12th International Command and Control Research and Technology Symposium

"Adapting C2 to the 21st Century"

Topic: C2 Concepts, Theory, and Policy

Title: Next State Planning: A "Whole of Government" Approach For Planning And Executing Operational Campaigns

Authors: Dr. Alexander Kott, Mr. Len Hawley, CDR Glenn Brown, Dr. Gary Citrenbaum, Mr. Peter S. Corpac

Points of Contact:
Dr. Alexander Kott
Defense Advanced Research Projects Agency
3701 N. Fairfax Ave
Arlington, Va 22203
(571) 218-4649
akott@darpa.mil

Mr. Peter S. Corpac
Science and Technology Associates
4100 N. Fairfax Ave
Arlington, Va 22203
PCorpac@stassociates.com
580 284 1256

Abstract

The Defense Advanced Research Project Agency (DARPA) and U.S. Joint Forces Command (JFCOM), as part of the Integrated Battle Command program, have developed a planning process for leaders to plan and execute campaigns at the operational level of war. The "Next State Planning' provides a process for operational leaders to plan campaigns along multiple political, military, economic, social, informational economic lines of effort and employ all elements of national power.
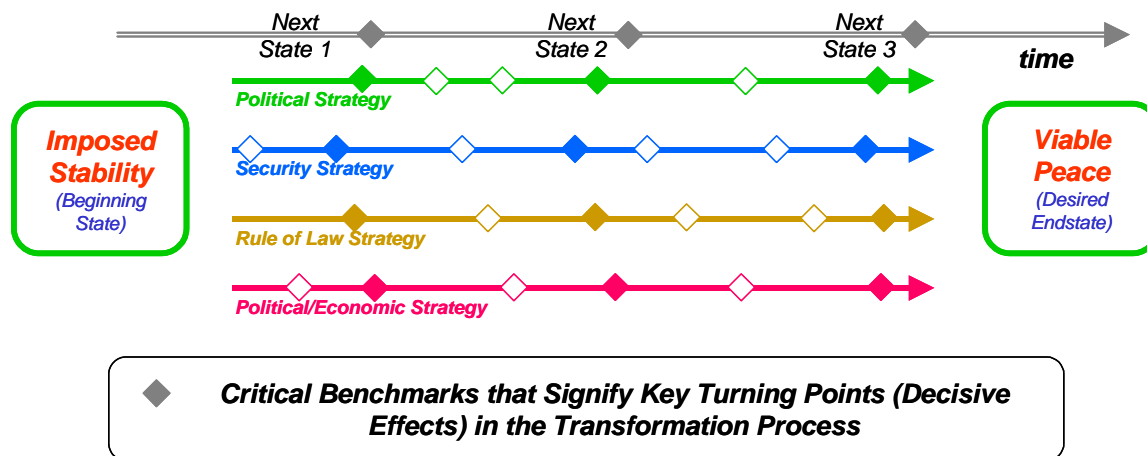
Next State Planning divides a campaign into a sequence of well defined, short duration "stepping stones" that can be achieved through coordinated, multiple domain, Line of Effort operations. Next states are defined in terms of objectives or end states rather than actions. It is an iterative planning process where the next state, N1, is well defined with specific actions planned to achieve it and next states N2-N… are less defined. This postpones the decision as to how to achieve the state until closer to execution time, when uncertainties will have been considerably reduced. Metrics are established and next states evaluated against achievements on the ground. The plan, allocation of resources, next states and over all objectives are then modified based operations. It provides framework for executing civil and military operations.

1. Introduction

This paper describes a new process for planning and implementing a multi-dimensional PMESII-wide campaign. The heart of this approach involves breaking down a complex, long-term campaign into a sequence of well-defined, short-duration "stepping stones" – something we have named *Next States*. Desired conditions of each next state of a long term campaign are created through time by integrating various *Lines of Effort*—political, security, rule of law, and economic efforts in a whole of government approach involving the various military and civilian agencies of an international mission.

The paradigm for Mission Campaign Planning includes the logical steps necessary to identify these intermediate Next States and their sequencing, and to convey to implementing organizations their roles, dependencies, and expected results. These implementing organizations, in turn, develop detailed lower-level operations plans to achieve each *Next State*—thereby making incremental and steady progress toward achieving the campaign's end state sought by a combined civilian-military mission.

Multiple Independent but Coordinated Lines of Effort, Each With a Strategy, to Transform Conflict and Bring About a Critical Endstate

Critical Benchmarks that Signify Key Turning Points (Decisive Effects) in the Transformation Process

The diagram above depicts some basic ideas of the new approach. Over an extended period of time (say, three years of the campaign), we wish to transform the current poor state of affairs (i.e., "imposed stability") into something much better, which we call a desired endstate (i.e., "viable peace"). We know that this transformation will require integrated efforts among many agencies, involving a number of civilian and military entities, and that each of these efforts has its own strategy and methods. Looking vertically at the diagram above, these *Lines of Effort* are named Political, Security, Rule of Law, and Political/Economic, and each of these strategies has various "*critical benchmarks*" to be created in the course of time.

Looking horizontally in the time dimension, you will see *Next State 1*, *Next State 2*, and so forth, and these represent intermediate stepping stones in the overall campaign. Associated with each *Next State* are one or more readily identifiable *benchmarks* involving two or more *Lines of Effort*, or key political-security-rule of law-economic turning points that together represent significant progress toward the desired endstate of the overall campaign.

As seen on the diagram, each *Line of Effort* may have other *benchmarks*, but the multidimensional *Next States* to which all *Lines of Effort* contribute serve to harmonize progress of the campaign across the entire mission.

What is new is that any one of these *Next States* normally embraces a multidimensional picture of desired conditions, or a set of PMESSII-wide desired effects on the ground. Previous methods of campaign planning focus largely on creating desired conditions in a single dimension, such as creating desired military conditions in a military campaign. These methods do not enable a whole of government approach to complex challenges confronting an international mission.

