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Economic Benefits Analysis

The “Other-Side” of Cost

Systems and Software Technology Conference (SSTC 2011)

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Agenda

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- » Introduction
- » Similarities/Differences in Benefits Analysis Approach vs. Cost Analysis
- » Benefits Analysis Process
- » Capabilities-Based Process
- » References
- » Acronyms

Introduction

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» Why Is This Important?

- » Integral part of an overall Economic Analysis (EA), Return on Investment (ROI)
- » Program Justification to External Entities (Investment Review Boards and Other-than-Defense Agencies)
- » New emphasis on Program Value – IT Investment Management
- » Decision Analysis – Selection of Preferred Alternative

Introduction

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- » Why Is This Important? (Cont.)
 - » Internal Competition for Resources (POM and FYDP, PoPS)
 - » GAO Audits and Tracked Recommendations (IG reporting to Congress)
 - » Acquisition Requirements (JCIDS, Others)

Agenda

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Cost Analysis and Benefits Analysis Share Some Technical Points

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» Cost Analysis

- » **Analogy**
- » **Parametric**
- » **Engineering Build-Up**
- » Expert Opinion
- » Extrapolation from Actual
- » Cost Element Structure (CES)

» Benefits Analysis

- » Analogy
- » Parametric
- » Engineering Build-Up
- » **Expert Opinion**
- » **Extrapolation from Actual**
- » **Benefits Elements Matrix (BEM)**

Both analyses sensitive to up-front important analytical decisions about allocations and application of economic concepts (NPV, ROI, BE)

However, there are important differences...

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Cost Analysis

- » Well recognized, published sources of cost data and factors
- » Service Cost Agency Review Process
- » Risk is better understood (CSPT)
- » Common Accepted Terms-of-Reference Across Field
- » Less Reliance on Expert Opinion
- » Certification for Analysts
- » Cost Review Boards

However, there are important differences... (cont.)

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Benefits Analysis

- » Analogies for new programs do not exist and little published benefits data
- » Parameters are often unknown
- » Terms-of-Reference
- » Heavy use of Expert Opinion
- » Risk not well defined
- » No Benefits Review Board
- » Quality of Benefits Analysis dependent upon client environment
- » Less scrutiny

Agenda

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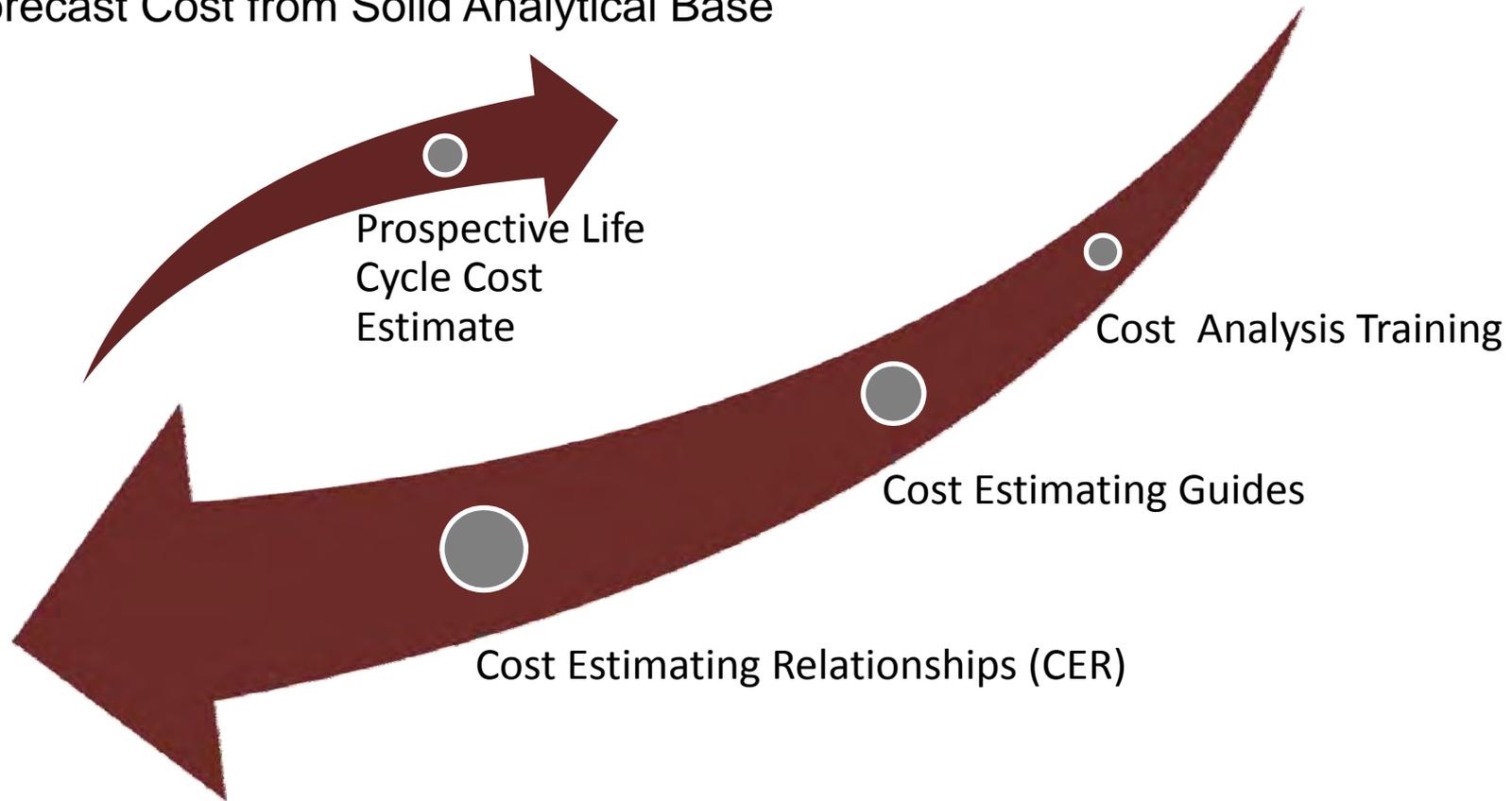
- » Introduction
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Relative Differences Between Cost vs. Benefits Analysis Processes

