

Chapter 8

Alternatives



**Security Analysis
Critical-Thinking
Framework**

Bottom Line Up Front

Effective thinking goes beyond conventional answers and solutions. To develop alternatives beyond the conventional requires a combination of critical and creative thinking. This chapter provides several systematic techniques for generating alternatives in security analysis. The chapter starts with discussing informed brainstorming. Several techniques—5Ws + 1H, 7 X 7, Red Team Analysis, and Storyboarding—are introduced to expand on informed brainstorming. Creative-thinking techniques, such as Fusion and SCAMPER, help generate additional ideas and alternatives that are both unique and useful. Finally, the CARVER technique is introduced as a tool for assessing and prioritizing a list of alternatives. The ability to expand alternatives for all critical-thinking elements is useful for most security analysis projects.

Role of Alternative Analysis

In the broader sense, the critical-thinking alternative element touches all the elements in the Figure 2.5 Security Analysis Critical-Thinking Framework. Most analyses include alternative purposes, questions, information, points of view, assumptions, concepts, interpretations/inferences, and implications/consequences. The process of developing alternatives for the critical-thinking elements can be empowering to the analyst. This chapter introduces a number of techniques to create alternatives for employment with critical thinking. While the alternative analysis techniques introduced are flexible and apply to all the elements, the focus in this chapter is on developing alternatives to support conceptualization/modeling (Chapter 7), interpretation/inference (Chapter 9), and implications/consequences (Chapter 10). Intelligence analysts develop alternatives concerning the potential decisions or behaviors of states or leaders who pose threats in addition to addressing Warning Problems (Chapter 10). Security policy analysts develop alternatives to not only address threats, but also to generate programs and decision recommendations (Chapters 9 and 10).

Developing alternatives requires the analyst to be both systematic and creative. Some analysts may not feel particularly creative at generating “out-of-the-box” alternatives, so the techniques presented in this chapter allow those with little confidence in their creative abilities to develop expanded lists of alternatives. The techniques in this chapter start with **informed brainstorming**, which is the most-used and normally default technique for generating ideas in the public and private sectors. The techniques for brainstorming are expanded in this chapter and supplemented with several widely used techniques. One of the keys in alternative development is for the analyst or a group of analysts to alter their **perspectives** on the situation under study. This often requires analyst(s) to place themselves in the role of the adversaries or targets under study. Box 2.1 discusses how, during the Cuban Missile Crisis, President Kennedy tried to place himself in

the shoes of Soviet Premier Nikita Khrushchev to better understand Khrushchev's decision making.

There is a large literature on techniques for expanding a person's imagination and creative thinking, most within the business and academic arts and humanities communities. In *Sparks of Genius*, academics Robert and Michele Root-Bernstein offer a historical analysis that highlights how creative thinking usually starts with energizing a person's **intuition**.¹ They describe how famous artists, scientists, and others, used basic intuitive techniques such as observing, imaging, abstracting, recognizing patterns, forming new patterns, analogizing, body thinking, empathizing, and dimensional thinking to engage their creative "right-brain" thinking. These techniques energize the thinker's **imagination**. For example, physicist Albert Einstein employed thought experiments, such as when "...he pretended to be a photon moving at the speed of light [abstracting], imagining what he saw [imaging] and what he felt [body thinking]. Then he became a second photon and tried to imagine what he could experience of the first one."² Thinkers may further advance their creative thinking through more advanced techniques such as modeling, playing, transforming, and synthesizing. Several of the creative techniques in this chapter call for synthesizing two or more ideas to generate new ideas by using associational techniques that employ unrelated objects. The goal of creative thinking is to generate **unique and useful** alternatives, which then may be placed into the critical-thinking framework and assessed alongside more conventional alternatives.

Altering an analyst's perspectives to energize alternative generation is often hampered by **bounded rationality**, which is a condition where a person becomes restricted in his/her thinking due to an existing mental model (Chapter 6) resulting from a combination of a person's education and experiences. Highly educated people often tend to be analytic "left-brain" thinkers who narrow the range of their thinking within their own professional or academic fields. Thinking techniques, such as those described in *Sparks of Genius* and in this chapter are designed to overcome bounded rationality by energizing imagination that leads to

creative “right-brain” thinking. The specific techniques in this chapter will assist analysts in countering bounded rationality and inserting creativity into their critical-thinking analyses.

Informed Brainstorming

While no doubt used across the ages, brainstorming was formalized in the 1950s by advertising executive Alex Osborn to increase the quantity and quality of advertising ideas.³ Informed brainstorming is one of several idea-generation techniques that have emerged over the past several decades. Informed brainstorming is often called structured brainstorming or just brainstorming. In security analysis, informed brainstorming simply indicates the use of systematic procedures by analysts who are *knowledgeable* about the topic being addressed. At a minimum, analysts should have reviewed material from the information, points of view, and assumptions critical-thinking elements supporting the generation of new ideas for the conceptualization/modeling, interpretation/inference, or implications/consequences elements. Informed brainstorming is used when a group of informed, core analysts work as a team with other knowledgeable outsiders on an analytic project. They generate ideas using a number of systematic and multi-step techniques. New ideas emerge from the synergy created by the interactions among group members. Analysts outside the core group should be included in order to insert differing perspectives into the analytic process. These outside analysts ideally should differ from the core group in educational backgrounds, cultures, technical knowledge, or mindsets, but should have some knowledge of the subject. The same systematic techniques discussed below may be employed by a single analyst, sometimes labeled **lone storming**, but the results will likely be less effective without different perspectives and the synergy gained through the interactions with other group members.

Informed-Brainstorming Procedures. Informed brainstorming works best with a group of four to twelve core and outside analysts. Less than four likely restricts the number of different perspectives and reduces group synergy. More than 12 likely makes the sessions too cumbersome. Six to seven group members is normally ideal. Each group has a facilitator or group leader and a recorder, which usually are the lead analyst(s) on the project. The facilitator coordinates the group's ground rules, leads the group through the systematic processes, ensures all group members have opportunities to participate, assists in preparing the group final report, and is in charge of the overall group effort. The recorder documents all phases of the group effort and assists in preparing the final report. Both the facilitator and recorder are fully engaged in the group efforts, providing their own perspectives and ideas in the group deliberations. The facilitator strives to avoid **groupthink** and ensures all group members participate by:

- Avoiding **production blocking** where members lose ideas, focus on a narrow range of ideas, and/or censure themselves. Normally, the ground rules for the group call for only one person to speak at a time. This rule often can derail lively interchanges among group members. It is the facilitator's responsibility to ensure one or two members do not take control of the discussions, and that all members have an opportunity to provide inputs.
- Foiling **evaluation apprehension** where certain members are hesitant to offer ideas or suggestions because they feel their inputs will be negatively received and/or criticized. The facilitator must enforce the rules during the group's deliberations.
- Curbing **free riding** or **social loafing** where some members refuse to contribute to the group effort. Statements from members similar to "I do not care what we decide, just let me know" should not be allowed by the facilitator.⁴

Informed brainstorming consists of five main phases. First, the facilitator and group members establish the ground rules for conducting the sessions. Second, preparations are completed for the sessions and a conventional-thinking effort conducted. Third, a creative **divergent-thinking** phase takes place where the group seeks a quantity of ideas, without worrying about their quality. Fourth, a **convergent-thinking** phase ensues in which the group takes the results of the divergent-thinking phase and revises the ideas into unique and useful input to the critical-thinking process. Finally, the group prepares a report of the brainstorming results.

