PART III. NEW TOOLS FOR DEFENSE DECISIONMAKING

INTRODUCTION TO PART III

RAND and other analysts have developed and refined a number of techniques for coping with uncertainty and making decisions that will have consequences over years, even generations. These techniques might be thought of in three broad categories: exercises, strategic products, and "groupware."

Drawing on earlier work in Europe, war-gaming for U.S. military planners was developed at the Naval War College in the late 19th century as a way of "getting into the minds" of potential military adversaries in order to develop and test alternative operational strategies.[1] In war games, the flow of events is affected by and, in turn, affects decisions made by players representing more than one "actor" or "side" that relies on less-than-perfect information. Simulations are different. Here, players represent only one actor, and some events may be determined before the game is played. Players can have incomplete and possibly misleading information—based on what sensors and human intelligence happen to provide—or they can be assumed to have complete and accurate information.

Both war games and simulations are referred to, in shorthand, as exercises. Such exercises can be conducted with educational or analytic objectives in mind: typical educational objectives include learning new lessons, reinforcing old lessons, and evaluating the understand-

[1]For further detail, see Peter P. Perla, *The Art of Wargaming,* Naval Institute Press, Annapolis, MD, 1990. Also see Peter P. Perla and Darryl L. Branting, "What Wargaming Is and Is Not," *Naval War College Review,* September/October 1985; and Peter P. Perla, "Games, Analyses, and Exercise," *Naval War College Review,* Spring 1987.

ing that has been gained; typical analytic objectives include developing strategy, identifying new issues, building consensus, or setting priorities. Exercises exist to test and refine human interaction, not to calculate outcomes. They explore decisionmaking by forcing players to make decisions; they achieve value by producing qualitative assessments of decisions that are made and not made and the effects of those decisions.

Exercises are generally

- Based on scenarios—i.e., credible, internally consistent, scripted events that set the scene and scope for players (although exercises can also be used to develop scenarios).
- Tolerant of some oversimplification and artificial assumptions.
- Designed by people acknowledged as experts in a particular area.
- Guided by rules and procedures to assure the logical flow of cause and effect.

Exercise play is most fruitful when participants free themselves from the constraints of "conventional wisdom" and suspend disbelief, much as they would when reading a well-written work of fiction. Getting the most out of games requires exposure of participants to a structured process of post-game analytic feedback. A well-structured exercise whose players have relevant experience and good information should yield insights about

- The feasibility of strategies, as well as their strengths and weaknesses.
- Key factors or variables that drive the results.
- The sensitivity of the results to variations in the factors or variables.

Strategic products, the second broad catgory of techniques, help evaluate the broader implications of changes in the planning environment. They come in two forms, *strategic planning*—"the evaluation and choice processes that determine how the world will be viewed, and the goals that the organization will pursue given this

world view"[2]—and *strategic forecasting*. Underlying both of these is scenario-based planning.

Scenario-based planning was pioneered in the late 1960s by Royal Dutch Shell, virtually the only major oil company to anticipate the changes that would occur in the oil market in 1973–1974. Now a standard technique for long-range planning in the face of uncertainty, scenario-based planning rests on the premise that the future cannot be predicted accurately enough for good planning. Scenario-based planning rarely aims to predict; it is "a tool for ordering one's perceptions about alternative future environments in which one's decisions might be played out."[3] As one leading practitioner puts it, "The point is not so much to have one scenario that 'gets it right' as to have a set of scenarios that illuminate the major forces driving the system, their interrelationships, and the critical uncertainties."[4] Trends and key uncertainties are used to establish a range of "futures" well enough to define a manageable number of plausible, internally consistent scenarios.[5] Planners then insert themselves into each future environment and assess how their near-term decisions affected the long-term futures.

In assessing these effects, planners use common and adaptive strategies. *Common strategies* are largely independent of which specific future is anticipated; *adaptive strategies* are developed early and then executed later only if specific variations of the future ensue. Because adaptive strategies tend to be costly and risky to execute, they are developed only for selected future circumstances. And because some futures are more desirable than others, some strategies seek to improve the future while others concentrate on how to cope with the less desirable ones. In this way, defense planners help identify ac-

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[2]Paul R. Kleindorfer, Howard C. Kunreuther, and Paul J.H. Schoemaker, *Decision Sciences: An Integrative Perspective,* Cambridge University Press, New York, 1993, p. 236.

[3]Peter Schwartz, *The Art of the Long View,* Doubleday, New York, 1991, p. 4. Also see Peter Schwartz, *The Art of Long View—Paths to Strategic Insight for Yourself and Your Company,* Bantam Doubleday Dell Publishing Group, Inc., New York, 1966.

[4]Paul J.H. Schoemaker, "How to Link Strategic Vision to Core Capabilities," *Sloan Management Review,* Fall 1992, p. 67.

[5]See, for example, Pierre Wack, "Scenarios: Shooting the Rapids," *Harvard Business Review,* November/December 1985, p. 146.

tions decisionmakers can take directly—as well as indirectly, through their influence on others.

A good defense planner will also identify a system of strategic indicators to trigger adaptive strategies, along with near-term courses of action decisionmakers may need to pursue to prepare or develop the strategies. Simply stated, the process is to develop strategies, test them, file them until needed, but exercise them periodically.[6]

In formal terms, collaboration is interaction among people that is intended to "create a shared understanding that none had previously possessed or could have come to on their own."[7] Collaboration technologies promise to improve the ability to coordinate action, share information, and understand information in order to facilitate inter- and intra-organizational teams. The following list shows three levels of collaboration; experienced defense analysts must be good at all of them.[8]

- *Level 1: Individual.* Individuals operating independently interact to selectively accommodate their own specific needs.
- *Level 2: Community of interest.* Groups of individuals exchange information in a shared community but not to achieve a common goal.
- *Level 3: Collaboration.* Individuals operate as a team to achieve a common goal by working together, sharing information, and thereby gaining new insights.