As will be seen, *Next State Planning* corresponds to "mission-level" or "operational" planning within the military's "strategic – operational – tactical" hierarchical approach to planning and execution, but the new paradigm extends its reach both in terms of breadth of execution (other government agencies besides the military participate) and in terms of breadth of the desired "end state" to be achieved by the mission.

Consistent with the ideas of the so-called "effects based approach to operations," *Next State Planning* describes conditions or outcomes to be achieved, but does *not* specify the particular actions which must be taken by any particular agency in order to bring about those conditions on the ground. This approach gives considerable freedom to the various organizations that will have to carry out the Next State Plan to choose from a variety of possible approaches to get the job done.

Before proceeding, three additional points need to be made. First as mentioned, the desired endstate is PMESII-wide – that is, it seeks to transform many dimensions including political, military, economic, social, infrastructure, and information aspects within the country of interest. Similarly, the actions to be taken within each *Line of Effort* – span the full set of DIME capabilities (diplomatic, information, military, economic, etc at hand in the mission.

Second, the process of *Next State Planning* is flexible in that it can adjust later-occurring benchmarks as additional information is received and uncertainty about the future clarifies. One advantage of this decomposition is that implementing organizations of the various Lines of Effort are always focused clearly on the "next right thing to do" rather than on some less well-defined remote goal in long run. The ultimate end is kept firmly in mind at the campaign level, but the definition of an intermediate Next State enables people in each Line of Effort to plan with confidence over a short time horizon.

Third, there is a well-defined interface between the overall Campaign Plan, on the one hand, and the individual Next State Plans incorporating each Line of Effort, on the other. As execution proceeds, the mission leaders of overall campaign are able to monitor progress in each of the Lines of Effort, integrate various civilian and military activities, and adjust the overall plan to take account of uncertainty or contingencies as they arise.

Taken as a whole, *Next State Planning* resides in a new conceptual framework for campaign planning. In its totality, this new framework includes three types, each one nested within the one higher:
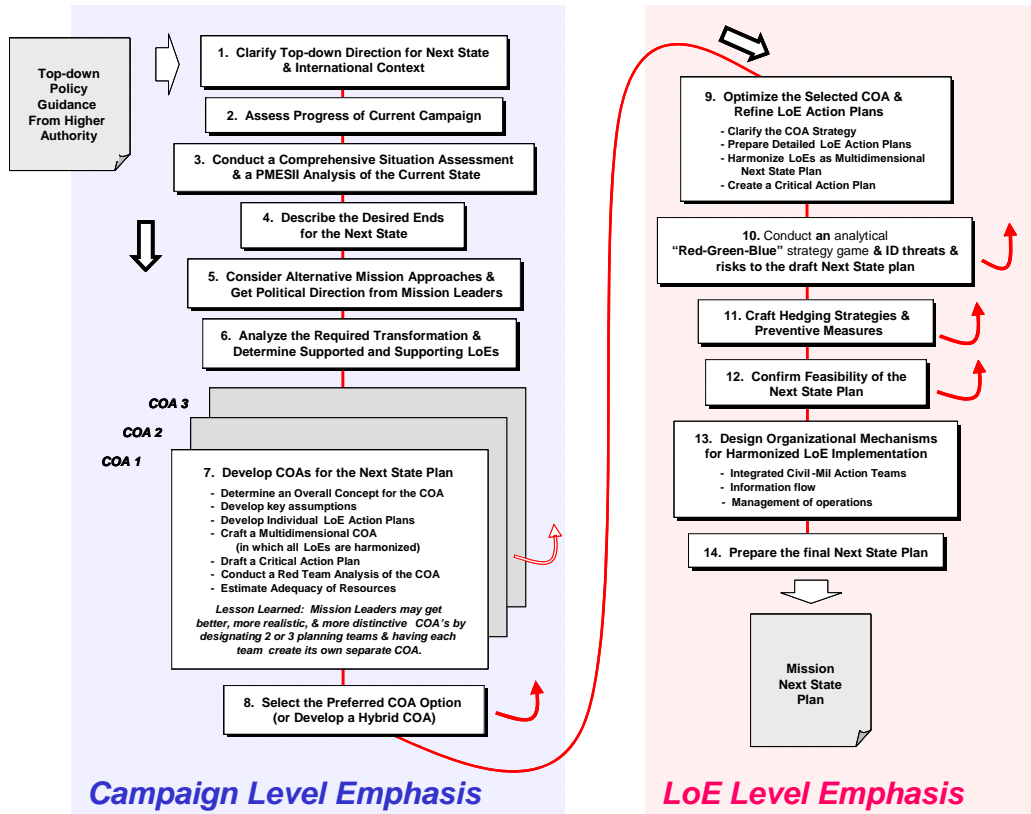
- *A Mission-level Campaign Plan* is the overarching plan covering about three years to achieve the projected PMESII-wide ends of the intervention. It identifies the series of intermediate Next States that describe achievable progress in steps which involve several Lines of Effort.
- A series of *Next State Plans* are the intermediate plans covering about three-months to bring about critical benchmarks among various Lines of Effort across the entire mission. The series of next states are nested within the overall *Mission Campaign Plan*.
- Any number of military and civilian agency *Operations Plans* are prepared for conducting operations and activities covering about three weeks or less to achieve specific benchmarks in a timely fashion within each Line of Effort. The various operations plans are nested within the current *Next State Plan*.

This paper focuses on the first two types—*Mission Campaign Planning* and *Next State Planning*—of this new framework. It describes a process in which these types of planning are nested and linked, and in which responsibilities and reporting requirements are clearly defined. Because *Next State Planning* represents new thinking, the paper will emphasize its components in depth.