Phase one. Informed-brainstorming sessions require some ground rules as follows:

- Do not criticize or censor a core member or outsider's ideas no matter how unconventional they might sound. Instead, find out what prompted the ideas, as they might contain the seeds of an important connection between the subject and an unstated perspective.
- Give the group plenty of time to do brainstorming correctly. It may take an hour or more to just to set the "ground rules" of the sessions and make the group comfortable. The group also must be given time to review the results of the information search (Chapter 5), points-of-view and assumptions (Chapter 6) analyses, and any other analytic working papers already created related to the project.
- Other simple rules include: (1) everyone in the group is treated as an equal, (2) do not enter the session with an official analytic line, (3) suppress negativity and do not allow judgmental phrases such as "that would not work," (4) review groupthink tendencies (Chapter 6) with the entire group, (5) keep individual sessions to 60-90 minutes, and (6) record all ideas openly for easy review.⁵

Phase two. Complete preparations for the group sessions and identify conventional thinking on the topic as follows:

- The typical informed-brainstorming session takes place in a conference room, classroom, or other suitable facility that can comfortably accommodate the group and facilitate the activities. Although not ideal, sessions can be held over video links. It also is possible to brainstorm with techniques such as *Brainwriting*,⁶ where all inputs are in writing, or using the *Delphi Technique*,⁷ where anonymous group members provide written input to the facilitator and/or recorder. At the session's end, the inputs are compiled, and feedback is sent to group members for reconsideration of their inputs. The Delphi Technique usually requires several rounds of input/feedback before a group consensus is achieved.
- For in-person sessions, provide pens or markers, index cards, large sticky notes, or sheets of paper for everyone to record their ideas. Also provide tables, easels, whiteboards, wall space, etc., to organize and display the ideas. The facilitator or recorder should post the brainstorming purpose, research questions, goals, objectives, etc., where all group members can see them. These statements or questions will drive the brainstorming sessions.
- Begin each session with a review of conventional thinking on the topic. Have the group members write down and then organize their initial thoughts. This input should come from the already-completed analysis of the topic (information search, etc.), experience of the group members, and ideas from similar situations or analyses. When developing alternative decisions or behaviors, one conventional alternative to consider is **do nothing** (i.e., **maintain the *status quo***). Distribute the conventional-thinking results to all members for consideration. It is only after the conventional thinking is documented that unique ideas can begin to emerge.

Phase three. The divergent-thinking phase begins here. The goal of this phase is to energize “right-brain” creative thinking and produce as many ideas as possible without assessing their quality. Proceed as follows:

- Provide the group sufficient “quiet time” to think through the information and conventional thinking, and then analyze and record their individual perspectives and ideas. Group members may use additional creative-thinking techniques presented in this chapter or from the larger literature on creative thinking. For example, some analysts like to use the 5Ws + 1H technique (i.e., generating questions using: Who, What, When, Where, Why and How), which are presented below to help organize and expand their thinking.
- Collect and organize under rough topics the group’s individual perspectives and ideas. Begin an open discussion to examine each perspective or idea, remembering not to criticize any member’s inputs. The open discussions are where unique ideas emerge through the interactions and synergy of group members. Update and revise perspectives and ideas as the group discussions proceed. These activities could take two or more group sessions.
- If time allows, pause the discussions and allow a period of **incubation** for one or more days to allow members to contemplate their own and group inputs to this point. An incubation period may be possible in strategic analysis projects; however, in time-sensitive operational or tactical situations, there may not be time for incubation.

Phase four. Begin the convergent-thinking phase. Here the wide range of ideas generated in the divergent-thinking Phase Three are investigated in greater detail and revised and eliminated as necessary such that the most useful ideas remain. The group may use a more robust technique, such as the 7 X 7 technique

(below), to assist with the convergent-thinking phase. A convergent-thinking process may include:

- Group members should individually arrange the notes in clusters according to their commonalities or similar concepts. No talking should be allowed during this activity. Some notes may be moved several times until they begin to cluster. Copying some notes is encouraged to allow ideas to be included in more than one cluster.
- Once all the notes have been arranged, select a title word or phrase that characterizes each cluster.
- Identify notes that do not easily fit with others and consider them either as unusable or as an idea deserving further attention later.
- Reorganize, combine, eliminate, or add new ideas or concepts to generate a list containing those most important and most applicable to the current study.
- Assess what the group has accomplished in terms of new ideas or concepts identified or new areas needing more work or further brainstorming.
- Instruct each participant to select (vote for) one or two ideas, concepts, and/or areas that deserve the most attention; then, tabulate the votes. Set the group's priorities based on the voting and decide on the next step of the analysis—to either restart the divergent-thinking phase, continue the convergent-thinking phase, or proceed to preparation of the final report.

Phase five. Prepare the final report. While this is normally the responsibility of the facilitator and recorder, other group members may volunteer or be assigned to complete this final phase. The final report may assume a number of formats. For an intelligence threat analysis, it may be a combination of the conventional and brainstormed alternatives for the threat's potential decisions or

behaviors that require further assessment in the critical-thinking interpretation/inference element (Chapter 9). For a security policy analysis project, it may be an outline of conventional and brainstormed alternatives to address the threat, also requiring further assessment, or it may result in a set of policy recommendations to revise or begin programs. The final report format should be such that other analysts or supervisors may review the group-brainstorming activities as part of the project's final review.

5Ws + 1H technique. This technique is one of the most flexible brainstorming techniques. It may be used with any of the critical-thinking elements, ranging from generating the research purposes and questions to identifying implications/consequences. It is an excellent technique for exploring the data/information in a research project and for kick-starting the brainstorming divergent-thinking phase. It also is useful for fine tuning (reality checking) the results of convergent- or creative-thinking efforts. The U.S. Intelligence Community (IC) refers to 5Ws + 1H as **Starbursting** because it often is diagrammed as a six-pointed star (see Figure 8.1).⁸

The goal of this technique is to generate questions pertaining to the research project. The 5Ws + 1H technique employs the "Probing Six Questions" widely used in journalism to obtain answers to Who, What, When, Where, Why and How? It is usually best to proceed in the order listed below, but the procedures are flexible such that some of the Probing Six Questions may be addressed more than once, or the analysts may find only three to four of the questions applicable to some situations.⁹ Depending on the research topic, typical questions include:

Who: Who is involved? Who is the primary decision maker? Who will the action be for? Who are all the people affected by this situation?

