

The United States Air Force Approach to Capabilities-Based Planning & Programming (CBP&P), Part 1: Planning

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ABSTRACT

The United States Air Force (USAF) is moving from a mission-oriented planning approach to a capabilities-oriented approach to help better prepare for an uncertain future by optimizing its capabilities to face a broad spectrum of threats. This paper addresses the USAF's approach to capabilities-based planning and describes a methodology for: better aligning the USAF's approach to operations with its approach to resource allocation; explicitly assessing and making decisions on operational risk; promoting a range of solutions to capability shortfalls from across the "DOTMLPF spectrum" (doctrine, organization, training, materiel, leadership and education, personnel, and facilities); providing an operational basis for resource allocation decisions; and providing an operationally-oriented forum for addressing combatant command (COCOM) priorities.

1.0 INTRODUCTION

During the cold war, the United States (US) military used a strategy-to-task requirements process to identify the weapon systems needed to fulfill its ultimate mission: ensuring the security of the United States and its Allies. The threat was specific and focused. In planning for this peer-to-peer engagement, senior leadership determined acquisition programs to satisfy traditional and established operational plan deficiencies, or to combat specific threat systems. This Requirements Generation System approach was usually service-centric, with large expenditures devoted towards one particular service's major program, while neglecting or postponing action on the other services' needs. In the years after the collapse of the Soviet Union, this system of planning was seen as too inflexible to yield a more balanced and effective force. Large, complex, and extremely expensive programs took decades to field and bogged down our acquisition system. More traditional warfare areas, such as our infantry numbers, were reduced to fund future systems. Today, the US is moving to a broader, capabilities-oriented approach to optimize its ability to face a wide spectrum of threats in a more uncertain future. The US Air Force Chief of Staff envisioned a planning process focused on effects and the capabilities required to achieve those effects in a Joint service context.

“America's armed forces must be re-balanced for future operations. What we require is a capability mix consistent with pre-defined operational concepts and effects-driven methodology. Future programs must be conceived with this mix in mind. Systems or capabilities based on

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arguments that do not consider the emerging joint character or the asymmetric nature of warfare will find themselves obsolete, irrelevant, and candidates for elimination.”

General John P. Jumper, Chief of Staff, USAF
The USAF Transformation Flight Plan, Nov 03

To help provide guidance for desired effects, the latest National Military Strategy evolved from near-peer engagements to smaller, more dynamic scenarios lacking traditional large force-on-force models. The emphasis shifted away from overwhelming mass managed by deconfliction, to coordinated forces managed with synergy and precision. New emphasis was also placed on non-traditional warfare as the danger of terrorism was realized in 2001. Large reductions in armed forces strength during the 1990's further complicated force-shaping decisions. The numbers remaining today must be balanced across the services to support Joint warfighting, as well as optimize our defense spending. In 2003, the Air Force Studies and Analyses Agency (AFSAA) undertook the challenge of devising a methodology to analytically enlighten senior decision makers to the issues and possible courses of action for shaping our future force structure. While it is only one part of the planning culture, this process now known as the Capabilities Review and Risk Assessment (CRRA) serves as one of the best examples of institutionalized capabilities-based planning (CBP) in the Department of Defense (DoD) today.

This paper is linked to, and will be further expanded upon by another NATO paper, “*The United States Air Force Approach to Capabilities-Based Planning & Programming (CBP&P), Part 2: Programming*” by Maj Kirabeth Jeffery and Mr. Ray Chapman. The CBP&P approach describes how the programming piece of the process ties each capability to the money required to achieve that capability. The overall synchronization of the CBP&P process will be able to support resource allocation decisions in the Air Force, as well as the Joint military community and the Office of the Secretary of Defense (OSD).

