

## RAND Strategy Assessment Center

ANALYTIC WAR GAMING  
WITH THE RAND STRATEGY  
ASSESSMENT SYSTEM (RSAS)

For the past several years, the RAND Strategy Assessment Center (RSAC) has been developing a **new framework for strategic analysis** that seeks to combine many of the subtle, nonquantitative aspects of human war gaming with the efficiency, rigor, and reproducibility of analytic modeling. In late 1986, the RSAC completed a first version of the RAND Strategy Assessment System (RSAS 2.0), an integrated collection of models and other information systems providing a laboratory for analysts and gamers to use in applying the emerging methodology. After considerable improvement and testing, a new version (RSAS 3.0) will be distributed to a variety of government users late in 1987. Collaboration on experimental applications has already begun.

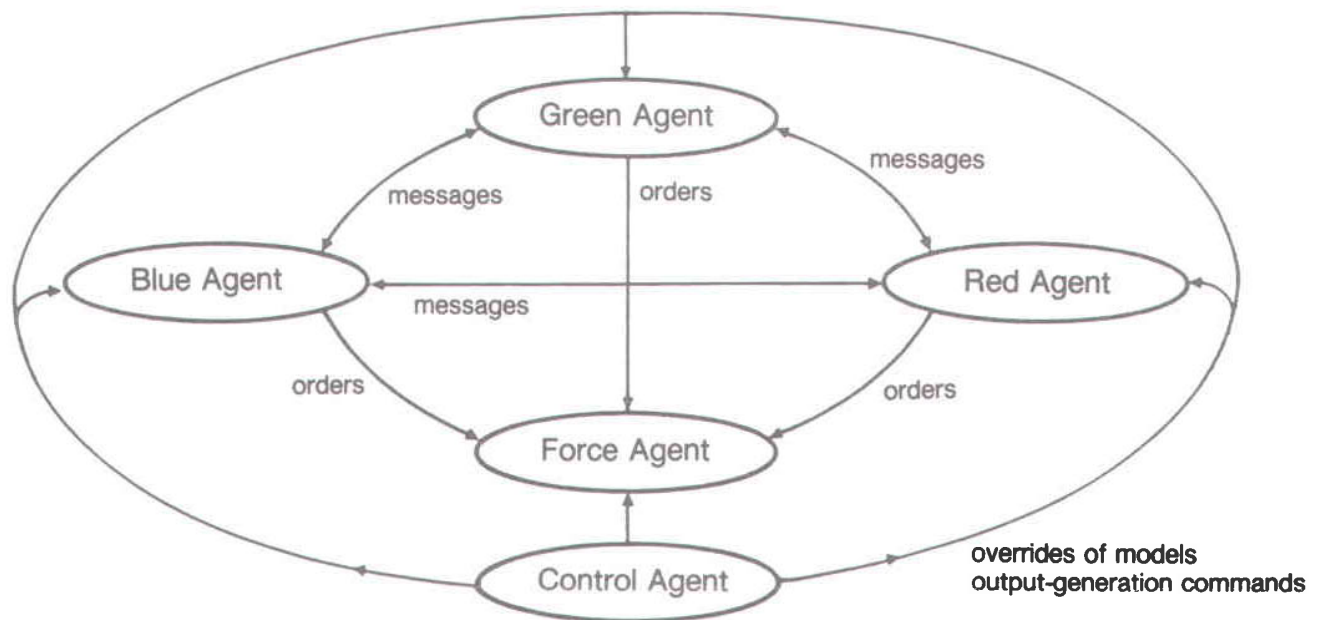
The RSAC's approach involves a number of guiding principles very different from those underlying traditional analytic efforts:

- **Focus on integrative strategy-level considerations** (both nuclear and conventional)—adopting the perspective of national authorities and, to some extent, of theater commanders. To achieve this, the RSAS was designed from the top down so that a user could work with aggregated strategic concepts and variables without being forced to worry about the details of military operations.
- **At the same time, provide capability to address operational-level issues.** A major problem in the past has been the gap between strategic- and operational-level thinking. Strategists have often found it difficult to understand the significance of operational constraints or the limitations of aggregated analysis. Those concerned with operational-level issues have often been lost in details and have also had difficulty relating their work to such global issues as the possible role of nuclear weapons or events in other theaters. To cut across these boundaries without thwarting the first principle, the RSAS allows users to specify their decisions or assumptions at different levels of generalization.