What: What is the history for this situation? What can be changed? What is the ideal outcome? What has been tried before?

How: How did this happen? How has it been handled in the past? How do others handle similar situations? How have we already responded? How do others think and feel about the situation? How will it work?

When: When did this start? When will it be offered or implemented? When would we like to take action? When would we like this to be resolved? Are there particular times when the situation or action could be worse or better?

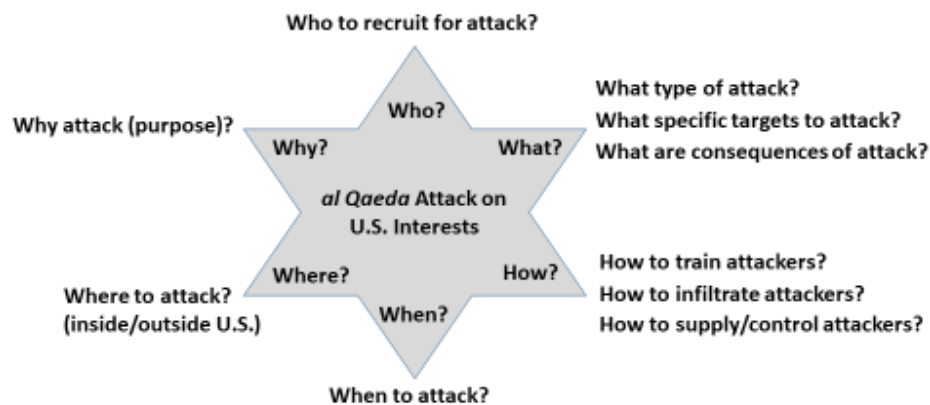
Where: Where is this taking place? Where may the situation be successfully handled? Where are/were situations similar to this and how are they similar? Where will it be offered?

Why: Why is this important? Why is this occurring? Why are we or others concerned about this situation? Why is change needed?¹⁰

Figure 8.1 provides an example 5Ws + 1H analysis based on a hypothetical planning effort for the international terrorist group *al Qaeda* as it was planning attacks on U.S. interests in the late-1990s and early-2000s. See below for additional information on this case.

The 5Ws + 1H technique can be even more powerful by adding the tag *else* to the questions (Who else...? What else...? etc.), because this can generate more questions. There are not necessarily any questions better than others.¹¹ If the questions developed do not generate additional ideas, concepts, or perceptions, then try a different technique.

Figure 8.1 5Ws + 1H: *al Qaeda* Attack on U.S. Interests



The 7 X 7 technique. This technique provides a series of rigorous steps to organize and evaluate ideas in the brainstorming convergent-thinking phase. The process usually starts after the initial divergent-thinking phase is completed and the notes on ideas, perspectives, and data are displayed in seven rows and seven columns (use less or more if needed) and grouped by commonalities and similar concepts. Group members then follow the process below:

- *Combine* similar ideas. With a large number of ideas or when the group has exhausted their idea generation, read each idea carefully. Discard any redundant ideas or data. Give each grouping of related ideas and data a title.
- *Exclude* irrelevant ideas or data. Eliminate all ideas or data not related to the purpose of the brainstorming session or are too “out-of-the-box” for present consideration. Put the excluded ideas and data in a separate pile for potential later use.
- *Modify* ideas to reflect insights gained in the two above steps. As necessary, copy or write new statements of ideas.

- *Defer* extraneous ideas or data for future reference or use. This is similar to the above *exclude* step, but the deferred ideas or data are more likely to still be of use.
- *Review* past steps to identify possibilities for alteration or refinement. Seek new insights from ideas and data already combined, excluded, modified, or deferred.
- *Classify* dissimilar groupings into separate columns. Make sure there is a separate column for each group of related ideas or data. Use as many columns as necessary.
- *Rank* ideas and data in each column. Place ideas and data in rows within each column based on its usefulness or importance relative to the objective.
- *Generalize* each column with similar items or data under the same column and create one- to three-word column titles or use a title related to the highest ranked idea or data in the column.
- *Rank* the columns from left to right on the display according to their importance or utility. Starting with the left-hand column; place the best, most important, timeliest, or most-critical ideas or data in rank order.
- *Evaluate* the results.¹²

Red team analysis technique. Another technique for generating insights into an adversary's thinking or perspectives is to conduct a red team analysis as part of the informed-brainstorming process.¹³ Security analysts often do not have the ability in a group-brainstorming project to include outsiders who may have a good perspective of how adversaries may think. Defectors, refugees, immigrants, or prisoners from the adversarial state may be of help, but are not always available. Assumptions and belief analyses (Chapter 6) may provide only a limited view of an adversary's perspectives. While psychobiographies assist in points-of-view and assumptions analyses (Chapter 6), it often is difficult to fully understand

how adversaries' thinking is influenced by their cultural, organizational, and personal experiences, which may be completely different than those of the analysts. Red team analysis assists the analysts in avoiding the cognitive bias of **mirror-imaging**, where analysts assume the adversary will make decisions or behave similarly to themselves or officials from the analysts' home state.

In red team analysis, a group of analysts is placed in the same cultural, organizational, and personal setting in which the adversary operates. Where analysts usually work from the position of friendly or "blue" forces, red team analysis attempts to see the issue under study from the perspectives of the adversarial or "red" forces. By putting the analytic team "in the shoes of the adversaries under study," it is hoped they can overcome any engrained friendly-force mind-sets that can bias analytic findings. This occurs by trying to replicate the mind-set of the adversary who may operate under very different motivations and codes of behavior.

Red team analysis calls for a group of analysts who not only have an in-depth knowledge of the issues to be studied, but also includes members who understand the adversary's language, share or have lived within the adversary's culture, share the adversary's ethnic background, or have worked in similar analytic or operational situations. Once the red team analysis is under way, the red team members should be isolated so they are separated from any outside influences. Group members should:

- Attempt to place themselves in the adversary's circumstances and react to stimuli as the adversary would.
- Develop a set of questions the adversary would ask, such as: "How would I perceive incoming information?" What would be my personal concerns? "Who would I look to for an opinion? (*Note: The 5Ws + 1H technique discussed above assists in developing questions.*)
- Employ informed brainstorming, the 7 X 7 technique, storyboarding (see below), or other techniques, to explain or predict the adversary's

decisions or behaviors. Tabletop exercises and war games with the analytic team playing the red force also are useful.

