Concepts & Analysis of Nuclear Strategy
(CANS – Theory Team)

SUPPORTING DOCUMENTS

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DR. BELINDA BRAGG
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# TABLE OF CONTENTS

Table of Contents ............................................................................................................................. 2

5-D Framework Dimension 1: Policy Objectives ........................................................................... 4

Deterrence ......................................................................................................................................... 4
- Extended Nuclear Deterrence: U.S. Alliance Relationships & Implications for Future Nuclear Force Posture................................................................................................................................................. 4
- Elbridge A. Colby, Research Analyst, Centre for Naval Analyses.................................................. 4
- Sorting Out the Questions on Deterrence: A Quick Look at Regional Deterrence in Northeast Asia............................................................................................................................................................... 10
  John A. Swegle, Savannah River National Laboratory................................................................. 10

Assurance ........................................................................................................................................ 23
- Assurance ...................................................................................................................................... 23
  Ely Ratner, RAND .......................................................................................................................... 23

Strategic Stability ............................................................................................................................ 30
- Stability Definitions and Taxonomy................................................................................................ 30
- Pat McKenna, STRATCOM .......................................................................................................... 30

5-D Framework Dimension 2: Actor Type ...................................................................................... 34

Actor Types Further Defined ........................................................................................................ 34
- CANS Theory Team ..................................................................................................................... 34

5-D Framework Dimension 4: International Future ...................................................................... 37

Futures Framework ........................................................................................................................ 37
- DNI ................................................................................................................................................ 37
- Alternative Futures and U.S. Nuclear Force Requirements........................................................... 39
  Daryl G. Press, Associate Professor, Dartmouth ......................................................................... 39

5-D Framework Dimension 5: Phase .............................................................................................. 45

Joint Publication 3-0 Conflict Phase Model .................................................................................. 45

Further Theoretical Issues .............................................................................................................. 47

- Deterrence Stability and Escalation Control: The Dynamics of Deterrence............................... 47
  John A. Swegle, Savannah River National Laboratory................................................................. 47

Community of Interest Summary and Think Piece ...................................................................... 53
Matthew Kroenig, Georgetown University ................................................................. 53

Moving From Theory to Analysis .............................................................................. 58

Structuring Analysis to Support Future Decisions About Nuclear Forces and Postures .......... 58

Paul K. Davis, Rand Corporation .............................................................................. 58
5-D FRAMEWORK DIMENSION 1: POLICY OBJECTIVES

Deterrence

Extended Nuclear Deterrence: U.S. Alliance Relationships & Implications for Future Nuclear Force Posture

Elbridge A. Colby, Research Analyst, Centre for Naval Analyses

It has long been widely accepted that using nuclear force to try to deter aggression or coercion against allies is a more demanding challenge than deterring such aggression or coercion against one’s homeland. This proposition stems, essentially, from the fact that the extension of nuclear deterrence involves a state pledging to execute nuclear strikes – and thereby risk all the consequences of such strikes – on behalf of another state. In any such situation, such an extension of nuclear deterrence would mandate that the extending state employ “the absolute weapon” in contingencies short of direct threats to its own survival, a decision fraught with strategic and moral implications. In situations in which the extending state faces off against an opponent with survivable, penetrating, and effective nuclear forces of its own, such extension would mean that the protecting state following through on its threat would put its own homeland at risk of nuclear reprisal. These factors create a fundamental tension for an extended deterrence posture in a world in which states remain primarily concerned with their own survival, strength, and prosperity. On one hand, the protecting state wishes to make its deterrent as effective and credible as possible, but on the other hand, the state wishes to minimize its own exposure to harm. Unsurprisingly, the strongest tendency is to seek to mitigate this tension, both in order to make the deterrent threat more credible and to make its implementation less unpalatable in the event of the failure of deterrence. Such mitigation can be sought by increasing (or, in some cases, decreasing) the nuclear options available, augmenting non-nuclear modes of deterrence and defense or by adjusting the scope of what the extending party pledges to protect in its deterrent envelope.

This fundamental tension and the consequent drive to mitigate it have constituted and will almost certainly continue to constitute a major driver for U.S. nuclear force structure, posture, and planning. The most significant factors influencing U.S. force posture in this regard include:

- **Number and Threat Posed by Adversaries**: The number of adversaries assumed as part of the extended deterrent alliance structure, and the scale and intensity of the threat they pose to U.S. allies and other protected parties;

- **Number and Capabilities of Allies and Partners**: The number of allies and protected parties assumed as part of this structure, and their capabilities to deter and defend against attacks on their own;
• **The Non-nuclear Balance**: The relative balance of the United States and allies against adversary non-nuclear capabilities in relevant theaters; and

• **Perceptions and Credibility**: The level of confidence held by both adversaries and the protected countries in the ability and willingness of the United States to follow through on its deterrent and alliance commitments, as influenced by perceptions of U.S. strength and activity in the world, underlying political, cultural, and moral bonds connecting the United States with the protected countries, and other such factors.

*Primary Drivers of U.S. Extended Nuclear Deterrence Force Posture*

**Adversaries**: Perhaps the leading determinant of U.S. force structure is the number of adversaries the United States believes it necessary to hold at risk. While some such countries are seen to threaten the United States directly, others that do not directly threaten the American homeland are nonetheless perceived as threats because they imperil U.S. allies and/or partners (as well as U.S. interests) abroad. The inclusion of additional adversaries in force requirements generates additional targets and concomitant requirements for survivability, effectiveness, penetration, etc. (A different driver of requirements is the number of targets within a target state that must be held at risk. This is influenced by the sophistication and size of the state and U.S. and adversary force characteristics and doctrines, among other factors. As a general principle, however, adding additional states to the target list should generate additional requirements.) The Middle East, where countries such as Iran and Syria (and Iraq in the past) do not presently directly threaten the United States but are nonetheless seen as serious adversaries because they threaten U.S. allies, partners, and interests in the region, is a classic example of this dynamic. Were the United States not allied to countries such as Israel and the Gulf states, the threat posed to the United States by states such as Iran and Syria would be considerably less severe. Moreover, the number of such adversary countries can change depending on geopolitical developments. Again in the Middle East, Iran switched from an ally to an enemy, altering U.S. military requirements in the region, i.e., the creation of the Rapid Deployment Force and U.S. Central Command (CENTCOM), etc. The expansion or contraction of the number of adversaries thus plays an important role in determining force posture.

The scale and intensity of the threat posed by adversaries are also highly significant drivers of U.S. force requirements. The growth in capability of an adversary, not only against the U.S. homeland but also (perhaps particularly) against allies, can drive up requirements for nuclear forces – and the reverse holds as well. The Soviet deployment of the SS-20 mobile intermediate-range ballistic missile (IRBMs), for instance, was thought to require a correlative response from the United States, even though the system did not pose any additional threat to the U.S. homeland. Conversely, the elimination of the SS-20 under the
Intermediate-Range Nuclear Forces Treaty (INF) and the general decay of Soviet/Russian military power in the last decades have been seen to obviate the need for most (though by no means all) NATO theater nuclear forces. More contemporaneously, the growing North Korean and Iranian missile and weapons of mass destruction (WMD) threats are beginning to generate pressures in some quarters to augment U.S. nuclear forces in the respective theaters. Perceptions of what is required to deter hostile action by given adversaries are also relevant. A North Korea may, for instance, be harder to deter than a Syria.

**Providing Deterrence for and Assuring Allies and Partners:** The number of allies and partners on behalf of which the United States assumes extended deterrent commitments is also a key driver. While the number of adversaries is clearly more directly relevant to force planning, as it is of course adversaries rather than allies and partners which are targeted and whose attacks must be survived, additional alliance commitments may impose additional requirements on U.S. force posture, especially if nuclear forces are seen to be of use for more than assured destruction and demonstrative purposes. So, for instance, the inclusion of flank states, such as Turkey and Norway, in the North Atlantic Treaty Organization (NATO) generated additional nuclear requirements if NATO was to be able to resist or blunt Soviet/Warsaw Pact aggression against the weaker flanks. Going forward, if the United States were to reestablish alliance relationships with Vietnam, for instance, this could likewise generate higher nuclear force requirements if Vietnam were to be defended rather than merely avenged.

The capability of allies and partners to defend themselves is also a driver. If the ally or partner has a robust deterrent and/or defensive capability, this lessens the military, including nuclear, burden on the United States. If the ally or partner has a credible second strike nuclear capability, as in the case of the United Kingdom and France and other U.S. partners, U.S. nuclear forces are essentially additive. Acquisition of nuclear forces by additional U.S. allies and partners, while it might have significant deleterious effects on nonproliferation and other equities, would presumably relieve pressure on U.S. military, including nuclear, force requirements.

**The Non-nuclear Balance:** The United States has long sought to mitigate the fundamental tension of extended nuclear deterrence by substituting non-nuclear capabilities for its reliance on nuclear forces. As Paul Nitze related in his testimony on the INF Treaty, the first conversation he recalled on the subject within government was in the late 1940s and has been a mainstay of U.S. defense policy since then. A necessary component of such a policy, however, is that the balance or potential balance of non-nuclear forces is sufficiently favorable to permit the transfer of weight from nuclear to non-nuclear capabilities while still providing credible deterrence. If the United States and its allies/partners outmatch a potential adversary at the non-nuclear level, then the role of nuclear forces may be to serve only as a counter-deterrent. U.S. deterrence against Iranian aggression in the Persian Gulf region or against Russian aggression in Europe today would be two examples in this category. Conversely, if the United States and its allies/partners would be overmatched at
the sub-nuclear level, or if an effective conventional defense would require steps that court escalation, substitution of non-nuclear for nuclear forces will be more problematic, with corresponding implications for nuclear force requirements. NATO's posture against the Soviet Union during the Cold War and U.S. defense of Taiwan in the event of augmented Chinese military capabilities would be two instances of this dynamic.

**Perceptions and Credibility:** Concrete military concerns are not the only drivers of nuclear force posture and structure. The need to demonstrate resolve and capability not only to opponents but also to allies/partners and third parties has always played a central role in such decisions, especially with respect to nuclear forces, and will almost certainly continue to do so. Indeed, influencing these perceptions is often a more important driver than straightforward military requirements, as nuclear forces’ primary objective is deterrence, which is ultimately a matter of manipulating perceptions. The repeated, overt deployment of nuclear bombers by the United States from the Berlin Crisis to the Yom Kippur War to signal resolve to the Soviets and U.S. allies is a clear example. So, too, is the decision to deploy the Pershing IIs and GLCMs in the 1970s/1980s, which, as important as their military capabilities might have been, constituted a clear signal to all that the United States and NATO were committed to a strong defense and deterrent, and one that coupled the defense of Europe to the security of the American homeland.

U.S. nuclear forces may be used in a number of ways to demonstrate resolve and capability, with consequent effects on force requirements. In addition to the signaling role referred to above, U.S. nuclear forces may also be used to make clear a capability that would otherwise remain opaque. For instance, U.S. nuclear forces today are preponderantly deployed on highly secretive ballistic missile submarines and in remote silos in the Central and Western United States. Non-expert politicians and populaces may not have a clear conception of these forces and may, in part for this reason, doubt their utility and salience. Criticism of President Jimmy Carter’s proposal to remove U.S. nuclear weapons from South Korea in the late 1970s touched on such concerns, as have more recent Japanese anxieties, expressed for instance, to the Congressional Strategic Posture Commission. U.S. nuclear forces may also serve as a kind of tripwire, as when NATO planned during the Cold War for the use of tactical nuclear weapons in the European theater to ensure that the Soviets could not be confident of a quick and “clean” win. Other uses, such as to create a variety of delivery and effects options, would also be potential drivers of both delivery systems and weapons.

**Scenarios for U.S. Alliance Structures and their Implications for Nuclear Force Posture**

There are a number of plausible scenarios for the development of U.S. extended nuclear deterrence commitments over the relevant timeframe. Geopolitical, economic, technological, social, religious, environmental, and other factors, as well as military factors, will all influence such developments. Such scenarios include:
**Alliances Hold Relatively Constant:** The United States may hold both the number of its allies and partners and the degree of its commitments to them relatively constant. Presumably this would derive from a global situation that roughly mimics today’s, with a uniquely powerful United States facing significant but manageable challenges particularly in the East Asian and Middle Eastern theaters. China’s growth, for instance, would not include the development of considerably more potent nuclear and non-nuclear forces that, if combined with a more aggressive attitude from Beijing, would place substantial added pressure on U.S. extended deterrence commitments in the region and on the broader U.S.-led order. In this context, U.S. nuclear force requirements would likely remain relatively stable, with offshore capabilities sufficient for most deterrence requirements and crisis contingencies, and with a major emphasis on non-nuclear offensive and defensive capabilities. Force requirements might also lessen if the geopolitical situation were perceived to be highly persistent and resilient.

**Adaptation to a Shifting Geopolitical Environment:** Perhaps the most likely scenario is one in which the United States continues to shift its focus and efforts from the traditional cockpit of great power conflict – Europe – to the emerging arenas of strategic rivalry, principally East Asia and the Middle East. In such a scenario, the United States would maintain a residual commitment to European security but would, in effect, transfer its efforts to the other regions. The perception of diminished threat to Europe might allow for lower requirements to meet extended deterrence commitments there. That said, such a scenario would likely be driven by Washington’s belief that a continued refocusing of effort was necessary to deal with a rising and more challenging China and with increasingly assertive and capable hostile states and forces in the Middle East. These trends might involve the United States assuming additional (or more formalized) extended deterrence commitments to states such as Vietnam or Indonesia, as well as taking on a deeper and more direct role with other allies/partners, such as with the GCC in relation to a possible nuclear Iran. Both dynamics could generate upward pressures on U.S. nuclear forces. They could also generate pressures for different kinds of force posture, requiring different mixes of U.S. weapons and delivery capabilities.

**Expansion of Alliance Commitments:** The United States might also decide to expand its extended deterrence commitments without any correlative retrenchment. The United States would be most likely to elect to follow this course if it both perceives a high degree of threat throughout the international system and has low confidence in the willingness and/or ability of allies and partners to address the threats from hostile states and non-state entities. (Or if the United States continues to value non-proliferation objectives highly and believes allies and partners are likely to acquire nuclear weapons unless they are more vigorously defended.) A very strong and highly aggressive China, perhaps accompanied by or in league with hostile nuclear-armed regional powers such as Iran, Syria, Venezuela, and/or others, could generate such fears. In response, the United States might extend formal deterrent commitments to additional states in the Middle East, East Asia, and Latin
America. In such a scenario, given the more impressive capabilities of U.S. opponents and the broader extent of U.S. commitments, U.S. nuclear force requirements would likely be more demanding.

Retrenchment: The United States might elect to withdraw some or all of its extended deterrent commitments as part of a broader strategic retrenchment. This might come about, for instance, because global conditions permit such a retrenchment, U.S. extended deterrent commitments are no longer desired abroad, or through a voluntary return to a more isolationist posture. With U.S. nuclear forces no longer responsible for providing a credible deterrent for allies and partners, requirements for these forces (especially deployed forces) are very likely to be substantially lower.
Sorting Out the Questions on Deterrence: A Quick Look at Regional Deterrence in Northeast Asia

John A. Swegle, Savannah River National Laboratory

Chris Yeaw has proposed that the use of U.S. strategic forces can be framed in terms of a set of what we will call here “policy pursuits,” \( \delta_{i,j,x,y} \), where the four subscripts denote

**Overall policy objective** \( i \), which includes, for example
- Deterring an adversary or strategic competitor;
- Assuring an ally or neutral party of interest to the U.S.;
- Building nuclear stability, by, for example, preventing nuclear proliferation or the unstable buildup of nuclear forces by other nuclear states; or
- Defeating an adversary.

**Policy sub-objective** \( j \), examples of which include
- Deterring nuclear-backed coercion, or nuclear use, or nuclear proliferation; or
- Assuring an ally by commitment of nuclear weapons to their territory or moving nuclear forces into their region.

**Actor** \( x \) as the object of the U.S. policy pursuit, which includes
- Strategic competitors such as Russia and China;
- Adversaries such as Iran and North Korea;
- Allies such as the NATO countries, Israel, Japan, South Korea, and Australia; and
- Partner countries not formally allied but friendly to the U.S. such as Saudi Arabia.

**Situation** \( y \), which is a composite of
- The state of the global environment, described in terms of the three dimensions agreed to by the Theory Team and discussed by Daryl Press:
  - Relations between the Great Powers;
  - The extent of proliferation of strategic weapons; and
  - U.S. non-nuclear military capabilities.
- Current conditions, which could be defined globally or regionally:
  - Peace (no matter how contentious the state of the global environment);
  - Crisis (and there might be multiple crises existing simultaneously); and
  - Conflict.

Schematically, we can depict this as shown in **Figure 1**. In the figure, the Overall Policy Objective \( i \) is the large arrow, while the Policy Sub-Objectives \( j \) are the smaller arrows within. The ellipse surrounding it all depicts the Situation \( y \). Before we proceed with a discussion that is particularized to a particular region, Northeast Asia, let us consider the description of the state of the global environment in greater detail, since this will influence our view of the regional issues.
**Considering the State of the Global Environment in Greater Detail**

Daryl Press described a three-dimensional model for the world environment, as indicated in **Figure 2**. As we mentioned earlier, those three dimensions describe the relations between the Great Powers, the extent of the proliferation of strategic weapons, and U.S. non-nuclear weapons capabilities. Presumably, the state of world conditions relevant to U.S. nuclear planning is represented by a point or region in this space.
To attempt to make this description more specific, we propose a five-zone description for each axis, varying from what would appear to be a worst case on the low end to a best case on the high end. To our thinking, these zones are not five well-defined bins, but rather a sort of fuzzy description of the progression from worst to best, going upward. We also attempt to make the lower and upper ends practically realizable. For example Great Power relations could, in principle, extend from Nuclear Armageddon to Nirvana; however, we find those limits uninterestingly unlikely. Our proposed classifications are shown in Table 1.

<table>
<thead>
<tr>
<th>Great Power Relations</th>
<th>Nuclear confrontation, unresolvable differences</th>
<th>Threat of, or actual, conventional conflict, difficult to resolve differences</th>
<th>No immediate threat of conflict, negotiable differences</th>
<th>Aggressively competitive with acknowledged differences negotiated</th>
<th>Stably, constructively competitive with accepted means to resolve differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent of Proliferation</td>
<td>International non-proliferation norms ineffective and active proliferators stressing others</td>
<td>International non-proliferation norms questionable, limited number of active proliferators</td>
<td>Moderate consensus on international norms, limited number of countries of active proliferation concern</td>
<td>International non-proliferation norms functioning, limited number of countries of concern</td>
<td>International non-proliferation norms dominant, countries of active concern branded pariah states</td>
</tr>
<tr>
<td>U.S. Non-Nuclear Military Capability</td>
<td>U.S. and allies globally disadvantaged</td>
<td>U.S. and allies inferior in one or more strategically important regions</td>
<td>Global balance of forces</td>
<td>U.S. and allies regionally superior (without superiority across all regions simultaneously)</td>
<td>Globally, U.S. in an advantaged position</td>
</tr>
</tbody>
</table>

Table 1. Proposed calibration of the three dimensions describing the world environment.

