

The United States Air Force Approach to Capabilities-Based Planning and Programming (CBP&P), Part 2: Programming

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ABSTRACT

The Air Force Studies and Analyses Agency (AFSAA) is exploring possibilities for mathematically linking capabilities to cost in support of the United States Air Force (USAF) Capabilities Based Planning and Programming (CBP&P) process. Leveraging significant progress in modeling the planning phase of CBP&P based on capability, analytic modeling to support the programming phase continues to evolve. Legacy Department of Defense (DoD) accounting and finance systems, designed years before the CBP&P concept, do not offer an unambiguous linkage between cost and capability in terms of either proficiency or sufficiency (i.e., quality or quantity). In relation to capabilities, the Air Force has three fundamental cost drivers: (1) manpower, (2) material and equipment and (3) overhead. Analysis of these cost drivers should enable us to link capabilities (and their associated sub-capabilities and tasks) directly to cost. Determining the functional relationship between capabilities and cost provides the analytic foundation for capabilities based programming. Once these functional relationships are derived, resource allocation decisions can be studied using Business Case Analysis (BCA) to make optimum “bang for the buck” decisions across a spectrum of capability options.

1.0 INTRODUCTION

The CBP process is an effects-based, top-down driven approach that measures current and future operational USAF capabilities to provide the initial rudimentary means for guiding investment decisions. While the DoD uses the CBP process and terminology to address capability assessments, AFSAA does not believe the term is all-inclusive. CBP is just the first step in an end-to-end analysis process required for CBP&P. CBP&P is a term coined by AFSAA, that not only addresses measuring current and future operational USAF capabilities, but also addresses the investment decisions needed to yield the most “bang for the buck” in a resource constrained environment. Since effects drive the required capabilities in the CBP&P process, the requirements are specified in terms of the capability proficiency (how well we do something) and sufficiency (how much do we need) required to achieve the desired effects within a broad scenario set. Applying a rigorous Capabilities Review and Risk Assessment (CRRRA) process, capability shortfalls and possible areas for tradespace are identified. See NATO paper titled “The United States Air Force Approach to Capabilities-Based Planning, Part 1: Planning,” by Maj. James Jones and Mr. Robert Herslow, for more information on these planning aspects of this CBP&P process. This paper will focus on the “&P” portion of the CBP&P process.

Jeffery, K.; Chapman, R. (2005) The United States Air Force Approach to Capabilities-Based Planning and Programming (CBP&P), Part 2: Programming. In *Analytical Support to Defence Transformation* (pp. 11-1 – 11-8). Meeting Proceedings RTO-MP-SAS-055, Paper 11. Neuilly-sur-Seine, France: RTO. Available from: <http://www.rto.nato.int/abstracts.asp>.

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 01 APR 2005		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE The United States Air Force Approach to Capabilities-Based Planning and Programming (CBP&P), Part 2: Programming				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Studies and Analysis Agency (AFSAA) 1570 Air Force Pentagon Washington, DC 20330-1570 UNITED STATES				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES See also ADM202031. NATO/RTO-MP-SAS-055, The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 23	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

CBP&P ties the assessed capabilities to dollars so cost-benefit analysis can be explored for the strategic decision-maker. Throughout this document, the term “CBP&P” will be used to describe the programming piece of CBP&P which ties each capability to the dollars required to achieve that capability, providing the foundational building blocks for Business Case Analyses (BCA). Using USAF Concept of Operations (CONOPS) as a framework for analyzing capabilities, USAF’s CBP&P analytic approach employs an analytically sound, repeatable, traceable, and defensible process which assesses and identifies USAF capability shortfalls, gaps and tradespace study areas across the Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) spectrum.

The overall analysis synchronization of the CBP&P process should support resource allocation decisions within the Air Force, and can be used to defend those decisions in the Joint Staff and the Office of the Secretary of Defense (OSD) resource allocation processes. However, there are currently no finance and accounting systems within the DoD that are based on military capabilities. Within the OSD Transformation Planning Guidance, defense planning is done based on capabilities, but modeling efforts have not been accomplished which link capabilities to accurate cost accounting measures. This paper will present an approach that the Air Force Studies and Analyses Agency is working on to make this connection.

