Introduction to Cost Benefit Analysis

"A Tool For Decision Making"

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Introduction to Cost Benefit Analysis

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Terminal Learning Objective

- **Task:** Perform Cost Benefit Analysis
- **Condition:** You are a cost advisor technician with access to all regulations/course handouts, and awareness of Operational Environment (OE)/Contemporary Operational Environment (COE) variables and actors
- **Standard:** with at least 80% accuracy:
- Define the purpose and motivation for Cost Benefit Analysis.
- Learn the Army 8 Step Cost Benefit Analysis process.
- Identify and enter relevant scenario data into macro enabled templates to calculate cost data, and inform managerial cost decisions.

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Course Outline and Content

This introductory course is comprised of the following main components:

I. Overview of Cost Benefit Analysis and its role in the U.S. Army
   a. A discussion focused on the elements of costing and cost management
   b. Army Training on Cost Benefit Analysis; What, Why, How, Who, When

II. Detail the Army 8 Step Cost Benefit Analysis Process
   a. Utilize the Army CBA training program
   b. Includes video from the CBA training session taught by Ms. Cecile Batchelor CIV USA ASA FMC

III. Perform Case Studies to apply the Army 8 Step CBA Process
   a. Case 1 – Choosing an Item from a Lunch Menu
   b. Case 2 – Choosing a Mode of Transportation
   c. Case 3 – Army Pre-Positioned Stock

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There Are Many Possible Ways to Measure Costs

- Consider the Following Types of Cost:
  - absorption, actual, average, avoidable, capital, carrying, common, controllable, conversion, current, depreciation, direct, discretionary, estimated, fixed, full, funded, historical, imputed, incremental, indirect, inter-entity, inventoriable, joint, mixed, non-production, normal, opportunity, out-of-pocket, overhead, period, primary, prime, project, quality, reimbursable, relevant, responsibility, separable, standard, sunk, target, unavoidable, unfunded, unit, variable.

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Two Sides of the Same Coin

external reporting		managerial costing
required	purpose	**needed**
compliance	goal	**learning**
structured	methodology	**customized**
audit	test	**use**
stable	dynamics	**responsive**

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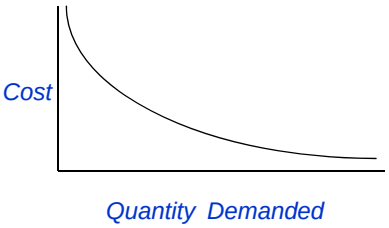
Demand Curve

- The most fundamental use of managerial costing is in decision support.
- Consider the "demand curve" from basic supply and demand economics.



- The "demand curve" recognizes that consumption increases as cost decreases

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Demand Curve

- Consider how consumption increased as cost was cut on calculators, computers, cell phones, I-pods and Kindles.

Can you think of other examples where cost reductions resulted in higher consumption?

- Ten years ago soldiers were sought for jobs such as handing out towels in the gym because they were "free" to the Garrison and free goods have infinite demand.

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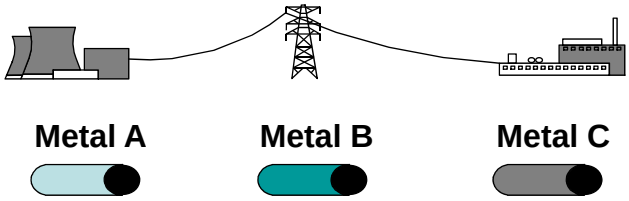
Decision Making Without Cost

- It is late September and you must buy cable to transmit power from generator to user



- Three metals are proposed and C is the best conductor and A is the worst
- Make a purchase decision ----- NOW!

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Decision Making With Cost

Would your decision change if you were given the cost of each metal?

Metal A = $0.20 per pound (iron)
Metal B = $4.10 per pound (copper)
Metal C = $1,500 per troy ounce (gold)

Would you pick Metal A (iron) because it cost only $.20 per pound?

- Iron is a terrible conductor often used as a resistance element in toasters and hairdryers

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Making Informed Decisions

Which metal would you choose given price and conductivity information

- Copper is used for electrical wire because it offers good conductivity at a reasonable price.

The best decisions are "cost informed" and not necessarily cost dominated.

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Take Away Lessons

- The absence of cost information can overvalue other attributes and may result in poor decisions.

- Not knowing cost makes everything appear to be free
  - Free goods have infinite demand
  - Things that aren't free, but appear to be free, get over consumed
  - Attempts to prevent overconsumption often lead to management paradigms of rules, regulations, and restrictions.

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Cost Benefit Analysis

- Cost Benefit Analysis (CBA) is a formal decision support tool
- CBA objective is to make better decisions in support of mission objectives by considering both quantifiable and non-quantifiable costs

- Its greatest value, may be through the learning that occurs during the process which can generate new courses of action or improvements to existing methodologies/processes.

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Cost Benefit Fundamentals

- Benefits must at least equal (but will hopefully exceed) Costs
- Benefits and Costs are difficult to quantify at times.
- Costs can be estimated but this requires some skill and thoughtful direction to get credible intelligence rather than misleading data
- Benefits are usually more subjective than Costs and are often non-quantifiable
- Establishing Costs places a useful bound on what must be the minimum value of Benefits
- CBA goal is to make better decisions by considering costs and benefits simultaneously, and to stimulate future learning and improvement

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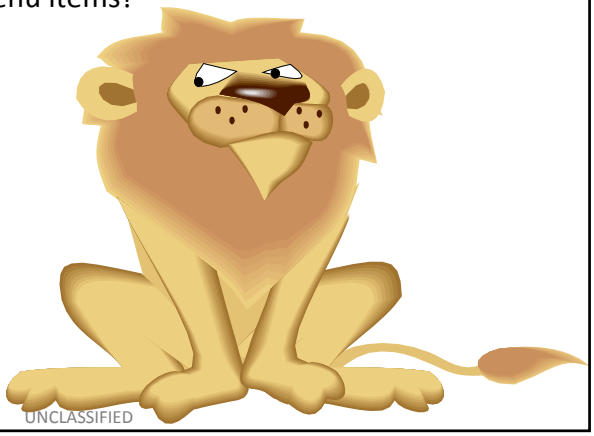
Consider the Hungry Lion

- Is there a “free lunch”?
- What are the “costs” and “benefits” of hunting?
- What are possible menu items?
- Should he hunt:
  - Rabbits?
  - Elephants?
  - Gazelles?



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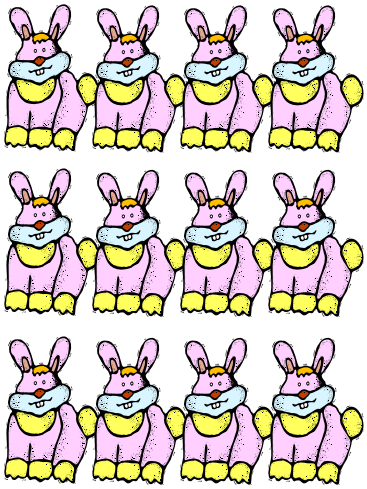
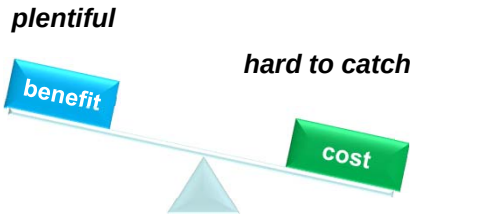
Consider the Hungry Lion





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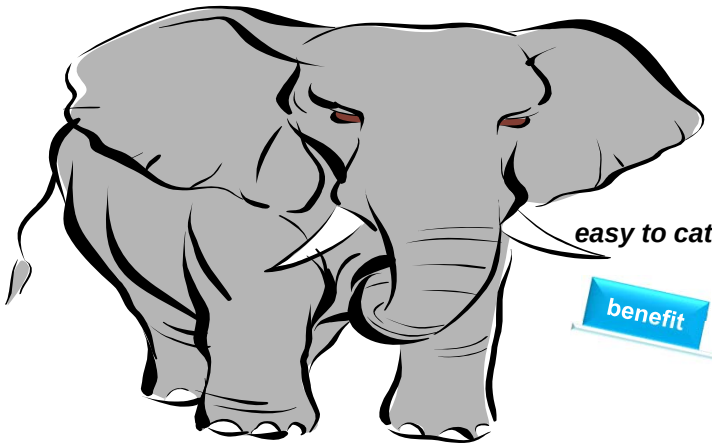
Consider the Hungry Lion



easy to catch

hard to eat

benefit

cost

dangerous

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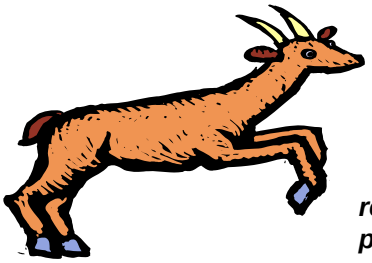
Consider the Hungry Lion



good meal

somewhat difficult to catch

benefit

cost

relatively plentiful

- Lions are good at cost benefit analysis and calculate that the gazelle's food value exceeds the caloric expenditure of the hunt