- Draft a set of intelligence and policy papers from the adversary's (red team's) perspective. These papers may include intelligence reports of what the red team assesses the blue force will do, the equivalent of threat assessments from the red team perspective. It also may include a policy paper with recommendations on the adversary's (red team's) potential strategic, operational, and/or tactical courses of action. The more these intelligence and policy papers reflect the cultural, organizational, and personal perspectives of the adversary, the better insights security analysis customers will gain into the adversary under study. These papers are the output of the red team analysis process.

Storyboarding technique. This technique was originally invented in 1928 by Walt Disney and his staff. The eventual founders of The Walt Disney Studios were looking for a method to conceptualize, organize, and track progress on their animated film features.¹⁴ Over the years, storyboarding methods advanced and, today, still are used by film companies and also as a management technique for idea generation and planning in the public and private sectors. As the name implies, storyboarding involves creation of stories on a series of boards. It is highly flexible, and the procedures may be altered to fit the situation under study. Other critical- and creative-thinking techniques, including all those presented in this book, may be inserted in the storyboarding process. Storyboarding differs from other brainstorming techniques because it can be employed on larger and more complex problems rather than addressing a narrower issue. It is particularly suited for identifying alternatives. Storyboarding is considered the best group problem-solving technique for complex problems.¹⁵

Storyboards can be employed in a variety of forms. Individual storyboards start as blank surfaces on poster boards, easel sheets, whiteboards, etc., and usually are presented in vertical displays (on bulletin boards, easels, walls, etc.),

which allow the viewing of the flow and continuity of the entire story under construction. For example, there may be scores of boards for film-production planning. Security analysis, such as red team analysis, usually employs four to eight story boards, but more may be required depending on the complexity of the situation. The minimum number of boards is usually four in security analysis, with the first storyboard given a title header of “Purpose(s)” and reserved for listing the purpose of the analysis, followed by questions, goals, and objectives. Other storyboards should be assigned title headers based on the progression of the story and in a sequence of process steps for the situation being analyzed. These follow-on board titles could be questions or a two- to three-word summary of the item or process to be developed or refined. As the storyboarding analysis continues, individual storyboards may be added, moved, or retitled to ensure the entire story is covered by the end of the analytic project.

Individual storyboards are filled in as the group completes its brainstorming sessions. Techniques such as informed brainstorming, 5Ws + 1H, 7 X 7 technique, and/or a red team analysis, may be carried out and results recorded on the individual boards. Each board may be annotated with drawings, charts, flowcharts, system and process diagrams, maps, or any of the other modeling techniques introduced in Chapter 7. The storyboard panels also may be used to draw figures, post notes, photographs, etc., and use lines or strings to connect ideas and data across boards, similar to a law enforcement evidence board discussed in Chapter 7. To take storyboarding to its logical conclusion, boards may also be included to capture the critical-thinking elements of interpretation and inference (Chapter 9) and/or implications and consequences (Chapter 10). With ideas and data presented on storyboards, the group may see how ideas and data points relate to each other and how all the pieces fit together.¹⁶ The overall objective is for any group member to view and understand the purpose and status of the storyboarding effort, while assisting with the identification of insights from the ideas and data.

Similar to informed brainstorming, the storyboarding process includes a facilitator or group leader and recorder. Because of the complexity of a storyboard effort, sub-facilitators may be assigned to lead the efforts as the group addresses one or more individual boards. For especially large or complicated efforts, sub-recorders may assist sub-facilitators.

Box 8.1 recreates the hypothetical initial planning for the *al Qaeda* September 11, 2001 (9/11), attacks on the United States, assuming a storyboarding process was used. Since this event happened and the results are known, this box presents a **counterfactual analysis**, meaning the event is being dissected after the fact to provide explanations and other insights. If the IC had conducted a red team analysis before 9/11 (assuming there was none), it could have started with the hypothetical effort described below.

Box 8.1 Hypothetical Storyboarding of the 9/11 Attacks' Initial Planning

In 1980, at 23 years of age, Saudi Arabian financier Osama bin Laden arrived in Afghanistan to assist Muslim forces (the *mujahedeen*) that were fighting the invading and occupying Soviet Union. The *mujahedeen* were a multi-national Muslim insurgency group with members from states across the Arab world. Bin Laden personally fought in at least one battle, but he became chiefly known for helping fund the anti-Soviet *jihad* (holy war). He helped coordinate the “Golden Chain” financial network of donors and supporters throughout the Arab world. This funding bought arms and supplies for the *mujahedeen*. This was a separate effort outside of the clandestine support the United States provided to the *mujahedeen*.¹⁷

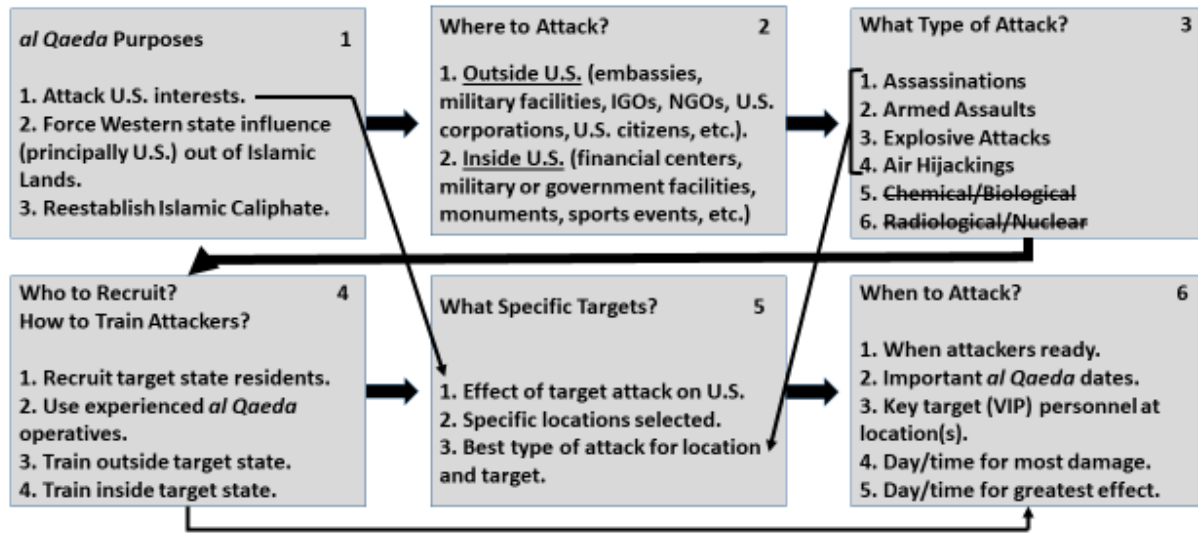
When the Soviets withdrew from Afghanistan in 1989, bin Laden seized on the opportunity to keep *jihad* alive against the West through a loose coalition of Islamic militant groups in the Middle East, North Africa, and Asia. Bin Laden’s central coordinating group, with him as the leader, became known as *al Qaeda*

(the base or foundation). The Islamic militants' goals included removing Western influences from the region and, in particular, the presence of the United States. Their ultimate goal was to reestablish an Islamic *caliphate* across the Arab world, which was to be governed by strict traditional interpretations of the sacred Muslim texts in the *Quran*, *Hadith*, and *Sharia*.