2.0 ELEMENTS OF CBP

For a CBP approach, the USAF makes warfighting effects and their required capabilities the primary process drivers. Just as any good strike planner uses the desired effect on a target as a starting point and works backwards to identify an optimum solution, this top-down approach targets USAF capability levels desired by senior leaders to achieve strategic planning goals within resource allocation constraints. AF Concepts of Operations (CONOPS), in support of Joint Operating Concepts, are used as the mechanism for identifying and analyzing required capabilities. Air Force CBP employs an analytically sound (repeatable, traceable, and defensible) process to identify, assess, and prioritize Air Force capability shortfalls, gaps, and potential tradespace study areas. These measure areas are not system specific, but encompass the entire Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) spectrum.

2.1 Scenarios Provide Context

The U.S. Defense Strategy implements a “capabilities-based” approach to defense planning to provide, over time, a richer set of military options across the full range of military operations. This offers U.S. forces the means to adapt to any potential surprise and deny asymmetric advantages to the enemy. Providing the context for CONOPS activities is the Secretary of Defense’s statement that “the shift from bi-polar political-military environment to multi-polar has broadened the range of possible missions and threat environments necessitating a move to a new planning construct that better accounts for uncertainties.” As a result, we have developed analytic baselines, based on Office of the Secretary of Defense for Policy approved scenarios. An analytic baseline is comprised of a Major Combat Operations (MCO) scenario, a concept of operations, and

integrated force deployment data used by the Department of Defense service components as a foundation for strategic analyses.

The Air Force uses the analytic baseline to conduct analyses that can be compared to studies conducted in the Joint world. The campaigns are designed to be as realistic and complete as possible, while maintaining a sense of reasonableness to eliminate bias towards one particular service. Scenario sets are chosen at the beginning of the CRRA process to serve as the basis for CONOPS activity models.

2.2 Capability Framework: The MCL – A *Functional Perspective*

A capability is defined as the ability to achieve an effect under specified conditions through multiple combinations of means and ways to perform a set of tasks. Multiple combinations of means and ways should be considered. For example, an aircraft by itself is not a capability. The capability exists when the aircraft is flown by a qualified crew, operates under proper command and control, has a secure base, has intelligence preparation, has weapons and communications appropriate to the mission, etc. Capabilities can be thought of as an interdependent package of operational and support resources and activities.

The Air Force **defines** and organizes capabilities in a Master Capabilities Library (MCL) from a *functional* perspective. These are the core things we do as a military force. This library of capabilities is designed to be system and service agnostic, emphasizing what we do, not how we do it. The idea here is to consider the multiple ways of achieving military missions using a variety of tools and techniques. A functional capability category list provides a common taxonomy linking AF functions to Joint functions. This list covers both warfighting (force application, communications) and institutional (acquisition, training) activities. Functional categories are more enduring than task-oriented constructs; they are less apt to change due to new systems, emerging threats, or doctrinal updates. They also provide clearer boundaries to assign manpower, weapon systems, etc., thereby reducing duplicity of elements in different categories and refining the examination process.

The AF MCL serves as the foundation of the CRRA CBP methodology. The assessment process begins with the MCL – a functionally oriented list of all the AF’s current operational capabilities, broken down to measurable task levels. A goal for the framework is that it be both mutually exclusive (avoid redundancy) and collectively exhaustive (all-encompassing). As stated, CBP is conducted from a capability perspective, and therefore, not a systems or mission perspective. Capabilities are defined and organized functionally, then evaluated within operational employment context to give senior leaders insight to problem areas [1]. See Figure 1.