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Cost Benefit Analysis Examples

Army Central Command (ARCENT)

Single Use

Estimated Future Cost

Cost Benefit Analysis

Cost Informed Decision Making

Cost War

Insurgency

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Refurbishing Shipping Containers

- Withdrawal from Iraq created the need for shipping containers
- 8,000 of the 90,000 containers in country were not suitable for ocean transit
- A multi-million dollar purchase order was written to bring them up to standard
- BG McGhee, ARCENT C-8, assigned cost team to do CBA for the Coalition Acquisition Review Board
- It was found that the 82,000 suitable containers were more than adequate for withdrawal

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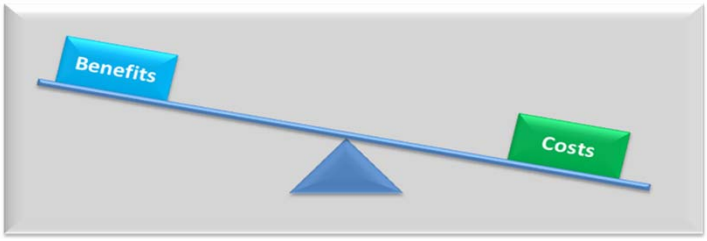
Refurbishing Shipping Containers

- The purchase order was cancelled
- Existing, suitable containers were used



(The technical accounting term for this type of decision is “no brainer”)

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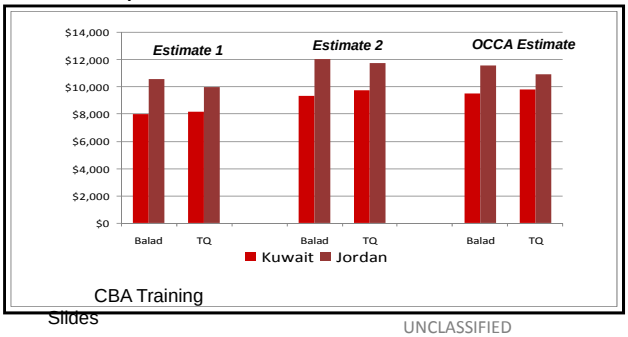
Cost “Intelligence” in Strategic Geo-Political Tradeoffs

- Retrograde Shipping Point Alternatives
  - GEN Petraeus wanted to maximize shipments to CONUS through Jordan as way to reward an ally
  - LTG Webster showed GEN Petraeus the following cost product



Cost to ship through Jordan more costly than Kuwait
Three separate estimates compared
Geo Political considerations may outweigh cost to ship through Jordan

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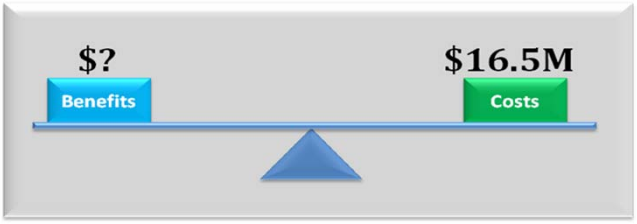
Known Cost: Unknown Benefit

- The geopolitical benefits of "rewarding" Jordan are impossible to quantify
  - Are they worth $16.5M?
- Who should make this determination?



  - General Petraeas brought the issue to King Abdullah's attention and started a process of generating alternatives and negotiations

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Main Battle Tank Requirements

- Significant main battle tank forces have been kept in Iraq since the initial invasion
- None has fired a round since the initial invasion raising the question of whether they should be kept in Iraq
- A CBA was performed to compare the dollar cost of leaving the battle tank forces in Iraq with;
  - Costs of not having them elsewhere
  - Benefits of having them near Iran
  - Benefits of deterring conflict in the region
- CBA can compare quantifiable costs and benefits with non-quantifiable costs and benefits

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Main Battle Tank Requirements

- Many of the costs were quantified; soldiers, sustainment, fuel, transport, repair, and arms
- However, non-quantifiable costs and benefits dwarfed the quantifiable

- This CBA resulted in keeping the battle tanks in the existing location.

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CBA Conclusions

- Good CBA work helps the organization meet its missions by enabling better decision making
- The CBA process adds value by stimulating thinking about alternatives and provides learning for the future
- CBA enable the comparison of quantifiable and non-quantifiable elements of a problem
- CBA is a single use costing effort rather than one repeated periodically
- The goal is “cost informed” rather than cost dominated decision making

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Check on Learning

- How does the lack of cost information affect decisions?
- What other decision criteria are considered in CBA?

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Cost Benefit Analysis

The following charts were extracted from the Deputy Assistant Secretary of the Army (DASA) for Cost and Economics (CE)
Cost-Benefit Analysis (CBA) Training Briefing

Much of the information was developed by Ms. Cecile Batchelor, CIV USA ASA FMC, as a CBA subject matter expert and key CBA training instructor for the Army

Three case studies are included to provide practical experience in conducting the Army CBA eight step process, and to assist the student in understanding the importance of CBA in the Army decision making process.

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Teaching Objectives

WHAT	• What is Cost-Benefit Analysis (CBA)?
WHY	• Why do we need CBA?
WHO	• Who are the key players?
WHEN	• What Army processes call for CBA?
HOW	• What are the processes and methodologies used in developing a CBA?

Sources and References

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29

What is a Cost Benefit Analysis (CBA)?

- A structured methodology for identifying and comparing costs and benefits (quantifiable and non-quantifiable) of alternative courses of action to identify the "BEST" solution for achieving a stated goal or objective.

- In English
  - Identify alternative courses of action (COA) for solving a problem
  - Determine their quantifiable and non-quantifiable costs and benefits.
  - Provides a method for selecting the best COA

Objective: Make the best possible use of limited funds and ensure that no significant resource-related issue is decided without a thorough review of its costs, its projected benefits, and the trade-offs that might be required to pay for it.

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Why do we need CBAs?

- To make the best possible use of limited funds, i.e. get the best bang for the buck.
- When making resourcing decisions:
  - Treat costs, both near-term and long-run, as an up-front consideration, not as an afterthought.
  - Understand how much benefit will be derived.
  - Identify billpayers.
  - Consider second- and third-order effects.
- Department of the Army memo dated DEC 30 2009

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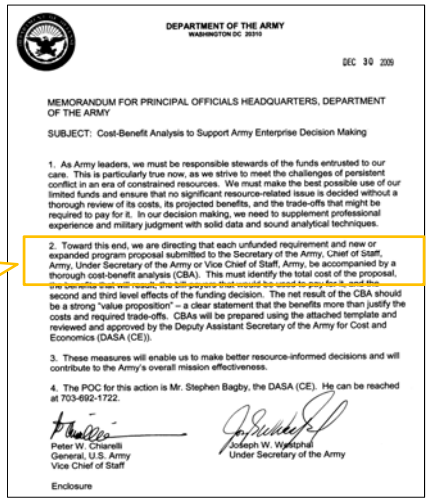
Department of Army Directive

- USA/VCSA memo was sent to HQDA principal officials (see back-up section for complete list of addressees)
- As expected, HQDA officials are also requesting CBAs from the field



DEPARTMENT OF THE ARMY
WASHINGTON DC 20310

DEC 30 2009

MEMORANDUM FOR PRINCIPAL OFFICIALS HEADQUARTERS, DEPARTMENT OF THE ARMY

SUBJECT: Cost-Benefit Analysis to Support Army Enterprise Decision Making

1. As Army leaders, we must be responsible stewards of the funds entrusted to our care. This is particularly true now, as we strive to meet the challenges of persistent conflict in an era of constrained resources. We must make the best possible use of our limited funds and ensure that no significant resource-related issue is decided without a thorough review of its costs, its projected benefits, and the trade-offs that might be required to pay for it. In our decision making, we need to supplement professional experience and military judgment with solid data and sound analytical techniques.

2. Toward this end, we are directing that each unfunded requirement and new or expanded program proposal submitted to the Secretary of the Army, Chief of Staff, Army, Under Secretary of the Army or Vice Chief of Staff, Army, be accompanied by a thorough cost-benefit analysis (CBA). This must identify the total cost of the proposal, the benefits that will result, the bill payers that would be used to pay for it, and the second and third level effects of the funding decision. The net result of the CBA should be a strong "value proposition" – a clear statement that the benefits more than justify the costs and required trade-offs. CBAs will be prepared using the attached template and reviewed and approved by the Deputy Assistant Secretary of the Army for Cost and Economics (DASA (CE)).

