertainty," *Conservation Biology* 20:4, 1051–1061.

²⁶ Richard Whaley, "Comments on Chermack's paper on scenarios and theories," *Futures* 40:3 (April 2008), 310-312.

experience of working on scenarios, working through different potential futures, and understanding how the future could differ from the present is as important as the quality of the finished product. This suggests that it's just as important to think about how to improve the way scenarios are packaged and communicated, and to develop tools to allow wider numbers of stakeholders to develop their own scenarios.²⁷ This would open the prospect of creating scenarios that are as complicated and unpredictable as the world itself, and are as useful to strategic corporals, entrepreneurs, and people in small networked organizations as they are to corporations, federal policymakers, and the Pentagon? Two new methods suggest themselves.

The first is to develop scenarios as maps rather than stories.²⁸ Maps are a well-established tool in futures research, and have a number of virtues. They have an open-endedness that invites elaboration, structured speculation, and a consideration of how trends could play out over time. Large-scale or

²⁷ For example, MIT's Michael Schrage argues that "one of the consequences of technological innovation is that more tools are available to everyone, including policymakers. On the one hand, such tools allow for a diversity of experience, ideas and experiments to interact. On the other hand, it has given rise to the phenomena Schrage dubbed as "BYOA = Be Your Own Analyst." Customers want to be able to do more of the analysis on their own, that is, to interact more with the data:" Global Futures Forum, *Emerging Threats in the 21st Century*, 12.

²⁸ David Sibbet, "Visual Intelligence: Using the Deep Patterns of Visual Language to Build Cognitive Skills," *Theory Into Practice* 47 (2008) 118–127.

digital maps can present both general views of high-level trends that will affect the future, and present some of the background information that informs them. Maps are also very useful in workshops or other processes aimed at applying the general insights of scenarios to specific industries and companies. Not only can maps help participants organize and focus their attention, they can also serve as a visual and structural anchor for events, by giving all participants a common frame of reference.

The second is to use games or simulations, to have scenarios inform either computer-generated training environments, or multi-person environments in which a number of participants work together to explore different futures, and understand the potential long-term consequences of current actions.²⁹

Games have several virtues. Games give users license to think radical thoughts: because they are approached as a form of serious play, they help unlock imagination. Games can draw on familiar skills: lots of people (particularly young people) who are mystified by prediction markets or

²⁹ Rachel K. Hanig and Mark E. Henshaw, "Needed: A National Security Simulation Center," *Studies in Intelligence* 52:2 (2008), online at <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/csi-studies/studies/vol52no2/to-improve-analytical-insight.html> ; Albert A. Nofi, *Recent Trends in Thinking about Warfare* (CNA, 2006); San Tangredi, *All Possible Wars? Toward a Consensus View of the Future Security Environment, 2001–2025*, McNair Paper 63 (Washington: National Defense University, 2000)

bored by narratives are unfazed by even complex, multilayered games. To the contrary, they embrace that complexity of games, which makes it easier to teach them about the complexity of the future itself. Games have the potential to teach new skills: the ability to think better about the future, see more possibilities, and cooperate with people. Finally, games can be used to study very large probability spaces. Scenarios traditionally have only been able to explore only a couple potential futures highlighting a few carefully-selected trends. Games, however, can harness the collective energy and time of many people, and thus allow for a wider or more intensive exploration of many possible futures.

GPPAG and the Future of Scenarios

So what does this mean for GPPAG? Environmental and intelligence scenarios represent two fields that GPPAG is naturally interested in. However, there is an opportunity to move from consuming and learning from this work, to contributing to it.

First, GPPAG could use scenarios within the graduate program, to knit together diverse researchers, create continuities between classes and alumni,

and at the same time help advance the state of the art. The methodological flexibility of scenarios would allow for the inclusion of researchers and students across the intellectual spectrum. For individual students, scenarios can serve as a way to think about the future in a disciplined but imaginative way. GPPAG classes could also work on scenarios connected by some broad theme, or focused on a particular region. For example, one entering class might work on scenarios around the theme of "Resources and Conflict;" the next class, on "Complex Networks, Interdependence and Insecurity;" another on "Strategic Leadership: Local Choices and Global Impacts." In this way, individual and class work can contribute to a larger GPPAG vision of the future possessing both breadth and depth.

Second, there is an opportunity for GPPAG to reach out to the environmental and intelligence scenario communities, and in so doing make itself a central player in the evolution of this field. There is little conversation between these different communities. Intelligence scenario-builders reference work from environmental scenarios from groups like the IPCC, but so far the two groups have not worked together on common scenarios, nor have they compared methods or innovations. One could link them together, for example, in an annual conference that brought together

researchers, policy-makers, and analysts to discuss recent work in each community, and developed a set of scenarios that synthesize their current research and speak to their current concerns. (These scenarios could also help set the research agenda for GPPAG classes for the coming year.)