This fuzzy division of each axis into five zones provides five rough divisions for each element of a 3-component vector describing the state of the world relative to U.S. nuclear planning, although, in principle, each component can vary continuously from worst to best case. Our goal is to provide a rough calibration for each component; others may provide alternate calibrations. At present, it appears that the world lies at the center, or one cell to
the right, with respect to Great Power Relations; at the center of the Extent of Proliferation; and one cell to the right of center with regard to U.S. Non-Nuclear Military Capability.

**Nuclear Planning at the Global and Regional Levels**

We assume that deterrence operates on multiple scales, a global level, involving nations with nuclear forces having global reach (as an example, at present, these are the NPT P-5 states) and a regional level, for a limited number of regions with a mix of global and regional nuclear powers, proliferators, U.S. allies, adversaries, competitors, and allies of the latter two. Surely, there are interactions between the global and regional level, as well as interactions between the regions; however, at the regional level, to a first approximation we can localize the considerations.

Before we identify the regions, let’s consider the world’s Nuclear-Weapon-Free Zones (NWFZs) as regions less likely to include states that lie in our nuclear regions. To be sure, this is an approximation as well, and there is no implicit assumption that membership in, or geographic location in, a NWFZ provides indefinite assurance that a state will not decide to pursue nuclear weapons at some point in the future. Indeed, we consider North Africa, nominally covered by the Treaty of Pelindaba as part of the African NWFZ, to be part of one of our nuclear regions. We note further that not all African nations have ratified the Treaty of Pelindaba. The NWFZs are depicted in **Figure 3**.

![Figure 3. World Nuclear-Weapon-Free Zones, governed by the treaties shown.](image-url)
Our choice of regions in which regional nuclear deterrence is at work today – again, we do not assume that these regions and their included members are static for all time – is shown in **Figure 4**. Briefly, we define four, with an inclusion of nations that is not intended to be rigorous:

- **Euro-Atlantic**, including the North American and European members of NATO, Russia, and the former Soviet states of Georgia, Ukraine, Belarus, and Moldova. While this region contains 4 of the NPT P-5 states, Russia’s large holdings of non-strategic nuclear weapons (NSNWs) and NATO’s smaller holdings of tactical nuclear weapons add a regional element to deterrence in this geographical area.
- **Middle East, North Africa (MENA)**, which includes Algeria, Libya, and Egypt in North Africa, and Middle East nations such as Israel, Syria, Lebanon, Iraq, Jordan, Saudi Arabia, the Gulf States, and Iran. One might include Turkey, which is a NATO member, but also a country with direct involvement in the Middle East.
- **South Asia**, which primarily involves India and Pakistan, but also includes Afghanistan because of the sub-state terrorist influence on events, and perhaps Burma. China certainly has a significant influence on this region.
- **Northeast Asia**, which includes China, North and South Korea, Japan, and Taiwan. It also peripherally involves Australia, the Philippines, Vietnam, Indonesia, Malaysia, and Singapore, the latter three not least because of their sharing of the Straits of Malacca, China’s maritime link to Middle Eastern oil supplies.
Visually, our multilevel picture is as shown in Figure 5. To reiterate a point, there can be interactions between the global and regional levels, and between regions themselves.

Figure 5. Two layers for Deterrence, Global and Regional, with different, perhaps overlapping regions shown separately. The regions of interest and the composition of the regions could shift over time.

We now see that by thinking of deterrence as operating at both the global and regional levels, our description of the Situation (y) might now need a third component, in addition to our three-dimensional description of the World environment and current conditions (peace, crisis, or conflict), to provide a more particularized description of the relevant regional environment.

Northeast Asia
To focus on a concrete set of issues, let’s look closely at one region, Northeast Asia. Under current circumstances, the major players are as shown in Figure 6.
Peripheral to the region, under future crisis conditions, the United States might wish for the Philippines to provide additional basing options on the border of the region, and Vietnam, which shares disputed islands with China, may become significant. Similarly, Australia, which explicitly embraces U.S. extended deterrence, could become important to U.S. actions in Northeast Asia. Malaysia, Indonesia, and Singapore stand astride the Straits of Malacca, the major route for Middle Eastern oil into the region.

The region has the following general features:
- Three major nuclear states;
- A rogue state with limited, not fully defined nuclear-weapons capability;
- Two major U.S. allies, with substantial U.S. troop commitments to each; and
- A subnational ally, under the One China Policy, in Taiwan.

Our classification of actors in the region is shown on the following page in Table 2. Note that this region is distinguished by having 6 of the 20 largest economies in the world. Statistics indicate that this includes 4 of the U.S.’s largest trading partners; interestingly, though, all three of the U.S. allies in the region have larger trading accounts with China than the United States.
In Figure 7, we summarize the peacetime major regional threat perceptions of the actors in
the region. The threat perceptions of China, Russia, and North Korea affect the ability of
the United States to deter each, while the threat perceptions of Japan, South Korea, and Taiwan
affect the ability of the United States to assure them. The weighting of the threats and their
exact nature could shift with shifting world conditions, which we shall discuss later. They
would also shift as the situation evolves from peacetime, to crisis (and several crises jump
out as being possible in the region), to conflict.

The Effect of Regional Conditions on Nuclear Planning in Northeast Asia
Let us consider the features of this region that would affect U.S. nuclear planning. Before we
consider the actors, let us consider the possible “hot buttons” or potential crises that could
arise in Northeast Asia. These potential crises might not initially have an explicit nuclear
component; however, given the presence of three major nuclear states, a rogue state
possibly nuclear armed, two U.S. allies with a high degree of latent nuclear capability, and
Taiwan, the threats of nuclear use or proliferation become implicit elements of any regional
crisis once tensions rise to a certain level. Five potential crises with the potential for
escalating to a nuclear crisis come to mind, although the occurrence of some might depend
on a world environment different from that of today:

- Coercion of Taiwan by China, possibly escalating to an attempt at forcible
  reunification of Taiwan with the mainland;
- Nuclear threats by North Korea against South Korea or Japan;
- Rising tension created by China over the possession of disputed islands in the
  region;
- Rising tension created by China in an attempt to “neutralize” South Korea or Japan
  so that they expel U.S. troops based in their countries; and
- The pursuit of nuclear weapons capability by South Korea, Japan, or even Taiwan.

The first two could happen in almost any world environment, given the significance of
Taiwan’s status in domestic Chinese politics in the former case and given the mercurial
nature of the current North Korean leadership in the latter. However, the challenges, and
possibly the probability, of a Taiwan crisis would likely increase under conditions of poor
relations between the Great Powers or declining U.S. non-nuclear military capability in the
region. Similarly the threat of a North Korean military threat or provocation rising to the
nuclear level is perhaps enabled by poor relations between the Great Powers, possibly
further enhanced by U.S. non-nuclear military decline from today.
<table>
<thead>
<tr>
<th>Relative Power [1]</th>
<th>US</th>
<th>China</th>
<th>SK</th>
<th>Japan</th>
<th>Taiwan</th>
<th>NK</th>
<th>Russia</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>State</td>
<td>State</td>
<td>State</td>
<td>State</td>
<td>Non-State</td>
<td>State</td>
<td>State</td>
</tr>
<tr>
<td>Relation to US</td>
<td>n/a</td>
<td>U.S. troops</td>
<td>U.S. troops</td>
<td>Agreement</td>
<td>Historical (CH)</td>
<td>Regional nuclear</td>
<td></td>
</tr>
<tr>
<td>Commitment</td>
<td>Med Latent</td>
<td>High</td>
<td>High Latent</td>
<td>Med Latent</td>
<td>Medium</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Nuclear Threat</td>
<td>n/a</td>
<td>High</td>
<td>Med Latent</td>
<td>High Latent</td>
<td>Med Latent</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Strategic Depth</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>H</td>
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<tr>
<td>GDP Rank</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>3</td>
<td>19</td>
<td>97</td>
<td>6</td>
</tr>
<tr>
<td>Trade US/CH</td>
<td>0.44</td>
<td>0.79</td>
<td>0.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[1] Significant, do not know how to quantify or describe

[2] United States does not consider Taiwan independent, but guarantees against coercive reunification


Table 2. Classification of the Actors in Northeast Asia
Figure 7. Major threat perceptions of the Actors in Northeast Asia.

**North Korea threats:**
- Loss of regime legitimacy or control
- Loss of China support
- Loss of deterrent capability
- Economic collapse

**South Korea threats:**
- NK military/nuclear threat
- Loss of regional balance w/ China, NK, Russia, Japan
- Loss of U.S. alliance

**Japan threats:**
- NK nuclear threat
- Chinese coercion
- Loss of regional balance w/ China & Russia
- Loss of US alliance

**Russia threats:**
- Control of territory & resources
- Regional missile defense coop w/ U.S.
- Loss of regional balance w/ China & U.S.

**China threats:**
- US nuclear “blackmail”
- Constraint on Taiwan
- Nuclearization of Japan or SK
- Constraint on disputed islands
- Missile defense coop w/ U.S.
- Unfavorable NK outcome

**Taiwan threats:**
- Coercive reunification
- Abandonment by U.S.

**United States**

**US threats:**
- Taiwan crisis precipitates nuclear crisis
- NK crisis precipitates a nuclear crisis
- Massive Chinese buildup of regional nuclear forces
- China achieves regional conventional superiority
- China attempts to neutralize Japan & SK
Similarly, the third and fourth potential crises involving a Chinese attempt to gain control of disputed islands in the region such as the Senkaku Islands claimed by Japan or even to force the U.S. from the region through pressure on South Korea and Japan would be more likely in situations of poor – even poorer – relations between the Great Powers and even greater non-nuclear weakness on the part of the United States. In both cases, China might back its aggressive stance with a buildup of nuclear-armed (or, more likely, dual-capable, with some nuclear-armed) medium-range and intermediate-range ballistic missiles (MRBMs and IRBMs), as well as, possibly, nuclear-armed cruise missiles. Similarly, South Korea and Japan might be tempted to seek nuclear weapons if declining U.S. non-nuclear military capability were seen as a sign of weakening commitment to the region and if the world non-proliferation regime was weaker than it is today. Both countries depend on foreign-supplied uranium for substantial nuclear-power industries, and a weakened non-proliferation regime that allowed these countries to continue to acquire nuclear fuel for their reactors and uranium for nuclear weapons would remove this considerable barrier to proliferation.

Another attempt by Taiwan to obtain nuclear weapons would put both China and the United States in difficult positions. China has declared this to be a red line that Taiwan must not cross, and the United States has previously halted Taiwanese nuclear-weapons efforts. Under all but a situation that included a near-complete breakdown of the non-proliferation regime and terrible relations between the Great Powers, the United States might withdraw support for a Taiwan that chose to develop nuclear weapons. This seems to make Taiwanese proliferation unlikely indeed.

**The Effect of a Northeast Asia Regional Crisis on U.S. Nuclear Planning**

Although nuclear weapons, militarily, are weapons of last resort that would actually be used only after a long chain of failures to resolve a situation by other means – political-military, economic, and information-operational – they do influence the development of situations long in advance of any threat of their use.

The overall U.S. nuclear policy objectives in this region are the following:

- To *deter* the use or threat of use of nuclear weapons by China, North Korea, and Russia;
- To *assure* Japan and South Korea of the strength of the U.S. commitment to extended nuclear deterrence;
- To *assure* Taiwan of the strength of the U.S. commitment that Taiwan should not forcibly be reunified with the mainland; and
- To *maintain nuclear proliferation stability* in the region by preventing the pursuit of nuclear weapons by Japan, South Korea, and Taiwan.

With regard to deterrence, example sub-objectives would be (1) to prevent the assumption of threatening nuclear postures in support of aggressive moves involving other levers of power initially; (2) to prevent a substantial nuclear-arms buildup in the region by China,
North Korea, or Russia; and (3) to prevent the first use of nuclear weapons by any of these states. The threat of U.S. nuclear weapons could also play a role in deterring North Korea from making nuclear threats in response to a move such as the use of the U.S.S. Washington in military exercises with South Korea following the North Korean artillery attack on Yeonpyeong Island late last year.

In peacetime, under current conditions in which the U.S. nuclear force consists largely of strategic nuclear weapons, regional deterrence, assurance, and maintenance of nuclear proliferation stability by the United States is preserved in Northeast Asia in part by the known capability of those weapons and the demonstration of commitment by the U.S. in basing troops in the region. Tactical nuclear weapons were removed from the Korean Peninsula in advance of the Korean Peninsula Denuclearization Agreement (since violated by North Korea), they have not been stored in Japan as a matter of Japanese policy (the Three Non-Nuclear Pledges, which are regularly renewed), and TLAM-N is in the process of being removed from service after having been kept in storage under the Presidential Nuclear Initiatives of 1991-1992.

In the event of a crisis in the region that threatens to escalate to the nuclear level – and we have offered five possibilities for the future under a range of world conditions – presumably the United States would make a number of “moves” to continue to deter, assure, and maintain proliferation stability. The goals of these moves would be to preserve the deterrence and assurance relationships, as well as proliferation stability, to maintain control of escalation, and, if necessary, demonstrate escalation dominance. Beyond the exercise of non-nuclear means outside the control of the U.S. Strategic Command – political-military, economic, and information-operational – these could include the changing of alert levels, the movement of bombers or submarines, and even the rebasing of weapons. Presumably they will involve the commitment of U.S. forces to a regional role – or demand their availability, which will reduce the force levels available for other missions.

Proposed Modification to the Analytical Framework

We suggest that this adds an additional layer of analysis to the Analytical Framework. We propose the following:

- Using a scenario-based approach, taking account of reasonable crisis scenarios, propose an “envelope” of force commitments expected for the region.

- Develop and use a set of attributes and metrics for the regional force commitment, accepting as appropriate the attributes previously defined for the force at large, and perhaps adding some that relate to regionally-significant attributes such as capability, commitment, resolve, and escalation potential.

- Examine the remainder of the nuclear force not committed to regional concerns and recalculate the effectiveness of that portion of the force.
- Iterate to determine the acceptable force availability for the regional crisis that allows the remainder of the force to achieve the required threshold metric for performance.

As force size diminishes, it is possible that non-strategic nuclear weapons will begin to change the dynamic at the regional level in ways that affect the global level as well. Russia maintains a large non-strategic nuclear weapons force; however, certain of these weapons – submarine-launched cruise missiles, short-range ballistic missiles, and weapons carried by Backfire bombers – could assume a significance approaching that of strategic weapons. This issue would be heightened dramatically in a future of contentious Great Power relations and weak non-proliferation norms if Russia were to withdraw from the INF Treaty. Similarly, China's potential for a regional buildup of MRBMs and IRBMs, and perhaps nuclear-armed cruise missiles could create similar problems. Presumably regional force-exchange calculations will capture these effects. Further, game-theoretic techniques might be brought to bear in multi-player situations, such as a scenario in which China implicitly supports North Korean nuclear threats, or Russia considers making opportunistic moves during a U.S.-China crisis.
Assurance

Ely Ratner, RAND

As with deterrence, assurance requires a combination of military capability, political will, and the ability to communicate both effectively. To assure allies and partners, the United States seeks to maintain the capability to deter and defeat potential adversaries. In addition, the U.S. seeks to demonstrate the credibility of its commitment through a combination of force posture (often including forward deployments), doctrine, and training, as well as explicit security guarantees and deepened economic, political, and diplomatic relationships. To the extent that the United States has a theory of assurance, it is when allies deem sufficient U.S. capability and will to defend them, they will choose not to seek accommodation with an adversary or develop or possess indigenous nuclear weapons.

U.S. Policies of Assurance

The priority of assuring U.S. allies and partners is articulated throughout the range of current high-level national security documents, including the Quadrennial Posture Review (QDR), the Nuclear Posture Review (NPR), the National Security Strategy (NSS), and the Ballistic Missile Defense Review (BMDR). The NPR lists assurance as one of “five key objectives of our nuclear weapons and posture.”\(^1\) The NPR goes on to describe the core logic of assurance: “By maintaining a credible nuclear deterrent and reinforcing regional security architectures with missile defenses and other conventional military capabilities, we can assure our non-nuclear allies and partners worldwide of our security commitments to them and confirm that they do not need nuclear weapons capabilities of their own.”\(^2\) In addition to dissuading allies from acquiring or developing nuclear weapons, assurance also seeks to prevent allies from taking other steps considered contrary to U.S. interests, including developing destabilizing conventional capabilities or severing ties with the U.S. and realigning with adversaries.

Although the term “extended deterrence” was originally nuclear oriented (and was treated as synonymous with extending the nuclear umbrella), the modern version is arguably provided by a combination of instruments, including both conventional and nuclear weapons and postures, and non-military mechanisms. From the beginning, the intent has been to deter invasion of or other aggression against U.S. allies, not merely to deter nuclear attacks or threats. During the Cold War, however, nuclear weapons played a major role and were backed up by the strategic forces of the U.S. Triad, tactical nuclear weapons forward deployed in key regions, and U.S.-based nuclear weapons that could be forward deployed in the event of regional contingencies. It remains to be seen how important each


of these elements is for the future, even while extended deterrence remains very important.

In Europe, despite significant reductions at the end of the Cold War, a small number of U.S. nuclear weapons remains. This limited arsenal seeks to assure European allies, combined with NATO’s unique arrangement of non-nuclear members participating in nuclear planning and possessing aircraft capable of delivering nuclear weapons. Whether such forward deployment is objectively necessary, or even helps, is arguable but it remains important in political perceptions. In East Asia, where no such multilateral alliances exist, the United States extended deterrent relies on the central strategic force, as well as the capability to rapidly redeploy nuclear systems in times of crisis.¹

As a central component of assuring allies and partners, and one that arguably has long since become primary in deterring aggression, the United States also employs a variety of non-nuclear conventional as well as non-military means. These include forward deployed U.S. conventional presence, theater ballistic missile defense², bilateral alliances, and security guarantees. Bringing these multiple tools to bear, the 2010 NPR notes that the United States will take several steps to maintain a credible extended deterrent: retain the capability to forward deploy U.S. nuclear weapons on tactical fighter-bombers and heavy bombers, maintain and develop long-range strike options to supplement U.S. forward military presence, and expand consultation with allies and partners on the credibility of the U.S. commitment.³ A subtext is that the “develop long-range strike options” may increasingly be a core element of U.S. planning.

Thinking Toward Key Principles of Assurance

Beyond the core logic of demonstrating will and commitment, there is no body of literature on assurance analogous to deterrence theory. In this theoretical lacuna, arguments about assurance and its requirements have been largely impressionistic. This paper seeks to develop initial principles of assurance to elucidate dynamics of interest and questions for research. They are meant to provoke discussion and debate, not to be the last word on the matter.

#1. **Total assurance is an unattainable goal; regardless of U.S. effort, allies and partners will continue experiencing some degree of insecurity and are likely to continue calling for more assurance from the United States.**

To demonstrate this point, consider two notional depictions of the relationship between U.S. effort (on the x-axis) and an ally’s sense of security (on the y-axis). In both cases, the

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¹ In the post-Cold War period, the U.S. withdrew forward deployed nuclear weapons from East Asia, including from naval surface vessels and general purpose submarines.