3. These measures will enable us to make better resource-informed decisions and will contribute to the Army's overall mission effectiveness.

4. The POC for this action is Mr. Stephen Bagby, the DASA (CE). He can be reached at 703-692-1722.

Peter W. Chiarelli
General, U.S. Army
Vice Chief of Staff

Joseph W. Westphal
Under Secretary of the Army

Enclosure

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The Spirit of the Memo

- Value of Cost-Benefit Analysis:
  - Supplements professional experience, subject matter expertise, and military judgment with rigorous analytical techniques
  - Enables leaders and managers to make better resource-informed decisions
  - Contributes to the Army's overall mission effectiveness
- What do senior leaders expect?
  - Collaborative and innovative problem solving
  - Analytical rigor and innovative thinking

This is adaptation, NOT transformation

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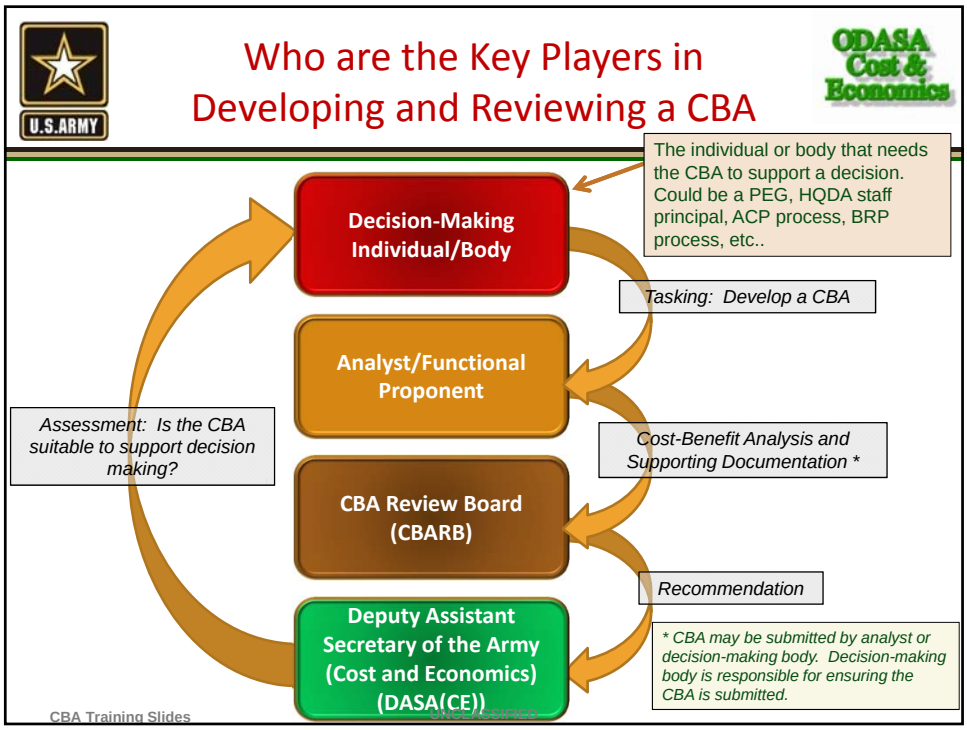
Who are the Key Players in Developing and Reviewing a CBA



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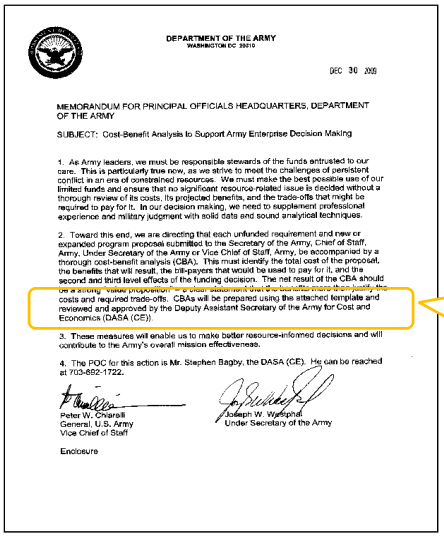
DASA(CE) Responsibility: Review and Approve CBAs



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Peter W. Chiarelli
General, U.S. Army
Vice Chief of Staff

Joseph W. Westphal
Under Secretary of the Army

Enclosure

- USA/VCSA memo requires DASA(CE) to review and approve CBAs
- DASA(CE) has established the Cost Benefit Analysis Review Board (CBARB) to support this task
- CBARB procedures are published in PPBC memo (Available via Cost & Performance Portal).

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CBARB Review: Technical and Functional

CBARB will determine whether the CBA is technically and functionally sound

Problem Statement, Assumptions, and Constraints
- Is the problem statement clear, and does it accurately identify the issue?
- Are the assumptions clearly stated and realistic?
- Are all relevant constraints identified?
- Are the problem statement, assumptions, or constraints structured in a manner that is clearly intended to favor one COA?

COA Development
- Is each of the alternative COAs feasible?
- Are the alternative COAs distinctly different?
- Are there obvious alternative COAs that are not presented?
- Does the CBA adequately identify (with supporting documentation) the costs and benefits of each COA?

Accuracy
- Is the CBA technically correct (math, formulas, models, data sources, etc.)?
- Is the CBA functionally correct (facts, not opinions)?

Analysis and Conclusions
- Are the decision criteria clearly identified?
- Does the CBA use analytical techniques appropriate for the situation?
- Is the recommended COA compatible with the assumptions and constraints?
- Does the analysis clearly explain how the recommended COA is better than the others at satisfying the decision criteria?
- Does the recommended COA satisfy the problem statement?
- Has risk been adequately reflected in the analysis and recommendation?
- Does the decision briefing (or other final product) support the recommended COA?

CBARB Review: Content

Key Questions

- The requirement or problem statement:
  - Is it sound?
  - Is it redundant or duplicative of another requirement?
  - Does it have a useful life that justifies the expenditure of resources?
- Does the recommended COA represent the *best value* for the Army? (Optimum balance of performance, cost, schedule, and risk.)
- Does the recommended COA adequately address second- and third-order effects?

CBARB does not usurp decision maker's authority to approve/disapprove the CBA recommendation.

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CBARB Composition

- Board chair: DASA(CE) division chief
- Standing members:
  - Army Budget Office (ABO)
  - PAED
  - G-3/5/7

- Other members, as needed based on the subject matter:
  - Appropriate DASA(CE) divisions
  - PEG representatives (as determined by PAED)
  - ABO appropriation sponsors (BUI, BUO, BUR)
  - HQDA functional proponents
  - Manpower specialist from G-1

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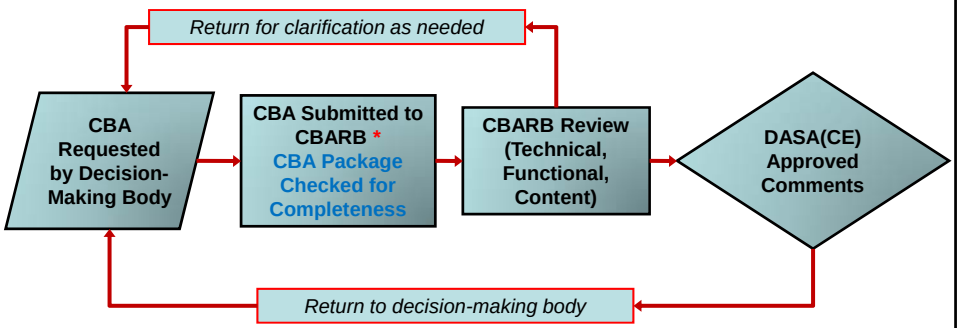
CBARB: Process



* Submit CBAs via the CBA Workflow Tool at **https://cpp.army.mil**.

CBARB is not a decision-making body.
It makes recommendations to the DASA(CE).

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When CBAs are Required: FY12-16 POM Development

Extract from Army Program Guidance Memorandum (APGM)

- CBA required:
  - Proposed new requirement or new funding request of $10 million in any year or $50 million over the POM
  - Proposed increase to existing requirement or existing funding request of $10 million in any year or $50 million over the POM, or 5% growth
  - At PEG discretion, any proposed new or increased requirement or funding request requirement sufficiently important to require CBA (without regard to dollar thresholds)
- CBA s are due to CBARB three weeks prior to MDEP briefing to PEG

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When CBAs are Required

Below is are some examples of when CBAs are required.

- As noted by USA/VCSA memo
- For POM development (see next slide)
- With Force Design Updates
- With Concept Plans
- Part of VCSA portfolio analyses
- To ACP, BRP, AR2B with issues they will consider
- Developed in response to directive from Army leadership, OSD, or Congress
- Submitted with acquisition actions not associated with a decision milestone

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Cost Benefit Analysis Process

CBA – Using analysis to make the case for a project or proposal:
Weighing the total expected costs against the total expected benefits over the near, far, and lifecycle timeframes from an ***Army enterprise*** perspective.