2.0 CAPABILITY BASED PLANNING AND PROGRAMMING METHODOLOGY

The programming piece of the capability based planning process is still in development. The current proposed methodology defines the capability to cost relationships of capability shortfalls, gaps, and tradespace areas identified through the CBP portion of the CBP&P process. The focus areas will be decomposed down to the measurable task level. Execution cost data and performance measures will be obtained from appropriate sources in the focus area of interest. A capability-cost function will then be derived, using regression techniques, from a 5-year history of the metrics and cost execution data. These capability-cost relationships will form the foundational building blocks for the analysis.

Questions that will have to be answered include: “What metrics do you use to measure capability?” “What AF capability do the dollars in your Program Element (PE) support?” “What are your performance measures?” Currently, the methodology assumes that sufficient execution cost data and metrics are available to develop a capability-cost function. When execution cost data is not available, financial estimates may be used and the required metrics developed. Activity based costing (ABC), when available, could provide additional details which link to capabilities.

2.1 Pilot Project

CBP&P is currently being developed on a small scale through a pilot project with the USAF Installation and Logistics Directorate of Resources (HQ USAF/ILP). This project covers the engine production and overhaul, at depot level maintenance, for the F-100 engine. The F-100 engine was selected as a pilot project because of the robust set of metrics and cost data currently available through HQ USAF/ILP. While the proposed methodology will be based on results from the CRR process, this pilot project began by forming a team of Subject Matter Experts (SMEs) to identify the critical elements and/or relevant relationships in this particular focus area or capability. The sources for cost data are the Weapon System Cost Retrieval System (WSCRS), the Commanders’ Resource Integration System (CRIS), and the AF Total Ownership Cost (AFTOC) database. WSCRS provides actual expenditures (labor costs, labor hours, material costs, overhead costs, and other costs) at the engine level. CRIS provides actual expenditures as well, but the lowest level available is the program element code. The AFTOC database provides total costs, including actual expenditures plus obligations.

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Preliminary results of regression analysis conducted on 5-year historical cost trends produce varying results, depending on the data source used. So, the next step is to identify which data source provides the best fit for capability-cost analysis, and then to develop low-resolution activity models to map the costs to activities and capabilities. See figure 1 for a depiction of a low-resolution activity model.