2. Process Overview

This section presents a top-level overview of the full end-to-end Next State Planning Process, which is summarized in the subsequent diagram. At the outset, it is well to keep in mind two perspectives. As mentioned, we focus on the top two types of planning: (1) Mission Campaign Planning, where the Next States and Lines of Effort are identified, and where overall progress toward the desired endstate is monitored and cross-LoE integration occurs; and (2) Next State Planning (which is nested within Campaign Planning), where the focus is on the achievement of interdependent critical benchmarks among various Lines of Effort.

The 14 Step Planning Process

Top-down Policy Guidance From Higher Authority

Campaign Level Emphasis

1. **Clarify Top-down Direction for Next State & International Context**

2. **Assess Progress of Current Campaign**

3. **Conduct a Comprehensive Situation Assessment & a PMESII Analysis of the Current State**

4. **Describe the Desired Ends for the Next State**

5. **Consider Alternative Mission Approaches & Get Political Direction from Mission Leaders**

6. **Analyze the Required Transformation & Determine Supported and Supporting LoEs**

COA 3
COA 2
COA 1

7. **Develop COAs for the Next State Plan**
   - Determine an Overall Concept for the COA
   - Develop key assumptions
   - Develop Individual LoE Action Plans
   - Craft a Multidimensional COA
     (in which all LoEs are harmonized)
   - Draft a Critical Action Plan
   - Conduct a Red Team Analysis of the COA
   - Estimate Adequacy of Resources

   Lesson Learned: Mission Leaders may get better, more realistic, & more distinctive COA's by designating 2 or 3 planning teams & having each team create its own separate COA.

8. **Select the Preferred COA Option (or Develop a Hybrid COA)**

LoE Level Emphasis

9. **Optimize the Selected COA & Refine LoE Action Plans**
   - Clarify the COA Strategy
   - Prepare Detailed LoE Action Plans
   - Harmonize LoEs as Multidimensional Next State Plan
   - Create a Critical Action Plan

10. Conduct **an** analytical **"Red-Green-Blue"** strategy game **& ID threats & risks to the draft Next State plan**

11. **Craft Hedging Strategies & Preventive Measures**

12. **Confirm Feasibility of the Next State Plan**

13. **Design Organizational Mechanisms for Harmonized LoE Implementation**
   - Integrated Civil-Mil Action Teams
   - Information flow
   - Management of operations

14. **Prepare the final Next State Plan**

Mission Next State Plan

Both Campaign Planning and Next State Planning rely on the same 14 steps, but the emphasis and level of detail varies. Briefly, the first eight steps are of primary interest at the Campaign Plan, since they focus on the identification of the Next States, and ensure overall long-term progress toward the desired goal.

The final six steps, on the other hand, tend to focus on operational details within a single LoE. Of course, coordination and feasibility constraints within an LoE will affect the viability of the top-level plan, so that the Campaign Plan cannot completely ignore operational detail. And similarly, it is well for individual LoEs to be aware of the larger campaign within which they serve, and their reliance on other LoEs for achieving key benchmarks or conditions. Thus, the full set of 14 Steps is executed for both types of planning, but with different emphasis and modeling detail.

Another point to keep in mind is that, in Campaign Planning, the set of Next States can, and will, be modified as the campaign proceeds. An initial set of Next States is identified and becomes the basis for all subsequent planning. However, there are feed-back loops within the structure that permit modification and adjustment of the Campaign Plan as the campaign proceeds and uncertainty diminishes. It is *not* expected that campaign planners see three years into the future with high confidence. It is expected that achievable

intermediate Next States will be identified that lead progressively toward the desired endstate, with the expectation that the initial vision will be adjusted over time to take account of actual experience during execution. Ongoing monitoring, feed-back and adjustment is built-in. In effect, the Next State planning process never stops until the mission is complete and the desired endstate is achieved.

It must also be understood that the both overall campaign planning and individual Line of Effort planning interact in an ongoing way over the course of the campaign. At any point, for example, campaign planning will need input from component Line of Effort planning for additional detail about COA feasibility (steps 9 – 11). This gives the campaign planners increased confidence that they have understood the operational consequences of the various COAs it is considering, and that the selected COA is achievable within the known constraints. Similarly, LoEs have the ability to report contingencies and request support from the campaign planners as execution of the Next State Plan begins.

At any point in time, a number of Next State Plans may be in the course of execution; and planning for the succeeding Next State will likewise be underway. In a similar way, each LoE may monitor and respond to the implementing agencies below it that are charged with actual execution of the Next State Plan within the LoE. Thus the process is dynamic and interconnected conceptually, much as an automatic flight control system dynamically adjusts to changing circumstances and goals.

The following summarizes the Next State Planning process both from the point of view of Campaign Planning (multiple Next States across multiple LoEs over a considerable period of time) and from the point of view of Line-of-Effort Next State planning (within a single LoE, to achieve a single Next State over a relative short time horizon).

Next State Planning at the Campaign Level

   Descriptive Features:
   - Takes a long-term planning horizon of about 2-3 years
   - Focuses on the mission-level -- a joint JTF Commander and Civilian Leader and their various program directors who prepare:
     – A counterinsurgency campaign plan
     – A political mediation campaign plan
     – A judicial reform campaign plan
     – An infrastructure repair campaign plan
     – An influence campaign plan
   - Embraces the new idea of conflict transformation to achieve a viable peace
   - Fosters an integrated multidimensional approach into a comprehensive strategy
   - Identifies relevant "lines of effort" to achieve the desired endstate
   - Leverages tried and true agency planning methods for each line of effort: objective, desired ends, strategy, benchmarks
   - Harmonizes efforts to achieve progress in a series of 'next states"
   - Enables planners to crafts a "coherently integrated mission campaign plan"