- **Face up to the challenge of planning under uncertainty.** The only certainty in strategic planning is uncertainty: best-estimate predictions of how future wars will unfold are unlikely to be accurate, so a high premium should be placed on flexibility and adaptability. To measure such intangibles, the RSAC encourages users to consider a broad range of possible scenarios—varying their assumptions about political-military context, forces, strategies, command and control, weapon capabilities, and the laws of war. The user can manage all these variables because the RSAS's analytic war games can be conducted quickly and comprehended easily through graphics; it is not necessary to deal with mountains of computer printout.
- **Plan for a mix of model-supported human war gaming, interactive simulation, and automated war gaming.** Empirically, there is a tendency for those who do human war gaming not to do modeling, and vice versa—to the detriment of both groups. The RSAS is designed instead to allow for a mix of these activities, allowing for synergism between human and automated elements.
- **Emphasize clarity and flexibility of assumptions.** The RSAS is very complex, since the likely evolution of plausible crises and conflicts in the real world is sensitive to scores of factors. It is therefore essential that users be able to change the underlying assumptions. Software tools have been provided for that purpose, along with considerable on-line documentation. Most data can be changed interactively during a simulation, without recompiling computer programs. Furthermore, by virtue of a new language (RAND-ABEL<sup>®</sup>), analysts can by themselves read and modify the rules (the "If . . . Then" statements) of the decision models.

## RSAS STRUCTURE

The fully automated RSAS consists of five *agents* and a World Situation Data Set. (Humans may play interactively from the position of any agent.) The Blue, Red, and Green agents are decision models that represent the national and military commands of the United States, the Soviet Union, and third countries, respectively. These agents (or their human substitutes) issue com-



NOTE: Agents obtain information from, and change values in, World Situation Data Set

Fig. 1—Channels of communication among RSAS agents and data set

mands to a Force Agent (also called CAMPAIGN), which includes a strategic-nuclear-exchange model, strategic/operational theater simulation models, and a maritime theater model. A Control Agent allows analysts to schedule or arrange certain adaptive changes in simulation parameters without having to monitor the simulation as it proceeds. The relationships among the agents are shown in Figure 1. We now consider each of the agents in more detail.

**The Blue and Red agents each consist of a National Command Level (NCL) and subsidiary hierarchical Military Command Levels.** The NCL develops objectives and specifies a strategy for execution by the military levels. To do so, it first assesses the world situation—including the prospects and risks, which it can evaluate by running its own look-ahead simulation. It then establishes guidance for escalation or deescalation and chooses other elements of strategy accordingly. All of these actions are influenced by the NCL's behavior pattern, which can be varied to reflect differences in such matters as attitude, bias, aggressiveness, decision style, and grand strategy. The NCL's automated behavior can be bypassed by the user, who can play the role of either agent interactively or schedule a rigid set of decisions (e.g., by setting the dates of M-Day and D-Day).

The Military Command Levels represent major Blue and Red theater commands. For Blue, these are the Joint Chiefs of Staff and the various CINCS—SACEUR, SACLANT, CINCSAC, and so on. For Red, they are the Supreme High Command of Forces and other commands for strategic nuclear forces and for various theaters—Northwestern, Western, Far Eastern, etc. Each Command Level gives orders to the one immediately

below it or to the Force Agent and sends information and requests to the level immediately above it. The Military Command Level models have the character of adaptive *analytic war plans* motivated by prior human games and studies. They contain the large numbers of detailed orders and procedures required for a branched plan characterized by a continual need for force-management decisions, such as the daily apportionment of aircraft across missions.

**The Green Agent represents the national political-military decisionmaking of countries other than the United States and the Soviet Union.** For each country, the RSAS user can specify a "temperament" ranging from that for a satellite or a staunch ally to that for a reluctant ally or a neutral country. The user can also assign degrees of assertiveness, opportunism, and staying power.

**The Force Agent is the focal point of most day-to-day work with the RSAS.** It is itself a large, sophisticated, and interactive simulation model that tracks military forces worldwide and assesses battle outcomes and the results of other operations. The model can consider air and ground combat in major and secondary theaters, noncombat operations such as mobilization and dispersal, intertheater (strategic) mobility, logistics, strategic nuclear warfare, space-based strategic defense, naval combat, and strategic command and control. The Force Agent keeps the game clock, advancing the simulations by intervals of a few minutes to a day (depending on the character of the conflict). It also notifies players or decision models when specified events occur, giving them opportunity to take action.

**The Control Agent aids analysis and gaming.** It aids analysis by allowing the user to specify such items as the outline of a game scenario or what displays should be logged. The Agent aids gaming by allowing the user to insert events that the simulation models would not have come up with on their own. Those events can be scheduled to occur at a designated time or on the occurrence of a specified event.