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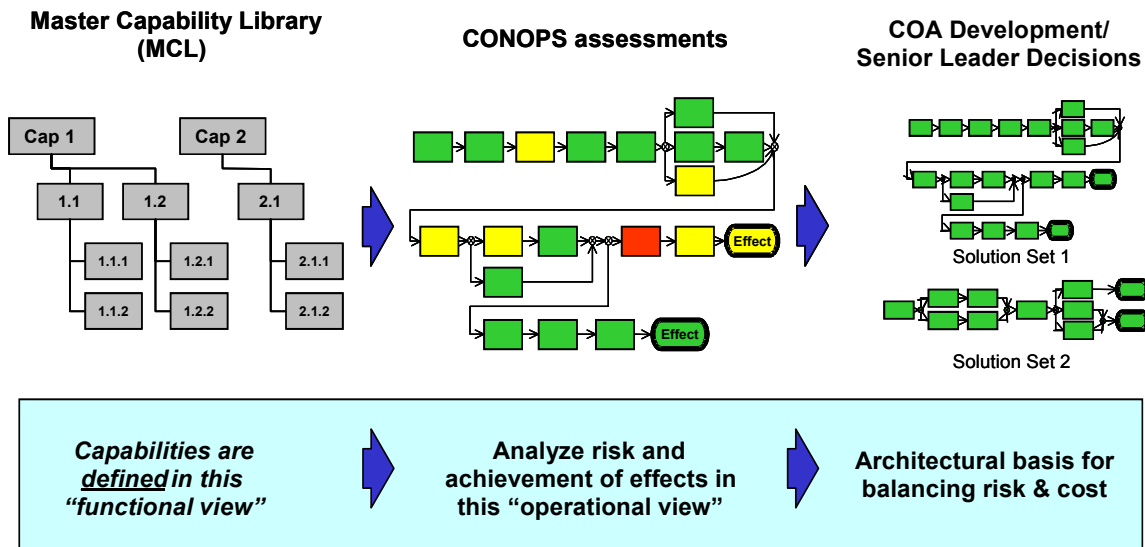


Figure 1: Air Force Approach to CBP.

2.3 AF CONOPS Provide Scope – An Operational Perspective

The Chief of Staff of the Air Force (CSAF) articulated the vision for the future of Air Force modernization planning, based on a family of effects-based and capabilities-focused "Concepts of Operations." The centerpiece of this transformation is the development of new AF Concepts of Operations (CONOPS) to guide our planning and programming, requirements, and acquisition. A CONOPS paints the overall picture and broad flow of tasks within a plan by which a commander maps capabilities to effects, and effects to endstates for a specific scenario. Seven CONOPS have been identified to focus on a range of operational challenges most pertinent to air and space power. They are Global Strike (GS); Global Persistent Attack (GPA); Global Mobility (GM); Nuclear Response (NR); Homeland Security (HLS); Space & Command, Control, Communications, and Computers, Intelligence, Surveillance, and Reconnaissance (S&C4ISR); and Agile Combat Support (ACS).

The CONOPS teams apply *operational* views to **analyze** functional capabilities and the effects they are intended to achieve in the determined set of OSD-approved scenarios. This operational emphasis provides a clear link to the Joint Combatant Commands' (COCOMs) concerns. Operational experts, lessons learned, and COCOM priorities are used here because they most accurately account for the varying conditions under which capabilities may be used, such as scalable tactical challenges. Here military "art" and "science" merge.

Within their lane of expertise, CONOPS teams define the activities necessary to achieve desired effects. An effect is defined as a change to a condition, behavior, or degree of freedom resulting from tasked actions. It can include physical, behavioral, or knowledge changes, and can be intended or unintended. An AF CONOPS document describes how sequenced operations (ways) are conducted and effects (ends) achieved using a defined set of tasks (means).

CONOPS teams choose capabilities/tasks from the MCL in order to conduct operational view assessments (See Figure 1). CONOPS activity models are constructed to link their applicable MCL tasks & capabilities to effects from an "operational perspective." They depict simultaneous and sequenced tasks, and are used to

apply realistic conditions, standards, measures, and metrics, and to assess our ability to achieve effects. Weight is assigned to each item in the activity, as some abilities are more important to one CONOPS than another. CONOPS teams use a weighted average from a group of severity factors (i.e., Achievement of Desired Effects, Friendly Casualties, Public Security Confidence, Collateral Damage, etc) and a specific level of Capacity (determined from Proficiency and Sufficiency levels) to determine relative impact to operations. These outcomes are high-level, operational concerns that put shortfalls in perspective and help form the starting point for discussions of relative risk.