Throughout the 1990s, bin Laden's *al Qaeda* and allied Islamic militant groups conducted attacks against both the West and Arab rulers who cooperated with the West. *Al Qaeda* provided much of the material and ideological support to the other Islamic militant groups. The *al Qaeda* organization provided funding support to the truck bombings of the New York World Trade Center (February 1993) and the Saudi Khobar Towers (June 1996), that housed U.S. military personnel. In February 1998, bin Laden issued a *fatwa* (interpretation of Islamic law) calling for the murder of Americans anywhere on earth and described it as the duty of every Muslim.¹⁸ After the *fatwa*, *al Qaeda* cells used truck bombs to attack the U.S. embassies in Nairobi, Kenya, and Dar es Salaam, Tanzania (August 1998); and conducted a small-boat attack by a suicide bomber on the *USS Cole* while in the Port of Aden, Yemen (October 2000). When U.S. President Bush took office in January 2001, outgoing President Bill Clinton informed Bush that the main international threat to the United States was *al Qaeda*.

The attacks on U.S. interests in the 1990s did little to dislodge the U.S. presence in the Arab world. Thus, bin Laden began looking for more spectacular attacks to diminish U.S. political will to remain in the Arab world. His chief planner was Khalid Sheikh Mohammed (KSM), who was known for his imagination, technical aptitude, and managerial skills. During the 1990s, KSM came to prominence in *al Qaeda* as a result of an array of terrorist attacks he planned, including political assassinations, car and truck bombings, aircraft bombings, and aircraft hijackings. Knowing that bin Laden wanted something more spectacular, KSM and his team could have started with the below hypothetical storyboarding

effort. This assumes KSM and his team already conducted a 5Ws + 1H analysis (see Figure 8.1).



The above storyboard includes six boards, starting with board #1 depicting al Qaeda’s purpose and goals. The remaining boards demonstrate the general flow of planning required to develop an attack on U.S. interests. Also shown are some of the cross-board considerations to be addressed. For example, to meet the purpose of attacking U.S. interests (board #1), the effects of the target attack on the United States must be assessed (board #5).

Board #2 addresses whether the attack will occur outside or inside the United States. Prior to 2001, Islamic militant attacks outside the United States had few effects on U.S. capabilities or political will, but they did generate U.S. retaliations, except the 2000 *USS Cole* attack. KSM knew bin Laden wanted a spectacular attack on U.S. soil. The 1993 New York World Trade Center truck bombing was considered a failure as it did not bring down either of the tall towers.

Board #3 reflects the type of attack to consider. There were *al Qaeda* operatives experienced in assassinations, armed assaults, explosive attacks, and air hijackings. The group had no capability or experience with chemical/biological attacks (beyond some water-system poisonings) or radiological/nuclear attacks. A creative-thinking, Fusion Level 1 analysis (see Figure 8.2), combined with a Fusion Level 2 analysis (see Figure 8.3), could assist *al Qaeda* with determining the type of attack.

Board #4 presents additional decision challenges regarding recruiting and training attackers. One alternative was using experienced *al Qaeda* operatives from outside the target state, those who have sworn fealty to bin Laden and demonstrated their loyalty in previous attacks. Selecting experienced *al Qaeda* operatives would provide the benefits of increased operational security and personnel experienced in attack command and control. The other option is to recruit attackers from the target state. Depending on the type of attack, the training of operatives could be undertaken either inside or outside the target state.

Board #5 deals with selecting specific targets that required a deeper analysis. A red team analysis, combined with a CARVER analysis (see Box 8.2), could assist with target selection and prioritization decisions.

Board #6 presents another decision challenge: when to attack. It would be foolhardy, for example, to attack if sufficient attackers were not trained and in place. Were there any key anniversary dates in regional or *al Qaeda* history to provide symbolism to the attack? When would the attack cause the greatest damage or overall most effects? For example, a weekend attack on a building would minimize the personnel casualties, but is that an outcome desired? In determining when to attack, the attack leaders faced pressure from bin Laden to get on with the attack.

Finally, at least one important storyboard is missing; that is, one for the implications/consequences of the attack (Chapter 10). Actions by *al Qaeda* after the 9/11 attack indicated there was no planning for consequences. In 1996, bin Laden moved *al Qaeda's* headquarters from Sudan to Afghanistan. He immediately allied with both the new Afghani-ruling Taliban Islamic fundamentalist government and the nearby Pakistani military. In Afghanistan, *al Qaeda* was able to maintain training bases, plus house and provide *al Qaeda* leaders and operatives and their families with relative security. After the actual 9/11 attacks, the United States demanded the Taliban hand over bin Laden and expel *al Qaeda* from Afghanistan. The Taliban refused. In cooperation with anti-Taliban Afghani tribes (Northern Alliance), the United States and allied nations invaded Afghanistan, removed the Taliban from power, and dismantled *al Qaeda* training, housing, and supply sites. Bin Laden, most of the *al Qaeda* leaders and operatives, and the Taliban, escaped to Pakistan.

Creative-Thinking Techniques

Creative-thinking techniques generate new ideas and alternatives beyond the conventional thinking that often result from the brainstorming techniques discussed above. Creative thinking assists analysts to create unique and useful ideas and alternatives by overcoming bounded rationality and the limits placed on thinking by education and experiences. There may be clashes between the results of creative thinking and more conventional ideas and alternatives. However, use of the below creative-thinking techniques often will lead to better ideas and alternatives, while finding new ways to solve problems.

Those involved in creative-thinking efforts would be wise to confidently value their ideas despite outside criticism. In his time, Greek philosopher Socrates was declared “the immoral corrupter of youth” and forced to drink the poison

hemlock because he challenged conventional ideas. There are usually new ways of doing anything better; so, in creative thinking, failure can be good as it may show what will not work, but may also reveal the road to success. Feedback should be sought throughout the creative-thinking process, but analysts should ignore mindless criticism.¹⁹

There are hundreds of creative-thinking techniques. Several general categories of these techniques were mentioned previously from academics Robert and Michele Root-Bernstein in *Sparks of Genius*. This section presents three specific techniques: Fusion Level 1 (Outer Objects), Fusion Level 2 (Inner Parameters), and SCAMPER, all from author Daniel Forsett's *Kick-Start Creative Thinking*.²⁰ These three techniques have wide application for security analysis. The two Fusion techniques foster idea association, allowing creation of new ideas by connecting conventional thinking with the unconventional. SCAMPER fosters new ideas by posing a series of questions that can unleash a flurry of new ideas.