² The BMDR notes that ballistic missile defenses “help support U.S. security commitments to allies and partners. They provide assurance that the United States will stand by those commitments despite the growth in the military potential of regional adversaries.” “Ballistic Missile Defense Review,” Department of Defense, February 2010, p. 12.

goal of the United States is to prevent the ally from perceiving extreme insecurity, at which point it might decide to acquire or develop nuclear weapons (or take some other destabilizing action, such as seeking another ally or simply neutralizing and abandoning the U.S. relationship). Figure 1 below demonstrates what may be seen as a *misperceived* notion of assurance. According to this depiction:

- The assurance curve is linear. In other words, the more effort the U.S. expends, the more assurance can be earned;
- Given the linear nature of the curve, an ally can be totally assured with enough U.S. effort; and,
- The distance between total assurance and extreme insecurity is small, such that an insecure ally is by definition on the brink of seriously considering nuclear weapons acquisition or development, accommodating to a neighboring power, or changing its relationship with the U.S.

**Figure 1: Misperceived Reassurance Curve**

An alternate depiction of assurance is offered in Figure 2 below. According to this *revised* notion:

- Ally insecurity is a “natural law” of extended deterrence. Given the asymmetry of stakes between the United States and the potential regional adversary, it is extremely difficult (if not impossible) for the United States to provide total assurance to an ally in the region. From this perspective, ally insecurity is often a statement about the nature of extended deterrence, *not* a statement about the current credibility of the U.S. commitment;
- The assurance curve reflects diminishing returns for effort; that is, the rate at which assurance rises decreases with increasing U.S. effort decreases;
- The distance between total assurance and extreme insecurity is large, such that the
existence of an insecure ally does not necessarily mean that the ally is close to considering the acquisition of nuclear weapons.

![Revised Reassurance Curve](image)

**Figure 2: Revised Reassurance Curve**

Two questions arise from this model: 1) At what point has “enough” assurance been offered, such that additional effort on the part of the United States earns little additional assurance? 2) How insecure will an ally really have to feel before they choose to pursue acquisition or development of nuclear weapons, or take other steps seriously uncomfortable to the United States such as switching sides to align with U.S. adversaries?

#2. Taking additional actions and offering more assurance can at times work counter to U.S. interests; i.e., more assurance is not always better.

It is a common assessment in the U.S. foreign policy community that the United States needs to do more to assure our allies, and that if we fail to do so, the consequences will be dire. There are at least three reasons to temper the notion that the United States should constantly be taking additional assurance measures. First, more assurance is not always better because, as indicated by the figures above, there are decreasing returns on assurance activities. Allies will remain somewhat insecure regardless of U.S. attempts to demonstrate the will and capability to follow through on its extended deterrent commitments. This might explain why it is said that assurance is exponentially more difficult than deterrence: perhaps it simply feels that way because the United States is pouring enormous effort into assurance activities well after they have ceased yielding significant return.

Second, more assurance is not always better because it could lead to entanglement in conflicts in which the United States does not have core interests. Throughout much of the previous decade, U.S.-led wars in Iraq and Afghanistan led allies and partners to be concerned about becoming entangled in U.S. conflicts. This should not distract from the
possibility of the reverse dynamic, whereby U.S. commitments embolden allies to take more risky or aggressive actions. At issue here is a variant of the classic security dilemma, as one side increases its efforts in response to anxieties; it increases anxiety of the other side. This can apply not only to “real” anxieties, but also to the semi-feigned anxieties exploited in countries’ political processes. Increased U.S. military efforts (e.g., defenses, exercises, deployments) can be depicted as “provocative” even when they are known not to be so.

This leads to the insight that, as ambiguity is considered a key component of deterrence, so too might it be important for managing assurance. Rather than expending additional resources to assure allies, it is possible that some degree of ambiguity about the nature of the U.S. commitment is useful for constraining allies from engaging in reckless behavior. Doing so could embolden adversaries, but that effect will have to be balanced with managing allies. That principle has been at the core of U.S. policies toward Taiwan for decades. On the flip side of the question of ambiguity, the United States should also think twice before making extended deterrent commitments or offering security guarantees (for the purposes of deterrence) if it itself is uncertain about its willingness to respond during a crisis. Failing to carry out an extended deterrence commitment would do substantial harm to alliance commitments worldwide. In this light, being modest in the selection of security guarantees has far-reaching and long-term value for deterrence. The dilemma here, of course, one irresolvable by analysis alone, is that the failure to explicitly extend deterrence can seem to provide license for aggression (as arguably occurred with ambiguous U.S. diplomacy in the days before Iraq’s invasion of Kuwait).

Third, and finally, deterrence and assurance strategies should be considered in tandem, as it is by no means certain that steps to assure allies supports deterrence, nor vice versa, that strengthening deterrence supports assurance. In fact, assurance activities can even work against strategic stability if it is overly threatening to an adversary. The result could be arms racing, exactly the opposite of the intended aim of assurance.

#3. The credibility of the U.S. extended deterrence may not be particularly relevant to an ally’s decision to acquire or develop nuclear weapons.

There tends to be a self-centeredness that permeates discussions about US assurance: the frequent assumption that our allies’ decisions to seek nuclear weapons are necessarily and inextricably linked to and dominated by the credibility of the U.S. extended deterrent. This may sometimes be the case, but what the U.S. thinks of as “proliferators,” have other reasons for considering the acquisition of nuclear weapons (e.g., related to territorial disputes, nationalism or domestic politics), as well as reasons beyond U.S. assurances for not doing so. As a result, strategists will have to expand the scope of assurance and consider new concepts (and vocabulary) for the tools available to pressure allies and prevent them from pursuing nuclear weapons, in ways that have nothing to do with strengthening the credibility of the U.S. extended deterrent.
#4. Credible extended deterrence requires both capability and will but the appropriate balance between the two is not yet clear.

Though not mutually exclusive, there are two related components to the U.S. extended deterrent: the capabilities in theater and CONUS that deter potential adversaries; and, the expression of commitment and political will to defend the ally in times of crisis and conflict. Despite our recognition of these central components, we have little understanding of the relationship between the two. For instance, it is often assumed that a forward in-country presence is crucial for signaling the credibility of our commitment and for creating a “tripwire” of U.S. personnel (and in some cases their families) such that any attack on the ally would be considered equivalent to an attack on the United States. But how many forward deployed forces are enough, and when can enhanced capabilities substitute for numbers? How can credible survivable capability substitute for tripwires? As a case in point, over the last decade the United States withdrew nearly 10,000 U.S. troops from South Korea and realigned the Second Infantry Division farther south, away from the DMZ. To compensate and supplement its extended deterrent, however, the U.S. spent $11 billion on 150 “enhancements” in capabilities.

Several questions follow: What was the effect of these transformations on the overall credibility of the U.S. deterrent? What does this say about the importance of a symbolic tripwire versus hard capabilities in theater? To what degree are allies assured by bean-counting of specific capabilities versus less quantifiable and more symbolic metrics of trust and confidence? And when and why might allies differ on this score? In light of fiscal constraints and changes to the international security environment, questions surrounding the relationship between pure capability and the symbolic demonstration of will are growing increasingly relevant as the U.S. military reconsiders its global posture.

#5. Deterrence and assurance often demand different activities and capabilities, but this need not be the case.

Credible deterrence is reliant on the perspective of the adversary, whereas credible assurance is reliant on the perspective of the ally. This means that, as is often the case, what the United States perceives as a sufficient deterrent against an adversary may not satisfy an insecure ally, or at least the organs of the ally’s government and intellectual elite that speaks most loudly on such matters. As was noted in the NPR (and reflected by the recent establishment of a U.S.-ROK Extended Deterrence Committee), the United States should consult closely with allies on matters related to U.S. credibility and extended deterrence. Doing so should be seen not only as an additional assurance tool, but also as an opportunity to harmonize threat perceptions and discontinue symbolic assurance activities that lack deterrent effect. Analysts should ask themselves, “Which would be more important as the outcome of discussions: that the allied government issue statements of having been assured (which might or might not be true, and which might or might not persist), or that the allied government’s leaders fully understand U.S. capabilities,
preparations to use them, and ambivalences where those exist, as in the U.S. intending to assure Taiwan while not giving it license to take provocative action?”

#6. Know thy ally.
Theories of assurance should supplement, not replace, regional expertise and analysis. Confronted with similar threat environments, U.S. allies will have different inclinations with regards to the development of nuclear weapons. This means that assurance should be calibrated for particular states, and U.S. assets need not be spread evenly between allies. It is commonly said, for instance, that Japan might choose to develop nuclear weapons if Tokyo begins to question the credibility of the U.S. extended deterrent. Regional analyses of Japanese politics and debates around nuclear weapons reveal that the country—TLAM/N or not—is not near considering the development of nuclear weapons. Public support for doing so is extremely weak and one internal review after another has reaffirmed that nuclear weapons would not serve Japan’s interests, even in the event of a weakened U.S. deterrent. In fact, the current debate in Japan is whether or not to legislate the “three non-nuclear principles.” In other words, whether to make it illegal for the United States to introduce its own nuclear weapons into Japanese territory, even in the event of a crisis or conflict. Political winds are certain to change, but it is necessary to understand the parameters within which those changes are likely to occur. These national particularities, particularly when they contravene the basic logic of assurance, call for a continued role for regional experts in force structure considerations.

In Sum
Assuring allies is no easy task, particularly given the challenge of credibly committing to “sacrifice Los Angeles for Tokyo,” as well as the uncertain balance between providing capabilities and expressing will. Regardless, allies are likely to feel perpetually insecure. Furthermore, providing additional assurance may yield unintended consequences, such as wasting resources, emboldening allies, and provoking adversaries. It must also be kept in mind that allies’ decisions around indigenous nuclear weapons may not be influenced by the quality or nature of the U.S. extended deterrent.

Taken together, there remain a number of key issues that deserve further scrutiny as the United States continues to commit resources to assure allies of its extended deterrent commitment.
Strategic Stability
Stability Definitions and Taxonomy
Pat McKenna, STRATCOM

Purpose: Provide a brief summary of stability definitions with source documents.

Background: CINC asked for a brief taxonomy on the different definitions and types of stability, e.g., Crisis Stability, Arms Race Stability, Political Stability, etc. CINC also asked for “classic” references.

Key Points: The term “stability” is often misused and misunderstood. Typically, all the confusion is because people are using different definitions. Lt. Gen. Kent (USAF ret.) argues that an adjective must come before the term “stability.” The adjective’s purpose is to clarify the stability discussion. However, even with the adjective, the definitions are neither robust nor is there general agreement.

Adjectives commonly used today:

Geopolitical Stability

- A state of relations among nations that is generally consistent with and conducive to change and progress without having to revert to initiating a war with global or regional proportions (Definitions of Stability, Melvin Best, Erice Conference 1993).

- Within the definition, “state of relations” refers to all factors that define a relationship. A stable system is an extremely complex system of interrelated forces. It is difficult to enumerate all the factors and even more difficult to determine their interrelationships. Military forces are one of many factors.

Crisis Stability

- Is robust when leaders of opposing sides do not “feel pressure because of emotion, uncertainty, miscalculation, misconception, or the posture of forces to strike first in order to avoid the worse consequence of absorbing a first strike” (First-Strike Stability – A Methodology for Evaluating Strategic Forces, G. Kent, D. Thaler, RAND note R03765-AF).

First Strike Stability
• The force structure component within Crisis Stability. First strike instability exists when, owing to the posture of forces, either leader is perceived to feel pressure to strike first in a crisis to avoid the worse consequences of incurring a first strike.

• The majority of stability calculations are attempting to measure first strike stability.

**Arms Race Stability**

• Arms race stability exists when neither side has an incentive to pursue a competitive advantage or when neither side changes expenditures for arms (Historical Overview of Strategic Models, Kruglov and Markov, 1999 and The Concepts of Stability, 1980).

**Adjectives found in the literature:**

**International Political Stability**

• Pre-crisis stability of the international community (The Concepts of Stability, 1980).

**Strategic Political Stability**

• Exists when there is no pressure on either side to increase strategic programs greatly (The Concepts of Stability, 1980).

• Likely a subset of Arms Race Stability.

**Weapons Stability**

• Stability or instability inherent in certain weapons (The Concepts of Stability, 1980)

• For example, survivable systems are inherently more stable.

**Strategic Stability**

• Best refers to military balance as the key component.

• Pinker, et al., define it as the totality of interrelationships between countries and the factors that influence those interrelationships (On 'Crisis Stability,” Pinker et al.). This definition is similar to Best’s definition for geopolitical stability.

**Deterrence Stability**

• Deterrence stability exists when there are reduced opportunities or incentives for either side to use its nuclear arsenal for political threats (Kruglov and Markov).
• James Scouras asks the question, “Should I strike” (*Strategic Stability in the Post Cold War World*).

• As shown above, definitions do not always agree.

*Mobilization Stability*

• A condition where both sides feel pressure to generate their strategic forces quickly in a crisis to strengthen their deterrent posture (*The Future US-Russian Strategic Nuclear Balance*, Dean Wilkening, RAND report, 1983).

*Generation Stability*

• Scouras asks the question, “Should I generate my forces?”

*Prompt Launch Stability*

• Scouras asks the question, “Should I launch under attack?”

*Escalation Stability*

• Once a conflict has begun, is the trend to increase escalation (towards total war/all out nuclear war) or is the trend flat or decreasing (*The Concepts of Stability*, 1980 and *U.S. Strategic Nuclear Weapons and Deterrence*, Conover, 1977).

*Command Stability*

• Presence of good command, control and communication systems (*The Concepts of Stability*, 1980).

*Perception Stability*


*Strategic Force Stability*

• “A state of relations among nations such that none feel an incentive to strike preemptively, in an extreme crisis, due to strategic force correlation or unacceptable damage calculations (*MESA/SM  A New Multipolar Strategic Force Planning & Stability Methodology*, Anson & Stein, 1999).
Taxonomy

- At the top of the taxonomy is Geopolitical Stability. Geopolitical Stability is a very broad term and is almost impossible to quantify. All other terms (adjectives) are subsets.
- Perception and International Political Stability come next in the terminology scale. These two terms tend to interact with each other and affect the terminology below them.
- Crisis Stability has the most terms underneath it (note, the cone formed by the dashed lines is for display purposes only).
- The locations on the graph are relative in nature. For example, Generation Stability has narrower focus and is easier to quantify than First Strike Stability.

Terminology use example

- The PNI that took bombers off alert was viewed by many as a “stabilizing” move. More properly, stabilizing at the Geopolitical level. However, at the First Strike Stability level, specifically at the Weapons and Mobilization level under First Strike, it was destabilizing.
- The above example illustrates the difficulty of stability discussion and the importance for first defining what type of stability is being discussed.
For the purposes of modeling, a wider range of variables often are required to provide more specific definition of the situation. Depending on the situation under consideration and the features explored by specific models, the full range of variables may not be required in every instance. Rather, models can be specified using a selection of the variables most relevant to the specific question to be addressed. Note that not all variables are quantitative, since all issues are not necessarily reduced to a set of purely quantitative questions; the most complete set of parameters necessarily includes quantitative or fuzzily defined variables.

Following is a full set of sixteen such variables (each represented by a bullet under the general headings given), which of course is subject to modification as circumstances dictate. Possible values are given as appropriate.

**Identity**

Entity type (state, non-state, sub-state, multi-state). An example of a significant non-state is Taiwan, which under United States acceptance of the One-China policy is not an independent state. Groups such as al Qaeda, Lashkar-e-Taiba, or Hezbollah are significant non-state actors, and NATO or the IAEA are representative multi-state actors.

**Governance** (liberal democracy, authoritarian democracy, single party, monarchy, dictatorship). We distinguish between the liberal democracies of NATO countries, and the authoritarian democracies of Russia, Belarus, and Iran. China and Vietnam are single-party states, Saudi Arabia is a monarchy, and North Korea is a dictatorship.

**Relative power**

Military budget (high, medium, low). Defined ranges are presumably more useful than absolute – and debatable – figures.

Economic power (high, medium, low). To be most useful, this variable may be defined differently for different countries. For example, in East Asia, GDP is the relevant variable, while in the Middle East, oil and gas production or reserves is the relevant variable. The utility of using high, medium, and low values is that it allows the reconciliation of these different, but commonsense, selections.

**Relationships**

Relationship to United States (ally, partner, neutral, competitor, adversary). Nations sharing interests with the US but not a formal alliance relationship would qualify as partners. North Korea is clearly an adversary, but under current circumstances, Russia or
China can be characterized as competitors. Obviously, Russia was an adversary during its Soviet past, and it could become one again in certain undesirable futures.

**Alliances.** This would be a listing of the significant alliance relationships for the actor. For states, NATO (and its constituent states), the Shanghai Cooperation Organization, or the Collective Security Treaty Organization are examples, while interconnections between sub-state actors can also be established. These binary relationships between actors accommodate the collective nature of deterrence, assurance, and stability, as well as defense defined more broadly.

**Adversaries.** This would be a listing of significant adversaries for the actor. For example, both Pakistan and India could be classified as partners of the United States; however, one cannot adequately describe the South Asian situation without acknowledging the adversary relationship between the two. Once again, these binary relationships between actors accommodate the collective nature of deterrence, assurance, and stability, as well as defense defined more broadly.

**WMD capability**

**Type** (nuclear, biological, chemical, none). The current Nuclear Posture Review reserves nuclear for nuclear, holding out the possibility that nuclear may be applied to biological subject to developments in that realm. Chemical possession by Syria, however, poses a very significant threat to Israel that could be matched by nuclear.

**Development stage** (high, medium, low, high-latent, medium-latent, none). In all but a limited number of cases, high, medium, and low will apply to nuclear. A likely division would equate high with missile-deliverable yields in the hundreds of kilotons range, medium with missile-deliverable yields in the ten or low tens of kilotons range, and low with air or other deliverable yields in the sub-ten kiloton range. Latency is extremely significant for highly-developed countries such as Japan or Turkey, for which nuclear-weapons development could proceed quickly.

**Range** (intercontinental, regional). These two values should provide adequate differentiation in most cases.

**Numbers** (separate numbers for both range classes).

**Survivability** (high, medium, low). Submarine and road-mobile launchers could provide high survivability, while silo-based systems could be medium to low, for example.

**Vulnerability**

**Population** (high, medium, low). Population figures are broken into ranges. While an Iran at 73 million may be high or medium, Iraq at 31 million may be medium or low, and Israel at 7 million is low. Membership in sub-state organizations is relevant.
**Physical size** (high, medium, or low). Certainly Russia, China, and the US are high. India and Iran are medium to high, depending on how one divides the classes, and the UK and Japan are medium to low.

**Strategic depth** (high, medium, low). This is an important consideration for countries. Japan, with heavy concentrations of industry and population in the two vicinities of Tokyo and Osaka has low strategic depth, as does Israel, obviously. France, although a medium-sized country, is medium to low in strategic depth because of the heavy concentration of population, industry, and government near Paris.