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- » Risk Mitigated
- » Forecast Cost from Solid Analytical Base

Cost Analysis



Mostly Retrospective Analysis Elements Applied to Future State

Relative Differences Between Cost vs. Benefits Analysis Processes

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- » Induced Risk
- » Forecast Benefits from Less Solid Analytical Base

Benefits Analysis

Benefit Estimating Relationships not clearly defined

Intensive Research for Benefits as Related to Future Capabilities

Few MAIS Analogies

Retrospective Benefits Analysis Elements

Mostly Prospective Analysis Elements of Future State based on "What is to be," and Extensive Use of Data Mining and BI Tools

What is an Economic Benefits Analysis?

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Economic Analysis is required for MAIS programs:

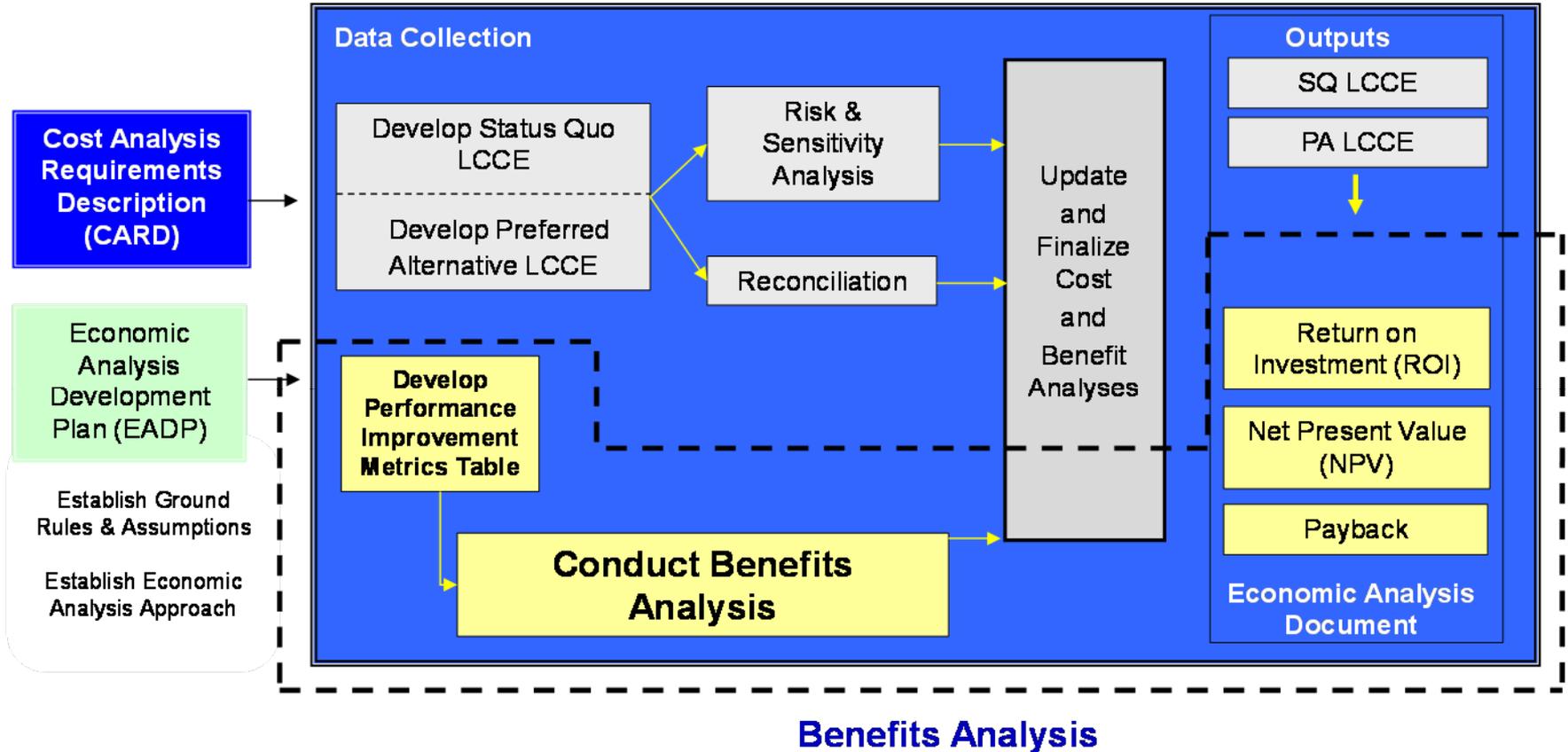
- » **Milestone A (may be combined with Analysis of Alternatives)**
- » **Milestone B (or equivalent)**
- » **Full Deployment Review (or equivalent)**

“The purpose of the **Economic Analysis** is to determine the best AIS program acquisition alternative, by assessing the net costs and benefits of the proposed AIS program relative to the status quo.”

*DoDI 5000.2 Encl (4), Table 2-1

Economic Analysis Process

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Benefits are Classified According to a 4-Tier Approach*

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- 
- » **Tier 0** consists of monetary cost savings determined by subtracting the costs associated with the PA from the current cost to maintain the SQ
 - » **Tier 1** includes mission critical operational efficiencies in terms of cost avoidances
 - » **Tier 2** includes achievable operational efficiencies subordinate to the efficiencies received in Tier 1, but which still provide cost avoidances to the DoD
 - » **Tier 3** consists of qualitative benefits associated with the implementation of the Preferred Alternative