Fusion level 1 (outer objects). This technique is grounded in conceptual blending. It allows the analyst(s) to make connections between two or more unrelated items to generate new ideas (see Figure 8.2). There are four main steps to Fusion Level 1.²¹

Step 1: Identify the specific challenge or problem in need of ideas or solutions.

Step 2: Think of an outside random thing or object that appears totally unrelated to the challenge or problem.

Step 3: Think about and record different aspects, attributes, or characteristics of the random thing or object. It could include identifying:

- What does it look like (color, shape, size, weight, peculiar features)?

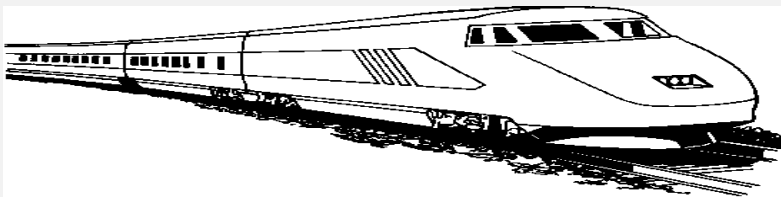
- What does it do?
- Where is it found?
- How does it function?
- What is special about the thing or object?

Step 4: Compare the aspects, attributes, or characteristics of the outside, random thing or object to the challenge or problem. The new ideas or alternatives should emerge as that object is compared to the challenge. Analyst(s) may have to use several outside objects before creating enough workable ideas to meet the challenge.

Figure 8.2 Fusion Level 1 (Fusion with Outer Objects)

Step 1: Challenge (*al Qaeda*): Ability to design a “spectacular” attack on U.S. interests.

Step 2: Outside Object: Railroad Train.



Steps 3 and 4: Characteristics and Comparison.

- Trains are metal and heavy and, if not stopped, can do significant damage to other trains or buildings. Can a heavy, metal object be used in an attack to penetrate and damage targets?

- A train can carry passengers, freight, bulk cargo, or liquid cargo. Can an attack be designed that will do both personnel and material damage?
- Trains are found in almost all countries and regularly connect most cities and manufacturing regions. Can an attack be designed that will work in most countries and take advantage of scheduled routes between cities and regions?
- Trains may be powered by diesel fuel, electricity, or coal. Can an attack be designed around a reliable power source?
- Some trains are very fast. Can an attack take advantage of speed?
- When a train carrying hazardous materials derails, it often catches on fire or explodes. Can an attack be designed that takes advantage of a crash-induced explosion (without the attackers providing explosives)?
- Trains operate in nearly all-weather conditions. Can an attack be designed that is not contingent on the weather?

While the above analysis does not provide an exact method for attacking U.S. interests, it provides ideas for analytic consideration. When combined with other critical- or creative-thinking techniques, the exact method for attacking U.S. interests may become more clear (see Figure 8.3).

Fusion level 2 (inner parameters). This technique also is grounded in conceptual blending, but changes perspectives by considering inner parameters of a challenge or problem instead of using outer objects. Ideas may be greatly expanded using this technique. Figure 8.3 provides an example of a Fusion Level 2 security analysis. There are four main steps to Fusion Level 2:

Step 1: Identify the specific challenge or problem where ideas or solutions are needed. Ask what information is needed to master the challenge or problem.

Step 2: Identify key inner parameters of the challenge or problem.

Step 3: Identify aspects, attributes, or characteristics for each key inner parameter.

Step 4: Randomly link the aspects, attributes, or characteristics across the key inner parameters. This could result in a number of alternative ideas, which then must be evaluated individually for their usefulness and priority (see CARVER technique below for evaluating multiple alternatives).

Figure 8.3 Fusion Level 2 (Fusion with Inner Parameters)

Step 1: Challenge (*al Qaeda*): Selecting a specific type of “spectacular” attack on U.S. interests.

Step 2: Key Inner Parameters: Refer to previous analysis from Box 8.1, Storyboard #3, which assumes assassinations and armed assaults are not spectacular enough. Therefore, this Fusion Level 2 analysis focuses on explosive attacks. The key inner parameters are: *al Qaeda* personnel loss, explosive types, explosive delivery method, and procurement of delivery method.

Step 3: Aspects, Attributes, and Characteristics: See table below.

Personnel Loss	Explosive Type	Delivery Method	Delivery Method Procurement
Non-Suicide Attack	Dynamite	Truck/Van	Rent
Suicide Attack	C-4 (or similar)	Boat	Buy
	Chemical	Train	Steal (hijack)
	Flammable Liquid	Aircraft	

Step 4: Randomly link Aspects, Attributes, and Characteristics: The linkages from the above table result in 96 different alternatives. Each alternative has a number of pros and cons that require further evaluation (Chapter 9). Selected alternatives include:

- Non-Suicide Attack + Chemical (fertilizer) + Truck/Van + Rent. This was the method used in the 1995 U.S. Oklahoma City federal building attack.
- Non-Suicide Attack + Chemical (gas-enhanced nitrate-hydrogen) + Truck/Van + Rent. This was the method used in the 1993 New York World Trade Center attack.
- Suicide (or non-suicide) + Dynamite (or C-4) + Train + Steal or Hijack. This method would require a controlled detonation when a train was adjacent to or under a target.
- Suicide + C-4 + Boat + Steal. This was method used in 2000 *USS Cole* bombing.
- Suicide + Flammable Liquid (fuel) + Aircraft + Steal or Hijack. This method was employed in *al Qaeda's* 9/11 attacks on the United States. This alternative is appealing when combined with the Figure 8.2 Fusion Level 1 hypothetical analysis.

SCAMPER technique. This technique employs a number of probing questions to generate new ideas on a challenge or problem. SCAMPER was invented by educator Robert Eberle in 1971 and first published in his book *Games for Imagination Development*.²² SCAMPER is a mnemonic for the seven steps of: **S**ubstitute, **C**ombine, **A**dapt, **M**agnify, **P**ut to Other Uses, **E**liminate, and **R**earrange/Reverse. Rigorous questioning of existing ideas allows new ideas to emerge. The technique is flexible as not all seven steps may be applicable to all challenges, problems, or situations. In security analysis, SCAMPER is best used

when policy analysts create or revise processes or programs. The questions for each of the seven steps may change based on the situation, but generally include:²³

Substitute allows new ideas to emerge out of old ones by altering usage and features:

- Can we replace or change any of the parts of a product or service?
- Can we substitute someone who is involved in the situation?
- Can any process involved be changed or replaced?
- Can we change ingredients or materials of the product?
- Can the same product or service be provided elsewhere?
- Can we change the product's shape, size, color, texture, packaging, or name?
- Can we change people's feelings or attitudes towards the product, service or process?