**Threats.** This is a listing of significant threats – security gaps, not adversaries – that can be called out. From a proliferation and energy standpoint, the dependence of Japan and South Korea on foreign-supplied uranium would qualify.
Futures Framework

The DNI futures framework is composed of four discrete futures which represent extremes along two dimensions; nature of the system (competitive/cooperative) and state strength (high/low). Conceptually these four combinations create distinct contexts for the security environment that could emerge in 2025; however the expectation is that any future reality will likely incorporate elements of all four.

Concert of Powers (Strong States; Cooperative International System)

In the Concert of Powers scenario, emerging and developed powers worked cooperatively in managing a variety of transnational security challenges. This scenario postulates that the growing number of powerful states strengthens the international community’s ability to deal multilaterally with future security challenges. In this scenario, the United States is one of a number important powers but its leadership remains critical in forging new multilateral security partnerships to tackle a variety of transnational security issues. Such partnerships would likely not be formal strategic alliances but rather coalitions of key state

Figure 1: DNI Futures Framework
powers agreeing to work cooperatively to address particular security issues such as peacekeeping, maritime security, and counter-proliferation. Strategic arms reduction agreements are likely to be a mechanism for building trust among the major nuclear powers in this future and could be a key precursor to developing the "concert of powers".

**Return of Great Power Confrontations (Strong States; Competitive International System)**

In the Return of Great Power Confrontations scenario the future security environment is defined by increasing competition between rising and status quo global powers for resources, markets, and influence. In some cases these competitions lead to interstate confrontations. Although total war involving massed force-on-force military clashes among the great powers is still unlikely, conflicts involving limited military objectives and warfare through non-military means, such as information, economic and resource warfare, become more prevalent in this environment. Balance of power dynamics emerge in this future that resembles a 21st century replay of the years before 1914 with major powers developing networks of friendly states through security arrangements, arms transfers, and economic relationships to secure their interests and constrain the actions of potential rivals. Nuclear weapons remain an important element of state power in this scenario and new escalation dynamics are likely introduced as a result of foreign development of conventional anti-access/area denial capabilities to counter US force projection.

**Fragmented International System (Weak States; Competitive International System)**

The **Fragmented International System** scenario postulates a security environment in which the diffusion of global power increases the difficulty for the international community in achieving consensus on how to manage global security challenges such as proliferation, terrorism, and energy security. In addition, varied interests among the principal actors in a multi-polar world increase competition and tensions as states seek to strengthen their own spheres of influence. These dynamics result in a breakdown of the global order into regional and other blocs ushering in an era of slower economic growth and globalization and ineffectiveness in dealing with transnational security challenges. Nuclear proliferation, shifting power dynamics, and potential for conflict in the Greater Middle East dominate U.S. security interests in this scenario. A breakdown of the international cooperation on proliferation that leads to a more proliferated world will likely have the greatest impact in the Middle East where Iran's pursuit of a nuclear weapon capability and the shift in the balance of power in the region raise the potential for conflict and further proliferation.

**Rise of Non-State Networks (Weak States; Cooperative International System)**

The **Rise of Non-state Networks** scenario envisions a future security environment in which the dispersion of power and authority away from nation-states gives rise to a myriad of security challenges involving sub-national and transnational entities. The problem of coping with these "global troubles," including the spread of violent extremism, transnational terrorism and crime, food and water scarcities, failing states, and intrastate
conflicts drives the future security agenda. The potential for weak states to lose secure control of their nuclear technologies and capabilities will raise concerns of nuclear materials falling into the hands of violent extremist organizations in this future.

Alternative Futures and U.S. Nuclear Force Requirements
Daryl G. Press, Associate Professor, Dartmouth

The nuclear forces that the United States procures in the coming years will need to fulfill U.S. strategic requirements for many decades. This poses a significant challenge for force planners because it is impossible to reliably forecast the security environment that the United States will inhabit in the coming decades, let alone the specific threats that the country will face. Force structure alternatives, therefore, must be assessed against a broad range of plausible strategic environments – or “alternative futures”.

The Theory Team’s initial approach for examining alternative futures was to use a framework developed by the National Intelligence Council’s (NIC) Long-Range Military-Security Program. The NIC framework identified “two critical uncertainties” that may define key aspects of the international system in the coming decades: the capacity of leading nation-states to manage emerging global security issues, and the relationship (i.e., level of cooperation and conflict) among the leading countries. Using these two uncertainties, the NIC identified four broad futures: cooperative great powers with great capacity (“concert of powers”); cooperative great powers with low capacity (“Rise of non-state networks”); competitive great powers with high capacity (“Return of Great Power Confrontations”); and competitive great powers with low capacity (“Fragmented International System”).

The Theory Team found the NIC framework to be very useful for considering how the international system may evolve. But we concluded that it was not ideal for exploring U.S. nuclear force requirements in the coming decades. Although the two uncertainties identified by the NIC may shape the general character of the international system, they do not seem to be the key factors that will determine how demanding the U.S. nuclear mission will be in the future. Many factors may affect U.S. nuclear force requirements in the future, but three stand out: (1) U.S. non-nuclear military capabilities, (2) the relationship among the leading countries (here we mirror the NIC framework), and (3) the extent of proliferation of strategic weapons, particularly to potential adversaries. The implication of each of these factors on U.S. nuclear requirements is described below.

U.S. Non-nuclear Military Capabilities
• If the U.S. maintains (or increases) its current advantage in non-nuclear conflict, this will tend to reduce the need, or role, for nuclear forces in U.S. national security policy, all other factors being equal.
• If the United States loses key elements of its current advantage in non-nuclear conflict, this will tend to increase the need, or role, for nuclear forces in U.S. national security policy, all other factors being equal.

There is a direct connection between the U.S. ability to defend its core interests using non-nuclear forces, and U.S. nuclear requirements. In the past, when the United States and its allies lacked the ability to defend their core interests with non-nuclear forces, they relied on nuclear weapons to deter attacks on those interests, and to defend those interests if war came (e.g., NATO during the Cold War). Today the United States appears to have substantial advantages in non-nuclear forces over potential adversaries in key theaters; not surprisingly the United States currently sees a reduced role for nuclear weapons in U.S. national security strategy.

The 2010 NPR suggests this link between U.S. non-nuclear capabilities and U.S. nuclear requirements when it says, “The United States will continue to strengthen conventional capabilities and reduce the role of nuclear weapons in deterring non-nuclear attacks…”, implying that nuclear weapons will be less necessary for deterring or defeating non-nuclear attacks as conventional capabilities grow. The converse should be true as well: if U.S. (and allied) non-nuclear capabilities wane, the role of U.S. nuclear forces will grow to deter attacks on difficult-to-defend vital interests.

The Relationship among Great Powers.

• If relations among the great powers remain benign – or even improve – in the coming decades, U.S. nuclear requirements will be smaller
• If relations among the great powers become more hostile in the coming decades, U.S. nuclear requirements will grow

A world of renewed great power competition would involve increased U.S. military requirements generally – including nuclear requirements. Increased great power competition would lead to greater nuclear requirements for at least three reasons.

First, the great powers are the countries that are most likely to possess sufficient economic resources and technological skill to field a force that could threaten the survivability of the U.S. nuclear arsenal. Assuming that force survivability remains a key mission requirement as long as the United States fields a nuclear arsenal, a world of renewed great power conflict would place greater stresses on that mission than a world in which great powers cooperated and military threats came from dangerous –but limited – regional adversaries.

Second, a great power conflict, whether it initially involved the United States or not, is the type of war most likely to engage the vital interests of many powerful states. And wars over vital interests are the ones in which it is most likely that combatants would consider using nuclear weapons. Finally, the great powers (at least now) all possess nuclear weapons; renewed great-power competition might produce crises and possibly even conventional wars among nuclear-armed states, which could cause crisis instability and intra-war inadvertent escalation.
Finally, and related to the next point about proliferation, a world of cooperative great powers may be a world of greater adherence to international norms (e.g., on non-proliferation) and cooperation to prevent acquisition of nuclear material by countries of concern or non-state actors.

The Extent of Proliferation of Strategic Weapons

- If proliferation stops – or is reversed – nuclear weapons will play a smaller and less demanding role in U.S. national security policy.
- If proliferation continues – or accelerates – nuclear weapons will play a larger role in U.S. national security policy.

Under the category of “proliferation,” the Theory Team includes the spread of strategic weapons to new countries or non-state actors (sometimes called “horizontal proliferation”), increases in the number of strategic weapons in arsenals (“vertical proliferation”), or increases in the sophistication of strategic weapons (e.g., range of delivery, or resistance to counter-measures).

The category of “strategic weapons” includes all types of weapons and techniques that could be construed as “weapons of mass effect” – i.e., weapons and techniques capable of creating grave destructive, psychological and/or economic damage, and hence capable of producing decisive strategic outcomes in a conflict. For example, this category could include nuclear weapons, advanced chemical and biological weapons, high-end cyber warfare techniques, anti-satellite weapons, weapons capable of neutralizing or degrading nuclear forces (e.g., submarine tracking, missile defense); conventional global strike systems, and others.

A world in which strategic systems proliferate is more demanding for U.S. nuclear forces, especially if that proliferation is to potential adversaries. First, the horizontal proliferation of strategic weapons will increase the frequency that the United States finds itself in conflict with a country or non-state actor possessing these weapons. Second, deterring adversary use of strategic weapons depends on convincing adversaries that their use will not provide them benefits or that their use will result in unacceptable costs, and hence that non-use is preferable. The problem is that U.S. non-nuclear forces alone may be unable to prevent adversaries from benefiting from strategic attacks. And U.S. non-nuclear forces may be unable to inflict sufficient cost on an enemy after a strategic attack to outweigh the benefit he has gained – especially because the fear of follow-up adversary strategic operations may inhibit U.S. responses. For these reasons, the United States has in the past relied upon nuclear forces to help deter strategic attacks. The more that these weapons proliferate, the more the United States may need nuclear weapons to deter enemies, assure allies, and if necessary defeat those who use strategic weapons.

To be clear, the effect of proliferation on U.S. nuclear requirements will vary depending on who is acquiring strategic systems. For example, a nuclear test by Sweden would be less alarming than a test by Syria. Although proliferation to potential adversaries is clearly
more detrimental than proliferation to allies, over the course of several decades – the time horizon of this study – relationships among countries can vary greatly -“good guys” can become “bad guys”, and vice versa. (Note that in the early years of the twentieth century, U.S. military planners identified the United Kingdom as a major military threat to the United States.) While every act of proliferation is not equally detrimental (some could even be helpful), a future characterized by accelerated proliferation and a weakened nonproliferation regime will, on average, require a greater role for U.S. nuclear forces than a future of zero proliferation or gradual disarmament.

**Interactions between dimensions:**
The three dimensions discussed above each have an independent effect on U.S. nuclear force requirements, but they also interact in important ways. In particular, there is a link between (a) U.S. non-nuclear military capabilities, and (b) the extent to which the two other dimensions (e.g., great power relations, and proliferation) affect U.S. nuclear requirements. If the United States retains or enhances superiority in non-nuclear forces, then the emergence of great power competition will have a more-muted effect on U.S. nuclear requirements as conventional aggression by other great powers could be deterred or defeated with a conventional response. If the U.S. lead in non-nuclear forces had disappeared, however, then the rise of great power competition would trigger greater requirements for U.S. nuclear forces.

Similarly, the consequences of proliferation could be mitigated or exacerbated by changes in U.S. non-nuclear capabilities. It is conceivable (though certainly debatable) that vast enhancements to U.S. non-nuclear forces (e.g., missile defenses, prompt global strike) would give the United States a robust capability to deter or defeat states with small nuclear arsenals. A weakening of U.S. conventional forces, on the other hand, would multiply the problems that the United States would face in a world of accelerated proliferation.

Figure 7 illustrates how the “three dimensional” futures framework can be used; the figure illustrates the type of world “conditions” – along each axis – that might lead modelers to code a specific world condition as being benign or threatening along each axis.

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1 This figure is take from Swegle’s report “Sorting out the Questions on Deterrence: A Quick Look at Regional Deterrence in Northeast Asia” which is attached as an appendix to this report.
In sum, the Theory Team characterized the “alternative futures” – as they affect U.S. nuclear requirements – in a 3-dimensional space. The three dimensions are: (1) the relative strength of U.S. and allied non-nuclear military capabilities, (2) the relationship among great powers, and (3) the extent of proliferation of strategic weapons. Figure 8 below illustrates the Futures Framework graphically – and offers a first draft estimate of where the current world state is located along these three dimensions.
The most demanding possible future would be one of renewed great power conflict, significant proliferation, and a declining U.S. lead in conventional military power. Analysts who worry about the rise of China, the gradual but continuing spread of nuclear weapons and the erosion of U.S. capabilities at high-end conventional warfare worry that this “most demanding” world is coming true. The “least demanding” world for U.S. nuclear forces would be one closely resembling conditions today: the great powers get along relatively well, proliferation (to this point) has been slow, and the United States enjoys conventional military superiority in the most critical regions of the world.

The fact that the current state of affairs (cooperative great power relations, slow proliferation, and U.S. conventional military dominance) corresponds to an era of U.S. enthusiasm for nuclear force reductions and global disarmament serves as some empirical validation for the framework linking alternative futures along these dimensions to U.S. nuclear requirements.
5-D FRAMEWORK DIMENSION 5: PHASE

Joint Publication 3-0 Conflict Phase Model

The final aspect of the strategic environment that directly influences the relevance and effectiveness of a policy and force structure decision is the operational phase one is planning or against which one is acting. Certain policy objectives can only be achieved before a situation reaches the point of direct military confrontation.

The phase dimension of the 5-D model considers phases as defined in accordance with the six-phase model articulated in Military Joint Publication 3-0 (see below). It is important to recognize that phases are interdependent and the timing of transitions from one phase to the next will be determined by the success of actions taken in a particular phase1.

![Conflict Phase Model Diagram](source: Joint Publication 3-0: 128)

**Figure 1: Conflict Phase Model**

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### Phase 0: Shape

Phase 0 is the shaping phase during which routine military and interagency actions are performed in support of U.S. objectives. “They are executed continuously with the intent to enhance international legitimacy and gain multinational cooperation in support of defined military and national strategic objectives” (Joint Publication 3-0: 129).

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### Phase 1: Deter

Phase 1 occurs once the crisis is defined and actions such as mobilization and pre-deployment of forces are undertaken. The intent during this phase is to deter “undesirable adversary action” (Joint Publication 3-0: 130).

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1 Note the term “deter” used in the phase model is distinct from the notion of “deterrence” as used elsewhere in this effort and by STRATCOM more generally.
Phase 2: Seize Initiative
Phase 2 is the first phase in which offensive military operations occur. “During this phase, operations to gain access to theater infrastructure and to expand friendly freedom of action continue while the JFC seeks to degrade enemy capabilities with the intent of resolving the crisis at the earliest opportunity” (Joint Publication 3-0: 131).

Phase 3: Dominate
“The “dominate” phase focuses on breaking the enemy’s will for organized resistance or, in noncombat situations, control of the operational environment.” This involves full employment of military capabilities and can be carried out against both conventional and unconventional opponents (Joint Publication 3-0: 131).

Phase 4: Stabilize
When the United States is engaged in actions in a state where there is limited or no functioning governing entity the stabilization phase is necessary. In this situation U.S. forces may be required to perform governance functions and to coordinate the efforts of other supporting/contributing multinational, OGA, IGO, or NGO participants until legitimate local entities are functioning. “Stability operations are necessary to ensure that the threat (military and/or political) is reduced to a manageable level that can be controlled by the potential civil authority or, in noncombat situations, to ensure that the situation leading to the original crisis does not reoccur or its effects are mitigated. (Joint Publication 3-0: 131)

Phase 5: Enable Civil Authority
Once the assessment is made that there is sufficient stability to transfer overall authority to a legitimate civilian entity Phase 4 ends and Phase 5 can begin. During this phase U.S. forces provide support for the newly installed civil government. The goal is to ensure the viability of the civilian authority and its ability to provide services to the population. “The military end state is achieved during this phase, signaling the end of the joint operation. The joint operation is concluded when redeployment operations are complete.” (Joint Publication 3-0: 132)
FURTHER THEORETICAL ISSUES

Deterrence Stability and Escalation Control: The Dynamics of Deterrence

John A. Swegle, Savannah River National Laboratory

Nuclear deterrence, whether in an equilibrium state of deterrence stability or in a time-varying state demanding escalation control, is in general a dynamic process. Indeed, the larger, collective dynamic of nuclear deterrence, writ large, involves a group of mutually-involved actors – states, non-state terrorist organizations, or even multi-state alliances (e.g., NATO) or groupings (e.g., the United Nations) – and the interplay of the basic elements of nuclear deterrence – to deter, assure, and dissuade (as well as to defeat enemies in times of crisis and conflict) – sometimes with multiple elements directed toward a particular state, whether an ally or an adversary.

In considering these dynamic processes, we recognize that nuclear deterrence does not operate solely on the basis of a collection of dyadic interactions between the United States and other actors, global and regional, but rather is driven by the aggregation of the interactions between all of the mutually-involved Actors in a given situation. Weapons and postures intended to deter an adversary in turn are meant to assure an ally, and the responses of the adversary and ally, both to the U.S. and to each other, play a role in determining the effectiveness of the weapons, postures, and other measures involving additional instruments of power in deterring and assuring. In fact, in part because Nuclear Deterrence is a dynamic process, the whole is indeed greater than the sum of the dyadic parts.

The 2001 Quadrennial Defense Review Report articulated U.S. defense goals of deterring threats and attempts at coercion, assuring allies and partners, dissuading potential competitors, and defeating adversaries in the event of a deterrence failure.\(^1\) These goals were reaffirmed in the 2001 Nuclear Posture Review.\(^2\) The 2010 Nuclear Posture Review Report,\(^3\) while saying little about dissuasion, nevertheless made repeated reference to the use of nuclear weapons to defend the vital interests of the United States. If we, therefore, add defend to our list of roles for nuclear weapons, we must surely add its counterpart for adversaries, confront. The 2010 review also presents as two of its key objectives “maintaining strategic deterrence and stability at reduced nuclear force levels” and “strengthening regional deterrence and reassuring U.S. allies and partners.” Thus the stability of deterrence is an important objective at both the strategic – or global – and regional levels.

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\(^1\) 30 Sep 2001 | Quadrennial Defense Review Report |
\(^2\) 14 Feb 2002 | Statement of John A. Gordon Under Secretary for Nuclear Security and Administrator, National Nuclear Security Administration, U. S. Department of Energy, Before the Committee on Armed Services, U. S. Senate |
\(^3\) Apr 2010 | Nuclear Posture Review Report |
Defining Deterrence Stability and Escalation Control

To organize our thinking about the hierarchy of political-military deterrence goals and objectives, in the following graphic we portray from left to right the phases of nuclear deterrence interactions, which we simplify to peace, crisis, and conflict; the relative length of the decision time associated with each phase; the high-level military-political objectives of deterrence, stability, and escalation control with the lengths of the bars indicating the ranges of the phases, or the ranges of the relative decision-making times, over which each applies; and the goals we’ve mentioned: deter, assure, dissuade, confront, defend, and defeat, and the phases or ranges of decision-making times over which these goals would be pursued. As the situation degenerates downward at the left of our figure, the time allowed to make decisions and take actions with the nuclear force shortens. In a time of peace, a stable balance – global or regional – is struck, and the time scale on which decisions are made and actions are taken is sufficiently long that all involved actors – adversaries and allies, competitors and partners – have adequate time to respond. As one descends into crisis, the times for decisions and actions shorten, although until one is sufficiently deep into the crisis phase, the decision and action times could still be long enough to rebalance the situation before new decisions and actions are required in response to changing circumstances. This range of phases, from peace to some level of crisis, and of decision and action times, we refer to as a regime of deterrence stability. Even if the situation is changing, the Actors have time to rebalance in response.