Finally, as an academic institution with close connections to policy and strategy, GPPAG stands in an almost unique position in the scenario world. It's an institution that can conduct long-term research on global trends, organize annual events, and over time develop a cumulative perspective and wisdom that corporate scenario planners cannot. Practitioners agree that scenario practice needs to be more reflexive, continuous, and transparent; it needs to devote more effort to understanding how global trends play out in specific contexts and locations; and it needs to develop tools for making the long-term impacts of current strategic decisions visible to "strategic corporals" and their opposites in corporations and nonprofits. However, few futurists are in a position to develop these practices and tools; GPPAG could do so. This is not work that will strike anyone as radical or hard to understand; to the contrary. But doing the work that everyone in the community agrees "someone should do" to make scenarios more perceptive

and persuasive would put NPS in a central position among people thinking about globalization, security, and the future.

Annotated Bibliography

This bibliography summarizes major works in environmental and intelligence scenarios. It is confined to primary works that are of methodological significance, take a global view of environmental and security issues, and illustrate the kinds of innovations described in this report. For the sake of brevity it does not discuss national-level or other specialized scenarios.

While they were produced over the course of a decade, the scenarios have a remarkable unity in their underlying assumptions. Most notably, all the scenarios in one way or another explore the consequences of either continued globalization or a retreat to nationalism or regionalism.

Globalization, it seems, will be as central to the 21st century as industrialization was to the 19th. They also demonstrate some measure of skepticism in the ability of existing international institutions to deal with the problems raised by climate change, migration, resource wars, economic disparities, and globalization; the more optimistic scenarios argue for the ability of civil society or local groups to manage their own affairs and create innovative sustainable responses to global problems. Finally, they assume that information technologies have and will continue to have a profound

impact on the developed world, and will affect political and social life in the developing world in the coming century—with both positive and negative impacts.

Ged Davis, *Exploring Sustainable Development* (WBCSD, 1997).

Exploring Sustainable Development presents three scenarios of global change to 2050 that explore the impact of "the new" (information technologies, business processes, and organizational forms); "the many" (a global population of 9-11 billion people); and "the connected" (more interconnections between individuals, states, and economies). In "First Raise Our Growth!" economic growth takes priority over sustainability and environmental preservation, and eventually leads to a set of crises that new technologies cannot solve. "Geopolity" envisions a combination of bottom-up response by civil society and local groups and greater economic regulation after nations, corporations, markets, and international bodies prove incapable of dealing with environmental crises. "Jazz" features "a world of social and technological innovation, experimentation, rapid adaptation, much voluntary interconnectedness, and a powerful and ever-changing global market" that solves "social and environmental problems in the most pragmatic possible way possible."

Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Opportunities and Challenges for Business and Industry* (Washington: World Resources Institute, 2005).

The Millennium Assessment created four scenarios around two dimensions: a world driven by regional versus global institutions and responses to environmental challenges; and reactive versus proactive environmental policies. The four scenarios all assume growing demand for natural resources; continued food insecurity and global shortages, despite growth in agriculture and global trade; changes in arable land patterns, rainfall, and water access driven by climate change; continued depletion of global fish stocks; deterioration of ecosystem services, caused by destruction of wetlands and forests. Notably, in each of the four scenarios participants

identified "opportunities for combining advantageous approaches to achieve synergistic benefits."

National Assessment Synthesis Team, *US Global Change Research Program, Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change* (Washington: US Global Change Research Program, 2000).

Scenarios on the regional impacts of climate change, as projected in climate models developed by the UK's Hadley Centre and Canadian Centre for Climate Modeling and Analysis. The scenarios are largely projections based on the climate models, US Census demographic data, and economic forecasts, and contain less in the way of imaginative explorations of possible futures. The results were more controversial than other contemporary scenarios.

National Intelligence Council, *Mapping the Global Future: Report of the National Intelligence Council's 2020 Project* (Washington, DC: National Intelligence Council, 2008).

Four scenarios exploring how the emergence of new global players, continued globalization, challenges to traditional governance, pervasive insecurity, and terrorism could shape the world to 2020. As the authors explain, "*Davos World* provides an illustration of how robust economic growth, led by China and India, over the next 15 years could reshape the globalization process—giving it a more non-Western face and transforming the political playing field as well. *Pax Americana* takes a look at how US predominance may survive the radical changes to the global political landscape and serve to fashion a new and inclusive global order. *A New Caliphate* provides an example of how a global movement fueled by radical religious identity politics could constitute a challenge to Western norms and values as the foundation of the global system. *Cycle of Fear* provides an example of how concerns about proliferation might increase to the point that large-scale intrusive security measures are taken to prevent outbreaks of deadly attacks, possibly introducing an Orwellian world."