COSTS

- Quantifiable costs
  - Direct
  - Indirect
  - Initial/Start up
  - Sustainment
  - Procurement
- Non Quantifiable costs
  - Life/Safety/Health
  - Perception/Image
  - Opportunity
  - Risk/Uncertainty
  - Political

1. Define the Problem/Opportunity
2. Define the Scope; Formulate Facts and Assumptions
3. Define Alternatives
4. Develop Cost Estimate for each Alternative
5. Identify Quantifiable and Non- Quantifiable Benefits
6. Define Alternative Selection Criteria
7. Compare Alternatives
8. Report Results and Recommendations

BENEFITS

- The total of quantifiable and non-quantifiable benefits
- Quantifiable benefits
  - Cost Savings
  - Cost Avoidances
- Non-quantifiable benefits
  - Greater capability
  - Faster availability
  - Better quality
  - Improved morale
  - Other?

BENEFITS MUST BALANCE OR OUTWEIGH COSTS

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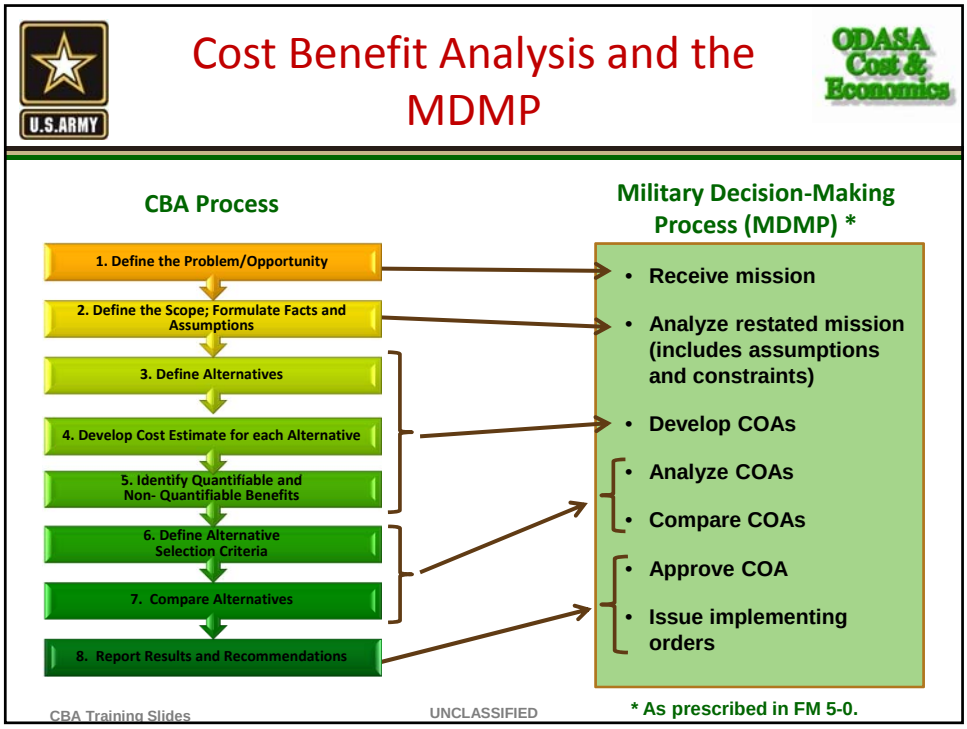

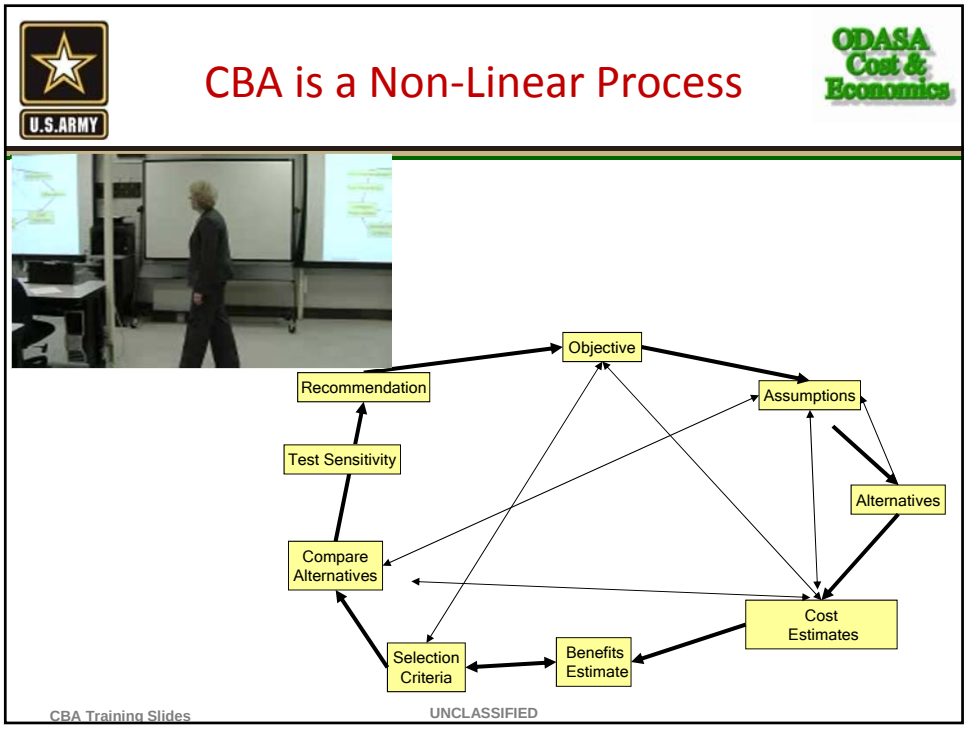

Check on Learning

- What is Cost Benefit Analysis?
- What is CBARB?
- Why do we need to do CBA?

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CBA: The Process

PROCESS STEPS

In this section, blue boxes identify questions that can be used by reviewers of CBAs.

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Step 1: Define the Problem/Opportunity

- Before beginning, determine whether the proposal will be realistically considered for funding.
- The problem statement clearly defines the problem, need, or opportunity that requires a solution and describes what the effort intends to accomplish.
- The problem statement should focus on
  - Improving, reducing, or increasing some aspect of a process, procedure, or program, or …
  - Identifying a solution to a problem not currently being solved.
- To provide context, the problem statement should be accompanied by a brief background description.

Questions for the reviewer:

- ***Does the problem statement define a clear, unambiguous issue?***
- ***As appropriate, does the objective reflect an enterprise perspective? What major stakeholders are likely to be impacted?***

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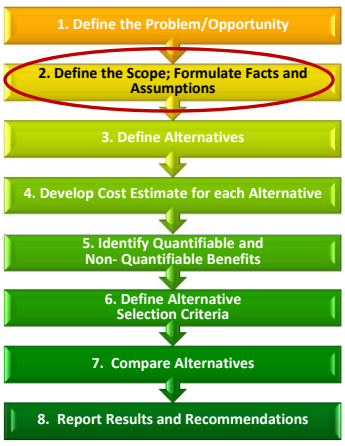
Step 2: Define the Scope; Formulate Facts and Assumptions