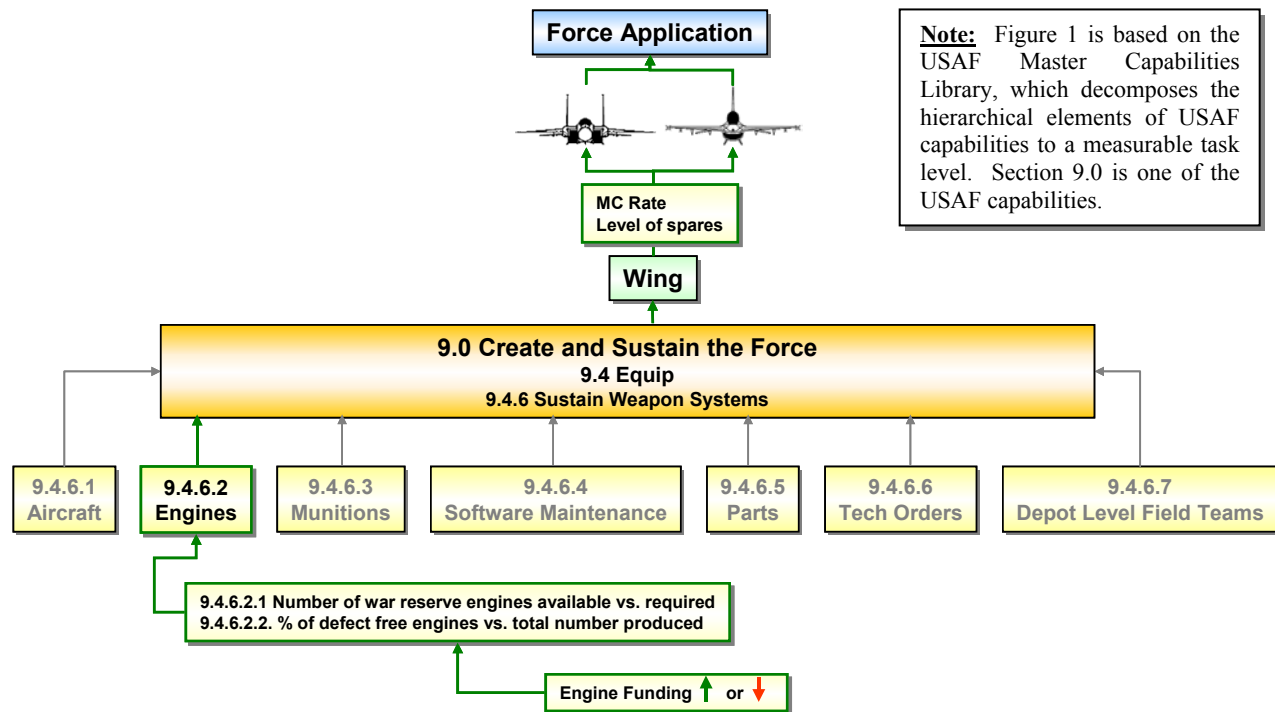


Figure 1: Conceptual Activity Model.

2.2 Programming

While the CBP portion of CBP&P addresses the CRRRA process of identifying shortfalls, as discussed in the “The United States Air Force Approach to Capabilities Based Planning” paper, CBP&P addresses programming the funds that are identified through the capability to cost relationships. These relationships support Analysis of Alternatives (AOA’s), BCA’s, etc, which help support investment decisions through the new Joint Capability Identification and Development System (JCIDS) process. DoD instituted the JCIDS process, requiring analyses to support capability investments that are not redundant and are interoperable, across the Joint spectrum. Once the capabilities are approved, the USAF programs the funds. Prior to that point, the AoA’s provide guidance on the best approach to potentially solve the shortfalls. To better understand how AoA results from the various shortfalls interact with one another, a BCA should be performed. This would provide a more strategic, institutional look at the implications of selecting one solution over another on the entire process.

3.0 BUSINESS CASE ANALYSIS BASICS

AFSAA is looking into different ways of incorporating programming into the CBP process. A main focus at this time is BCA. As such, a discussion of BCA basics follows, along with its possible areas of application in the CBP&P process.

Developing business cases in corporate companies is a step used for selecting projects. In terms of the DoD, it is a potential step for selecting acquisition programs, based on the capabilities the associated weapon systems provide. BCA can be used to implement company strategies, in this case USAF warfighting strategies, and further maintain a competitive advantage over external threats.

Activity based costing (ABC) would enable identification of “money making” and “money losing” capabilities. It would add an economic element to the CBP&P process, which would enhance capability tradespace analysis. The economic element provides further delineation for making choices between systems and capabilities. It is one thing to require a capability, and another thing to be able to finance it. Different capability packages could be compared/contrasted and their economic impact on overarching AF capabilities evaluated. Knowledge of the “true” cost of each capability is required to explore opportunity costs of different capability options, as well as to improve strategic decision-making. Opportunity costs are the potential benefit of one alternative course of action that is lost or compromised, by selecting another alternative course of action.

Activity based costing focuses on indirect (overhead) costs, but links them directly to their expense category and particular cost object. Cost objects are defined as any item (in this case, systems and resources) for which cost data is desired. These cost objects consume activities, which consume resources, and then in turn drive costs. ABC is best used when the overhead is high, products are diverse and complex, costs of errors are high, and competition is tough. The steps for ABC are: 1) identify activities, 2) determine the cost for each activity, 3) determine cost drivers, 4) collect activity data, and 5) calculate product cost. Since activities have a direct link to capabilities, this accounting process could be used in CBP&P to answer the question “What AF capability do the dollars in your Program Element support?” The difficulty still will be in defining the “products” which make up the capabilities and are the cost objects.

Another question that remains unanswered is “What metrics do you use to measure capability?” Good, meaningful, performance metrics should be: timely, easy to use, uniform across the organization, and multi-dimensional. Even in a military context, the business model can be applied. The metrics perhaps should then focus on the customer, the supplier, and the inventory. The performance measures can be in the form of percentages of customers served, supply rates, inventory turns, etc. They are typically in the form of percentages (perhaps successes/failures), counts (number of parts/people), costs (associated with production/inventory), and time required (to manufacture/deliver products).