A Paradigm for Next State Campaign Planning:
- Intervention Policy Aims, Political Outcome & International Context
- Comprehensive Situation Assessment
- Conflict Analysis / Power Struggle Assessment / Theory of the Conflict
- Ends Determination / Desired Endstate
- Alternative Mission Approaches & Mission Leaders' Direction
- Transformation Analysis — "Line of Effort" (LoE) Determination
- Individual LoE Campaign Plan Development: Objective, Strategy, Benchmarks, Timelines, Benchmarks, Resource Adequacy, etc
- Multidimensional Campaign Design: Harmonize all LOEs
- Projection of Intermediate "Next States"
- Policy Issues, Coalition Requirements, & Resource Shortfalls
- Mission Design and Civil-Military Integration
- Multidimensional Financial Support Strategy
- Multidimensional Campaign Plan

Next State Planning at the Line-of-Effort Level

Descriptive Features:
- Takes a near-term planning horizon of about 3-4 months within the context of the overall mission campaign plan
- Focuses on the mission level — a joint JTF Commander & Civilian Leader plan that involves the program directors within the mission
- Focuses on the "next state" in transforming conflict according to the overall mission campaign plan
- Integrates multiple lines of effort that involve several operations or activities that need to be integrated to achieve the desired effects of the "next state"
- Identifies one or more primary objectives that embrace the achievement of critical benchmarks
- Creates an effects-based plan for each line of effort that will bring about essential conditions sought for in the next state
- Involves supported and supporting operations among the lines of effort. Intent is to harmonize operations and activities of the various lines of effort
- Accounts for resource constraints
- Crafts and implements a "coherently integrated next state plan"

A Paradigm for Next State Planning at the LoE Level
- Top-down Direction & International Context
- Current Campaign Progress & Assumptions of Theory of Conflict
- Comprehensive Situation Assessment / PMESII Assessment / Critical Uncertainties
- Desired Ends for the Next State
- Alternative Mission Approaches & Political Direction
- Transformation Analysis — "Lines of Effort" / Supported & Supporting LOEs

- Multidimensional COA Development w/ Individual LOE Action Plans
  - General idea behind the COA, including all lines of effort (LoE)
  - Objectives and effects for each LoE
  - Individual LoE Action Strategies (by agency experts)
  - Integration of the LoEs and design a multidimensional COA
  - Preliminary Red Team Analysis of the proposed COA
  - COA's resource requirements
  - Summary and evaluation of the proposed COA
- Preferred COA or Hybrid COA
- Refinement of COA & LoE Action Plans
- Red Team Analysis / Threats and Risks
- Preventive Measures & Hedging Strategies
- Feasibility Analysis of the Next State Plan
- Organizational Mechanisms to Harmonize Implementation
- Final Next State Plan Preparation

3. A Detailed Walk-through of the 14 Steps in Next State Planning

Each of the following 14 detailed descriptions will provide specifics about what happens in each step of the process. Recall that while the process is to be implemented both at the Campaign level and also within each of the LoEs, the characteristics of the step at each level are adjusted to reflect the goals and view of each organization. Our discussion of steps 1 – 8 will primarily take the point of view of the Campaign level planner, and our discussion of steps 9 – 14 will primarily take the point of view of the Next State planner within a single LoE.

Prior to initiation, it may also be necessary to customize, initialize and validate any tools or models that will be used to support the process.

Following a textual description, each step will be briefly summarized in the following four areas:
- Purpose
- Key Inputs
- Process
- Key Outputs

3.1 Step 1: Analysis of Top-down Direction and International Context

The planning team's first order of business in Step 1 will be to deal with questions such as the following:

- What is the US interest in the situation?
- What are the key aims of the coalition?
- What is the acceptable form and extent of the intervention?
- What resources can be anticipated?

- What assets are to be made available?
- What constraints (e.g., ROEs) must be followed?
- What endstates are acceptable?
- What timelines are acceptable to leading organization?
- What assumptions have been made by the higher headquarters?

Generally, some of the answers are implicit in, or derivable from the assigning organization's guidance. Higher Headquarters guidance, for instance, can be expected to establish mission aims and objectives, the resources that will be made available, and the acceptable scale for intrusion. Moreover, many answers will be forthcoming from the extensive documentation generally available – a national political-military plan, intelligence estimates, and country handbooks.   Every situation is unique, and there will often be questions that require collaboration and thinking "outside the box."

3.2 Step 2: Assess Progress of Current Campaign

Good planning begins by identifying critical uncertainties up front – what we really don't know about the operating environment. Then, we can formulate assumptions regarding conditions that can be of importance to NSP. Typically, these deal with factors such as assets that are to be made available, timelines, physical (environmental) conditions, degrees of cooperation of various actors (e.g., Red, Red populace, and Grey), form of the Red threat, and so forth; however, assumptions can also deal with high level Blue-centric considerations such as who is to lead an activity (vs. support it).

In this step pertinent assumptions are revisited, brought up to date, and dealt with to the extent possible. This process entails, for each assumption, the following steps (illustrated

Assumption Development and Monitoring

- *Identify all MCP elements affected by assumption*
- *Monitor assumption, alert affected elements*
- *Continue monitoring throughout NSP/OP execution, as shown*

below):

Continue Monitoring

Still relevant? No

Yes

Resolved? Yes

No

Close out Assumption
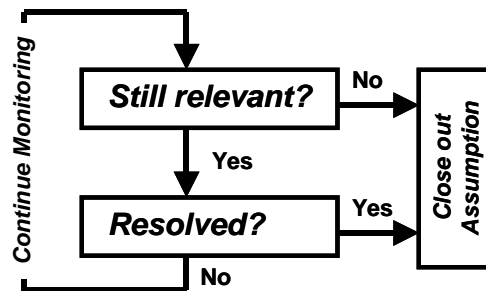
Assumption clarification process

During monitoring, the need for the continuation of the assumption is regularly revisited. This involves determining whether some form of the assumption is still required, and whether the condition underpinning the assumption has been, or can now be quantified or qualified with high confidence. When the assumption is resolved or is no longer relevant,

then the assumption is closed out, and all interested parties are alerted that the particular assumption is no longer being tracked.