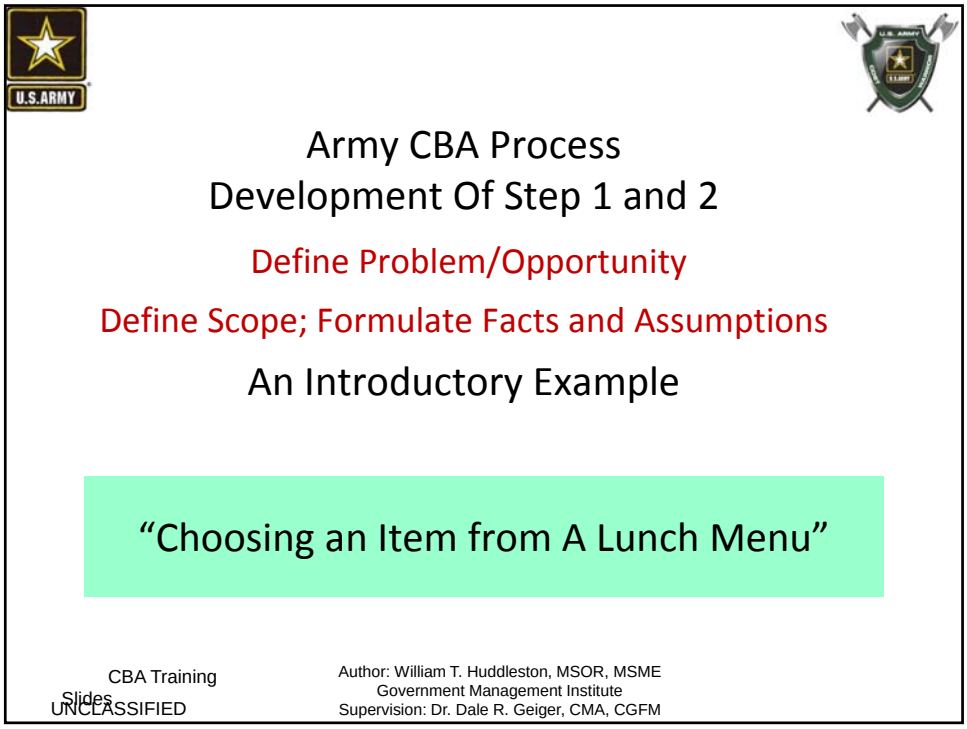


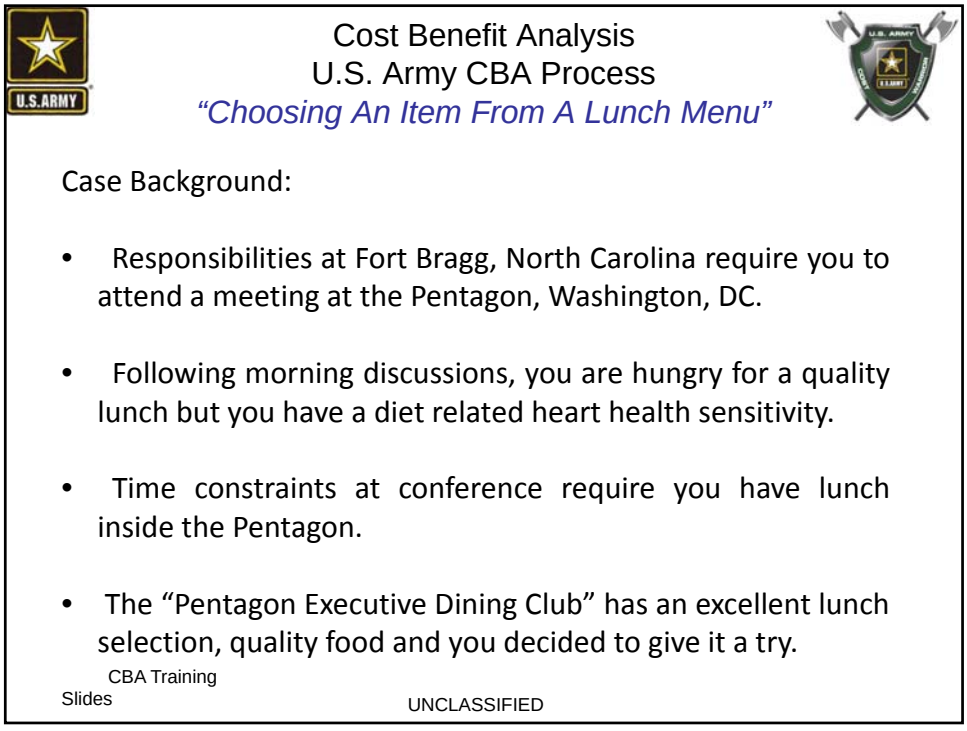
- Assumptions are factors or conditions that are essential to the success of the solution, are beyond the control of the organization, and impose risk.
  - With sufficient time for analysis, we can sometimes convert assumptions to facts, or at least reduce uncertainty.
- Facts are empirically true and can be supported by evidence. Relevant facts are those that have a direct bearing on the CBA. Facts include constraints, which usually refer to limits placed on resources to be devoted to the project. Facts and constraints are usually beyond the control of the analyst, but not necessarily beyond the control of the organization.
- Scope defines and limits the range of coverage encompassed by an initiative or proposal along specific dimensions such as time, location, organization, technology, or function.

Questions for the reviewer:

- ***Are the assumptions realistic? Were they provided by an appropriate subject matter expert?***
- ***Are the assumptions or facts structured in a way that favors one alternative COA?***
- ***Do the scope, assumptions, and facts clearly identify the natural and/or artificial limits or expansions placed on the solution set?***

CBA Training Slides





Cost Benefit Analysis
U.S. Army CBA Process
"Choosing An Item From A Lunch Menu"

Assumptions/Constraints

- You are looking forward to choosing lunch from the menu at the "Pentagon Executive Dining Club" dining facility.
- The establishment is known for having excellent award winning food and an exceptional luncheon selection!
- Although you are very hungry and have no cost constraints on your selection, you must select a heart healthy lunch of low saturated fat.
- Your lunch selection has been narrowed down to five items

Perform a Cost Benefit Analysis (CBA) to determine the "best" lunch selection.

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Pentagon Executive Dining Club Luncheon Menu

Fresh-Simple-Authentic-Delicious

Classic Pepperoni Pizza; $10.99; Cal: 910; Sat. Fat: 22g; Carb: 144g

BBQ Bacon Burger Combo; $6.99; cal: 1,285; Sat. Fat 42g; Carb: 125g

Chicken Parmigiana Dinner; $13.79; Cal: 1,020; Fat: 39g; Carb: 105g

Parmesan-crusted Chicken; $10.49; Cal: 880; Sat. Fat: Carb: 41g

Mom's Meatballs and Spaghetti; $12.50; Cal: 1,240; Sat. Fat 21g; Carb: 99g

Grilled Salmon; $17.99; Cal: 660: Sat Fat 11g; Carb: 72g

Grilled Chicken sandwich; $10.99, Cal: 670; Sat Fat: 9g: Carb: 66g

Chicken Caesar Salad; $9.99, Cal:650; Sat Fat: 9g: Carb: 29g

Traditional Greek Salad; $4.99; Cal: 550; Sat.Fat:10g; Carb: 14g

Desserts
All Desserts $ 3.50

Chocolate Cake; Cal: 540; Sat Fat: 13g; Carb: 62g

Lemon Passion; Cal: 32; Sat Fat: 1.7g: Carb: 64g

Panna Cotta; Cal: 450; Sat Fat: 32g; Carb: 27g

Apple Crostata; Cal: 310; St Fat 6g; Carb: 47g

Drinks
All Drinks $ 1.50

Coffee; Cal: 2; Str Fat:0g; Carb:0g

Blackberry Mint Tea; Cal: 130; Sat Fat: 0; Carb: 31g

COCA-COLA; Cal:140; Sat Fat: 0g; Carb: 39g

DIET COKE; Cal:0; Sat Fat:0g; Carb:0g:

Beer; Cal: 110; Sat Fat: 0g; Carb: 11g

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Step 1 – Define Problem / Opportunity

"Choosing An Item From A Lunch Menu"

- Step 1 – Define Problem / Opportunity

Step 1	Define Problem / Opportunity	
	Problem statement:	What am I going to have for lunch

- Step 2 – Define Scope, Formulate Facts, Identify Assumptions / Constraints

Step 2	Define Scope, Formulate Facts, Identify Assumptions / Constraints	
	Scope:	Determine a what I am having for lunch today
	Facts:	time is limited
		Must make heart healthy choice
		I am hungry
	Assumptions / Constraints:	choose only from the lunch menu (no special orders)
		due to time constraints must eat at the Pentagon

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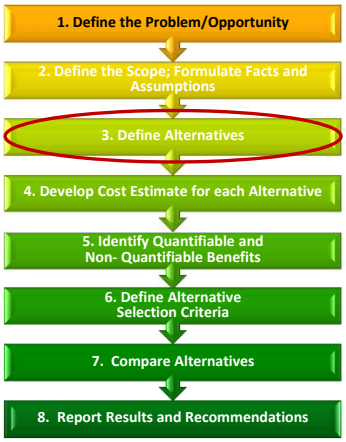
Step 3: Define Alternatives



- Alternatives are the potential solutions to the problem statement
- Alternatives include the status quo or current state
  - If the problem addresses a need not currently being met, there might not be a status quo
- Alternatives must:
  - Be feasible
  - Reflect an enterprise perspective
  - Provide a complete solution consistent with scope and constraints
- Leaders expect innovative solutions

Questions for the reviewer:

- ***Have all feasible alternatives been considered, to include alternatives that represent creative thinking?***
- ***Have the alternatives been defined or described clearly, and to a sufficient level of detail to support the development of a cost estimate?***
- ***Is the status quo included, or is its absence explained?***
- ***Do the alternatives span a reasonably wide range of potential solutions?***

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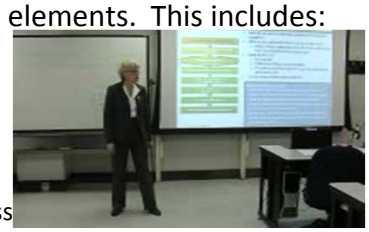
Developing Alternatives

- Be innovative … think creatively
- Consider the complete process that is the subject of the CBA, and be willing to change any of the elements. This includes:
  - Inputs
  - Outputs
  - Performance standards
  - Policies
  - Resources used to perform the process

  (in-house labor, contractors, automation, supplies, etc.)