*Based on Guidance from OSD CAPE: Methodology captures inherent subjectivity and relative risk. Cost savings increase incrementally and cumulatively from “initial outlay” benefits to the inclusion of “must have” benefits to the inclusion of “nice to have” benefits.

Benefits Analysis Methodology - Four Steps:

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- » Identify the benefits of the Preferred Alternative (PA) over the Status Quo (SQ)
- » Develop the benefits model by allocating benefits to the four tiers of the framework
- » Estimate the monetary value of the quantitative benefits by combining the LCCE, cost savings, and operational efficiencies - this will yield an ROI, NPV, and Payback Period calculations
- » Perform uncertainty and sensitivity analysis around the benefits estimate



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Capabilities-Based Benefits Analysis Process

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- » Investment Provides Capabilities which Generate Benefits
- » Return on Investment (ROI) is negative in the beginning due to massive initial investment outlay for development and implementation
- » ROI improves as the system increasingly provides capabilities and generates monetary benefits as well as intangible benefits
- » End Game: More Benefits than Cost



Capabilities-Based Benefits: System Investment

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- » Three Major DoD Decision Support Systems
 - » Capabilities Development through the Joint Capabilities Integration and Development System (JCIDS)
 - » Acquisition Management System (AMS)
 - » Planning, Programming, Budgeting and Execution System (PPBE)
- » Decision to invest in a new MAIS is a result of JCIDS DOTMLPF* analyses that identified Capability Gaps, and recommended investment in a Materiel Solution to achieve desired Operational Efficiencies

*Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities

Capabilities-Based Benefits: System Investment (cont.)