3.0 CBP METHODOLOGY

The highest level of Air Force leadership put forth the task—to find out where our deficiencies and overages in force strength are in terms of *shortfalls* (not being proficient enough or lacking the numbers to accomplish a task), *gaps* (having no capability to perform a task), and *tradespace study areas* (identified excesses in the force structure that may be used to reduce costs or improve other areas, while keeping risk at an acceptable level). AF CONOPS teams lead this quest using the CRRA process as the investigatory step. There are three main questions posed: 1. How good are we (Proficiency)? 2. Do we have enough of whatever it takes (Sufficiency)? and 3. What is the impact (Severity)?

3.1 Proficiency: Value Focused Thinking (VFT) helps answer *How Good are We?*

Value Focused Thinking is a Multi-Objective Decision Analysis (MODA) technique used to structure a complex problem and integrate multi-command objectives into a decision making process. VFT provides the following benefits to the CBP methodology: an understanding of what is important (relative value) before evaluating alternatives, improved communication between stakeholder groups (across CONOPS), a systematic approach to planning that reduces the adversarial nature of stakeholder discussions (it is a debate about values, not about systems), and a better list of alternatives. Through an approach based on VFT [2], the MCL was constructed as a hierarchical list, with elements on each level having common importance. CONOPS teams can use this list in a spreadsheet or database to sum performance scores for each functional area in each scenario over given time periods. The CRRA methodology uses a piecewise linear estimation of the value curve to analyze capability proficiency. Subject Matter Experts (SMEs) are used to help estimate a value function for each measure using discrimination points like “More Doesn’t Matter”, “Good Enough”, “Limited Military Value”, and “No Military Value”. See Figure 2 for an example of the use of a value function.

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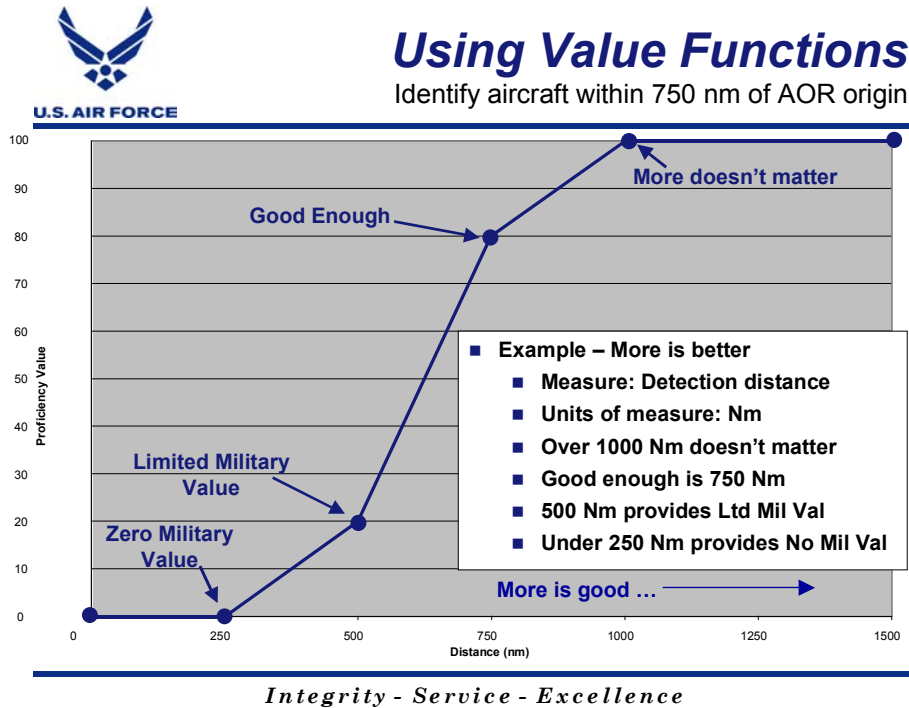


Figure 2: Estimating the Value Function.