- To help address the problem from all perspectives, get active participation by all stakeholders

Think outside the box!

CBA Training Slides

Step 3 – Define Alternative COA's

"Choosing An Item From A Lunch Menu"

Step 3: Define Alternative Courses of Action (COAs)

Although the menu offers excellent selections we have narrowed our lunch choice to:

Step 3 Define COAs (Courses of Action)

COA	Description
COA #1	Skip Lunch (always an option)
COA #2	Classic Pepperoni Pizza
COA #3	BBQ Bacon Burger
COA #4	Traditional Greek Salad
COA #5	Chicken Parmigiana dinner

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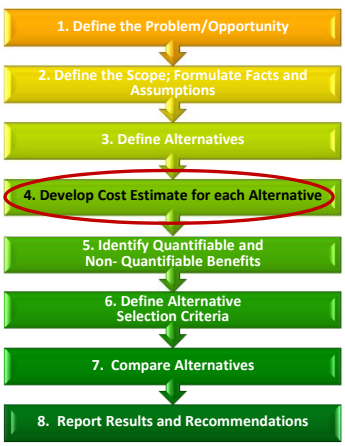
Check on Learning

- What are the first three steps of the CBA process?
- Why are each of the first 3 steps of the process important in developing a CBA?

Step 4: Develop Cost Estimate for Each Alternative



- Cost estimate captures the total cost of each alternative over its relevant life cycle
  - Cost perspective vs. POM/budget perspective: Relevant life cycle often extends beyond POM/budget time horizon
- Cost estimate includes both one-time and recurring costs
  - One-time: Costs of developing the solution and putting it in place
  - Recurring: Costs of performing the new process/solution
- To ensure apples-to-apples comparison of alternatives:
  - Develop robust cost element structure or work breakdown structure (a list of things that cost money) and use same structure for all alternatives
  - Don't change major elements – problem statement, assumptions, scope, etc.. – from one alternative to another

Questions for the Reviewer

- *Does the cost estimate span the appropriate life cycle?*
- *As appropriate, does the documentation clearly differentiate between a cost-perspective estimate and a POM/budget-perspective estimate?*
- *Are the cost estimates for each COA structured in a way that supports apples-to-apples comparison?*
- *Is the cost estimate backed up by supporting documentation:*
  - *Data sources identified?*
  - *Rationale and methodology explained?*
  - *Analysts/POCs identified?*

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Guidelines and Tips for Cost Estimating

- Begin with clear understanding of how each COA works and what resources are used to carry out the process … process map or flowchart can be very helpful
- Use authoritative data sources, to include:
  - Personnel costs: Army Military-Civilian Cost System (AMCOS) *
  - Contract costs: Contracting office
  - Inflation: Known price growth or ASA(FM&C) website *
- To help ensure you've captured all costs, be sure to consider:
  - One-time and recurring costs
  - Roles of all relevant stakeholders
  - Costs associated with technology, safety, security, etc..
- Increase level of detail as needed. For example, you might need to segregate costs by
  - MDEPs
  - Appropriations
  - Cost categories (civilian personnel, military personnel, contracts, supplies, etc..)

CBA Training Slides * URLs are in Resources section (slides 58-59)

Guidelines and Tips for Cost Estimating (cont'd)

- Develop supporting documentation that can stand alone to explain the cost estimate – a critical element for CBARB reviews
- Current vs. constant dollars
  - Definitions
    - Current: Includes inflation … the cost that will be incurred when the money is used. Also referred to as "then-year dollars" and "inflated dollars."
    - Constant: Cost with inflation removed.
  - Guidance:
    - Develop cost estimate in constant dollars to support decision making. Ensures apples-to apples comparison of costs over time.
    - Display cost estimate in current dollars to ensure decision maker is aware of impact on POM and budget.

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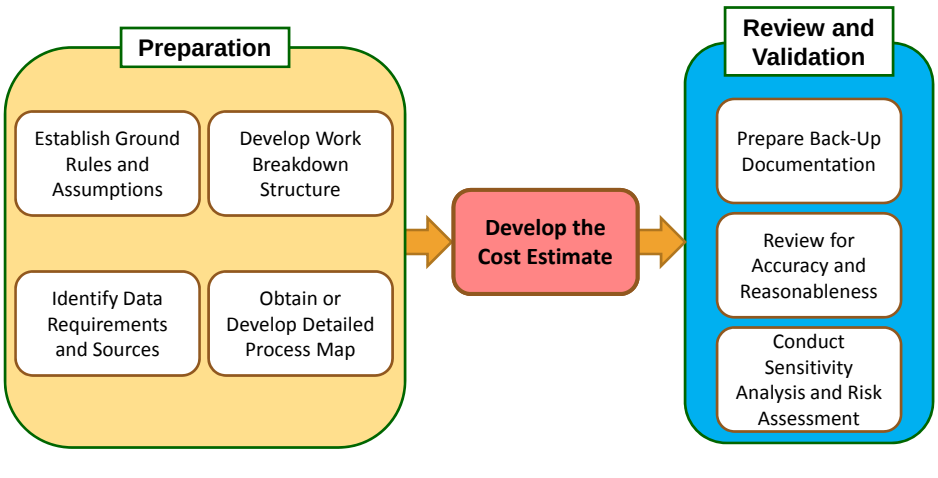
CBA Costing Process



If you do all this, you'll have a good cost estimate

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Case Study:
"Choosing An Item From A Lunch Menu"

Step 4 - Develop Cost Estimate for each Course of Action (COA)

Guidelines and Tips for Cost Estimating:

- Use authoritative data sources (menu)
- Capture all costs (burger and shake, salad and water….)
- Increase level of detail only as needed
- Apply inflation as applicable
- Each COA should have comparable cost elements

- Does Cost estimate span appropriate life cycle?
- Is there supporting documentation for our cost estimate?

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Step 4 – Develop a Cost Estimate
"Choosing An Item From A Lunch Menu"

Step 4: Develop Cost Estimate for each Course of Action (COA) (see Menu)

COST \ COA	SKIP LUNCH	PIZZA & Beer	BURGER & Coke	GREEK SALAD & Mint Tea	PARMIGIANA & Diet Coke
QUANTIFIABLE	$0	$12.49	$ 8.49	$6.49	$15.29
QUALITATIVE NON QUANTIFIABLE	• Blood sugar imbalance-medical cost impact.	• Medical cost heart impact. • Hunger satisfaction	• Medical cost heart impact. • Hunger satisfaction	• Heart health	• Medical cost heart impact. • Hunger satisfaction

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Create a Cost Estimate

"Choosing An Item From A Lunch Menu"

- Each COA should have comparable Cost elements

Constant Dollars ($K)	Menu Item	Menu Cost
	Skip Lunch	0
	Pizza	12.49
	Burger	8.49
	Greek Salad	6.49
	Parmigiana	15.29

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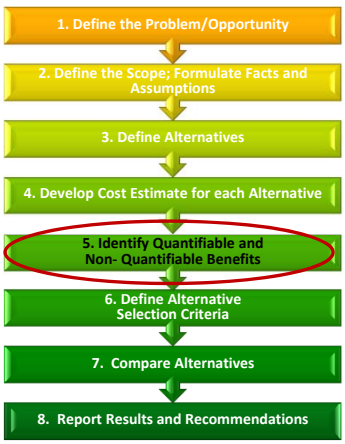
Step 5: Identify Quantifiable and Non-Quantifiable Benefits



- Benefits: The quantitative and qualitative results expected as a result of implementing an alternative.
- Identify benefits one COA at a time … no comparison of COAs is done at this point.
- Benefits provide the starting point for identifying alternative selection criteria (Step 6).
- Best source for identifying benefits: Subject matter experts
- Two broad categories:
  - *Quantifiable benefits* are measurable … they can be assigned a numeric value.
  - *Non-quantifiable benefits* cannot be measured with any reasonable accuracy or possibly at all.

Questions for the reviewer:

- ***Do the perceived benefits reflect an enterprise perspective?***
- ***Are the benefits consistent with the problem statement?***

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Typical Types of Benefits

Objective Benefits

- Cost (wide range of cost data can be developed)
- Cycle time or material usage
- Revenue generated from sales of assets
- Readiness ratings
- Number of documents processed

All objective benefits are quantifiable

Subjective Benefits

- Customer satisfaction
- Morale
- Mission capability

Usually quantifiable

- Quality of service
- Risk to Soldiers and other personnel
- Public perception of the Army

Usually not quantifiable

The analysis should clearly identify what the Army will get in return for the costs that will be incurred.