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**Figure 1:** An organization of higher and lower level military and policy goals over the different phases of Deterrence interactions.
For further deterioration of the situation, from worsening crisis toward conflict, decision and action times continue to shorten to the point that it is no longer possible to rebalance the situation before the other side acts again. In this regime, one cannot achieve stability, so that in fact the goal is to control both the rate of escalation of the tension and the level to which tension escalates. This we call escalation control. As opposed to the stable balancing and rebalancing Actors were able to accomplish in the regime of deterrence stability, in this regime of escalation control actors must pursue a variety of intermediate goals, dependent on their situation and capabilities, that are aimed at producing some desired end state; for example:

- *Rapid escalation* by an Actor trying to seize the initiative and, by doing so, dictate the pace and direction of change in a crisis or conflict;
- *De-escalation* by an actor with a limited stake in the outcome of a confrontation or by an actor trying to contain a crisis or conflict to the conventional realm;
- *Limited escalation* by an actor probing the risk tolerance or resolve or level of commitment of an adversary.

Escalation control depends both on the rate and the level of escalation, both of which must be manipulated in order to achieve control. In attempting to control escalation, an actor must attempt to accurately anticipate what the other mutually-engaged actors will do, based on a number of criteria: doctrine and past practice, the current ebb and flow of events, perceived vulnerabilities and openings to achieve advantage, strategic or diplomatic communications.

**The Intrinsic Difference between Deterrence Stability and Escalation Control**

Analytically, as we have described the regime of deterrence stability, it is a state distinguished by two features: (1) little or no overall temporal variation of circumstances, and (2) the tendency to return to the state even in the face of disturbances. Mathematically, a situation with no overall time variation is referred to as being in *equilibrium*. This is not to say that there is no variation internal to the state; many times equilibria are dynamic, which requires a time-dependent balancing of actions that deter, dissuade, and assure in order to achieve a net Deterrence for adversaries and competitors and assurance for allies and partners. These actions should nevertheless occur over relatively long periods of time so that the overall balance is not upset. Because this is a peace-time state, it would normally be desirable to maintain such an equilibrium state. If indeed this is the case, that the interests of the parties are essentially in balance and mutually acceptable, such a state is said to be *stable*. As a counterexample, a situation in which a foreign government is left alone to conduct genocide against a minority population may be characterized as a form of overall international equilibrium if no one intervenes, but clearly it would not be desirable to maintain this particular state, and one would expect an external intervention to eventually disrupt such an unstable equilibrium.
In modeling the suitability of the nuclear force for maintaining deterrence stability, one can define a set of positive attributes of the nuclear force such as reliability, responsiveness, and flexibility that function as metrics and enable quantitative evaluation. These can be used to quantitatively evaluate the effectiveness of the force for deterring targeted adversaries and competitors from designated actions, and for assuring chosen allies and partners and dissuading potential competitors as a means of accomplishing the policy goals associated with maintaining deterrence stability.

Returning to a point made earlier, as one begins to descend into crisis situations will arise in which measures that ameliorate the sources of the crisis and help restore a situation closer to peace will still be available and capable of evaluation using the quantitative measures appropriate to a state of deterrence stability. This regime is characterized by two features: (1) de-escalation is still possible, and (2) the measures employed to deter, assure, and dissuade are still adequate to more broadly deter, assure, and dissuade in a de-escalatory context.

At some point, however, a crisis will become sufficiently acute that de-escalatory means alone are insufficient to deal with the situation. Beyond this point in a deteriorating situation, one must exercise escalation control in a fluid, intrinsically time-varying environment. The state of deterrence stability has been left behind, and the quantitative measures employed to evaluate forces and postures are no longer adequate, taken alone. Further, measures meant to deter, assure, and dissuade – which we assert as a matter of definition to be de-escalatory in intent – are no longer adequate in themselves; one must bring to bear their more aggressive counterparts, measures intended to confront adversaries, potential adversaries, and their supporters (note the polarization and lack of concern for competitors, except for the opportunistic threat they pose, for which de-escalatory measures still apply) and to defend allies and partners. Indeed, the need to confront and defend is a defining feature of the state in which escalation control is necessary.

The time-dependent nature of this regime of escalation control will require different evaluation methods. To be sure, while capability is a major element requiring quantification in the case of maintaining deterrence stability, escalation control will demand that we devote much increased attention to options – combinations of capability, posture, and concomitant messaging – that demonstrate commitment and resolve as features to be included in our evaluation. Indeed, one might well define commitment and

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1 As a shorthand, and as a sign of the primary focus of our discussion, we will refer to “the nuclear force” in our discussion. However, we recognize that the strategic military forces at hand will include conventionally-armed strategic systems and will involve missile-defense assets. In time, as doctrine and art advance, they may also include certain cyber and space assets as well. Looking farther afield – and frankly at the far reach of our purview – we acknowledge the importance of the strategic hedge, which includes non-deployed delivery vehicles and warheads and, on a longer time frame suited at least to peacetime and slow-developing crises, the infrastructure to further augment the force. We also acknowledge the fundamental role of other non-military instruments of power but firmly declare those to be beyond the scope of this discussion.
resolve to be attributes appropriate to this time-dependent state. It seems that one should be able to define metrics quantifying the utility and effectiveness of different options for deterring, assuring, dissuading, confronting, and defending in an acute crisis. To be sure, the interplay of action and reaction between the mutually-involved Actors will make it impossible to do any more than define envelopes for available courses of action. It is tempting to believe that one might bound these envelopes by some associated level of escalation, but we believe this would be a mistake. The level of escalation will depend on the situation (taking account of the time lags in gathering information – mathematically, we would say that our definition of the "situation" is non-localized in time – and the differing interpretations of events among the different Actors). One might employ multiplayer game theory to evaluate the desirability of certain courses of action in certain situations, and one should be able to determine the efficacy of the variety of available options (to repeat: combinations of capability, posture, and messaging).

Ultimately, however, it seems that repeated simulation and wargaming will be required to develop and exercise the capability to control escalation and to probe the near-infinite possibilities created by the perceptions, actions, and reactions of multiple Actors. Further, while models of deterrence and assurance and actors will have some general value, particularly as one extrapolates into the future, there is no substitute for understanding the values and goals of the particular adversaries, competitors, allies, and partners with which the United States will be involved.

We close this section with four additional points about escalation control:

- In controlling escalation, recognizing that this involves attempting to manage a highly time-dependent series of events, one must be willing to both raise and lower the level of escalation with a desired end state – or range of acceptable end states – in mind. One might even find that the acceptable end state shifts, with accepting a formerly undesirable outcome a possibility as events evolve. Focusing solely on de-escalation could become a liability and lead to even more undesirable outcomes.

- Risk aversion alone is not an adequate risk-management strategy. This extends to those facing the prospect of nuclear use.

- Policy is inseparable from process.¹

- Nuclear weapons have an apocalyptic character, even if it would be a mistake to fail to recognize that a range of yields (to the sub-kiloton level) and effects (notably EMP as a highly destructive, but non-contact means of attack) are available. Further, nuclear aversion and a fear of letting the genie out of the bottle once again are fundamental moral and humanitarian concerns. Consequently, the employment of nuclear weapons in any way, including in ways that involve explicit manipulation of an adversary even without an actual detonation, is a momentous event. The number of historical situations in which nuclear weapons have played an explicit, versus implicit, role can

¹ In the current study, we are sensibly enjoined from recommending policy directions; however, it would be unrealistic to fail to acknowledge that policy plays a major role in determining the range of capabilities available at the outset and the range of options available in times of Crisis and Conflict.
be counted on one hand. Thus, one must recognize the extraordinary implications of their employment (again, including non-explosive posturing) and the extraordinarily fine touch this demands.

The Grim Possibility of Conflict

We close with brief comments on the awful possibility of nuclear conflict, even if the involvement of nuclear is explicit but not explosive. Defeat is, in truth, the fate of all involved; however, this does not rule out the possibility of winners and losers, as Kahn grimly observed. In our figure, we defined defeat is a very limited way as the fate of the “loser” in a conflict. To be sure, defeat, or its flip-side, winning, could be defined more generally, to include situations in which one side backs down. In any event, use is to be avoided. But the explicit elimination of use as an option from the outset paradoxically may essentially disadvantage the holder of such a position. One should not possess nuclear weapons if one has not faced the possibilities and made at least some decisions in advance about the kinds of situations to which one is willing to expose himself. A future of reduced nuclear forces makes it imperative that potential adversaries and competitors be more clearly defined, and that allies and partners and the mutual expectations of extended deterrence be more clearly understood. A future United States of reduced nuclear capability must think clearly about trying to maintain an implicitly but poorly-defined shadow region surrounding its core interests in the face of nuclear-armed adversaries and competitors, as must those living in that shadow. Under these circumstances, ambiguity becomes an increasingly rare luxury item.

Let me thank Lt. Col. David Lyle for his valuable comments on this piece.
Community of Interest Summary and Think Piece

Matthew Kroenig, Georgetown University

The Community of Interest (COI) is a group of academics, policymakers, and analysts with expertise and interest in the role of U.S. force posture and national security, convened by the Concepts and Analysis of Nuclear Strategy (CANS) project to contribute to the theory team effort. From December 2010 to May 2011, the COI engaged in an online discussion about appropriate roles and missions for U.S. forces, the future of U.S. national security, and proposed frameworks for future analysts and policymakers to employ when designing U.S. force posture. This paper presents a summary and analysis of these exchanges.

The paper proceeds in four parts. First, it provides an overview of the COI discussions, briefly highlighting the broad range of issues covered in the online communications. Next, it explores in more detail three key debates that emerged among the COI: whether the assurance or deterrence role of U.S. nuclear weapons presents more demanding force requirements; how future states of the world influence force requirements for specific missions; and whether different theoretical frameworks are necessary to analyze strategic stability during peacetime and in crisis situations.

Overview

The COI online discussions were a key component of the Concepts and Analysis of Nuclear Strategy (CANS) Theory Team’s work. As such, the principal product of the COI was its input to the theory team’s theoretical review and framework. The COI debated and refined the CANS problem space vortex, a “frame for conceptualizing the complex of conditions that impact assessment of force sufficiency relative to US policy objectives.” In addition, the COI contributed to the development of the 5D Framework. This conceptual guide for future force planners provides 5 dimensions to consider when developing force posture, including: policy objectives; actor types; threat; international future; and operational phase.¹

Beyond contributing to these intellectual endeavors, the COI debated a range of national security and strategic posture issues including: the definition of key concepts, the role of defenses in strategic posture, the relative demands that competing policy objectives place on strategic forces, possible future states of the world and their influence on strategic planning, metaphors for understanding strategic stability in peacetime and during a crisis, and many other issues. The rest of this paper analyses the three most salient debates to emerge in the COI deliberations in greater detail.

The Relative Demands of Assurance and Deterrence

A key debate that emerged among the COI was whether the policy goal of deterring adversaries or assuring allies presented more demanding requirements on U.S. forces.

¹ More on the problem space vortex and the 5D framework can be found in the theory team report.
In one camp, a group of analysts argued that U.S. strategic forces should be designed primarily to achieve deterrence. As long as the United States maintains a secure second strike capability, it can threaten to unleash a devastating nuclear attack on a potential adversary even after absorbing a first strike. With the proper posture, declaratory policies could be issued to deter attacks against the United States or against U.S. allies. These analysts argued, therefore, that the ability of the United States to deter direct attacks or to extend deterrence to allies both rely primarily on Washington’s ability to ensure the survivability of its arsenal. Since the requirements for deterring enemies and assuring allies are the same, the policy objective of assurance does not impose any additional demands on U.S. strategic posture.

On the contrary, other analysts argued that assuring allies is more difficult than deterring adversaries and that assurance goals place additional demands on U.S. forces. They point out that extended deterrence is inherently less credible than deterring direct attacks against the United States. As Charles de Gaulle famously asked, would Washington be willing to trade New York for Paris? The incredibly of extended deterrence requires the United States to take additional steps to assure nervous allies that Washington can provide for their security, steps that would not be necessary for a pure deterrence mission. For example, the forward deployment of U.S. nuclear weapons on allied soil primarily serves an assurance mission, but does not contribute to (and indeed many even threaten) the survivability of the U.S. arsenal.

Both sets of conjectures are internally consistent and plausible. This is a debate that cannot be definitively settled in the theoretical realm. The question, therefore, becomes an empirical one: do U.S. allies demand a more robust strategic posture than U.S. policymakers would design for themselves? The answer appears to vary on a case-by-case basis. In certain cases, changes to the U.S. posture frighten allies and undermined assurance. For example, when the United States announced plans to withdraw U.S. forces from South Korea in 1970, Seoul assessed that it could no longer rely on the United States to provide for its protection and pursued an independent nuclear option. In other cases, it seems that U.S. allies are not concerned about the details of U.S. force posture and, therefore, do not place additional demands on U.S. forces. For example, one COI member produced a compelling analysis of Japanese assessments of the credibility of the U.S. nuclear umbrella, demonstrating that Japanese leaders base the credibility of America’s pledges on the strength of the U.S.-Japanese political relationship, not the details of U.S. force posture. Many Japanese leaders, therefore, are not bothered by discussion of deep cuts in the U.S. nuclear arsenal and, in fact, are even in favor of eliminating certain U.S. weapons systems.

In the end, therefore, both camps provide important insights. U.S. forces must be designed to ensure survivability and meet the requirements of deterrence as assessed by U.S. policymakers. Such a posture will also satisfy many allies. Whether or not an ally feels secure, however, cannot be decided in Washington, but rather depends on each ally’s own perception of its security environment. In certain cases, therefore, nervous allies will require additional proof of America’s commitment, placing greater demands on U.S. forces.

**Future States of the World and Strategic Planning**
A second key debate that arose among the COI was how future states of the world figured into the 5D framework.

Initially, the COI proposed that the development of the international system in coming years would greatly shape future force requirements. For example, if great power relations become highly competitive in the future, there will be greater demands on U.S. forces than if international relations are characterized by increased cooperation. The COI then debated which set of future conditions would be most pertinent to U.S. force posture. The COI ultimately concluded that the three most important variables for future force planning requirements were: the relative non-nuclear strength of the United States, the competitiveness of great power relations, and the extent of the proliferation of strategic weapons.1 The COI reasoned that relative non-nuclear weakness of the United States, a competitive international system, and the widespread proliferation of strategic weapons would impose the greatest demands on U.S. forces.

Other COI members argued against including future states of the world in the 5D framework. They argued that the overall state of the world was largely irrelevant to planning for specific policy objectives in the future. They claimed that the other 4Ds would be central, namely the objective, the actor, the threat, and the operational phase, but that the general state of the world would not greatly affect a specific mission. For example, if the United States intended to deter a specific adversary from taking a certain course of action, whether that actor had strategic weapons would matter greatly (a characteristic of actor type), but the extent of proliferation in the international system (one of the three elements considered in the future states of the world) would not directly affect that mission. Rather, they argued, the future states of the world provide an indication of the relative frequency with which one could expect to encounter various values of the other 4Ds. Therefore, they advocated for a 4D framework for planning that relegated alternative futures to a separate category.

In the end, the COI decided that alternative futures should be included in the 5D planning framework. They reasoned that the rationale for removing alternative futures focused narrowly on dyadic conception of the interaction between the United States and a target state for achieving policy objectives and did not adequately account for the multitude of other factors that could be relevant to the outcome. In sum, the COI rightly concluded that structural factors can have a determinative influence on dyadic interactions.

Theorizing Strategic Stability in War and Peace

A third major debate between COI participants was whether separate analytical frameworks were needed to think about strategic stability in peacetime and during a crisis.

In one school, analysts argued that maintaining strategic stability during peacetime was qualitatively different from restoring strategic stability during an ongoing crisis and that, therefore, separate theoretical frameworks were needed to think about each. The critical difference between the two contexts is time dependence. One analyst claimed that, “in

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1 For more on the selection of these conditions and some possible alternatives that were ultimately rejected, see the Theory Team Report.
peace or the early stages of crisis, (there) is a state with little (quasi-equilibrium) or no (equilibrium) time variation in the overall relations between mutually-involved Actors.” In contrast, during a crisis, “the situation becomes time-dependent (things are happening faster), and an equilibrium (defined as a time-independent state) is no longer possible.” To make their case, these thinkers drew on a number of metaphors from plasma physics and other physical sciences.

By far the most colorful analogy, however, brought us south of the border. One analyst suggested that strategic stability during peacetime is like a ball in a cone. The ball rests easily in the bottom of the cone and even after perturbations, such as rolling the ball up the side of the cone, the ball will eventually fall back to rest at the bottom of the cone. This is a stable system. In contrast, strategic stability during a crisis is like a ball in a cone on a tray carried by a waiter on a beach in Cancun, Mexico, while he weaves in and out of running children, bouncing beach balls, and sunbathers. In this context, it is much more likely that everything will spin out of control. This is a much less stable system.

Others challenged the idea, however, that separate theoretical frameworks were required for thinking about stability in a crisis and at peace. These thinkers drew on metaphors from different physical sciences, including chemistry, to demonstrate that a single, simple theoretical model can be used to describe very different states of the world. They, therefore, concluded that it should be possible to develop a single theoretical model of stability that applies to deterrence in both peacetime and during crises.

Indeed, one could go further and argue that not only is a single model of stability for both war and peace possible, it is necessary. As game theorists and chess masters know, a player’s first move in a competitive game is heavily shaped by his expectation about how future moves will unfold. Similarly, how states behave in peacetime is determined by their expectations about crisis initiation, escalation, and outcome. After all, we believe that one of the principal reasons for high levels of peacetime strategic stability over the past half century has been precisely because leaders in great powers have badly wanted to avoid one of the possible outcomes of great power conflict: nuclear war. Therefore, a theory of peacetime strategic stability, in order to be helpful, must be informed by a corresponding theory of crisis stability.

Others bypassed the metaphorical discussion and directly questioned the insight that a crisis resulted in greater “time dependence.” They recognized that the pace of action and reaction between actors in a crisis quickened, but were confused as to how that related to the passage of time itself. In the end, a precise definition of time dependence, how it varied in war and peace, and why different time dependencies necessitated separate theoretical models were never fully explained.