Determining the relevance and degree of certainty of an assumption requires an analysis using the latest information. Depending on the time scales involved, new information may be many months more recent than the data upon which the assumption was made. Given the new data, and the possibly modified crisis environment, previously uncertain value may now be determined with sufficient accuracy for planning purposes. If so, then the assumption is dispensed with, and any interested parties are notified of the high-confidence value of the previously assumed condition.

All of this can be thought of as a kind of *state estimation* process, in which estimated state values (assumptions) are revised based on new information, and in which the state variable of interest is discarded when no longer relevant to the planning process.

3.3 Step 3: Comprehensive PMESII Assessment of Situation and Next State

Situation assessment is currently supported by the intelligence community and is further advanced by the System of Systems Analysis, or SoSA process. This process considers a society (a country or large organization) as comprising roughly six elements: political, military, economic, social, infrastructure, and information (typically represented by the *symbol* PMESII). It characterizes a society in terms of those elements, their interactions within the society, and their interactions external to the society, and supports the planning team in developing a mental-model of the society which is capable of supporting the upcoming analysis and planning. The process constitutes a systemic PMESII-focused variant of the IPB process.

Situation assessment serves several purposes: it helps the team understand the environment in which the current situation evolved, it helps bound the current problem, and it helps identify potential problem mitigation approaches. In addition, it may (or may not) jump start the process of identifying a state of affairs (or endstate) which the team might strive to achieve.

Situation assessment and the underpinning SoSA are large and complex, and it is often not possible to acquire the data needed to develop these analyses to the breadth and depth desired. A key challenge, consequently, is on *focusing* these processes as sharply as possible. The analysis, once focused, might concentrate on the following PMESII topics:

- Economic: size and nature of the economy in the region, key products / skills, economic differences between the persecuting and persecuted groups, key actors;
- Political: kind of government in the region; government strengths; key actors; degree of popular support;
- Social: size and makeup of the populace in the region; size and relative influence of various ethnic groups and religious groups, the persecutors and persecutees in particular (to the extent that they can be identified at this point); nature of historical animosities and conflicts; key actors;
- Infrastructure: scope and status of operation in the region, differences between infrastructure available to the persecuting and persecuted groups (again, to the extent that they can be identified at this point), key actors;

- Information: key information propagation methods in the region, key media, influential people on both sides of the conflict, key actors;
- Military: strength of various forces, key assets, key actors, degree of loyalty of forces to military leaders, degree of loyalty of leaders to the government.

Depending on the type of the crisis, the focus could vary dramatically. In the case of natural disasters, for instance, the analysis would likely give more attention to social and infrastructure issues, and less to the rule of law. Or, in the case of an invasion, the focus would likely be on the respective military capabilities of the invader and invadee.

The key product of this step is a SoSA / IPB characterization of the region and country that is sufficient to guide the team in identifying the optimal approach for achieving each desired Next State. Accordingly, the product must be able to support the team in answering key questions such as:

- Who are the key actors?
- What do they want?
- How are they likely to proceed if Blue does not intervene?
- How do they draw support?
- How do they interact?
- How does the desired Next State contribute to the over-all mission?

Similar to any large information acquisition process, situation and PMESII assessment can benefit substantially from tools, in particular data mining and knowledge discovery tools and model-based tools for efficiently and effectively capturing and quality-assuring information.

3.4 Step 4: Description, Specification of Desired Ends for the Next State

Specification of Next State objectives is not an open ended proposition. The objectives make a wide range of demands on the planning and execution process and may impact the planning team's views regarding factors such as risk, cost, coalition commitment, and tolerance for delay. A key initial step is to identifying *candidate* objectives. These are formulated so as to satisfy the specific aims delineated in the mission directive. However, since the team may have a better understanding of the situation than the parent organization, good judgment is expected and required.

Next State objectives must ensure that the candidate set is comprehensive. To this end, the team may: i) partition itself along PMESII lines, and have each partition focus on a particular area; and/or ii) define different assumption sets for the endstate time, and develop different endstates for each set. As will be seen, such a diversification tactic is employed frequently in NSP.

The team next determines whether each candidate objective is effective and acceptable within the larger context. Typical considerations at this point include:

- Does this endstate condition conflict with the policy aims for the intervention?
- Does it support the overall political process?
- Does it solve the problem for the long term, or does it leave the door open for potential new problems in the future?

These considerations are analyzed with the assistance of policy experts, individuals with hands-on crisis management experience, and DIME→ PMESII analysts, and the analyses draw heavily on the conflict analysis of the preceding step.

Finally, the team specifies the desired conditions for each Next State. The degree of DIME/PMESII flexibility which is permitted is a major consideration. On the one hand, greater specification (a smaller, more bounded objectives space) simplifies down-stream planning by significantly narrowing the size of the solution space that must be explored. On the other hand, narrow, precise specification introduces the possibility that good approaches and solutions may be eliminated too early in the process, before they can be fully vetted and understood. A typical Next State objective spans all the major LoEs, and is achievable in a relatively short (three to five month) time frame. Generally, it culminates in a publicly recognizable event. Possibilities include, among *many* others: elections, the opening of significant manufacturing or infrastructure facilities or production capabilities, or achievement of some measurable and valued public health or education milestone. Many of these types of events require concerted action across multiple LoEs, and can have significant influence on both US and indigenous public opinion. By decomposing the end-to-end campaign plan into an orchestrated and synchronized sequence of such events, benchmarks or milestones in the transformation of conflict, the coalition force is able to show measurable progress toward its goals, and thereby build a band-wagon effect as each new important and valued milestone is achieved.