3.2 Sufficiency: Supply vs. Demand answers *Do we have enough?*

One of the questions that is being asked by the CSAF is, “Do we have sufficient Force Structure (SUPPLY) to meet the DEMAND of the DoD planning constructs?” Scenarios and time phasing of actions provide plans for the use of specified platforms and systems. While a list of systems required to achieve an effect is not wholly in keeping with the CBP concept, the question of sufficiency can be answered by comparing future force data projections with what is identified as required. Ideally, capabilities needed during the scenario, such as “attrition of enemy armor by 40%” or “200 targets per day for 3 days, 500 per day for 5 days, 1500 per day for 10 ten days, etc. (with some specifics on types)” are used to frame such a review. Regardless of form, this becomes a Supply vs. Demand argument, with time requirements for the campaigns being a most important stressor.

3.3 Severity: Determination of Operational Risk answers *What is the Impact on Operations?*

Risk is typically defined in terms of the potential downside of a decision or action. An integral part of Operational Risk Management is the analysis of likelihood and consequence. To answer the question "So What?" we must determine the *consequences* of having particular capability levels (shortfalls, gaps, etc.) in the scenario sets for a given time period and the *likelihood* that an adverse impact will occur. This forces participants to think from a broader perspective about the role the Air Force plays in warfare.

Operational Risk = f(Consequence, Likelihood)

In other words, given the existence of a shortfall or gap, participants must determine the likelihood of the deficiency having an adverse impact on the Air Force's ability to accomplish the mission or to achieve desired effects during each time period. The consequence is then plotted on the x-axis versus the likelihood on the y-axis for each shortfall over time. The red, yellow, and green bands in Figure 3 are meant to show approximate operational risk levels and help paint a picture indicating the risk tolerance for the AF. This Risk Chart graphically presents operational risk and illustrates changes in its status relative to our current year performance. Operational Risk Management then guides senior leaders to begin evaluating the capability objectives that fall inside the red areas (higher likelihood, higher consequence) and evaluate them in terms of potential risk reduction, resources required, and benefits to the DoD.

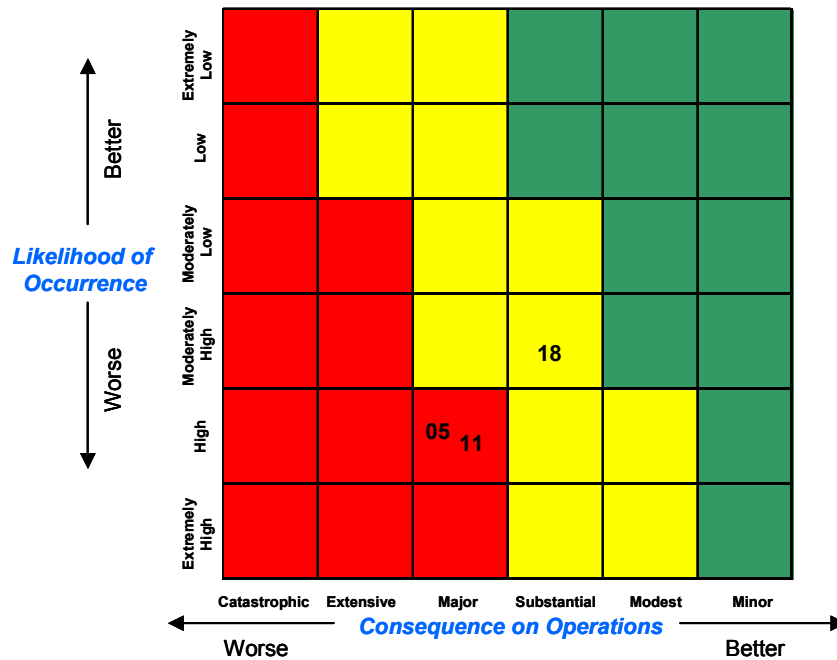


Figure 3: Risk Matrix.

4.0 OUTCOMES

The culmination of this analytical process provides a functional frame of reference presented to operational experts who make assessments of our current, mid-term and far-term capabilities to determine shortfalls, gaps, and tradespace. Assessments are then presented in order, according to the level of operational risk, to senior leaders for their consideration and direction.