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- » JCIDS and AMS require documents that articulate the capabilities that will be created through investment in the MAIS
- » Economic Analysis of both Costs *and* Benefits provide decision makers with the information needed to make resource allocation decisions among the projects in the portfolio, given the proposed capability gains (decision is not always economics based)

Capabilities-Based Benefits: Operational Capabilities

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- » Source document for Capabilities-Based Benefits Analysis is determined by MAIS Program's position on the Acquisition lifecycle

Capabilities Production Document (CPD)	<ul style="list-style-type: none">• Milestone C• Highest level of resolution on what will be built• Metrics and Benefits should be well articulated• Mission Analysis Performance Measurement Plan in place
Capabilities Development Document (CDD)	<ul style="list-style-type: none">• Milestone B• Less resolution on what will be built• Metrics and Benefits not fully evident
Initial Capabilities Document (ICD/Draft CDD)	<ul style="list-style-type: none">• Material Development Decision/Milestone A• Least analytical resolution• Difficult to project benefits with detailed analysis

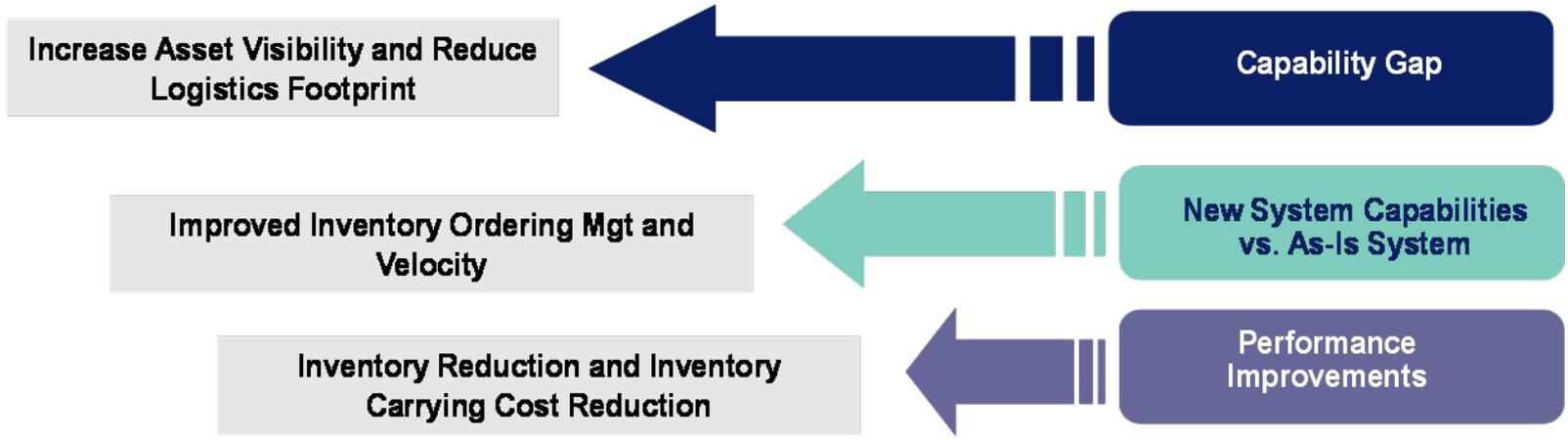
Capabilities-Based Benefits: Operational Efficiencies

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- » To the extent possible:
 - » Baseline current As-Is state in relation to the capabilities of the new system
 - » Determine which Capability Sets hold the most promise for benefits and bin according to a must-have/nice-to-have thought process, and determine how they will be analyzed
 - » Utilize Data Analysis Plan, Data Mining Tools, Business Intelligence Tools

Example: Inventory Reduction Benefit

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Performance Improvement Metrics Table

Description of Performance Improvements	Capability Affected	Current System Performance (As-is)	New System Performance (To-Be)	Performance Improvement
Inventory Reduction <i>Inventory carrying requirements, order timing, and costs</i>	<ul style="list-style-type: none"> Request Management Supply Maintenance 	Replenishment action initiated whenever on-hand quantity plus the dues, less back orders, is equal to or less than the reorder point. Inflates Inventory	System will use advanced supply chain planning engine at retail level and min/max planning tool	Potential decrease in Inventory and Inventory Carrying Cost