3.5   Step 5: Consideration of Alternative Approaches/ Political Direction

The step begins by assessing the importance of the contribution of this Next State to the overall campaign objectives. Why is it important, and to whom? What are the implications if it is not achieved, or not achieved well? The team also must assess the political will of the coalition – politically, financially, and willingness to accept risk. What is the scope of the effort, and what pace of change is desirable/acceptable? In dialog with potential leaders, the team next begins to brain-storm alternative solutions approaches. Should the approach be coercive, or persuasive, or some combination? High level guidance will often be determinative by setting constraints (policy, time lines, rules of engagement, etc.). The step concludes by down-selecting the less desirable alternatives, and reaching consensus.

3.6   Step 6: Transformation Analysis (Mission Analysis) – LoE Determination

In this step, the particular LoEs to participate in this transformation to the Next State will be identified, and any cross-LoE effects (positive or negative) will be assessed. A key determination will be which LoE should take the lead in coordinating the activities that span multiple LoE dimensions. When this step is performed as a plan update (e.g., in the midst of the ongoing execution of a Campaign), the level of commitment of LoEs and their effectiveness in the target environment will be major considerations. A top-level strategy for transformation is conceptualized, including the role each LoE will play, and any dependencies and synchronization constraints (e.g., if the effect from one LoE must be achieved before another LoE can begin its efforts effectively). With this concept in mind, outcomes-based objectives for each LoE can be identified.

3.7 Step 7: Course of Action Development

Creating Options. The goal is to generate realistic but distinct options that give mission leaders flexibility in strategies to make progress. If only a single planning team is employed, it will typically develop a favored option, and then simply spin off one or two more unrealistic options, superficially suggesting that the team has engaged in a comprehensive, broad, and balanced assessment of all alternatives. To avoid this trap, one approach to generating realistic and distinct CoAs is to form two or three separate planning groups each tasked to develop its own CoA independent of the others. This can produce viable CoAs that give mission leaders real choices, and independent results can also be combined to form effective hybrids. CoA actions produced in this way can be expected to be more robust than those produced by a single planning group. Feature *convergence* across teams with different backgrounds will also lend credence to features that recur across independent solutions.

Developing a CoA. This is a creative activity, coupled with realism in judgment. While there may be various processes in play be each planning group, the approach outlined below is logical, systematic, and encourages the generation and vetting of innovative ideas.   This approach comprises six planning tasks:

  7.1   Clarify the CoAs Operational Concept.
  7.2   Develop Individual LoE Action Plans (from Step 6 above, each LoE Action Plan is crafted by a small number of planners who are experts in the topic).
  7.3   Design a Multi-dimensional CoA that revolves issues among LoEs and links, sequences, and harmonized various LoE actions to get the job done (i.e., create the desired conditions of the Next State).
  7.4   Define the Critical Action Pathway for the CoA.
  7.5   Conduct a Red Team Analysis of the CoA and adjust accordingly (or redo tasks 7.1 – 7.4).
  7.6   Ascertain the CoA's Resource Requirements in general terms.

CoA development should also employ sensitivity analyses (e.g., parametric analysis) in order to identify important values of controllable variables and to assess the robustness of the CoA. Moreover, CoA development should be structured so as to make effective use of visualization (although visualizations, in turn, must be tailored to the COA development process).

> *Effects Assessment.* A key element of CoA development is *effects assessment* (EA). In a DIME$\rightarrow$PMESII campaign, in which the objective is often to influence behavior rather than to incapacitate, the gauging impact on an adversary can be difficult. Since a COA may have little operational utility unless it can be assessed with confidence, it is crucial that approach development include a process for developing an effective EA process.

3.8 Step 8: Selection of Approach or Development of Hybrid

This step assumes that the planning effort has produced two or more realistic CoAs, and that the selection of the "best" CoA is not obvious. The goal is either i) to select the best CoA (from among those developed in Step 7), or ii) to design and negotiate some manner of hybrid approach. A challenge will be to deal with non-quantifiable selection criteria: CoA

"acceptability" and "desirability", cost in public relations, and cost in national prestige. Another "soft" area is trade-offs between two or more LoEs. Many of these trade-offs (e.g., election sites need to be very safe and secure, but the coalition military cannot be seen near them on election day) call for expanded discussion by planners and other experts so that mission leaders can make reasonable value judgments regarding the many controversial aspects embedded within a CoA.

The results of this analysis must be "rolled up" into a single, meaningful decision-ready construct. Various manners of weighted sums are often employed for this, but these tend to ignore the fact that roll-up is generally a *non-linear process*, and that some form of multi-attribute, or Pareto criteria is more in line with most planner's thinking. Accordingly, this aspect of selection is one in which tools (such as IBC will offer) may be able to help significantly. Similar challenges face the develop of hybrid plans that combine multiple CoAs.

When this step is performed at the Campaign level, it may be necessary to task candidate LoEs for an assessment of some key metrics associated with their participation in executing the CoA under consideration. This is because the metrics may require detailed models of risk, uncertainty, and effectiveness that are generally not maintained at the Campaign planning level. This is one of the key Campaign/LoE interfaces necessary to make the end-to-end process function effectively in practice.

The results of this process are briefed to a decision maker, who then makes the final decision. The briefing may not result in a decision, however, but rather direction to revisit certain issues or provide additional analysis and justification. It is expected that, especially early in the Campaign when uncertainty is high, this step may need to be iterated – perhaps including a return to Step 7.

3.9   Step 9: Next State Plan Optimization and LoE Refinement

As noted in Section 2, there is a natural break in emphasis that occurs between Steps 8 and 9. Steps 1 through 8 are typically of greatest interest at the Campaign level – that is, identifying a good set of intermediate Next States, and the LoEs that are best suited to achieve them. Steps 9 through 14, on the other hand, are typically of greatest interest within an LoE – that is, when specifics of operations come to the fore. Accordingly, our discussion will tend, at this point, to take the point of view of a Next State planner *within* an LoE that has been tasked by the Campaign level to achieve a single well-specified Next State goal.