4.1 Prioritizing Shortfalls

A series of informal senior leader reviews allows the CONOPS to focus further study efforts on two priorities: a way ahead for courses of action (COAs) and/or tradespace study area development and evaluation. The produced list focuses the attention of key decision makers throughout the Air Force, and provides insights to the Joint community as to what are the AF concerns. Initial investment or divestiture possibilities can be identified, discussed, and prioritized to yield candidates for further review. These can be assigned to be researched and modeled using objective analysis tools, and later considered for budget inputs as applicable.

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4.2 COA/Solution Set Development

Further analysis refines capability objectives and identifies potential COAs. This effort brings the analytic community together to provide the best recommendations for senior leader decisions. COAs are developed from across the DOTMLPF spectrum to address the top-priority capability areas. HQ USAF works with subordinate units as well as the Joint staff to develop and test candidate solutions using modeling and simulation (M&S), architecture models, military utility, and cost analysis to assess capability improvement and validate the proposed COAs. Solutions can be derived from multiple COAs. Results from the capability review and risk assessment and proposed solution set studies are reviewed and refined at succeeding levels, culminating with a review led by the Secretary of the Air Force (SECAF) and the CSAF. As the CRRA is a risk balancing exercise, the most senior phase provides leadership guidance on areas where risk can be accepted, i.e., reducing an outdated system without imperiling the Joint warfighter. The senior CRRA attendees approve detailed planning language that ultimately guides budget development.

5.0 RELATIONSHIP TO OTHER MAJOR PROCESSES

CBP is an iterative, cyclical process where outputs from the previous cycle serve as inputs to the current cycle. In addition, the products further serve to relate Air Force concerns to those of the other services, feeding the Joint requirements system as it looks for the best possible solutions. CBP is an integral element in resource allocation (such as planning, requirements, acquisition, programming, and budgeting). As proper analysis requires CBP to use data from other processes as inputs, outputs from CBP are used as inputs elsewhere in resource allocation. Defining joint capability categories is an essential early step to implementing a capabilities-based approach because they provide a basis for comparing Service contributions to Joint warfighting, and therefore facilitate cross-Service trades.

5.1 Inputs

Previously identified COAs, Air Force and Joint Lessons Learned, Combatant Commanders' Integrated Priority Lists, and capabilities development initiatives serve as inputs to the CBP process. Air Force functional area inputs, such as the planning products from CONOPS expertise, also feed the various CBP sub processes. It also requires current Joint strategic guidance, defense planning scenarios, AF CONOPS documents, and metrics.

5.2 Outputs

CBP produces new Air Force guidance to be documented in the planning guidance and sets the stage for implementation in the programming language. Approved ways ahead, potential tradespace study areas, and recommendations to initiate capabilities development go forward to acquisition processes. Guidance derived from CBP is applicable in organizational and technology developments, operational experimentation, resource allocation, and manpower/personnel areas.

6.0 ROAD FORWARD

CBP is planning, under uncertainty, to provide capabilities suitable for a wide range of modern-day challenges and circumstances, while working within an economic framework that necessitates choice [3]. The primary focus of Air Force CBP is to help senior leaders better prepare the United States for an uncertain future, facing a broad spectrum of threats. The Air Force must have the capabilities and optimum force mix necessary to support the National Military Strategy into the future.

Because the DoD has more needs than resources, it must seek the highest levels of efficiency and effectiveness, eliminate unnecessary duplication across the Services, and develop multi-Service efficiencies. This capability requires an assessment of needs above the Service level. A continuing effort to develop Joint capabilities-based assessment and planning methodologies will be essential to understanding contributions to the warfighter, and investment strategies to mitigate shortfalls and capability priorities.

The next step in the evolution is to address the programming aspect of defense planning, or “tying capabilities to dollars.” CBP&P ties the assessed capabilities to dollars to simplify the cost benefit analysis leap for the strategic decision-maker. The NATO paper “*The United States Air Force Approach to Capabilities-Based Planning & Programming (CBP&P), Part 2: Programming*” by Maj Kirabeth Jeffery and Mr. Ray Chapman, will further expand upon CBP&P.