Combine allows the merging of two or more ideas:

- What ideas or products can we combine?
- Can we merge an existing idea with a new one to improved function?
- Can combining two (or more) ideas increase the number of uses?
- What similar or dissimilar things can be combined with existing ideas?
- Can we combine different processes to improve the final product?
- What materials may be combined to improve the final product?

Adapt allows exploration of new perceptions to the challenge or problem:

- What other ideas or processes can we adapt or copy?

- Is there an existing example similar to what we want to create?
- What features of similar examples can we emulate?
- How can we adapt conditions to best fit the environment (context)?
- What do we need to adopt to make the product more useful?
- How will the new idea be perceived?

Magnify allows focusing on both the size of the challenge or problem and on small details:

- How can we make the product (or parts of the product) bigger?
- Would making it bigger address the challenge or solve the problem?
- How can we add more functions or value?
- Can we duplicate the product?
- Can we add extra features or a greater frequency?
- What parts can be made bigger for better results?

Put to Other Uses is a divergent-thinking technique allowing expanded deployment of the ideas:

- What else can this process or product be used for?
- Can it be offered to an expanded customer base?
- How can diverse people and groups (gender, age, personalities, etc.) use it?
- Can people with different health problems use it?
- By modifying it, can we identify new ways of using the process or product?
- Can the process or product be used by other industries, markets, or organizations?
- Can the process or product be used in other consequences?

Eliminate allows assessment of whether canceling some features or ideas will improve the process or product:

- What can we eliminate in the given situation?
- What features or ideas seem counter-productive or redundant?
- What can we reduce to improve the situation?
- Can some parts be eliminated to simplify the process or product without affecting its function?
- Can a process be eliminated?
- Can we streamline, condense, divide, or split some parts, features, or ideas?

Rearrange/Reverse allows new ideas to emerge by assessing the order and sequence of the situation:

- Can there be another arrangement of process steps or product parts and functions?
- Can the sequence of the activities be changed?
- Can the speed of the process be changed?
- How does the process or product look from inside-out? Upside-down?
- Can it work backwards?
- What if we do the opposite of what we initially planned?

CARVER Technique for Alternative Assessment

The **CARVER** technique was used originally by the U.S. military, but its use has expanded for generating threat and risk analyses in both the public and private sectors. The exact origins of the CARVER technique are unknown, but its first documented use was in World War II by the U.S. Army Air Corps for deciding

target priorities in its daylight bombing runs over Germany. After the war, it continued to be used for prioritizing targets, most notably by U.S. Special Forces in Vietnam. After the 9/11 attacks on the United States, CARVER found new life as it became one of the primary early techniques employed in risk analysis for protecting U.S. critical infrastructure. Today, it is used widely in the U.S. business and management communities for conducting risk analyses and assessing weaknesses in internal processes and in analyzing business competitors.²⁴

CARVER is a mnemonic for the six evaluation factors of: **C**riticality, **A**ccessibility, **R**ecoverability, **V**ulnerability, **E**ffect, and **R**ecognizability. Using a combination of qualitative and quantitative techniques, CARVER allows the analyst to evaluate and score alternatives, assessing which ones are the best to pursue or to identify where weaknesses exist. In security analysis, the alternatives assessed are usually potential targets or courses of action. In business and management analysis, the alternatives could be goals, objectives, or project tasks. If used for internal auditing, it allows analysts to determine an organization's weakest areas.²⁵

A CARVER technique analysis begins with identifying whose perspective is to be evaluated. This could be an adversary, competitor, or the analyst's own organization. Alternatives should have been determined up front, using the techniques in this chapter if possible. A matrix is then created by placing the alternatives under consideration along the top of each column. The six evaluation factors are placed down the rows in the left column. Alternatives then are evaluated for each of the six factors on a subjective, ordinal scoring range of 1 to 5 (some use 1 to 10). The evaluation scores are added for each alternative to obtain a total score. This; however, is a relative total score because subjective scoring and ordinal measures are used. Finally, the alternatives are placed in relative rank order using the total scores, but the distance between total scores has little meaning because they are based on relative, ordinal scores. Evaluation factors for a targeting analysis are assessed using the following criteria:

- *Criticality*: How important or critical is a particular factor to the overall objective? What are the critical systems, single points of failure, or choke points?
(Scoring Range: 5 = multiple points of failure/choke points, 1 = none)
- *Accessibility*: How easy is it to access the objective? If the objective is under construction, renovation, or in case of a new deployment, are conditions complete? What is the ease of access to critical systems?
(Scoring Range: 5 = substantial ease of access, 1 = difficult access)
- *Recoverability*: How much time would it take to replace or restore a damaged critical system?
(Scoring Range: 5 = maximum restoration time, 1 = minimal restoration time)
- *Vulnerability*: How well protected are the critical systems? What is the likelihood that an adversary or competitor would make extra efforts to protect the critical system?
(Scoring Range: 5 = not protected/low or no likelihood, 1 = well protected/ high likelihood)
- *Effect*: What is the scope and magnitude of adverse consequences that would result from malicious actions and responses to them—including physical, emotional, economic, or political?
(Scoring Range: 5 = significant consequences, 1 = minimal or no consequences)
- *Recognizability*: What is the likelihood that potential adversaries or competitors would recognize a system was critical and take action to protect, strengthen, or improve it?
(Scoring Range: 5 = low or no likelihood, 1 = high likelihood)

Box 8.2 provides a sample CARVER analysis continuing with the previous *al Qaeda* planning analysis in this chapter.

Box 8.2 Example CARVER Technique: *al Qaeda* Target Selection

Perspective: al Qaeda

Alternatives: As noted earlier, Figure 8.3 could be used to generate 96 different alternatives for an *al Qaeda* attack. Assuming *al Qaeda* decided to attack targets inside the United States, these different types of attacks should be considered for thousands of individual U.S. domestic targets. Past *al Qaeda* attacks focused on U.S. targets of government, military, and financial significance. Domestically, *al Qaeda* also could consider targets of symbolic significance, such as monuments, cultural sites, sports events, etc., where an attack could kill personnel as well as inflict emotional damage (fear, anxiety, etc.) on U.S. citizens. For this example, assume *al Qaeda* used informed brainstorming to generate a primary target list including the New York World Trade Center (WTC—U.S. financial center and target of failed 1993 attack), U.S. Capitol (symbol of U.S. government), Pentagon (center of U.S. military power), and several U.S. nuclear power plants (both infrastructure and personnel implications). Assuming each of these targets were evaluated against the types of attacks listed in Figure 8.3, the following alternatives received the highest CARVER analysis total scores.