The process of fleshing out plans resembles the backwards planning process espoused by EBO for identifying enabling effects. It works like this:

- Beginning at an LoE endstate, all precursor states are identified.
- For each of these precursors, all of their precursors ("2nd order" precursors) are identified.
- For each of these 2nd order precursors, all of their precursors ("3rd order" precursors) are identified, and so forth, until the initial state is reached.
- Other necessary conditions are identified, in particular, those beyond Blue control.

The result is, for each LoE, a set of achievable "stepping stones" or milestones that lead from the current state to the desired Next State.

As the Next State plan comes together, steps are taken to ensure that i) all constraints are satisfied (e.g., constraints in assets, resources, environmental conditions, political conditions, and so forth), that ii) cross-task conflicts are identified and mitigated, and that iii) the plan is efficient as well as effective. An important part of this process is what is known as synchronization (or harmonization). This process deals simultaneously with the *problem* of identifying and eliminating cross-task conflicts, and the *objective* of identifying and exploiting cross-task synergies. Next State planning ensures that i) a comprehensive set of activity alternatives is identified and maintained, and that ii) constraints, such as execution times, are not frozen prematurely. Without these two enablers, harmonization typically amounts to little more than a crude exercise in serendipity.

It is important to step back from time to time during the planning process, and to identify the actions of highest priority and ensure their proper preparation and resource adequacy. This helps in presenting the plan to mission leaders, since it directs attention to a manageable number of key milestones, and their relationships across the set of LoEs. It also helps to ensure that all other, less important activities are properly related by providing a "road map" or end-to-end context within which all pieces fit and find their *raison d'etre*. Unless such a clean, manageable overall view of the Next State evolution can be formulated, it is unlikely that the plan itself can be conveyed – either upwards to approving management, or downwards to executing entities – with sufficient clarity. The Road Map and associated critical path, represented graphically, becomes the primary vehicle for communicating the plan to those outside the team. The *critical path* in this type of analysis is represented by a small number of the measurable intermediate conditions, along with their associated temporal sequence, against which progress toward the endstate can be measured. Typically, the critical path identifies the states that "drive" the timeline in the sense that if they are delayed, an entire endstate is delayed in turn. The notion of a *critical path* applies equally at the Campaign level and at the LoE level.

3.10 Step 10: Red Team Analysis of Threats and Risks

The step entails conducting a systematic assessment of what can go wrong when actors seek to derail or hinder the emergence of the Next State. This is often difficult for post-Cold-War Blue planners, since their natural inclination is to assume that Blue forces are in control of the situation, and that Red is capable of doing little more than respond to Blue initiatives. However, in the cross-cultural, PMESII-wide conflicts of today, this attitude is problematic. Blue does not appear to have an adequate understanding of obstructionist objectives and operational ground rules, and Red actors are becoming more and more adept as employing diplomatic, information, and economic actions of their own, and to great advantage.

One approach to this problem is to create a Red Team and to have them undertake a Next State planning process similar to the (Blue-focused) process dealt with in this paper. The Red Team assumes resources and assets in accordance with the best analysis available, and formulates its goals and levies its operating constraints based on its understanding of Red's intentions and purposes. This type of in-depth Red Team analysis may, or may not be feasible at the provisional stage of Step 7, since several teams may be investigating

multiple alternative approaches. But even when it is not, planning teams must make an effort to imagine themselves in the shoes of the adversary, and to think about what countervailing actions the adversary might employ. Moreover, these actions should not be confined to responses to Blue actions; they should include initiatives on Red's part that might, conceivably, put Blue on the "defensive".

There are other types of risk besides adversarial action. Unanticipated (or unlikely) events may occur in any of the PMESII realms: economic disturbance, agricultural failure, political disruption or intervention by third parties, health or social disruptions, etc. While it is not possible to foresee or account for every possible contingency, it is reasonable to identify the most likely, or the most severe, possibilities, and assess the robustness of the plan with respect to them. In this regard, hedging (see Step 11 below) is a powerful planning technology.

3.11   Step 11: Development of Hedging Strategies and Preventive Measures

The step develops contingency responses to the potential disruptions identified in the Red team analyses of the previous step. It draws heavily on a process known as *hedging* to enable "just in time decision making". This process minimizes sensitivity to uncontrolled events and/or to longer than tolerable operations preparations horizons by exploiting the flexibility if a planner is willing to accept some additional cost or delay in return for the ability to maintain a robust contingency plan.

The technique of hedging is not new; the business world employs it all the time, and to great benefit. When applied our concept of Next States, hedging entails the following process:

- *Identify intermediate states*
- *Develop approach(s) for intermediate states*
- *Assess the approaches using metrics*
- *Define Critical Decision Points*
- *Assess the cost of "hedging"*
- *Determine whether or not to hedge*

Properly employed, this process provides to the military the same types of benefit that "just in time decision making" provides industry.

3.12   Step 12: Analysis of Feasibility

Feasibility analysis focuses on constraints: specifically, ensuring that a proposed solution is consistent with the known (or assumed) limitations in resources, policy, timeliness, robustness and probability of success, cross-LoE dependencies, etc. The step ensures that lower-level planning assumptions (within an LoE, for example) still hold true when they are rolled-up into an end-to-end summarization of the complete Next State transition COA. Tools that can accept the various partial solutions and from them form a complete, integrated summarization are very useful in support of this function. Since the summary metrics produced by this step will provide major inputs to Step 7 (selection among alternative approaches), it is important that the models, input data, and computational procedures used to produce these metrics be as reliable as possible.

Feasibility analysis is also used to ensure consistency and synergy across multiple concurrent Next State transition efforts. Within a given Next State planning effort, there may be a somewhat vague awareness that other Next State transition activities are underway, but the potential for interference or synergy between them must be the province of Campaign planning, not Next State planning within each LoE. In particular, the Campaign level must be able to task component LoE entities to provide necessary feasibility estimates so that the feasibility of the global Campaign Plan can be assessed. This is a key interface between the Campaign level and the LoE level of Next Step Planning. Violation of constraints typically requires iteration of one or more previous steps in the process depending on its seriousness and extent.