7.0 REFERENCES

- [1] Aldridge, Pete, *Joint Defense Capabilities Study*, January 2004.
- [2] Kirkwood, Craig W., *Strategic Decision Making*, Duxbury Press, 1997.
- [3] Davis, Paul K., *Analytic Architecture for Capabilities Based Planning, Mission-System Analysis, and Transformation*, RAND, Santa Monica, CA.

8.0 CAPABILITIES BASED PLANNING & PROGRAMMING TERMS / DEFINITIONS

Air Force Concept of Operation (AF CONOPS) – An Air Force Concept of Operations is the highest Service-level concept comprising a commander’s assumptions and intent to achieve desired effects through the guided integration of capabilities and tasks that solve a problem in an expected mission area. Joint Force Commanders employ Air Force Concepts of Operations through Air Expeditionary Forces to fight and win wars.

AF CONOPS Sponsor – The Air Staff Directorate or Air Force Major Command responsible for developing any AF CONOPS in support of the Air Force CBP process.

AF CONOPS Flight Lead – The Air Staff Directorate representative or Air Force Major Command representative responsible for documenting Service-level CONOPS on behalf of their sponsor and advocating AF CONOPS effects and capabilities to their appropriate HQ USAF CONOPS Champion.

Capabilities Based Planning – Planning, under uncertainty, to provide capabilities suitable for a wide range of challenges and circumstances, all designed to achieve certain battlespace effects.

Capability – The ability to achieve an effect under specified conditions through multiple combinations of means and ways to perform a set of tasks.

Capability Gaps – Those synergistic resources (DOTMLPF) that are unavailable but potentially attainable to the operational user for effective task execution.

Capability Objective – The grouping of like capability shortfalls and gaps that allows senior leaders to make decisions on a common capability topic requiring improvement.

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Capability Shortfall – A lack of full military utility needed by an operational user to effectively execute a task.

Course of Action (COA) – The COA is a planning and decision process that culminates in a MAJCOM decision. The COA includes a series of alternative program choices developed by the MDA or his designate, presented to a MAJCOM commander and that once a specific COA is selected, becomes a formal agreement between the MDA and the operator (MAJCOM Commander) that clearly articulates the performance, schedule, and cost expectations of the program. The COA provides the basis for the Technology Development Strategy during the Technology Development Phase. The COA becomes the basis for the SAMP.

HQ USAF CONOPS Champion – The Air Staff focal point for Service-level CONOPS and the basket of capabilities described and required by that CONOPS. The Champion promotes the attainment and sustainment of essential Air Force capabilities required to achieve the effects needed by Joint Force Commanders (JFC) to fulfill their assigned missions. The Champion is also responsible for leading the Capabilities Review and Risk Assessment (CRRA) process, advocating AF CONOPS, effects, and capabilities in all Department of Defense, Joint Staff, and Air Staff CBP processes, and informing the Air Force Corporate and the Planning, Programming, Budgeting, and Execution System processes.

Proficiency – Estimate used during capability analysis that answers the question “How well do we perform a given task (miles, minutes, percent, etc.)?” Together, proficiency and sufficiency ratings will be used to determine overall health and risk of a capability to achieve an effect.

Risk Assessment Team (RAT) – A cross-functional group of subject matter experts convened to support the Air Force CRRA activity, and representing Air Staff, MAJCOM, DRU, other service, JFC, and government agency interests pertaining to a specific area of analysis.

Sponsor – The DoD component responsible for all common documentation, periodic reporting, and funding actions required to support the capabilities and acquisition process.

Sufficiency – Estimate used during capability analysis that answers the question “Do we have enough (troops, aircraft, supplies, etc.)?” Together, sufficiency and proficiency ratings will be used to determine overall health and risk of a capability to achieve an effect.

Tradespace – Any identified excess(es) in the force structure that may be used to reduce costs while keeping risk at an acceptable level. Areas for consideration as tradespace may be found in capability sufficiency and capability overlap. All tradespace examinations should include Joint contributions.

Tradespace Study Area – Areas specifically identified through the CRRA process requiring additional MAJCOM review for potential divestiture opportunities.