Still others questioned the value of metaphors to the task at hand altogether. Unlike physical systems, leaders can react in unpredictable ways to their environmental stimuli. As one participant pointed out, “Even the study of very large rocks, like say The Matterhorn, may be very complicated, but the mountain does not change its behavior because you are observing it - and perhaps more importantly, the mountain does not study you back.”
In the end, the COI settled on a single theoretical framework that was applicable to both peacetime and crises. As one participant humorously noted, the key insight he took from the metaphor discussions, including the lengthy discussion of the waiter in Cancun, was that he was “suddenly getting thirsty for a Corona with lime.”
MOVING FROM THEORY TO ANALYSIS

Structuring Analysis to Support Future Decisions About Nuclear Forces and Postures

Paul K. Davis, Rand Corporation

This paper presents a possible analytic structure for supporting high-level decisionmaking about future nuclear forces and postures. It identifies criteria for assessing options by: reviewing policy debates; reviewing classic criteria but adding candor about how they should be interpreted; and adjusting for modern circumstances in which nuclear weapons play a secondary but still-important role in a challenging new era. The analytic structure highlights diverse types of risk. The paper illustrates notional use of the structure, which requires identifying an appropriate set of stressful test cases—evaluations for which can be based on, e.g., models and simulations, war games, historical analysis, or structured subjective judgment by analysts or subject-matter experts. The structure deals with major uncertainties and disagreements, rather than attempting to wash away such matters. Finally, the paper identifies questions for research and analysis, and suggests analytic tools that may prove useful in this pursuit. It recommends a new approach to analysis that combines several kinds of modeling with war gaming, expert elicitation, and other sources of information. An unusual feature is making use of synthetic cognitive models to understand possible adversary reasoning in crisis, and to use such models to help structure gaming and simulation.

Introduction

This paper is a think piece developed for a DoD project, “Concepts & Analysis of Nuclear Strategy” (CANS),” requested by U.S. STRATCOM’s J-5 and executed by the Strategic Multi-Layer Assessment (SMA) activity. The challenge for the project is to reevaluate how to analyze nuclear forces and postures in an era following the “New START” agreement.\(^1\) That era will include debates about reducing nuclear forces to well below those mandated by the agreement, and for changing force postures. Analysis should play a constructive role, but—as stressed by STRATCOM in setting up the CANS study—that will mean going well beyond Cold War exchange calculations. In attempting to define a new approach, the CANS effort is developing an integrated framework paper with inputs from multiple participants and is sponsoring a variety of analytical efforts,\(^2\) of which this paper is one. In this paper I describe a possible analytic structure for analysis to support strategic-level decision-making. The structure is tied to classic strategic theory, ideas highlighted in the

\(^1\) United States Department of State (2010).

\(^2\) CAN-project efforts include a review of theory and concepts, a simulation effort by George Mason University and Carnegie Mellon University, a crowd-sourcing prototype by Monitor 360, a prototype subjective decision analysis by NSI, the current effort, and war games run by the Office of the Director, National Intelligence, and the Army, Navy, and Air Force.
Nuclear Posture Review,¹ and continuing points of controversy. The paper seeks an inclusive framework that could transcend administrations.

The paper proceeds as follows. Section 2 summarizes desirable features of an analytic structure, Section 3 identifies key variables and suggests a taxonomy within which the variables fit. Section 4 instantiates the analytic structure in a notional analysis using contrived and simplified options. Section 5 summarizes continuing issues and suggests research and analysis efforts to address them, as well as related tool development.

2. General Considerations in Structuring a Policy Analysis

2.1 General Features

Generic features of a good structure for supporting strategic-level decisions are as follows:

1. **Multiple criteria, i.e., multiple measures of effectiveness**, including multiple measures relating to risk control, with the measures being qualitative or quantitative as appropriate and—as a set—giving fair visibility to all relevant considerations.

2. **A good set of options** that includes the no-changes baseline. The set should cover the spectrum of reasonable positions.

3. **Well-chosen test cases** to evaluate options for the range of stressful circumstances needed to appreciate the options’ strengths and shortcomings.

4. **Evaluation tools**: models, structured subjective assessment methods, empirical data, and other means by which to evaluate options.

5. **Exploratory analysis under uncertainty and disagreement**, which may or may not be incorporated in risk analysis.

6. **A ”scoreboard” approach** to comparing options across the multiple criteria.

7. **Drill-down features** to view assessments at different levels of detail, thereby “explaining” higher-level assessments.

8. **Summary comparisons of effectiveness and effectiveness-versus-cost landscapes**, but as a function of strategic perspective that imply different ways of “rolling up” or “aggregating” across the multiple attributes after decision-makers have provided interim guidance based on scorecard-level discussion.

9. **The overarching FARness principle**: the principle that analysis should assist decision makers in identifying strategies providing capabilities that will be flexible enough to allow for different missions and tasks, adaptive across circumstances, and robust to shocks.

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¹ Department of Defense (2010)
2.2 Discussion

The reasons for these general features are described elsewhere.¹ The features apply to strategic-level decisionmaking rather than, say, analysis adding incrementally to the knowledge base, to more technical-level analysis on system capabilities, or to maximizing efficiency of operations. Most items may appear unexceptionable, but all are either controversial or challenging. Many analyses, for example, reduce problems to a single measure of effectiveness, as in monetizing all factors or ascribing them positions on some common value scale. Developing good options is notoriously difficult because organizations often put forth only options reflecting current practices or desires. The test cases used are often committee-generated scenarios that have not been designed well for insightful analysis amidst multiple criteria, uncertainty, and disagreement.² Tools for assessing options are always controversial and it is common to use some tools (e.g., computer models) but not others that would add further dimensions of information. Although uncertainty is commonly mentioned, true exploratory analysis across the full range of uncertainties and disagreements remains rare, despite major advances in the ability to do such work.³ The scoreboard approach is ubiquitous, whether in consumer magazines or in Pentagon briefings with stop-light charts, but the basis for the evaluations within them is often mysterious. While summary effectiveness, cost-effectiveness ratios, and effectiveness-versus-cost charts are common, it is less usual for decisionmakers to be shown how those depend on assumptions about which there are major disagreements.⁴

Finally, the FARness principle is radical in many respects. In particular, it contradicts the common notion that analysts’ jobs are done if merely the policymakers acknowledge and understand the assumptions on which the analysis was based.

¹ The list is rooted in early systems analysis and policy analysis at RAND (Kahn and Mann, 1957; Fisher, 1971; Goeller, 1983; Quade and Carter, 1989) and elsewhere (Hammond, Keeney, and Raiffa, 2002; Morgan and Henrion, 1992; Saaty, 1999), but has a richer treatment of uncertainty and disagreement, as well as drill-down explanations. The approach has evolved over time, helped motivate capabilities-based planning (Davis, 2002), and has been applied in defense planning (Davis, Shaver, and Beck, 2008; Davis et al., 2010), grand strategy (Davis, Gompert, Johnson, and Long, 2008) and border security (Willis, Predd, Davis, and Brown, 2010).
² See also Davis (2002). How to develop a good “spanning set” of test cases has been illustrated elsewhere (Davis et al., 2008; National Academy of Sciences, 2008).
³ Sensitivity analysis changes assumptions one by one. Exploratory analysis examines how results change for all combinations of changes—i.e., it explores the entire possibility space. This is especially important when no baseline case is reliable and when important variables are correlated, as when an adversary exploits multiple vulnerabilities simultaneously, or when effectiveness depends on all of the critical components of a system working. Exploratory-analysis methods encourage seeking flexible, adaptive, and robust capabilities (Davis, Bankes, and Egner, 2007; Davis, Kulick, and Egner, 2005; Davis, 2002). To use slightly different language, it encourages what colleagues call robust decision making (Lempert, Groves, Popper, and Bankes, 2006) and seeking agility in capability (Alberts, forthcoming).
⁴ Aggregate effectiveness depends on how lower-level evaluations are combined. There may be disagreements about, for example, the relative importance of short term and long term, whether threshold levels of component capability are required, and whether an option will do what it advertises or the opposite. A summary depiction should therefore highlight how results vary across points of view (“strategic perspectives”). The mathematics and a related tool are discussed elsewhere (Davis and Dreyer, 2009).
• The FARness principle admonishes analysts to discuss risks and show how
to hedge in various ways, which will typically produce a much stronger
strategy than when uncertainties are given short shrift.

The next section is an attempt to identify what the criteria should be and how they can be
organized with respect to each other.

3. Identifying and Organizing the Criteria for Evaluation

3.1 Approach

The intent here is to be relatively comprehensive in identifying criteria and related
variables, although—in any given study—a smaller subset of criteria might suffice. The
following subsections use three tacks in identifying criteria: (1) looking at what
policymakers talk about; (2) looking at classic variables of “strategic nuclear” analysis, but
amending them to deal more candidly with issues; and (3) adjusting for the current era in
which military affairs are dominated by conventional forces with precision weapons, but in
the ominous shadow of nuclear weapons in the hands of unpredictable rogue states,¹ and
with China’s having already achieved great-power status in East and Southeast Asia.²

3.2 Understanding Policymaker Considerations

If analysis is to be helpful to decision makers, it must deal with the issues and variables
salient to them. It is therefore useful to review briefly the primary issues arising in debates
about nuclear strategy and policy. At the price of oversimplification, it is possible to
contrast two stylized policy-level stances that bound the range of views.³ These stances are
“stylized” in that the views of individual strategists are often more nuanced and combine
elements of both.

Stance 1

• Nuclear weapons are useless except for deterring nuclear (and perhaps biological-
weapon) use by others.
• Nuclear weapons are also unnecessary, except for nuclear deterrence, because of
precision conventional weapons and the major advantage in such capabilities
enjoyed by the United States.
• It is in the U.S. interest to pursue the course of nuclear disarmament (to which it is
also obligated by international agreement), because progress on such a course can

¹ A current effort led by C. Ryan Henry under RAND’s Project Air Force is addressing such issues (Henry et al.,
2011).
² See a new occasional paper on new challenges for defense planing(Davis and Wilson, 2011).
³ The ideas can be found in a small number of documents, notably the Nuclear Posture Review (Department of
Defense, 2010), an excellent compendium of competing essays (Perkovich and Acton, 2009), a cautionary piece
drawing on history (Payne, 2011), and two influential OpEds (Schultz, Perry, Kissinger, and Nunn, 2007; Shultz,
Perry, Kissinger, and Nunn, 2008). An older document is a good source of historical material on U.S. nuclear
strategy (Kunsman and Lawson, 2001).
reduce the risk of nuclear war, encourage nations to forego or reverse nuclear
weaponization, and encourage other nations to support and enforce the
nonproliferation treaty (NPT). Without pursuit of nuclear disarmament, further
progress on nonproliferation is unlikely.

- Nuclear deterrence can very probably be achieved with a small number of nuclear
  weapons (e.g., tens or hundreds) and, if nuclear deterrence fails (which some
  believe it will, eventually), the consequences will be less catastrophic in a world
  with fewer nuclear weapons.
- International agreements with respect to nuclear weapons, even at low numbers,
  can be adequately verified.
- If necessary, nuclear weapons could be redeployed, a deterrent to nations that
  might otherwise attempt to cheat on agreements and contemplate breakout.

**Stance 2**

- Nuclear deterrence has been a major, historically unprecedented factor in avoiding
  major wars since 1945.
- Deterrence is multifaceted and depends on the actors, individuals, circumstances,
  and other mysterious considerations. It may require large numbers of nuclear
  weapons (thousands).
- Conventional weapons do not substitute adequately in deterring aggression
  because they are much less destructive than nuclear weapons. Moreover, U.S.
  conventional-force advantages are highly situation dependent and sometimes
  nonexistent.
- The nuclear-weapon balance affects important perceptions of national strength
  and foreign affairs—in peace, crisis, and wartime.
- The perceived balance of nuclear weapons can be very troublesome domestically.
- Other nations' nuclear decisions will reflect their own interests of security,
  influence, and domestic politics. Further U.S. and Russian reductions would not
  affect those other nations’ calculations positively but rather would create
  incentives for nuclear buildups. Nor, except in rhetoric, would such reductions truly
  improve willingness of other nations to enforce provisions of the NPT.
- Reducing to low numbers of nuclear weapons would make verification of
  agreements infeasible and magnify benefits of successful cheating.
- Re-establishing nuclear forces after adversary breakout would be difficult and time
  consuming because of the loss of capabilities, know-how, and organizational
  prowess. Risks could be high during the catch-up period.

These dichotomous stances include numerous assertions, which depend on assumptions
that cannot possibly be correct in all instances. For example, it may well be that nuclear
weapons will seldom play much of a role in deterring aggression, but is that always true?
For all kinds of aggression? Everywhere? Also, while it is surely true that conventional
weapons can sometimes substitute for nuclear weapons in war fighting, is it not important
to understand when? Table 2 lists some analytic questions in this spirit, suggesting by its form that research and analysis “ought” to be able to narrow the disagreements represented by the two stances.\(^1\)

**Table 2**

**Analytic Questions Motivated by Policy-Level Disagreements**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Some Dimensions of “When”</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>When</em> are nuclear weapons important for deterring or reversing conventional aggression, or as part of compellence?</td>
<td>Actors in the crisis or conflict (real or virtual)</td>
</tr>
<tr>
<td><em>When</em> is deterrence affected by the number and posture of U.S. nuclear weapons?</td>
<td>Related geography</td>
</tr>
<tr>
<td>If other states contemplate deploying nuclear weapons, <em>when</em> do they see them as important for deterrence or compellence?</td>
<td>Related conventional capabilities</td>
</tr>
<tr>
<td><em>When</em> are various measures of U.S. nuclear forces and posture important to assuring allies so as to dissuade them from becoming nuclear-weapon states?</td>
<td>Absolute and relative nuclear capabilities</td>
</tr>
<tr>
<td><em>When</em> can conventional weapons substitute for nuclear weapons in strategic targeting?</td>
<td>Stage of crisis and conflict</td>
</tr>
<tr>
<td></td>
<td>Recent and past events, leadership behaviors, and apparent trends</td>
</tr>
<tr>
<td></td>
<td>The closeness of cultures and political partnerships</td>
</tr>
<tr>
<td></td>
<td><em>Objective</em> U.S. interests, the necessity of it honoring commitments</td>
</tr>
<tr>
<td></td>
<td>The military tasks at issue (e.g., different target classes)</td>
</tr>
</tbody>
</table>

3.2 Tapping the Classic Concepts

3.2.1 Sources

Other sources for criteria to be used in an analytic structure are official documents from the Cold War and related scholarly literature, including books and articles by previous officials, which are often more nuanced and informative than purely academic materials. This paper is not the place for a review of such material,\(^2\) but what follows attempts to

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\(^1\) The primary limitations in conventional weapons are three: (1) they are not sufficient to attack hard deeply buried targets (National Research Council, 2005) or hard targets with actual locations that are hidden or misrepresented by deception; (2) absent long aerial bombing campaigns with large conventional weapons, they are not very useful for “area” targets; (3) they do not devastate or terrorize to the same extent as nuclear weapons. Some of these points have been made elsewhere (Colby, 2010; Payne, 2011).

\(^2\) For core ideas, see George and Smoke (1974). Early papers by James Schlesinger are well worth reading to understand how thinking changed after the United States had lost its nuclear monopoly and had to worry about more complex versions of both conventional and nuclear deterrence, as well as nuclear proliferation and arms control (Schlesinger, 1968; Schlesinger, 1974b). Some of the considerations are quite relevant again. Good summaries exist on the concepts emerging from work of three administrations in the period 1969-1980.
address the major elements of classic nuclear strategy. It also includes rather specialized citations to material that is often overlooked.

3.2.2 Increasing Candor

Reviewing the classic concepts can be puzzling to a careful reader because of a long-standing absence of candor on such issues, particularly in official documents. This can adversely affect analysis by omitting important considerations or, worse, by having analysis depend on deeply buried assumptions. I see some of the more important subtleties as follows:

Strategic stability, if interpreted literally, is only sometimes desirable. Today’s Arab Spring movements seek to overturn dictators and, it is hoped, to move toward democracy. That would surely be better than stasis. We should also acknowledge that the United States has on numerous occasions intervened to promote regime change militarily (e.g., Nicaragua, Afghanistan, Iraq) or diplomatically (e.g., Philippines, current-day Libya). Thus, stability per se is not really a top-level objective.¹

Deterring War or Big War? Where strategic stability is sought, the intent is to avoiding not just large-scale conflict, but also smaller acts of aggression and coercion. It is this increased scope that has made deterrence so challenging from the 1960s onward.²

Crisis Stability? In the event of crisis, the United States would actually prefer to have escalation dominance, so as to have maximum leverage in influencing an adversary. However, it also wishes to avoid first-strike (or first-military-action) instability and to avoid inadvertent escalation. It is true that the feasibility of escalation dominance against the Soviet Union largely vanished as the Soviet Union deployed large numbers of sophisticated nuclear weapons, but in today’s world, crisis may involve a mix of major powers, middle-level powers, and limited-capability rogue states. The relevant objective, then, might be escalation dominance or crisis stability, depending on details.³

And if deterrence fails? In most crises and conflicts, the United States will seek to win, whether by compelling an adversary to reverse an aggression, by imposing regime change,

¹ See Chernus (2011) for historical difficulty in decoding “stability.”
² Herman Kahn was particularly influential in demonstrating the folly of imagining that nuclear strategy could be restricted to all-or-nothing thinking. Limited actions have always been part of the repertoire of aggressors (Kahn, 1962).
³ Whether to stress escalation dominance or crisis stability was been a matter of fierce debate for decades. For contrasting views, see Kahn (1966) and Freedman (2003a, p.390).
or in some other way. In the special case of nuclear war, damage limitation and recovery potential might be extremely important and meaningful, and even a kind of victory (although this is quite doubtful for an all-out war between nuclear powers). Thus, it is not sufficient to bank exclusively on the success of deterrence in the abstract. Nor is it sensible to rely entirely on non-military instruments of influence, as important as those are.

Larger aspects of foreign policy. Some of the most important factors in evaluating future nuclear-posture options will be the anticipated effects on other foreign-policy matters such as controlling the proliferation of nuclear weapons and encouraging “a process toward” nuclear disarmament.

Assurance of allies. Assurance of allies is crucial, since alliances are fundamental to America’s grand strategy and the U.S. has sought to dissuade allies from developing their own nuclear-weapon capabilities. The U.S. attitude on this has probably been due to a combination of considerations. First, it is commonly believed that allied military nuclearization would feed more general proliferation and instability, and is therefore undesirable (although exceptions have been accepted, most notably with Israel in the 1960s). Second, the United States arguably benefits from having strategically important allies dependent on the United States for their security. Although allied assurance might logically be seen as a mere consequence of maintaining certain military capabilities and policies, rather than an end in itself, the reality is that assurance also depends heavily on perceptions and psychology, which can be affected by what are seen as negative trends, despite arguments against such interpretations. Foreign perspectives about the significance of nuclear weapons and related balances are highly complex, and are partially rooted in national histories.