National Intelligence Council, *Global Scenarios to 2025* (Washington, DC: National Intelligence Council, 2008). Available online at http://www.dni.gov/nic/NIC_2025_global_scenarios.html.

The Global Scenarios focused on two major questions: "How can the world attain a high level of sustainable economic growth given the rapidly changing geopolitical landscape of the early 21st century?" and "What will the balance of power look like in 2025 and to what degree might collaborative policies and frameworks shape the global context?" It presents three scenarios. In *Borrowed Time*, the global economy continues to grow, but governments and NGOs fail to deal with long-term economic and geopolitical problems it causes. In *Fragmented World*, political instability and a focus on local interests slows economic growth, eventually leading to an "overwhelmed international system [that] is collapsing under its own weight." Finally, in "Constant Renewal" civil society groups and new international mechanisms make it possible for states and organizations to respond to global challenges.

Nebojsa Nakicenovic and Rob Swart, eds., *Emission Scenarios* (IPCC, 2000), available online at <http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=0>.

Like the Millennium Assessment scenarios, the SRES consists of four scenarios, in this case featuring a global order that was either fragmented or integrated, and a global economy that either did or did not consider sustainability to be a priority. It assumes that global economic and political integration leads to faster growth and technology development, and sustainability is balanced against other priorities like economic growth and security. All four scenarios have potential highs and lows: a globally integrated world that sacrifices sustainability for economic growth is potentially the most unstable, but is also most capable of rapidly developing new technologies and energy sources; a fragmented sustainability-oriented world may be more resilient, but develops and diffuses new technologies--including alternative energy and carbon capture technologies-- more slowly.

Jacqueline Newmyer and Stephen Rosen, *NIC-LRAU 2025 Security Environment: Final Report* (Washington: National Intelligence Council, 2008).

Outlines of scenarios on the global security environment to 2025, based on three expert workshops conducted by the Long Term Strategy Group. The scenarios featured retreat by the United States from the Middle East; a more aggressive and interventionist Chinese foreign policy driven mainly by a need to increase energy security; alternately, a China severely weakened by economic stagnation, loss of faith in the Communist Party, and growing power of dissident groups; an India weakened by conflict with Pakistan and internal resistance to globalization.

Edward Parson, et al, *Global-Change Scenarios: Their Development and Use* (Sub-report 2.1B of Synthesis and Assessment Product 2.1 by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research) (Washington: Department of Energy, Office of Biological & Environmental Research, 2007).

Literature review that "examines the development and use of scenarios in global climate change applications. It considers scenarios of various types... and reviews how they have been developed, what uses they have served, what consistent challenges they have faced, what controversies they have raised, and how their development and use might be made more effective."

Paul Raskin, et al, *Bending the Curve: Toward Global Sustainability* (Stockholm Environment Institute, 1998); Paul Raskin, et al, *Great Transition: The Promise and Lure of the Times Ahead* (Stockholm Environment Institute, 2002).

The Global Scenario Group has produced three detailed scenarios of global change: *Conventional Worlds*, *Barbarisation* and *Great Transitions*. *Conventional Worlds* describes a global system based on the continued dominance of today's institutions and industries; it is the global equivalent of a "business as usual" or baseline scenario. *Barbarisation* envisions a world in which global institutions, trade, and resilience break down in the face of environmental stresses, regional catastrophes, and local wars. *Great Transitions* describes a world in which international institutions, robust networks of small groups, cleantech and sustainable business find ways to ease global problems. Like the Millennium Assessment scenarios, these are

primarily concerned with describing how global society can respond to environmental changes.

Paul D. Raskin and Eric Kemp-Benedict, *Global Environment Outlook Scenario Framework* (United Nations Environment Programme, 2004).

Not itself a set of scenarios, but an overview of major global environmental scenarios, this is an excellent introduction to the practice of environmental scenario development, and the current scenario literature.

San Tangredi, *All Possible Wars? Toward a Consensus View of the Future Security Environment, 2001–2025*, McNair Paper 63 (Washington: National Defense University, 2000).

Discusses the major trends shaping the future of national security, and the use of scenarios "to create a path of logic that leads to practical strategies and defense policies and suggests the force structure to implement them." The report synthesizes studies on future security environments in the aftermath of the Cold War, and describes the major points of consensus and divergence among them. The report is not a set of scenarios-- though it presents a "consensus scenario"-- but rather is more methodological in its aims.

UK Climate Impacts Programme, *Climate Change Scenarios for the United Kingdom*, UKCIP Technical Report No. 1 (Oxford: UKCIP, 1998). http://www.ukcip.org.uk/resources/publications/pub_dets.asp?ID=11.

Four scenarios organized around two axes: values (ranging from a consumerist society on one side, to a communitarian society on the other) and governance (ranging from concentrated national power taking primacy over global institutions, to an interdependent world in which global, local, and civil society institutions work with national governments and each other).