"Groupware" is software that supports the third level of collaboration. At its best, it applies the scientific method to the process of how groups use or should use analysis in making decisions. Analysis, in turn, can be considered good when it is a structured, systematic,

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[6]On broad-based assumption-based planning and other styles of strategic planning, see Paul K. Davis and Zalmay Khalilzad, *A Composite Approach to Air Force Planning,* MR-787-AF, RAND, 1996.

[7]Michael Schrage, *No More Teams! Mastering the Dynamics of Creative Collaboration* (Doubleday, 1995), as quoted in P. A. Dargan, "The Ideal Collaboration Environment," April 2001 (available at http://www.stsc.hill.af.mil/CrossTalk/2001/apr/dargan.asp).

[8]Michael Schrage, *Shared Minds—The New Technologies of Collaboration,* Random-House, Inc., New York, 1990, as cited in P. A. Dargan.

traceable process of providing useful information to planners. This means that all data, inputs, assumptions, and methodologies are made transparent, and alternative decision paths are examined using logic chains to evaluate each one's advantages and disadvantages.

The first chapter in this part of the book is Chapter Nine, Paul Davis's "Exploratory Analysis and Implications for Modeling," in which he examines the consequences of uncertainty—not merely via standard sensitivity methods, but more comprehensively. Rather than going into excruciating detail on n^{th}-order effects, he uses a wide array of input variables (many well beyond what "experts" believe is plausible) to discover both the key uncertainties on which analysis may hinge and the primary drivers beside which all other variables pale in importance. This technique is useful primarily for studies in breadth (rather than depth), especially to gain a broad understanding of a problem area before dipping into details, or to see a forest rather than trees after detailed analysis. Hence, it is a good fit for capabilities-based planning. Davis describes techniques for doing exploratory analysis and explains how such analysis can be facilitated by multiresolution, multiperspective models (MRMPMs).

Chapter Ten, Dan Fox's "Using Exploratory Modeling," focuses on the practical issues associated with harnessing combat modeling and modern computers to explore a wide range of outcomes in order to understand the risks of engagement. In effect, he designs an experiment by identifying and then systematically varying experimental decision and risk variables to produce a range of outcomes. *Decision variables* represent policy alternatives (e.g., different levels of committed forces or alternative concepts of operations); *risk variables* (e.g., warning time) are given, not chosen. Measures of outcome may be simple (e.g., maximum kilometers that enemy forces advance) or complex (e.g., ratio of friendly to enemy losses). Combat simulation is used to create a matrix of results representing the outcomes for every combination of values for the experimental variables. Fox includes a comprehensive example that goes from designing the experiment to interpreting the results.

Stuart Starr's "Assessing Military Information Systems" is Chapter Eleven. Twenty-five years ago, Starr observes, several defense intellectuals sought to construct an ability to assess how much information systems contribute to military mission effectiveness. In line with

this goal, substantial progress has been made in four areas: culture, process, tools, and experiments. Many of the principles and much of the guidance that have emerged in these areas are summarized in the revised 2002 version of *NATO Code of Best Practice for Command and Control Assessment*.[9] However, the changing geopolitical landscape poses daunting challenges for the assessment community. The contribution and impact of information systems must now be assessed in the context of not only emerging missions and complex, multidimensional information infrastructures ("infospheres"), but also the broader transformation of DoD itself.

Chapter Twelve is David Mussington's "The Day After Methodology and National Security Analysis." Mussington outlines the "Day After," an innovative gaming technique, developed by RAND, that examines strategic issues by playing out a scenario and then working backward to see how better decisionmaking could have improved the outcome. For this technique to work well, the scenario must be carefully designed and the testing process must be lengthy. Mussington describes how, in two concrete examples—one dealing with strategic information warfare, and one with the use of e-commerce technologies for money laundering—this approach illuminated strategy and policy questions. The most important issue in using this approach is how to remove the biases of the exercise designer or research sponsor from the scenario design or question formulation and still retain the policy relevance of the deliberations and findings. A readily usable *process* for evaluating scenario details and issue treatment is applied as an integral part of exercise development.

In the final chapter, "Using Electronic Meeting Systems to Aid Defense Decisions," Stuart Johnson explores another set of tools for improving the quality of defense deliberations. The basic problem being addressed is that, faced with complexity and uncertainty, individual planners risk becoming comfortable with familiar illusions. Moreover, there are limits to how well any one planner can imagine the future; and when planners work collectively, groupthink becomes a real risk. Johnson discusses a case in which an electronic meeting system (EMS) was used to help the Navy prepare for the 1997 Quadrennial Defense Review (QDR). Experts were first asked to

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[9]Available at http://www.dodccrp.org/nato_supplnato.htm.

rank missions in terms of priority and likelihood (via anonymous voting, which was informed, after the fact, by group discussion). They were then asked to rank capabilities in terms of their contribution to each mission, and systems in terms of their contribution to each capability. This process resulted in a conclusion that probably would not have been recognized up front: command-and-control systems (C2) were of especial importance to naval operations and thus deserved to have their budget fenced off during the QDR process.