Managing Risk. It is not sufficient that the “best estimate” of an option be favorable or at least tolerable; policymakers also need confidence that risks are tolerable (i.e., that the

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1 In the only full-up nuclear crisis during the Cold War, assessments of who would “win” a nuclear war (and, therefore, who would blink first) were prominent within both U.S. and Soviet governments, although Kennedy and Khrushchev rose above such assessments in finding a way to avoid war. Deterrence worked and sanity prevailed, but the world came much closer to actual war than was recognized at the time or for many years thereafter Dobbs (2008). By the 1970s, the U.S. found it necessary to contemplate limited versions of nuclear war, such as might occur if the Warsaw Pact invaded NATO and NATO resorted to limited nuclear use to re-establish deterrence. Making the deterrent threats credible was not just a theorist’s game, but something in which NATO’s policy makers invested substantially (Legge, 1983). This said, from the 1960s onward, most policymakers recognized that “victory” in large-scale nuclear war would probably be less than meaningful, although precluding the Soviet Union from imagining that it could win was very meaningful. That led to the countervailing strategy (Slcombe, 1981). Early in the Reagan administration, some U.S. policymakers sought the capability to “prevail” in war (Freedman, 2003b, p.388), although this, as well as the strategic defense initiative (SDI), was intended as a way to strengthen deterrence rather than as expression of enthusiasm for war fighting. The language of “prevail” was extremely controversial and was eventually softened.

2 This is probably necessary but not sufficient. Despite U.S. capabilities, allies might not be assured because of doubting the resolve of U.S. leaders, because of misperceptions, or because of various failures of diplomacy. For discussion of assurance, see the recent paper by colleague Ely Ratner (Ratner, 2011). See also a full study on foreign attitudes (Dunn, Giles, Larsen, and Skypek, 2006).
actual consequences of the option will not be much worse than nominally assumed). For example, even if assessments are sanguine when based on standard scenarios of crisis and war, there may be good reason to worry about more troublesome scenarios. Perhaps even rational adversaries will not reason as we expect, perhaps escalation will be inadvertent, or perhaps some adversary leaders might prefer a “glorious,” “courageous,” or vengeful ending rather than one good for their country. Substantial risk also exists when projecting outcomes of conventional war. During the Cold War, U.S. strategic nuclear planning was extremely risk averse—much more so in some respects than that of the Soviets or Chinese (neither of whom emphasized bolt-from-the-blue scenarios in which many nuclear forces would be especially vulnerable). Today’s public discussion of the era beyond New Start is remarkably sanguine in comparison because the world is, at least for now, profoundly different.2

Political stability. Another crucial issue for U.S. policymakers is that the American public perceives that a course of action is sound. When that condition is not met, the domestic political scene can be quite troublesome. Out-of-office political candidates routinely attempt to paint incumbent policies as weak and dangerous, as illustrated by historical political campaigns decrying the alleged “Missile Gap” (1960) and “Window of Vulnerability” (1980). Because of this dark side of politics, Cold War policymakers sought to assure both the reality and perception of “strategic equivalence,” even when that meant highlighting dubious measures of the strategic-nuclear balance.3 In today’s world, a comparable concern might correspond to maintaining both real and perceived strategic equivalence with Russia and China, and manifest superiority over other states. Or perhaps this would not be good enough. Perceptions might be quite averse if arms control brought about parity with China, after years of China having been satisfied with a lesser status.4 Would parity be perceived as acceptable with India, Pakistan, North Korea, and Iran? And would any of those states accept permanent status at less than parity? The point in this paper is merely to flag an important criterion, not to take a view on what would or should be acceptable. It may be that the concerns mentioned will not have resonance in modern public debate.

1 This discussion uses the standard meaning of risk, which essentially refers to the likelihood and consequences of events worse than expected. We don’t expect an earthquake tomorrow, but we may buy insurance to reduce our economic risk. We may expect that the military balance will be somewhat more adverse in a region under a given force posture, but it is a separate matter to recognize that consequences could prove to be much worse than expected.
2 There have been some more cautionary discussions (Miller, 2009; Payne, 2009; Payne, 2011).
3 See Betts (1981).
4 It has long been noted (and repeatedly demonstrated in psychological experiments associated with “Prospect Theory”) that people hate “giving up” something they possess, whether or not their feelings on the matter are rational. Moving from superiority to parity might be felt as a loss, with repercussions for politics. An analogue might be the question sometimes asked “Which would you prefer over the next ten years for the United States relative to our primary economic competitor: that the U.S. growth rate is 3% and the competitor’s is 6%, or that both growth rates are only 2%?” Many focus on relative growth.
**Flexibility in crisis and war.** In the real world, policy makers in crisis and conflict are constantly looking for flexibility in how they can address challenges. This may mean changing the nature of a coercive threat, finding an acceptable way out for the adversary, executing a limited attack to reestablish deterrence or improve compellence, or changing approach when previous strategy has failed. Regardless of what some deterrence theorists might argue for in peacetime, no President has wanted to be left only with options depending on willingness to commit mutual suicide or moral atrocities. It is for such reasons that Cold War deterrence by threat of mutual destruction has often been recognized as a condition (i.e., a fact of life) rather than as a strategy.

**Executability and sustainability.** Yet another underdiscussed issue is that an option needs to be executable and sustainable. The problems that arise in this domain include motivating top-notch personnel to serve in the nuclear forces and to maintain extremely high operational standards when doing so. Various technical and operational issues also arise in seeking to maintain extreme weapon-system reliability and survivability despite severe restrictions on testing and deployment posture. Still other considerations include the political viability of an option. During the 1970s, for example, the Department of Defense spent a great deal of effort—over three administrations—studying concepts for survivable ICBMs, including multiple aim-point systems. Although the best of those options was attractive to many analysts and won out within the Carter administration, it was eventually dismissed by President Reagan in significant part because of strenuous objections by the governors whose states would be affected (Utah and Nevada). Remarkably, the result was to deploy the Peacekeeper ICBM (previously MX) in silos—thereby exacerbating the crisis-stability problem and leading to increased embrace of launch-under-attack tactics, which had been anathema for many years to most of those contributing to nuclear strategy.

### 3.3 Adjusting for the Current Era

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1 For discussion in the Nixon administration, see (Burr, 2005). Secretary of Defense James Schlesinger discussed such matters compellingly in the Ford administration (Schlesinger, 1974a). In the Carter administration, Secretary of Defense Harold Brown developed the countervailing strategy, which emphasized the ability to cope with diverse circumstances and adversary beliefs (Brown, 1983; Slocombe, 1981). President Reagan introduced the Strategic Defense Initiative (SDI) because he regarded dependence on assured-destruction deterrence to be fundamentally unacceptable (Skinner, Anderson, and Anderson, 2001). See also, e.g., a famous article by Fred C. Iklé (Iklé, 1973) and a later study on discriminate deterrence (Iklé and Wohlstetter, 1988). For both moral and pragmatic reasons, U.S. nuclear-force commanders have often emphasized the importance of flexibility in U.S. nuclear capabilities and posture.

2 These issues came to the forefront in recent years due to mishaps in the handling of nuclear weapons that led in 2008 to Secretary Robert Gates asking for the resignations of the Secretary of the Air Force and the Air Force Chief of Staff.

3 The classic argument favoring the Triad of intercontinental bombers, ICBMs, and SLBMs was based on concerns about common-mode technical failures (e.g., all SLBMs or all ICBMs failing because of an echnical problem common to all of them) and hedging against threats to one or another Triad component.

4 See the discussion of General Lee Butler, the first Commander of U.S. STRATCOM, which expresses anguish about the dangers of the nuclear posture during his period of command—due in part to the launch-under-attack strategy Schell (1998) (as cited by Bruce D. Blair at http://www.cdi.org/blair/launch-on-warning.cfm). For a nuanced and technical discussion of launch-under-attack issues, see (Carter, 1987).
3.3.1 Recognizing Classes of Challenge

The special challenges of the current era are considerable, although some had Cold War precedents. Reviewing the special challenges is helpful in defining stressful test cases for evaluating options on forces and posture, as illustrated in Section 4. Table 3 summarizes some different classes of "special challenge" and speculates about the form that analysis might take and sources of information. Most of the methods are familiar; the method of synthetic cognitive models will be discussed later, in Section 5.

---

1 A recent paper (Davis and Wilson, 2011) describes the substantial challenges facing U.S. defense planners, challenges stemming from the "democratization of military technology," geostrategic changes, new theaters of warfare (space and cyberspace), continued nuclear proliferation, and the need to plan for both traditional missions and counterinsurgency. It sees profound difficulties for force projection and does not accept the common claim that the United States can accomplish its objectives with conventional weapons. The paper makes no claims about nuclear forces helping in this regard; rather, it argues that the conventional "balance" will not be nearly so favorable as often asserted.
<table>
<thead>
<tr>
<th>Class of Challenge</th>
<th>Examples</th>
<th>Relevant Analytic Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Balance of Power</td>
<td>US/China, US/Russia; US/China-Russia; US and Allies/China/Russia/India/Pakistan</td>
<td>Bean counts Survey methods</td>
</tr>
<tr>
<td>Regional Balance of Power</td>
<td>Iran/Israel; Iran/Rest of Middle East</td>
<td>Bean counts Survey methods</td>
</tr>
<tr>
<td>Strategic and Crisis Instability: limited provocation or aggression</td>
<td>Chinese seizure of possibly oil-rich islands, followed by military confrontation</td>
<td>War games Agent-based models and other simulations Synthetic cognitive models Subject-matter experts History</td>
</tr>
<tr>
<td>Crisis Instability: collapse of a rogue state with nuclear weapons</td>
<td>North Korean collapse, perhaps with South Korean and/or Chinese forces entering</td>
<td>War games Agent-based models and other simulations Synthetic cognitive models Subject-matter experts History</td>
</tr>
<tr>
<td>Indirect aggression</td>
<td>Vigorous Iranian support of regional irregular-warfare actions, via Hamas and Hezbollah, with military confrontation arising with Israel or other Middle Eastern countries and their ally, the United States.</td>
<td>War games Agent-based models and other simulations Synthetic cognitive models Subject-matter experts History</td>
</tr>
<tr>
<td>Based in part on the above, the credibility of U.S. defense commitments</td>
<td>Would the U.S. really risk annihilation of an American city in order to ____</td>
<td>War games Agent-based models and other simulations Synthetic cognitive models Subject-matter experts History</td>
</tr>
</tbody>
</table>

### 3.3.2 Rethinking Targeting “Requirements”

Another adjustment may be necessary for the current era. Throughout the Cold War, strategists believed that the ability to devastate the adversary's society was at the core of nuclear strategy—even though policymakers went to great lengths to have more limited options. In the 1960s, the “requirements” to achieve essentially complete destruction (or at least to reach the analyst’s knee of the curve) were estimated at about 400 equivalent
megatons, which might have amounted to 2000-4000 smaller-yield weapons.\(^1\) Although it was recognized that the prospect of losing even one major city might well be enough to deter, the “requirement” was nonetheless part of the nuclear-strategy story for many years thereafter.

Similarly, separate Cold War targeting options existed for attacking conventional military forces, nuclear-threat forces, and war-supporting industry. A “lesser” option, for example, might seek to destroy the adversary’s ability to project and sustain conventional forces. The number of weapons needed for each such option was well understood by analysts, who could even use easy rules of thumb for such matters and rationalize the “requirement” for thousands of nuclear weapons. The “requirements” increased as worst casing was extended to include some or all of: bolt-from-the-blue attacks with no launch-under attack, independent requirements on each leg of the nuclear Triad, very high damage-expectancy levels, very high certainty about those damage-expectancy levels, and inclusion of some marginal-value targets in target lists.

The Cold War notions of requirements were overdone, but there is need for some quantification of today’s needs. Rough, unclassified, estimates are needed about “how much is enough?” for various targeting missions of nuclear forces, or for mixes of nuclear and conventional forces. Arguably, what is needed is discussion somewhat along the lines suggested by Table 4—although the numbers in Table 4 have no basis in actual data aside from modest linkage to assured-destruction capabilities estimated in the 1960s and casual observation of the number of precision weapons used in recent wars such as that in Iraq (as of 2011, Boeing had built more than 200,000 tail kits for the JDAM munition alone, and news reports indicate that roughly 20,000 precision weapons were used in Iraq).\(^2\)

If Table 4 happens to be even very crudely accurate, then:

- Dozens or hundreds of arriving nuclear weapons would suffice for attacks against a given large nation’s cities, or its economic value, respectively.
- Large-scale countermilitary attacks (i.e., against conventional forces) against large countries, if desired, might require a thousand arriving nuclear weapons per large country.
- Counter nuclear-threat attacks, if desired, might require thousands of nuclear weapons, depending on the number of targets, the ability to locate them, and the possible need to use of numerous weapons per site against hardened, deep-underground targets with unknown configurations or for barraging deployment areas. Even with large numbers of weapons, however, counterforce prospects might be quite poor except in a surprise first strike, and perhaps even then.

---

\(^1\)These estimates were published, and indeed were intended for public discussion (McNamara, 1969; Enthoven and Smith, 1971).
\(^2\)See Boeing (2011).
• It might take several times more deployed nuclear weapons, depending on assured survivability of forces and assumptions about degrees of alert, as well as about reliability and strategic defenses (if any).

• Reserve requirements might be substantial in a world with multiple nuclear-armed potential adversaries. It should be noted that much of the arsenal could be depleted in an attack on one adversary, with the result being an adverse balance (at the number level) with other nations.

• Although precision conventional weapons can surely substitute for nuclear weapons in some cases, they are poorly suited for “area targets,” hard and deeply buried targets, and even hardened point targets if target locations have been hidden or mischaracterized because of adversary deception. Further, the ability to deliver large numbers of such weapons would be adversely affected by distance, air defenses, and the limited number of delivery platforms (a far cry from the numbers in World War II or the Korean war).

Perhaps these estimates are quite wrong. Also, the actual “requirements” would depend not only on the targeting options seen as necessary by policy makers, but also on policy judgments about how much is enough. My intent here is to flag the importance of understanding the rough numbers, not prejudging what policy makers will or should conclude about requirements. After all, the need for and appropriateness of the options contemplated in Table 4 can be regarded as other-worldly. It is notable that some of the strongest proponents of the process toward nuclear disarmament are stalwarts of national-security policy making such as George Shultz, Henry Kissinger, and Sam Nunn.¹

¹ See Schultz et al. (2007; 2008).
Table 4
Notional Weapon Requirements from a Purely Hypothetical Study

<table>
<thead>
<tr>
<th>Task</th>
<th>Arriving Nuclear Weapons</th>
<th>Arriving Nuclear and Conventional Weapons in Mixed Attack</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nuclear</td>
</tr>
<tr>
<td>Annihilate 5 cities and their populations</td>
<td>5-25&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5-25&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Destroy economic value of 5 cities</td>
<td>5-25</td>
<td>N.A.</td>
</tr>
<tr>
<td>Destruction of a society</td>
<td>500&lt;sup&gt;c&lt;/sup&gt;</td>
<td>100</td>
</tr>
<tr>
<td>Destruction of a society's economic value</td>
<td>500&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0-10</td>
</tr>
<tr>
<td>Destruction of two large-country's societies</td>
<td>1000</td>
<td>200</td>
</tr>
<tr>
<td>Destruction of two large-country's economic value</td>
<td>1000</td>
<td>0-20</td>
</tr>
<tr>
<td>Destroy adversary's conventional military infrastructure and forces</td>
<td>1000</td>
<td>100</td>
</tr>
<tr>
<td>Destroy two large-adversary conventional military infrastructures and forces</td>
<td>2000</td>
<td>200</td>
</tr>
<tr>
<td>Destroy adversary's nuclear-threat systems</td>
<td>10-1000s (if feasible at all)&lt;sup&gt;d&lt;/sup&gt;</td>
<td>10-100s (if feasible at all)</td>
</tr>
<tr>
<td>Maintain strategic reserve for post-exchange deterrence, coercion, and follow-on attacks—of both the immediate adversary and other nations.</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

a. The number of deployed weapons required might be several times larger than those shown in the table, depending on the ratio of alert and nonalert weapons, inherent survivability of deployed weapons, reliabilities, and strategic defenses.
b. The number would depend on the size of cities, extent of damage required, and weapon yields. The assured-destruction “requirement” from the 1960s was 400 delivered equivalent megatons (EMT), or roughly 2000 100-kT weapons.
c. This assumes that most targeted areas can be destroyed by a 100-kT weapon. That was the case for Cold War targeting of Soviet cities, but not for Soviet targeting of U.S. cities.
d. This depends on the adversary and launch facilities being targeted. Feasibility is very much in question for conventional weapons (National Research Council, 2005), and with nuclear weapons, in the absence of exquisite intelligence. The radioactive fallout from such nuclear attacks could be large for attacks on deep underground targets (although much smaller than from surface bursts because of the smaller yields necessary), and would travel to other countries.
3.3 Rethinking the Sub Cases and Measures for Analysis

Another aspect of rethinking analysis will be to reassess for what sub cases nuclear forces should be evaluated. Even for the simple Cold War calculation with only two parties (U.S. and Soviet Union), the result was a sizable combination of sub cases, reflecting who would launch the first attack, the alert posture of both sides, whether launch under attack was executed, and the targeting strategies of all concerned (i.e., countermilitary, counterforce, full-up assured retaliation...). In some periods, the analysis also included effects of strategic defenses—in intercepting some attackers and in creating additional target requirements.

The measures of effectiveness used in analysis varied, but included paying attention to the number of nuclear weapons surviving at each stage of simulated conflict, the damage accomplished by attacks, and—in some analyses—such consequence as human fatalities and long-term problems associated with radiation and effects on climate. Many of these were controversial because, depending on assumptions, it was possible to convey remarkably different impressions about whether U.S. forces were adequate or inadequate, highly vulnerable, or highly secure. There is no reason to review the issues here except to make some points that may be relevant to the future as well:

- The primary threat to crisis stability may be “dangerous ideas” triggered or exacerbated by fear, paranoia, desperation, or a sense that there might be glory and heavenly or historical honor in annihilating large numbers of people.

- The measures of crisis stability that have been used in analysis have been mathematically elegant, but of dubious relevance to decisionmakers. Some measures used in debate (e.g., post-exchange ratios of ICBM weapons) have been demonstrably bad “decision aids,” in the sense of presenting a distorted view of the power balance (see previous reference).

- Counterforce strategies, and even first strike counterforce strategies, will inevitably be relevant in crises in which the adversary could plausibly be disarmed of nuclear weapons. The splendid-first-strike option vanished in the 1960s, but could reemerge in modern settings. Indeed, over the last fifteen years, the idea of (conventional) attacks to disarm North Korea and, more recently, Iran, has arisen repeatedly.

- Countermilitary strategies designed to preclude the adversary from having usable projection forces, and perhaps to destroy its security apparatus, will continue to be important.

- As discussed above in Table 4, conventional weapons can sometimes substitute for nuclear weapons, but the extent to which that is true is not yet understood technically or strategically. Further, the ability to deliver massive conventional-
weapon attacks will certainly be in question for some conceivable situations. Indeed, U.S. force-projection capabilities face high challenges generally. 

3.4 A Proposed Analytic Structure

3.4.1 A Taxonomy of Criteria

Against this background, Figure 1 shows a suggested top-level structure that seems to cover the above considerations adequately. The higher-level terms are defined in Appendix A. Items in parentheses will subsequently be omitted (i.e., taken for granted). The intent, then, is to evaluate options against all the criteria shown, but in a spanning set of test cases stressing the force structure and posture in diverse ways across the possibility space. These may be seen as virtual crises and conflicts that are unlikely to occur but that may affect perceptions. In normal parlance, the test cases would be referred to as scenarios. Thus, an option would be deemed very good if it contributed well to achieving or maintaining the objectives above in all of the spanning set of test cases.