In these agents and their interactions, the RSAS combines traditional simulation, artificial intelligence, and other techniques for man-machine operations—and does so for a large and complex policy-relevant domain. This work is unique worldwide; much of what is embodied in the RSAS would not have been possible even two or three years ago. The opportunities for further dramatic improvements are many, and it is likely that the RSAS will continue to evolve for some years.

## RSAS APPLICATIONS

**Analysis.** Most analytic uses of the RSAS are likely to be simple and informal. An analyst may perform simulations to support a particular need, drawing on files developed over a period of time for such routine work. Major analytic studies, however, require more planning and testing and may make use of the RSAS's full capabilities. Such a study might proceed as follows.

First, the analyst identifies his objectives, issues, and hypotheses, then meets with modelers, programmers, and other analysts to explain and review his plan and to evaluate the suitability of the existing RSAS tools and data. Most likely, there would have to be model adaptations and data updates, which could require significant effort. The RSAS emphasizes this to prospective users, because strategic analysis is complex and difficult. The RSAS is a set of tools, not an answer machine, and each study is unique.

Once modifications are complete, the analyst might "play" with the Force Agent to begin getting a feel for the implications of his assumptions at the operational level. He might start out on his own, then run games with separate teams (with another analyst playing the Control Agent). At this point, **the analyst would essentially be conducting a modernized version of "sandtabling,"** which would be supplemented with higher-resolution human war games for insight into additional issues.

The next step could be **practice runs at the theater-strategic or global-strategic level,** involving more of the RSAS machinery. The Blue, Red, and Green agents allow the analyst considerable flexibility in grand strategies, national behavior patterns, and war plans. He might develop Blue and Red analytic war plans to provide detailed orders consistent with the strategies being tested. Or, he might focus on the National Command Level models themselves to study such issues as strategic

command and control or deterrence, escalation control, and war termination. The process of building such models is a rigorous method for the analyst to use in defining the *context* of his problem. Doing so may very well highlight, for example, the importance of the behavior of allies or of such procedures as rules of engagement.

Eventually, the analyst would be ready to perform the **systematic experimentation** towards which all his actions have been directed, though by this time, the way he defines his problem might have changed significantly. In this final phase, the work would be as automated as possible, as the premium should be on collecting information for a large number of carefully defined cases. Thus, this phase would be characterized by a series of "production runs" rather than interactive play of individual games. In this phase, analysts would take advantage of graphical and other analytical aids for organizing information meaningfully. These initial production runs might satisfy the study's objectives, but there would probably be substantive surprises and the need to iterate.

**Training.** Another major class of RSAS applications is likely to be in training, e.g., through military war gaming in support of war college courses on strategy and operations. Parts of the RSAS have already been used experimentally for several semesters at the National Defense University in a new course on joint and combined operations. Other such applications are likely. The RSAS could also be used to expose new senior officers, officials, and their staffs to a diversity of situations to which they might have to react. Either way, the RSAS could help fulfill two elusive goals of training:

- To communicate a sense of the whole, i.e., a sense for what all the parts are and how they might be interconnected.
- To demonstrate the importance of uncertainties and how they might be taken into account.

**Synthesis.** Though the RSAS is principally a tool for gaming and analysis at present, it has the potential for synthetic applications. For example, one of the chronic challenges for the intelligence community is finding ways to integrate disparate pieces of information and communicate the results effectively. By incorporating intelligence information about Soviet campaign planning into the RSAS's war plans, the full import of that information could be conveyed through games and simulations. This could be especially useful in distinguishing between Soviet doctrinal aims and operational capabilities in a variety of cases, or in highlighting differences between Soviet and U.S. operational styles.

Finally, the RSAS is working with the Organization of the Joint Chiefs of Staff to develop methods for the OJCS to use in assessing global strategy and in integrating and testing the war plans developed by the various CINCs worldwide. This also appears to be an excellent candidate for productive effort in the years ahead.

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Davis, Paul K., and James A. Winnefeld. *The RAND Strategy Assessment Center: An Overview and Interim Conclusions about Utility and Development Options*. The RAND Corporation, R-2945-DNA, March 1983.

Davis, Paul K., *Game-Structured Analysis as a Framework for Defense Planning*. The RAND Corporation, P-7051, January 1985.

Davis, Paul K., Steven C. Bankes, and James P. Kahan. *A New Methodology for Modeling National Command Level Decisionmaking in War Games and Simulations*. The RAND Corporation, R-3290-NA, July 1986.

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