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Step 5 - Identify Quantifiable and Non-Quantifiable Benefits

"Choosing An Item From A Lunch Menu"

Step 5: Identify Quantifiable and Non-Quantifiable Benefits:

COA / BENEFIT	SKIP LUNCH	PIZZA	BURGER	GREEK SALAD	PARMIGIANA
QUANTIFIABLE (Sat. Fat)	0	22g	42g	10g	39g
NON QUANTIFIABLE	• None	• Taste •Hunger Satisfaction	• Taste •Hunger Satisfaction	• Heart health •Hunger Satisfaction	• Taste •Hunger Satisfaction

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Step 6: Define Alternative Selection Criteria

1. Define the Problem/Opportunity
2. Define the Scope; Formulate Facts and Assumptions
3. Define Alternatives
4. Develop Cost Estimate for each Alternative
5. Identify Quantifiable and Non- Quantifiable Benefits
6. Define Alternative Selection Criteria
7. Compare Alternatives
8. Report Results and Recommendations

- Alternative selection criteria are the standards upon which the decision will be based.
- CBAs must contain documentation that identifies the recommended decision criteria and the extent to which each alternative satisfies each of the criteria.

Questions for the reviewer:

- ***Are the selection criteria appropriately tailored to the problem statement or requirement?***
- ***Has appropriate consideration been given to both cost and non-cost criteria?***
- ***If weighting of selection criteria has been used, has the leader agreed with the weighting?***
- ***Do the selection criteria appear unrealistically skewed to favor one alternative?***

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An Approach to Identifying Selection Criteria

- Develop list of selection criteria
  - Relevant cost issues
  - Benefits identified in Step 5
  - Negative impacts of the alternative COAs
  - Guidance provided by the leader
  - Objectives specified by HQDA or other headquarters (see next slide)
- Pare the list down to the handful of most meaningful factors that should be taken into account in selecting a COA.

The person best qualified to identify selection criteria is the process owner or subject matter expert

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Possible Selection Criteria: Non-Financial

Number of items produced
Accuracy rate
Time to delivery or fielding
Interoperability with current systems
Maintainability
Political goodwill
Combat effectiveness
Criteria imposed by higher headquarters.

E.g., in a recent POM build, HQDA directed that all issues be evaluated for their impact on ARFORGEN.

Define how each criterion is measured and by whom. Make sure that the entity providing the measurement is credible.

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Possible Selection Criteria: Financial

- Total Lifecycle Cost: Compares the total cost of two or more COAs over a relevant time period.
  Use of Net Present Value might be appropriate in situations involving major investments
- Benefit-Cost Ratio: Compares the present value of total benefits with the present value of total costs.
- Break-Even Point (Payback Period): The point in time at which the cumulative cost reduction generated by a COA equals its one-time investment or implementation cost. I.e., it is the point in time at which the COA has paid for itself.

Reminder: Financial criteria must be evaluated in current and constant dollars.

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Step 6 - Define Alternative Selection Criteria

"Choosing An Item From A Lunch Menu"

- List the Alternative Selection Criteria

Step 6	Define Alternative Selection Criteria	
	Criteria	Description
	1	Hunger Satisfaction
	2	Cost
	3	Nutritional Value
	4	Taste

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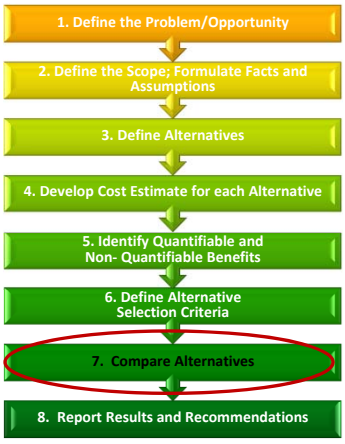
Step 7: Comparison of Alternatives



7a. Compare COAs using alternative selection criteria and identify the preferred COA.

7b. If there is a bill associated with the recommended COA, identify the billpayer.

7c. Identify the positive and negative impacts of the second- and third-order effects. What must be done to manage the negative impacts?

7d. Determine the robustness of the conclusions. If anything changes – assumptions, costs, benefits, etc... – would the recommendation change?

7e. Identify the high-risk aspects of the recommended COA and define appropriate risk mitigation measures.

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Step 7a: Compare COAs Using Alternative Selection Criteria

- The essence of the CBA process is in comparing at least two courses of action in order to identify the preferred alternative.
- As a general rule, the preferred alternative is the alternative that provides the greatest amount of benefit in relation to its cost.

Aid for Accomplishing Step 7a

Costs	Benefits	Selection Criteria
Equal	Unequal	Alternative that provides greatest benefits for given cost
	Equal	Subjective reasoning and *a fortiori* analysis
Unequal	Unequal	Alternatives ranked in order (based on benefit/cost ratio, net present value, or other relevant criterion)
	Equal	Least costly alternative

Step 7b: Billpayers
Step 7c: 2nd- and 3rd-Order Effects

- Billpayers are the funding sources that have been identified to cover the cost of the recommended COA.

In most cases, the individual or team developing the CBA won't have the authority to identify billpayers. This requires collaboration with the organization's resource manager.

Note: Savings can be used as a billpayer, but cost avoidances cannot.

Savings: A cost reduction that enables a manager to move funds from one function to another

Cost avoidance: A cost reduction that does not enable a manager to move funds.

- Second- and third-order effects are the "ripple effect" of the recommended COA: "The recommended COA will solve our problem, but it will also create an additional factor we will have to deal with."

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Steps 7d and 7e: Sensitivity Analysis and Risk Assessment

- Sensitivity analysis identifies the impact on the recommendation should any element of the analysis change.
- Risk assessment describes risks that can impact the achievement of stated benefits or the cost of solving the business problem. For each risk, assess the likelihood of occurrence and develop a mitigation strategy.

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Questions for the Reviewer: Step 7

- *Does the analysis clearly demonstrate how the recommended COA best satisfies the selection criteria?*
- *Is the recommended billpayer consistent with Army priorities? Do the benefits of the recommended COA justify the billpayer?*
- *Are second- and third-order effects identified, and are the negative impacts acceptable?*
- *How sensitive is the recommendation to possible changes in costs, benefits, assumptions, etc...? If the recommendation is highly sensitive to changes, has more in-depth analysis been done?*

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Questions for the Reviewer: Step 7 (cont'd)

- *Which elements of the CBA require sensitivity analysis?*
  - *Test only those elements for which there is considerable uncertainty or risk.*
  - *Can include any element: Assumptions, constraints, costs, benefits, weighting of selection criteria, etc...*
- *Address sensitivity from either or both perspectives:*
  - *What is the impact of a change of such and such a magnitude?*
  - *How large a change can occur before the recommendation changes?*
- *Have all reasonably likely risks and their impacts been identified? Are the recommended mitigation approaches adequate? Are they affordable?*

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Step 7 – Compare Alternatives

Step 7

Decision Matrix

The best course of action based on the selection criteria is represented by the highest score.

		COA #1 Skip Lunch			COA #2 Pizza & Beer			COA #3 Burger & Coke			COA #4 Greek Salad & Mint Tea			COA #5 Chk Parm & Diet Coke		
Criteria	Weight	Data	Rank	Score	Data	Rank	Score	Data	Rank	Score	Data	Rank	Score	Data	Rank	Score
Hunger Satisfaction	25%			0		3	0.75		2	0.5		1	0.25		4	1
Cost	20%	-	4	0.8	12.5	2	0.4	8.5	3	0.6	6.5	4	0.8	15.3	1	0.2
Nutritional Value	35%	-	2	0.7	22g	3	1.05	42g	1	0.35	10g	4	1.4	39g	2	0.7
Taste	20%		1	0.2		2	0.4		3	0.6		2	0.4		4	0.8
	100%			1.7			2.6			2.05			2.85			2.7

Rankings	
Best	4
Acceptable	3
Marginal	2
Worst	1

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Step 8: Report Results and Recommendations

1. Define the Problem/Opportunity
2. Define the Scope; Formulate Facts and Assumptions
3. Define Alternatives
4. Develop Cost Estimate for each Alternative
5. Identify Quantifiable and Non- Quantifiable Benefits
6. Define Alternative Selection Criteria
7. Compare Alternatives
8. Report Results and Recommendations

- Preferred format for documenting the CBA is a narrative. This will probably be accompanied by a decision briefing.
- Results and recommendations summarize the analysis and make conclusive statements about the comparisons of alternatives.
- The results address how the alternatives were ranked using the criteria developed in Step 6. Following a clear statement of the conclusions, there should be a firm recommendation regarding the preferred alternative.
- All data and other information used in Steps 1-8 must be adequately documented. Supporting information should be identified so decision makers and analysts can understand how Steps 1-8 were developed.