Figure 1
A Structured Set of Objectives and Enablers

3.4.2 Relationships to Other Concepts

Deterrence. Some familiar terms do not appear explicitly in Figure 1, terms such as persuasion, dissuasion, deterrence, and influence more generally. If the objectives shown in Figure 1 are achieved, then it may be in part because efforts to persuade, dissuade, deter, and influence worked. However, many factors typically affect the actions of nations. A state that foregoes aggression may simply not be motivated to be aggressive, with coercive diplomacy having played no part. That state may never have considered aggression or may have dismissed such ideas for reasons of morality, self image, or political and economic self interest. The same is true for states that choose not to develop nuclear weapons. They may

1 This is discussed in Davis and Wilson (2011).
be persuaded, dissuaded, or deterred by others from such a course, but they may instead have simply judged such weapons to be unnecessary and the pursuit of them inappropriate or foolish.¹

**Flexibility.** Another term that does not appear explicitly in Figure 1 is flexibility, but that is an important attribute of the “capabilities” indicated at the bottom of the figure. It can be measured by the ability of nuclear forces to execute a diverse range of missions (including perhaps those in Table 4 or some updated concept) in a diverse set of scenarios. Another consideration in flexibility is being able to minimize collateral damage, i.e., the capability for discriminate attacks (even nuclear weapons can be used more or less discriminatingly).

A brief comparison of the structure suggested here with the suggestions of other authors suggests that the structure is indeed rather comprehensive, although not always explicit on the same points as made by other authors.²

4. An Illustrative Instantiation

4.1 Setting Up the Analysis

Applying the analytic structure will require substantial work, but what follows sketches higher-level aspects of a purely notional analysis.

Let us assume that the “substantial work” mentioned above has included:

- Identifying an appropriate spanning set of test cases (scenarios) by which to evaluate options for force structure and posture. As a set, these tests should stress the options in all the ways necessary to assess capability to accomplish the various objectives of interest. Developing a meaningful test set is much more demanding analytically than is sometimes realized because results depend on many variables. Further, how stressful the tests should be must reflect iterations with policymakers. Details on the degree of stress will drive conclusions.

- Decomposing each of the test cases into the many sub cases implied by different assumptions about who attacks whom first, what alert postures apply, and so on.

- Deciding upon measures of effectiveness within the various criteria of the structure.

- Identifying the primary points of analytic uncertainty, so as to define the range of exploratory analysis needed (much of it in background).

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¹ An early example was Sweden’s backing away from developing nuclear weapons in the 1970s. The reasons included Sweden’s self image, as well as a belief that the U.S. extended deterrent to NATO effectively protected Sweden as well (Cole, 1994).

² Elbridge Colby lists seven requirements: to deter aggression against U.S. vital interests; to size and shape forces according to what is needed to deter; to maintain ability to hold an opponent at risk wherever he goes; to assure devastating second strike capability; to maintain and improve limited and discriminate options; to maintain a secure reserve force; and to minimize the destabilizing aspects of U.S. forces (Colby, 2011).
• Identifying the primary points of strategic disagreement, and aggregating those into a minimum set of conflicting strategic “perspectives” (assumed to be just two in what follows).

On the latter point, it should be noted that it is not necessary to list every possible combination of assumptions as a different perspective. In practice, considering even a minimal set of stylized perspectives (an analytic analogue to the “stances” discussed earlier in the paper) can be powerful in clarifying issues and opening minds in strategic-level debate. Further, doing so can encourage the search for options that will hedge in various ways when it is not certain which perspective will prove more nearly “right.” The core intent here is to break away from the tyranny of the best estimate (or the estimate by the most powerful faction).\(^1\)

With these heroic assumptions about analytic background work, the next section illustrates how results might be discussed in a decision-support context using the multiple higher-level criteria of Figure 1 and two perspectives corresponding roughly to the relatively more optimistic and skeptical views of further nuclear force reductions and a process working toward total disarmament. I assume that all relevant decisionmakers accept the policy that emerged from the most recent nuclear posture review, but that the optimistic versus skeptical perspectives will still be very much in play, independent of political administration, as the nation goes on to contemplate future proposals for force structure, posture, and arms control.

4.2 Illustrating Decision Support

To illustrate what displays might look like, imagine a set of options under consideration that include:

A. the baseline (the future force and posture consistent with decisions already made)
B. a reduction to 300 nuclear weapons with only minimal verification
C. the same reduction but with good verification provisions (by the standards of arms control, which seldom allow no-notice, anywhere-type inspections);
D. Option C, but with a substantial deployment of additional conventional global-strike weapons
E. Option D plus deployment of hypothetically excellent defenses that are quite effective for regional purposes (e.g., defense of allies and U.S. forward-deployed forces), and effective against very small and relatively unsophisticated attacks on the homeland.

\(^1\) My colleagues and I discussed such issues in connection with decision science’s implications for decision support (Davis et al., 2005), drawing in part on our review of historical errors by national-level decisionmakers in crisis. That review was never published because as it became ready for review and publication, the United States was reeling from the surprising developments of the Iraq war. The work would have inevitably been seen as “political” because some of the classic (and Party-independent) problems had been in evidence during the prewar deliberations.
F. The baseline plus the defenses assumed in Option D.

In practice, there would be innumerable details to specify, but the intent here is purely illustrative. Figure 2 then shows what the top-level summary assessment might look like. Although the scores shown have no basis whatsoever in serious analysis, and could be completely wrong, they reflect a hypothetical story. In this story, even the baseline situation does not look very good in some respects and a weakly constructed reductions agreement (Option B) would make things worse. The shortcomings could be reduced with better verification (Option C). Adding more global strike capability improves matters somewhat more (Option D), and defenses improve things even more. Note that some column pair show assessments by the same criterion, but from the two different perspectives.

**Figure 2**

*A Notional Summary of Option Assessment*

<table>
<thead>
<tr>
<th>Measures</th>
<th>Strategic Stability (Persp 1)</th>
<th>Strategic Stability (Persp 2)</th>
<th>Crisis Stability</th>
<th>US ability to act, defeat, defend</th>
<th>Nonproliferation (Persp 2)</th>
<th>Nonproliferation (Persp 1)</th>
<th>Net Risk Control (Persp 1)</th>
<th>Net Risk Control (Persp 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment Options</td>
<td>Detail</td>
<td>Detail</td>
<td>Detail</td>
<td>Detail</td>
<td>Detail</td>
<td>Detail</td>
<td>Detail</td>
<td>Detail</td>
</tr>
<tr>
<td>A. Baseline</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>B. 300 Wpns. Weak Verif.</td>
<td>Yellow</td>
<td>Orange</td>
<td>Yellow</td>
<td>Orange</td>
<td>Yellow</td>
<td>Orange</td>
<td>Yellow</td>
<td>Orange</td>
</tr>
<tr>
<td>C. 2 + Verif.</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Green</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>D. C + Global Strike</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Green</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>E. D + Defenses</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Green</td>
<td>Yellow</td>
<td>Black</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>F. Defenses</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Green</td>
<td>Yellow</td>
<td>Black</td>
<td>Black</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

Note: the color coding is red (very bad), orange (bad), yellow (marginal), light green (good), dark green (very good). Underlying the colors are numerical scores from 0 to 1 (not shown).

The approach recommended is that decisionmakers see the multicriteria richness summarized in Figure 2 (although some condensation would be possible). However, once such discussions have been had and assumptions checked and iterated, it is useful to produce more simple-minded summaries.

Table 5 and Figure 3 show a composite effectiveness score for each of the hypotheticals, but they contrast results for the two perspectives (in a real application, more perspectives
might be needed to do justice to issues). The composite effectiveness is given a score from 0 to 1. The scores differ by perspective because those holding the two views put different relative weights on the various criteria and because they differ on the likely effectiveness of the options for particular objectives. These are not “technical” disagreements, but strategic-level judgmental disagreements.

For example (Figure 2), those with Perspective 2 are much more skeptical about the value of reduced weapons in slowing or halting proliferation (orange rather than yellow). Whether using tabular results or the equivalent bar-chart version (Table 5 versus Figure 3), we see that there are rather stark disagreements about how the options will be viewed in the aggregate. Perspective 1 sees a clear progression as one moves from Option A (baseline) to Options B, C, D, and E. Option F is seen as not quite as good as Option E. In contrast, Perspective 2 sees great problems with large reductions with weak verification (Option B) and concludes that the only element of the options that actually accomplishes very much is the postulated defenses. Thus, Option F is favored. Despite the disagreement, however, an observer would note that both sides of the debate agree that defenses would be especially significant, and that poorly verified arms control could cause significant problems.
### Table 5
**Summary Effectiveness**

<table>
<thead>
<tr>
<th>Option</th>
<th>Perspective 1</th>
<th>Perspective 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Baseline</td>
<td>.57</td>
<td>.73</td>
</tr>
<tr>
<td>B. 300 Weapons, Weak Verification</td>
<td>.45</td>
<td>.32</td>
</tr>
<tr>
<td>C. Option B + Strong Verification</td>
<td>.62</td>
<td>.5</td>
</tr>
<tr>
<td>D. Option C + Extensive Global Strike</td>
<td>.69</td>
<td>.59</td>
</tr>
<tr>
<td>E. Option D + Good Regional Defenses and Good Homeland Defenses Against Light Attack</td>
<td>.85</td>
<td>.77</td>
</tr>
<tr>
<td>F. Baseline + Defenses as in E</td>
<td>.72</td>
<td>.77</td>
</tr>
</tbody>
</table>

### Figure 3
**Effectiveness by Perspective**
Recall that Figures 2-3 and Table 5 all deal with high-level assessments, which are aggregates, or “roll ups” from numerous subordinate assessments. For example, the assessments of “strategic stability” vary by perspective. The differences are more stark with regard to the options’ effects on nonproliferation objectives. Figure 4 drills down for each of the two perspectives, showing the Perspective 1 and 2 results in the upper and lower panes, respectively. There are many differences in detail, but the most marked difference is that the skeptical perspective believes that it is implausible that any of the options will have an effect on enlisting international cooperation in effectively enforcing provisions of the NPT and other arms-control agreements. Also, the skeptics predict that the effect of a poorly verified deep-reductions agreement would be precisely the opposite of what the NPT-optimistic side anticipates. The skeptics are less concerned in the baseline about proliferation prospects and they believe that Option B would be seen as establishing by allies as a dangerous trend undercutting the credibility of U.S. assurances. This, in turn, would cause them to more seriously examine their own options for nuclear-weapons capability. At the same time, states such as Iran would, if anything, be emboldened because of seeing the opportunity for their nuclear forces to be relatively more powerful than previously. The NPT-optimist view, to the contrary, is that even Option B, but certainly Option C (the verifiable cuts) would have sizable influence worldwide. With good diplomacy, they would argue, the trends perceived would be quite positive, would discourage proliferation, and might even encourage some countries to pull back from marginal programs.

Figure 6 is another example of “drill down,” this one dealing with Risk Control. It indicates that, in this notional analysis, those associated with Perspective 2 are more alarmed than the optimists about the potential for divisive political debates unless changes are accompanied by strong buildups in conventional forces (global strike) and strategic defenses.

To reiterate one more time, the assessments shown here are purely notional, intended to illustrate what results of analysis might look like that contain a mix of qualitative considerations that recognize disagreements, and that sharpen discussion of why assessments differ.
**Figure 4**

*Drill-Down Assessment of Nonproliferation Prospects, by Option (Perspectives 1 and 2 are shown at top and at bottom).*

<table>
<thead>
<tr>
<th>Level 1 Measure</th>
<th>Nonproliferation</th>
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</thead>
<tbody>
<tr>
<td>Level 2 Measure</td>
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</tr>
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<td>Nonproliferation</td>
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<td>A. Baseline</td>
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<tr>
<td>B. 300 Wpns, Weak Verf.</td>
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</tr>
<tr>
<td>C. 2 + Verif.</td>
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<tr>
<td>D. C + Global Strike</td>
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<table>
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<tr>
<td>F. Defenses</td>
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</table>
**Figure 5**
*Drill-Down for “Control Risks”*

(upper and lower panes correspond to perspectives 1 and 2, respectively; the last column is the roll-up, i.e., the column of values to be found in Figure 2)

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<th>Risk Control</th>
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<th>Military/technical</th>
<th>Political</th>
<th>Cheating and Breakout</th>
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5. Conclusions

The purposes of this think piece have been relatively modest—to suggest a structure for analysis suitable for supporting senior leaders as they discuss and debate nuclear-force options, and to include in that structure ample room for considering qualitative judgments as well as calculated results from models.

One observation that rather stands out is that most of the important issues cannot be accurately evaluated with reliably predictive models. To the contrary, the most important challenges are probably identifying appropriate test cases, making qualitative evaluation, sharpening the most important differences of view, eliciting coherent “stories” corresponding to those views, summarizing results clearly for decisionmakers, and pointing out ways (option adjustments) that would hedge against uncertainty (including uncertainty about who is more “right” where disagreements exist).

Some suggestions:

- Identify a spanning set of stressful test cases, each case being parameterized so as to provide varied levels of stress and to deal with major uncertainties and disagreements (reflected in the various sub cases discussed above). In identifying the test cases, look for special troublesome contexts, such as discussed in Tables 2 and 3.

- As suggested in Table 3, use a combination of analytic methods for evaluation.

- Use qualitative modeling, particularly “synthetic cognitive decision models,” to characterize the issues and reasoning as discussed below. Use these models both to help focus the war games and to draw insights from them (e.g., confirmation of disconfirmation of structure, and results for some discrete points, between which analysts could interpolate).

- Use other methods, such as crowd sourcing, to collect additional information—including information about factional differences in narrative (a kind of perspective).

Figure 6, then, suggests a new approach to the combined use of multiple was of obtaining information and insight. The most important suggestion is that the process of using war games, models and simulations, expert elicitation and the like be informed by synthetic cognitive models, which can be relatively simple qualitative models (largely reducible to viewgraphs) that attempt to characterize alternative possible reasoning of adversaries.  

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1 A short summary of earlier ideas on synthetic cognitive modeling is available in reprint (Davis, 2004), as well as in a study by the national academy of sciences (National Academy of Sciences, 1996). During the 1980s, my colleagues and I built very large artificial-intelligence computer models to represent the reasoning of Soviet and U.S. leaders in crisis and conflict. These were part of the RAND Strategy Assessment System (RSAS). The synthetic cognitive modeling was an attempt to abstract the cream from those earlier, and much more
These depend on identifying key factors in adversary reasoning, using multiresolution methods to allow higher level factors to be determined by lower-level factors. The result is to improve ability to discuss what situation or case the adversary may perceive himself to be dealing with, and how to affect the adversary’s perception of situation and evaluation thereof. Because the understanding of adversary reasoning in crisis has been notoriously unreliable historically, it is central to the approach that one consider alternative models (i.e., with different relative emphasis on the various factors, with different degrees or risk aversion and sense of desperation). This approach can help frame key issues for exploration with war gaming, simulation, expert consultation, or field research with survey methods, for example. It can also be used to interpolate sensibly between cases that are particularly well understood from history and prior gaming and simulation. As Figure 6 indicates, however, everything in the anticipated research and analysis is iterative with insights potentially coming from a myriad of sources, some of them affirming or disconfirming prior constructs.

The approach suggested is not quite so radical as some readers may imagine. The original ideas of using synthetic cognitive modeling were developed some years ago based on extensive experience with both human and automate strategic-level war gaming sponsored by the Office of Net Assessment. They were simplified for the study of Saddam Hussein before and during the first Gulf War, where they proved quite useful. Some of the ideas were used in early versions of the Pythias agent-based simulations being used in the CANS effort by Alex Levis of George Mason University. In recent years, some of the very same techniques have been successfully used to construct conceptual models to better understand terrorism and public support of insurgency and terrorism.¹ A very small current effort for the Human Social and Cultural and Behavioral (HSCB) modeling program is pursuing ways to turn the conceptual models into qualitative “computational” models (albeit, with continued emphasis on uncertainty). Far more could be done with the approach than has been attempted in the past. In particular, the methods can define distinguishable situations, characterize evaluations for these situations for alternative concepts of the adversary, and thereby “fill in” the possibility space, whereas a given war game (or even a limited knowledge elicitation from experts) typically provides information on much more specific point situations. Simulations can also “fill in,” but they have their own advantages and disadvantages.

¹ See discussion of “factor-tree” methods in recent publications (Davis and Cragin, 2009; Davis, 2011; Davis et al., forthcoming).
Figure 6
A Conceptual Approach to Integrated Analysis

Research and analysis building and using synthetic cognitive models to structure potential adversary reasoning about possible military actions

Factors, issues, data

Conduct exploratory research with classic M&S and agent-based simulations to better understand possibility space

Use structured methods to elicit information from scholarly and operational subject matter experts

Insights, "data"

Confirmation, disconfirmation, additional considerations, "data points"

Draw on history, area research and other sources for factual basis and for recognition of factors and disagreements.

Other information

Integrative analysis

Study results, decision support

Conduct war games

Structured question-posing
Appendix A
Definitions

The terms in Figure 1 are defined here as follows:

1. *(Dynamic) Strategic Stability:* the degree to which international affairs allows for healthy changes, but is characterized by a low probability of war generally and, more specifically, the absence of incentives for nations to engage in arms races, security-related realignments, coercion, preventive war, or preemptive attacks. A special aspect of strategic stability is nations not feeling a security need to develop and deploy nuclear weapons. Thus, “assurance of allies” is subsumed under this criterion.

2. *Crisis Stability:* the degree to which, in a state of international crisis, parties do not perceive incentives to escalate conflict (or the necessity of doing so)—e.g., by using nuclear weapons, invading another country, or expanding the scope of an existing conflict geographically. Components can be distinguished for first-action stability and subsequent escalation control.

3. *Act, Defend and Defeat:* a measure of the degree to which the option in question would affect U.S. ability to defend its homeland, its forces abroad, and its interests abroad, including those involving allies. This may include routine military presence, crisis action, defeating an adversary in war, and defense. An element under this is damage limitation capability: the capability, in the event of war, to limit damage to the United States, its forces abroad, and its foreign interests including those involving allies.

4. *Contribution to Other Foreign Policy Goals:* a measure of the degree to which an option promotes or otherwise supports broader strategy, such as the U.S. effort under multiple presidents to reduce arsenals of nuclear weapons (including Russian tactical nuclear weapons), reduce reliance on nuclear weapons, limit nuclear proliferation, and even to move toward an eventual goal of nuclear disarmament (Department of Defense, 2010).

5. *Risk Control:* a measure of confidence that an option’s actual effectiveness will not be significantly worse than assessed with the prior criteria and evaluation methods. This means having confidence in implementability, avoiding severe operational or technical problems, and avoiding severe political problems that might undercut effectiveness or sustainability.
References


Davis, Paul K. et al., *Understanding and Influencing Public Support for Insurgency and Terrorism*, Santa Monica, Calif.: RAND Corporation, forthcoming.


Kahn, Herman, "Thinking about the Unthinkable," 1962.