4.0 CONCLUSION

The real challenge today facing lawmakers and defense planners is funding a joint capabilities-based budget between the various military services within the US Department of Defense. Although we believe this journey has just started, linking capabilities to cost is a necessary next step and will result in better inter-service budget priorities and more robust shortfall/tradespace analysis.

The goal of capability-based planning and programming is to build the optimal force to meet a wide variety of threats, rather than a narrow set of threats. A continuing effort to develop Joint capabilities-based assessment and planning methodologies is essential to understanding contributions to warfighter investment strategies in order to mitigate shortfalls and capability priorities. Our effort begins here with CBP&P’s F-100 pilot project.

Using Business Case Analysis, the USAF is developing a way to link capabilities to cost and provide cost-benefit analysis to the strategic decision-maker. There are many yet unanswered questions in determining performance measures, cost metrics, actually assigning costs to capabilities, and truly addressing the

programming aspect of the process. As the CBP&P process evolves, the USAF will continue to develop an analytic methodology to link capabilities to costs in the CBP&P process. It cannot be emphasized enough that the CBP&P process is in its infancy. The solicitation of new ideas to program capabilities is both warranted and welcome.

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6.0 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

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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 to a standard 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.

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 (CRRRA) 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 CRRRA activity, and representing Air Staff, MAJCOM, DRU, other service, JFC, and government agency interests pertaining to a specific area of analysis.



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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.



Headquarters U.S. Air Force

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27 April 2005

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Introduction



- **Background**
- **Methodology**
 - **Pilot Project**
 - **Programming**
- **Conclusions**



Background



- **Capability Based Planning & Programming (CBP&P)**
 - **Term coined by AFSAA**
 - **Begins with CBP**
 - **Effects based, top-down driven**
 - **Programming ties capabilities to costs**
- **Supports USAF resource allocation decisions**
- **Road ahead for Joint US military planning & programming**
- **Moving forward with Pilot Project to link capabilities to costs**



Methodology



- **Form team with SMEs to define focus area, desired results and approach**
 - **HQ USAF Installation and Logistics Directorate and Resources (ILP)**
 - **Air Force Studies and Analysis Agency**
- **Map ILP focus areas to Master Capability Library (MCL)**
 - **Decomposed to measurable task level**
 - **Metrics identified in MCL**
- **Source additional metrics and cost execution data for identified task**
 - **Develop capability cost functions from 5 year history of metrics and cost execution data**
 - **Add capability cost function to MCL master spreadsheet**
- **Build activity model which represents hierarchical operational process to test methodology for Pilot Project cost functions**



Methodology: Assumptions



- **Appropriate historical cost data and metrics are available to create capability/cost function**
 - **Where cost data is not available SME financial estimates will be used**
 - **Where metrics are not available SMEs will develop them**
- **If available, activity based costing could provide additional detail**

Accounting and finance data systems are not capability-based
Will identify more as we progress



Methodology: Pilot Project



- **Pilot Project focus area:**
 - **The F-100 Engine selected because robust metrics and cost data are available**

- **Potential Data Sources:**
 - **Weapon System Cost Retrieval System (WSCRS)**
 - **Commanders' Resource Integration System (CRIS)**
 - **AF Total Ownership Cost (AFTOC)**
 - **Automated Budget Interactive Environment System (ABIDES)**
 - **AFMC, Oklahoma City-Air Logistics Center (OC-ALC)**



Methodology:



Pilot Project Data Source Selection

- Initial look - Weapon System Cost Retrieval System (WSCRS)
 - Actual engine expenditures
- Alternate sources for future looks:
 - Commanders' Resource Integration System (CRIS)
 - Actual expenditures
 - Lowest level is Program Element (PE) Code
 - AF Total Ownership Cost (AFTOC)
 - Total cost
 - Actual expenditures plus obligations



Methodology:

Pilot Project & Master Capability Library



9. Create and Sustain the Force

9.1. Organize Forces

9.2. Train

9.3. Educate

9.4. Equip

9.4.1. Design, develop, acquire, and modernize (modify) force elements; includes equipment and systems

9.4.2. Respond to urgent wartime/contingency acquisition requirements

9.4.3. Ensure a viable industrial base

9.4.4. Test and Evaluate systems, equipment, and materiel

9.4.5. Test system, equipment, and material capabilities against mission requirements across life cycle

9.4.6. Sustain weapons systems

9.4.6.1. Aircraft

9.4.6.2. Engines

9.4.6.2.1. Number of war reserve engines available vs required

9.4.6.2.2. % of defect free engines vs total number produced

9.4.6.3. Munitions

9.4.6.4. Software maintenance

9.4.6.5. Parts

9.4.6.6. Tech Orders

9.4.6.7. Depot level field teams

9.4.6.8. Sustain support equipment

9.5. Recruit and Access

9.6. Manage Force Quality

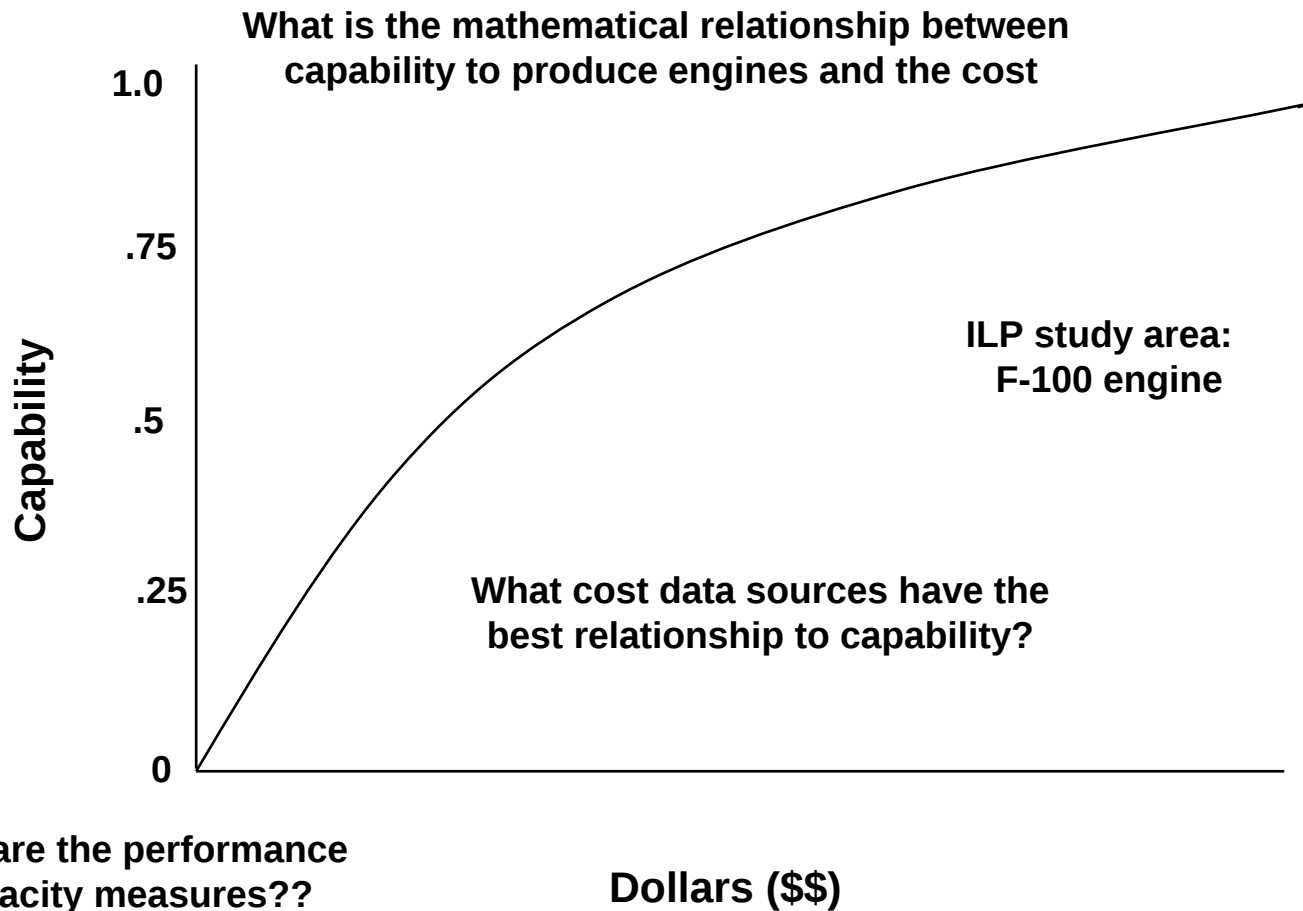
9.7. Posture Responsive Forces

9.8. Generate Public Goodwill (placeholders)

Source: MCL 5.5

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Methodology: Capability/Dollars

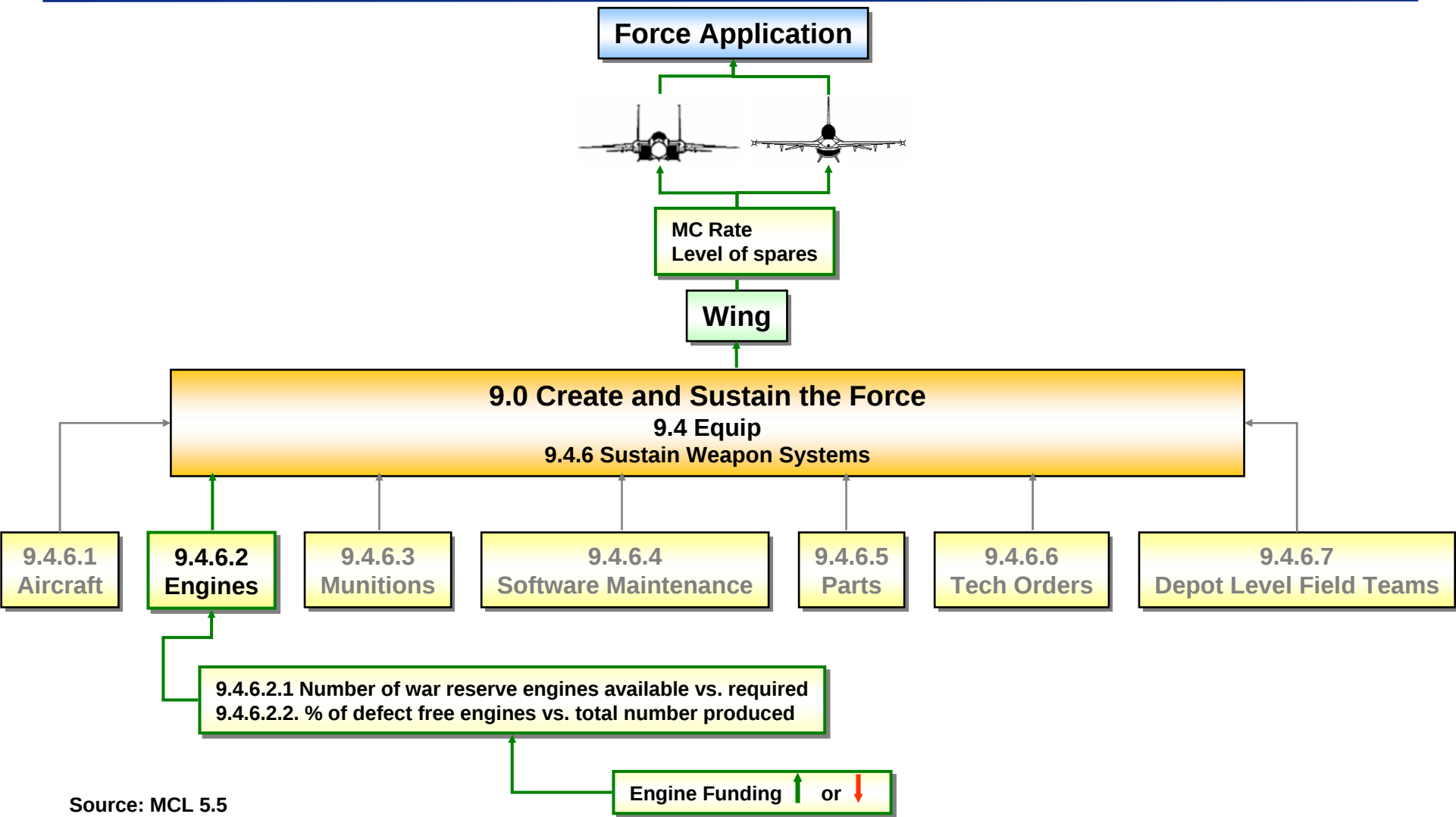




Methodology:



Pilot Project Conceptual Activity Model



Source: MCL 5.5

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Methodology: Programming



- **Capability to cost relationships can:**
 - **Shed light on programs that must be funded**
 - **Support Analysis of Alternatives, Business Case Analysis, etc.**
 - **Support investment decisions through Joint Capability Identification and Development System (JCIDS) process**
- **Capability-based programming may require:**
 - **Defining capability metrics differently**
 - **Placing more emphasis on Activity Based Costing**
 - **Capturing new cost data that link directly to capabilities**
 - **Institutionalizing a Business Case Analysis process**



Conclusions



- **Goal of CBP&P is to build the optimal force to meet a wide variety of threats**
 - **Linking capabilities to cost is a fundamental step**
 - **Overall programming piece is still evolving**
- **This CBP&P approach could lead to a standardized Joint capability assessment methodology**
- **Ultimate goal is to fund an effects driven joint capabilities-based budget**
- **Result – Stronger more robust joint forces maximizing the “bang for the buck”**



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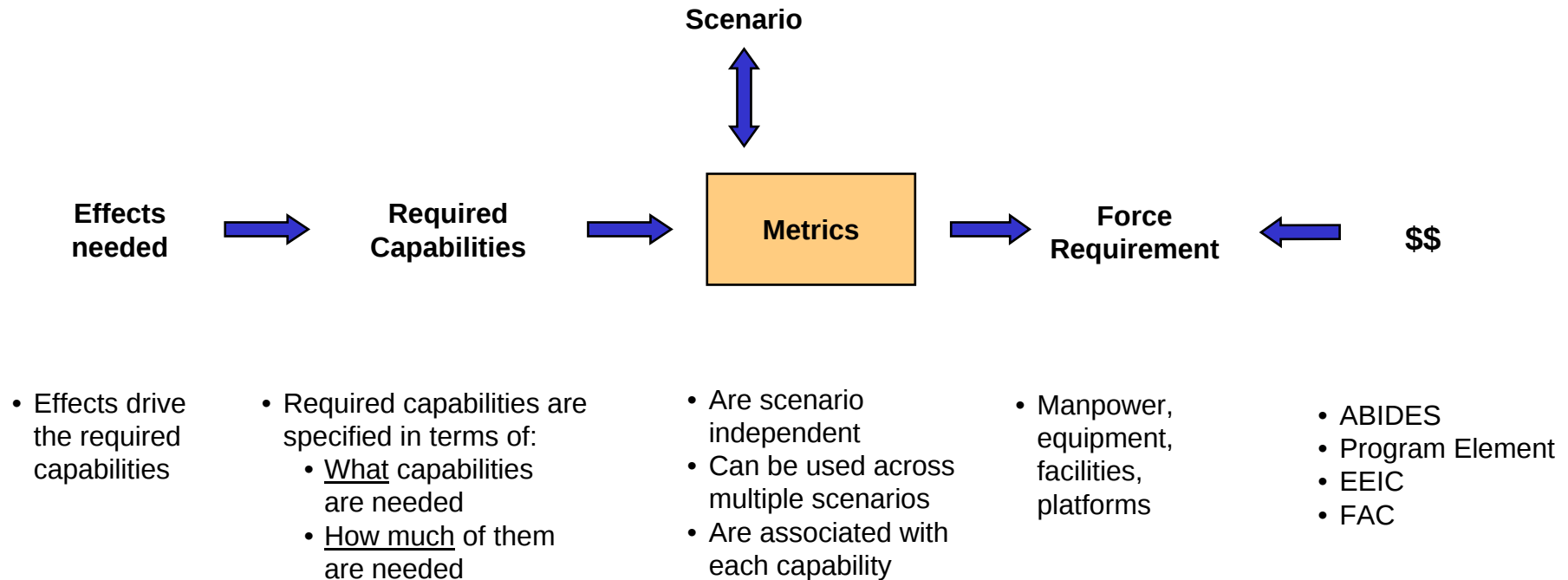