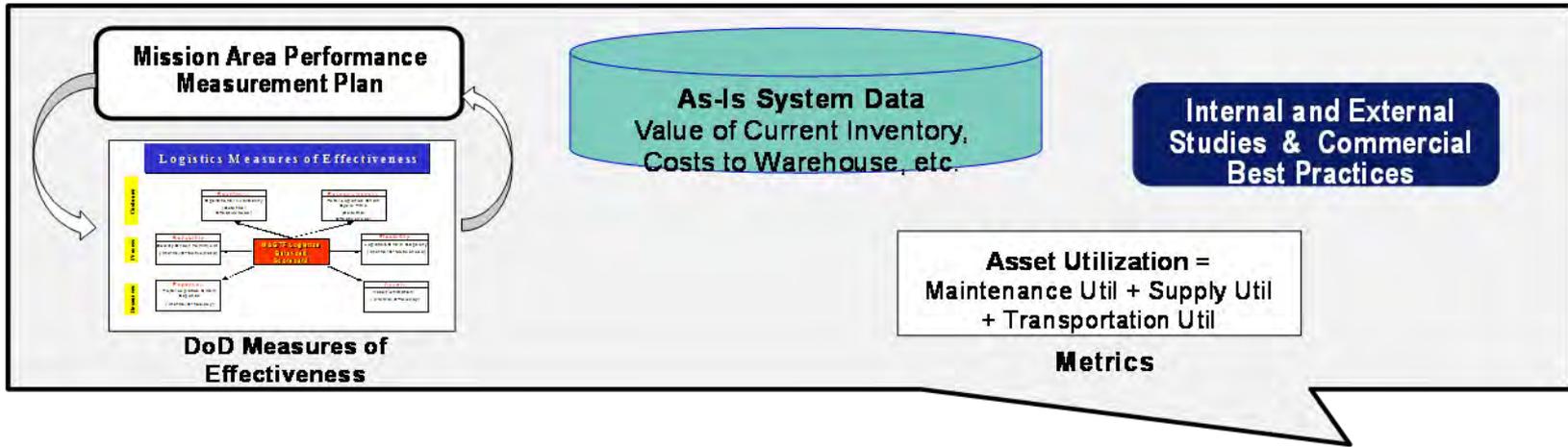
Capabilities-Based Benefits: Operational Efficiencies

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- » Translate selected new capabilities into Operational Efficiencies
 - » Metrics for quantitative cost savings and cost avoidances in terms of reduction in FTEs, reduced order-to-ship time, order cycle time, increased customer satisfaction, etc.
 - » Document non-monetary benefits through research and facilitated expert panels
- » Identify the top ten benefits for potential to generate:
 - » Cost Savings
 - » Cost Avoidances
 - » Intangible or Non-monetary benefits

Example: Inventory Reduction Benefit (Cont.)

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Performance Improvement Metrics Table

Description of Performance Improvements	Capability Affected	Current System Performance (As-is)	New System Performance (To-Be)	Performance Improvement
Inventory Reduction <i>Inventory carrying requirements, order timing, and costs</i>	<ul style="list-style-type: none"> Request Management Supply Maintenance 	Replenishment action initiated whenever on-hand quantity plus the dues, less back orders, is equal to or less than the reorder point. Inflates Inventory	System will use advanced supply chain planning engine at retail level and min/max planning tool	One time drawdown between 15-25%, Inventory Carrying Cost reduction of 25% annually

Capabilities-Based Benefits: Monetized Cost Avoidances

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- » Express Operational Efficiencies in terms of money
 - » Number of units reduced by cost of each unit
 - » Expected percentage reductions over time priced by the proportion
 - » Standard factors applied to baseline quantities
 - » Any other reasonable monetary conversion of an expected efficiency gain generated by the investment in a capability
- » Document results and methodologies used
- » Relate results to capability
- » Be cognizant of the difference between Cost Savings and Cost Avoidance



Capabilities-Based Benefits: Monetized Cost Avoidances

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Cost Savings	Cost Avoidance
Direct cost saving result now as a result of the action	Cost that will be incurred in the future if the action is not taken
Reduced Appropriation Baseline	Inventory Carrying Costs
Reduced Budget Spend Plan	Maintenance Actions
Volume Reduction	Personnel Expenses