Perspective: <i>al Qaeda</i>	1. WTC, U.S. Capitol, Pentagon Truck Bombs	2. WTC, U.S. Capitol, Pentagon Hijacked Aircraft	3. Nuclear Power Plants Hijacked Aircraft
Criticality	5	5	4
Accessibility	2	5	5
Recoverability	5	5	5
Vulnerability	4	5	4
Effect	5	5	5
Recognizability	5	5	4
Total Score/Rank	26/3	30/1	27/2

Insights/Comments:

Alternative # 2 receives the highest total score and, since this is a counterfactual (after the fact) analysis, we know this was the one selected by *al Qaeda*.

Alternative # 3 receives the second highest score. It receives lower scores in three evaluation factors because the U.S. electrical grid could compensate for loss of the nuclear power plants (criticality), and the nuclear plants are hardened against attack or natural disasters (vulnerability, recognizability). Personnel casualties from radiation poisoning could be high in areas around attacked nuclear power plants (effect).

Alternative # 1 is the third highest score. It receives lower scores in two of the evaluation factors because getting a truck bomb close to these targets to do significant damage would be difficult (accessibility), and the targets have security measures to prevent truck bombings (vulnerability).

The CARVER technique has two main weaknesses. First, as mentioned above, the 1 to 5 scoring range entails subjective scoring, which allows only ordinal measurement and relative comparisons of the total scores. To compensate for this weakness, multiple analysts should evaluate the alternatives using CARVER and then compare their results. Second, the technique assumes each CARVER element is of the same weight (importance) in the alternative evaluations. Some CARVER risk analyses attempt to compensate for this weakness by adding a seventh evaluation factor of Shock (**CARVER + Shock**). The Shock evaluation factor is similar to the Effect evaluation factor with an added focus on the emotional distress caused by an attack.²⁶ CARVER + Shock doubles the combined Effect and Shock evaluation factors in the total score. To overcome this

second weakness, a weighted ranking technique (Chapter 9) may be used to adjust the individual evaluation scores relative to their importance in the analysis.

The CARVER technique facilitates an assessment of a number of alternatives. When conducting threat analyses, CARVER is useful as an initial method to assess the relative ranking of a number of alternative targets. With the results of the CARVER analysis, the highest-ranking alternative targets then may undergo a more robust analysis in the critical-thinking interpretation/inference element covered in Chapter 9.

Key Concepts

5Ws + 1H Technique

7 X 7 Technique

Bounded Rationality

CARVER

CARVER + Shock

Convergent Thinking

Counterfactual Analysis

Creative Thinking

Divergent Thinking

Do Nothing (Status Quo)

Evaluation Apprehension

Free Riding

Fusion Level 1 (Outside Objects)

Fusion Level 2 (Inner Parameters)

Groupthink

Imagination

Incubation

Informed Brainstorming

Intuition

Lone Storming

Mirror Imaging

Perspectives

Production Blocking

Red Team Analysis

SCAMPER

Social Loafing

Starbursting

Storyboarding

Discussion Points

1. Referring to Boxes 6.3 and 7.1 on the 1980 Iran-Iraq War, assume the perspective of Iraq and conduct a group-brainstorming (or lone-storming) analysis, including a storyboard for Iraq's planning of an attack on Iran. Use the CARVER technique to prioritize attack alternatives.
2. Also referring to the information in Boxes 6.3 and 7.1, assume the perspective of Iran and conduct a group (or individual) creative-thinking analysis for preparing a better defense against Iraqi attack. Use a combination of 5Ws + 1H, Fusion Level 1, Fusion Level 2, and SCAMPER to generate ideas.

Notes

¹ Robert Root-Bernstein and Michele Root-Bernstein, *Sparks of Genius, The Thirteen Thinking Tools of the World's Most Creative People* (Boston, MA: Houghton Mifflin Company, 1999).

² Ibid, 3.

³ Alex Osborn, *Applied Imagination* (New York, NY: Charles Scribner & Sons, 1953).

⁴ Russell Carpenter, Charlie Sweet, and Hal Blythe, *Introduction to Applied Creative Thinking: Taking Control of Your Future* (Stillwater, OK: New Forums Press Inc., 2112), 35-36.

⁵ U.S. Government, "A Tradecraft Primer: Structured Analytic Techniques for Improving Intelligence Analysis," March 2009, <https://www.cia.gov/static/955180a45afe3f5013772c313b16face/Tradecraft-Primer-apr09.pdf> (accessed February 13, 2021), 27-29.

⁶ James M. Higgins, *101 Creative Problem Solving Techniques, The Handbook of New Ideas for Business* (New York, NY: The New Management Publishing Company, 1994), 125-126.

⁷ Ibid, 135-136.

⁸ Richards J. Heuer Jr. and Randolph H. Pherson, *Structured Analytic Techniques for Intelligence Analysis*, 2nd ed. (Thousand Oaks, CA: Sage/CQ Press, 2015), 113-114.

⁹ Ibid, 113.

¹⁰ Modified from Gerard J. Puccio, Marie Mance, and Mary C. Murdock, *Creative Leadership, Skills That Drive Change*, 2nd ed. (Thousand Oaks, CA: SAGE, 2011), 124.

¹¹ Ibid.

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- ¹² This section modified from Higgins, 102-103.
- ¹³ U.S. Government, 31-33.
- ¹⁴ The Disney Imagineers, *The Imagineering Workout, Exercises to Shape Your Creative Muscles* (New York, NY: Disney Editions, 2005), 10.
- ¹⁵ Higgins, 161-176.
- ¹⁶ Ibid, 162.
- ¹⁷ National Commission on Terrorist Attacks Upon the United States, *The 9/11 Commission Report* (New York, NY: W.W. Norton and Company, 2004 (report release year)), 55.
- ¹⁸ Ibid, 47.
- ¹⁹ Daniel Forsett, *Kick-Start Creative Thinking, Instant Techniques to Innovative Ideas and Ingenious Problem Solving* (Amazon Kindle ebook, 2012).
- ²⁰ Ibid.
- ²¹ Ibid.
- ²² P. Mulder, "SCAMPER Technique by Bob Eberle," <https://www.toolshero.com/creativity/scamper-technique-bob-eberle/> (accessed February 21, 2021).
- ²³ Forsett.
- ²⁴ Luke Bencie and Sami Arboghli, "A 6-Part Tool for Ranking and Assessing Risks," *Harvard Business Review*, September 21, 2018, <https://hbr.org/2018/09/a-6-part-tool-for-ranking-and-assessing-risks> (accessed February 21, 2021).
- ²⁵ Sidharth Thakur, "Using CARVER Matrix in Projects: Explained with an Example," <https://www.brighthubpm.com/project-planning/122417-carver-matrix-a-versatile-project-management-tool/> (accessed February 21, 2021).
- ²⁶ U.S. Food and Drug Administration, "CARVER + Shock Primer," <https://www.fda.gov/food/food-defense-programs/carver-shock-primer> (accessed February 22, 2021).