3.13   Step 13: Organizational Mechanisms for LoE Harmonization

Implementation of the Next State plan will normally require several integrated military and civilian agency teams to manage the many diverse actions across the mission. In some areas, existing action teams may be used; while in other areas, a new team will have to be formed. The plan should identify critical areas needing integrated management of action, and the participating civilian, military, and coalition agencies. The following list illustrates this concept by identifying some integrated teams from previous missions:

- *Elections Action Team* (political, security, human rights, and public information)
- *Humanitarian Response Action Team* (relief, security, political, human rights, economic)
- *Security Force Generation Action Team* (military, police, justice, human rights, public information)
- *Justice Action Team* (security, legal and public information)
- *Electrical Power Action Team* (engineers, security, political, economic, justice)

The Next State plan provides instructions to the various Action Teams regarding their objectives, tasks, and authorities. As the Action Team is formed, it establishes the management processes for implementation of the integrated effort.

3.14   Step 14: Preparation of the Next State Plan

This step entails preparing detailed implementing instructions to responsible agencies and organizations. The product of this step, a Next State Plan, serves as the guidance to military and civilian planners of operations and activities across the mission.

In accordance with EBAO principles, the tasking is itself given in terms of the achievement of desired endstates (at the appropriate level of abstraction), constraints, and dependencies. The specification of dependencies here is very important, since an entity *within* an LoE cannot (in general) directly task an entity within some other LoE. Rather, the NSP process has, itself, identified these dependencies and ensured that (within the context of the plan) they will be satisfied.

Once planning and execution of operations and activities begin, feedback and redirection based on the actual experience of an executing entity is an essential part of the Next State process. Assumptions have been made and conveyed to civilian and military organizations; should those assumptions be violated, then either contingency plans (prepared in advance)

must be implemented, or plan redirection must occur (when the circumstance was not foreseen or otherwise accounted for). Hence, the Next State planning process at each level monitors and responds to feed-back from lower executing levels on a continuing basis as execution of the plan unfolds.

4. Enablers

Many of the steps in the Next State planning process can benefit from tools, models, optimization techniques, and other technologies. The IBC program at DARPA is developing a number of these capabilities, and the following discussion will briefly describe each technology and its potential contribution to this type of multi-dimension campaign planning.

Integration of heterogenous models: because Next State planning spans the full range of DIME -> PMESII interactions, there is a need to fully integrate models in all of these areas in such a way that their interactions can be assessed and a variety of multi-pronged CoAs considered. One major goal of IBC is to provide the system infrastructure to enable a large number of heterogeneous, independently developed, customizable, and situation-specific models to be rapidly integrated so as to form in the entirety a consistent, predictive, and constantly updated view of the PMESII/DIME environment.

Optimized Plan Synchronization and Harmonization: This capability represents a quantum leap forward in planning sophistication, since it undertakes to construct a complete plan that spans multiple Next States and multiple LoEs. The algorithmic optimization approach is predictive and model-based, and the user can select from a number of evaluation factors to assess a variety of plan prioritization policies.

Visualization: Because the models used in DIME/PMESII multi-dimensional planning are so various, the technical challenge of providing an integrated approach to viewing and analyzing the models and their interactions is significant. IBC is devoting considerable effort to developing the system infrastructure to enable this capability.

5. Status, Challenges, and the Way Ahead

The Next State planning process described in this paper has evolved steadily over the past 18 months, and is now firmly enough conceptualized that parts of it have been a the subject of formal experimentation. Within the IBC program at DARPA, some elements of NSP have been exercised and vetted. Based on the results from these experiments – that is, observations and lessons learned – important refinements have been made.

In addition, some elements of the NSP process are already being employed operationally in the analysis of real world issues. Of particular interest are the ideas relating to a full PMESII-wide characterization of the problem domain, development of a wide variety of COAs based on all DIME capabilities (employed singly and in combination), and development of tasking orders that truly specify desired state rather than actions to achieve the state. All these issues are of active interest, and based on recent experience, the Next State planning approach is resonating with perceived needs in campaign planning.

Active R&D is underway to develop the tools and system infrastructure needed to fully support the NSP process with state-of-the-art technology. The previous section listed some of these efforts, but additional detail may be appropriate in two instances. First, an ambitious planning tool is being developed with a number of characteristics specifically targeted to an NSP process. LoEs figure as fundamental entities, both in composing Campaign level Next State strings and as planning entities in their own right for accomplishing (singly or in combination) desired Next States. These LoEs are able to accept and utilize SoSA analysis and node-link-action models for generating and evaluating alternative COAs. These COAs can then be directly compared against PMESII-wide state models, integrated into the IBC framework, so investigate secondary effects and develop contingency strategies. The planning tool will also perform cross-LoE synchronization and enforce temporal dependencies and other plan constraints. Such a capability goes a long way toward providing the technology basis on which the NSP can fully realize its potential.

As we look further out into the future, the need for a planning process with NSP-like characteristics will grow rather than diminish. Driving this requirement is the realization that stove-pipe planning by independent organizations in isolation both misses opportunities for synergy (loss of efficiency) and in many cases leads to unanticipated and undesirable secondary effects in areas outside a given LoE province. Future crisis intervention must be multi-dimensional, holistically considering the full PMESII state as a system of systems, and opportunistically exploiting the full range of national capabilities (DIME) to achieve long-term political and economic stability. NSP takes that reality explicitly as its goal, and provides a comprehensive process for reaching long term goals by identifying and focusing on a series of intermediate achievable "stepping stones" leading to the desired endstate. The technical development to date is dramatic, and experimental results are encouraging, as the NSP process development continues to move from concept toward a fully deployed operational capability.