Performance Improvement Metrics Table

Description of Performance Improvements	Capability Affected	Current System Performance (As-is)	New System Performance (To-Be)	Performance Improvement	Yearly Benefit
<u>Inventory Reduction</u> <i>Inventory carrying requirements, order timing, and costs</i>	<ul style="list-style-type: none"> Request Management Supply Maintenance 	Replenishment action initiated whenever on-hand quantity plus the dues, less back orders, is equal to or less than the reorder point. Inflates Inventory	System will use advanced supply chain planning engine at retail level and min/max planning tool	One time drawdown between 15-25%, Inventory Carrying Cost reduction of 20% annually	One time \$500M drawdown of inventory spread over 3 years Annual Inventory Carrying Cost Avoidance of \$100M

Capabilities-Based Benefits: Benefit Summary/ROI

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- » Gather all benefits expressed in terms of money
- » Determine the time-phasing as to when each benefit will be actualized by year
- » Does the benefit begin at IOC or FOC?
- » How long do you expect to recognize the benefit?

Capabilities-Based Benefits: Benefit Summary/ROI

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- » Are there any allocation concepts that can be applied such as those found in Cost Accounting? Other recognized sources?
- » Apply financial tools to calculate and report Net Present Value (NPV) and Return On Investment (ROI) using the Benefits Data, and Life Cycle Cost Estimate (LCCE)
- » Prepare for Post-Investment Analysis (PIA)
- » How well did we do against expected benefit generation and expected ROI?

Capabilities-Based Benefits: Keys to Success

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- » Program Office Support
- » Benefits IPT (separate from the Cost IPT)
- » Start with the Program Capabilities/Requirements Documents
- » Document traceability
- » Gain Buy-In from Functional Advocate, Legacy System Owners, and Stakeholders
- » Identify monetized benefits that can offset future budget request/POMs
- » Use actual data (if possible)
- » Create a benefits capture plan up front

References

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http://www.ncca.navy.mil/resources/DoD_AIS_EA_Guide_1995_DRAFT_RCW.pdf
- » Analysis of Alternatives (AoA) Handbook: Practical Guide to Analyses of Alternatives, July 2008, Office of Aerospace Studies, Air Force Materiel Command (AFMC) OAS/A9, 1655 1st Street SE, Kirtland AFB, NM 87117-5522; <http://www.oas.kirtland.af.mil/>
- » Department of the Army - Economic Analysis Manual;
www.asafm.army.mil/pubs/cdfs/manual/economic.pdf
- » Benchmarking Cost Savings & Cost Avoidance - NASPO BENCHMARKING WORKGROUP Research Brief September 2007;
http://www.naspo.org/old_site/whitepapers/documents/BenchmarkingCostSavingsandCostAvoidance.pdf
- » *There are many more resources, but these are a good start.*

Acronyms

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Acronym	Definition	Acronym	Definition
AIS	Automated Information System	CPD	Capabilities Production Document
AMS	Acquisition Management System	CSPT	Cost, Schedule, Performance, Technology
BE	Break Even	DoDI	Department of Defense Instruction
BEM	Benefits Element Matrix	DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities
CAPE	Cost Analysis and Program Evaluation	EA	Economic Analysis
CARD	Cost Analysis Requirements Description	EADP	Economic Analysis Development Plan
CDD	Capabilities Development Document	FOC	Full Operational Capability
CER	Cost Estimating Relationship	FTE	Full Time Equivalent
CES	Cost Element Structure	FYDP	Future Years Defense Plan

Acronyms

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Acronym	Definition	Acronym	Definition
GAO	Government Accountability Office	NPV	Net Present Value
ICD	Initial Capabilities Document	OSD	Office of the Secretary of Defense
IG	Inspector General	PA	Preferred Alternative
IOC	Initial Operating Capability	PIA	Post Investment Analysis
IPT	Integrated Product Team	PIMT	Performance Improvement Metrics Table
IT	Information Technology	POM	Program Objective Memorandum
JCIDS	Joint Capabilities Integration and Development System	PoPS	Probability of Program Success
LCCE	Life Cycle Cost Estimate	PPBES	Programming, Planning, Budgeting, and Execution System
MAIS	Major Automated Information System	ROI	Return on Investment
		SQ	Status Quo