BACK-UP

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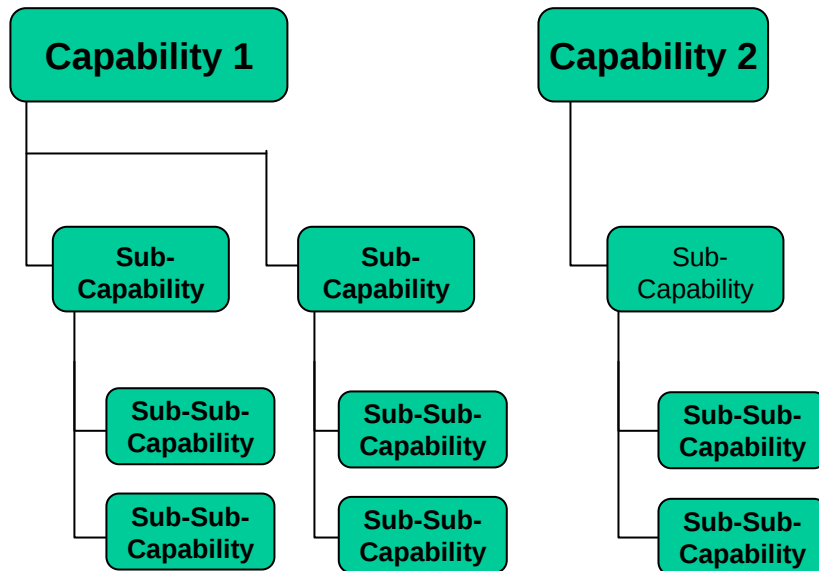
Capability/Metrics/\$\$ Overview



Hard to do!
Different approach from past efforts

Methodology: Capability Relationships

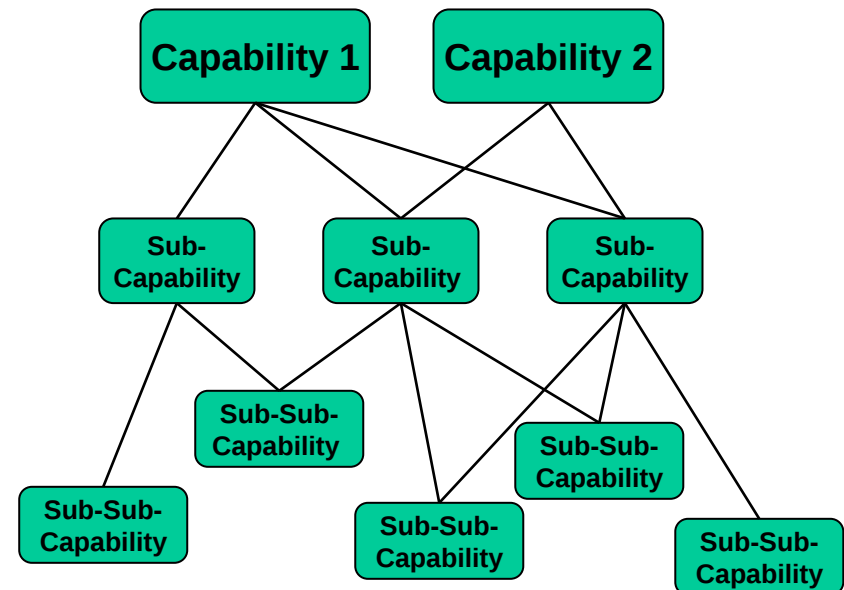
**Master Capability Library (MCL)
defines Air Force functional
capabilities**



Here is where we are

- Functionally oriented
- Collectively exhaustive, Mutually exclusive
- Provides library of capabilities down to task level

**Architectures describe how
capabilities interact operationally**



Here is where we need to go

- Operationally oriented
- Illustrates processes (eg. "F2T2EA")
- Explicitly identifies interdependencies (Requires robust metrics)