Questions for the reviewer:

- ***Does the package contain all key elements, accompanied by supporting documentation?***
- ***Does the recommended COA address the problem, and is it consistent with the assumptions and constraints?***
- ***Does the analysis explain how the recommended COA is best at satisfying the selection criteria?***

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Cost Benefit Analysis
U.S. Army CBA Process
"Choosing An Item From A Lunch Menu"

Step 8: Report Results and Recommendations

Executive summary includes, Problem statement, COAs, summary of necessary resources, Recommendation, and Cost

Executive Summary

Problem: What should I have for lunch today?
Five Courses of Action were developed to determine the best menu choice.
All COAs utilize existing funding allocated to the action.

Recommendation: Order the Greek Salad and Mint Tea
Cost to Implement:
- $ 4.99 + $ 1.50 = $ 6.49
- Sat Fat content: 14g

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CBA Summary

- CBA has top-down support and is becoming embedded in Army decision-making processes.
- CBA helps leaders and managers make better resource-informed decisions and thus helps the Army make better use of resources that are becoming increasingly constrained.
- Robust analysis makes it easier to explain and defend Army resource requirements.
- Many of us will be active users of CBAs – either helping to develop them or reviewing them for senior decision makers.
- Support is available – tools, models, guides, dedicated mailbox, additional training.
- CBA is based on a sound, logical approach to problem solving, similar to MDMP. It's not rocket science.

DASA-CE is here to help!

CBA Training Slides
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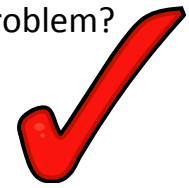
Check on Learning

- What are 2nd and 3rd order effects?
- Selection criteria may be _____ or _____ - _____.
- How do results change when rank or weights are adjusted?
- Is there always clear solution to a given problem?



CBA Training Slides

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Cost Benefit Analysis
A Second Practical Exercise

U.S. Army Cost Benefit Analysis Process

"Choosing A Mode of Transportation"

CBA Training Slides

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Author: William T. Huddleston, MSOR, MSME
Government Management Institute
Supervision: Dr. Dale R. Geiger, CMA, CGFM

Cost Benefit Analysis
"Choosing A Mode of Transportation"

Case Background:

- You are a Project Manager assigned to Fort Huachuca, Sierra Vista Arizona.
- You and your wife are looking forward to some well deserved time off to attend the wedding of your sister in Los Angeles, California.
- In addition to the wedding, this will be the first time in over 3 years that the entire family is together. It is also the first family reunion since the completion of your tours in Iraq and Afghanistan.
- Three modes of transportation are available to attend the wedding, Personally Operated Vehicle (POV), Airplane, and Train.
- Since you are on a tight family budget, you gathered relevant data to assist you and your wife in arriving at a **"cost informed decision"** on the best mode of transportation to attend the family event.

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Cost Benefit Analysis
"Choosing A Mode of Transportation"

Case Background Supporting Data:

Trip duration 4 days, 3 nights
Cost of gasoline: $3.50/gal
Depreciation of automobile (miles based): 22 cents/mile
Tires rated at 40,000 miles Cost of tires: $1,000
Automobile gas mileage: 22 miles/gal
Two individuals traveling; Plane ticket; $400/person.
Train ticket: $158/person
In-route food: $30 (automobile) $25 (train) $15 (airplane)
Round trip mileage: Sierra Vista. to Los Angeles Cailfornia:1,000 miles Los Angeles hotel: $100/night
Entertainment; $100/day
Rent-A-Car; 45/day
POV parking (Tucson, AZ): $14/day
POV parking (Union Station-Tucson): $10/day.
POV parking (Hotel): $ 7 / day

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Cost Benefit Analysis
"Choosing A Mode of Transportation"

In Class Assignment:

Using the Army CBA Cost Benefit Analysis Process;

- Develop a response to each of the first 3 steps in the CBA process. (15 minutes)
- Use the Case background information, and class agreed upon COAs to complete steps 4 thru 7 (30 minutes)
- Use Excel spreadsheet for module 12.1 to help with the CBA
- Write an executive summary for your recommendation (15 minutes)

Army Cost Benefit Analysis Process

1. Define and scope the problem/opportunity
2. Formulate assumptions and constraints.
3. Define Courses of Action.
4. Develop cost estimates for Courses of Action.
5. Identify quantifiable and non-quantifiable benefits.
6. Define Courses of Action selection criteria.
7. Compare Courses of Action.
8. Report results/recommendations

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Cost Benefit Analysis
"Choosing A Mode of Transportation"
Step 1: Define the Problem/Opportunity

Step 1: Define the Problem/opportunity:

Make a **"cost informed decision"** on the best mode of transportation to use for a trip from Sierra Vista, Arizona to Los Angeles, California to attend a wedding and a family reunion."

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Cost Benefit Analysis

"Choosing A Mode of Transportation"

Step 2: Define Scope, Formulate Facts

Step 2. Define Scope, Formulate Facts, Identify Assumptions and Constraints

Scope: Mode of transportation decision is limited to this single round trip from Sierra Vista, AZ to Los Angeles, CA.

Facts:
- Trip duration is 4 days, 3 nights
- Two individuals to make the trip
- A car is needed upon arrival

Assumptions
- Entertainment: $100 / day
- Parking:
  - Airport : $ 14/day
  - Train Station: $10 / day
  - Hotel: $ 7 / day
- Tires rated at 40,000 miles
- Cost of tires: $250 / tire

Assumptions (cont'd):
- Gasoline: $3.50 / gal.
- Auto depreciation: $0.22 / mile
- Car gas mileage: 22 mpg
- Round-trip mileage: 1,000 miles
- Plane ticket: $400 / person
- Train ticket: $158 / person
- Food Costs:
  - Train : $25 per person per trip
  - Plane: $15 /person per flight
  - Car: $30 / day
- Hotel: $100 / night double occupancy
- Car Rental: $45 / day

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Cost Benefit Analysis

"Choosing A Mode of Transportation"

Step 3: Define Courses of Action

Step 3: Define Courses of Action (COA's):

1. Stay home (always an option)
2. Drive POV
3. Airplane
4. Train

These are the only 4 options to consider for this case study.

Class to complete Step 4: Create Cost Estimates (20 minutes to complete)

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Cost Benefit Analysis

"Choosing A Mode of Transportation"

Step 4: Create Cost Estimates

Step 4: Create Cost Estimates

1. Stay Home; No quantifiable cost; Lost time with family non-quantifiable cost
2. CAR:
   - Fuel : 1,000 miles÷22miles/gal x $3.50/gal: $159
   - Food: $30 x 2 days $ 60
   - Depreciation of automobile (miles based) : $0.22 / mi x 1,000 mi: $220
   - Tire wear : 1,000miles/40,000 miles x $1,000: $ 25
   - Hotel : $100/night x 3 nights: $300
   - Entertainment : $100/day x 2 days: $200
   - Hotel Parking: $ 8 / day x 3 days $ 21

   TOTAL COST **$985**
3. AIRPLANE
   - Ticket : $400/person x 2: $800
   - Rent-A-Car : $45/day x 4 days: $180
   - @Entertainment : $100/day x 3 days: $300
   - Hotel : $100/day x 3 days: $300
   - POV parking @ AP = $14/day x 4 days: $ 56
   - Food = $7 x 2: $14 $196

   TOTAL COST **$1,636**

(continued on next slide)

Cost Benefit Analysis

"Choosing A Mode of Transportation"

Step 4: Create Cost Estimates

Step 4: Create Cost Estimates (cont'd)

4. TRAIN
   - Ticket @ $158 x 2: $316
   - Car parking @ Union station @ $10/day x 4: $ 40
   - Hotel @ $100/night x 3: $300
   - Entertainment @ $100/day x 2: $200
   - Food @ $25/day x 2 people x 1 day: $ 50
   - Rent-A-Car @ $45/day x 4: $180

   TOTAL COST **$1,046**

Class to complete Step 5: Define Quantifiable and Non-Quantifiable Costs. (10 minutes to complete)

Cost Benefit Analysis

"Choosing A Mode of Transportation"

Step 5: Define Quantifiable and Non-Quantifiable Costs

Step 5: Define Quantifiable and Non-Quantifiable Costs

COA / COST	STAY HOME	CAR	AIRPLANE	TRAIN
QUANTIFIABLE	$0	$985	$1,636	$1,086
NON QUANTIFIABLE	• Unrecoverable lost time with family. •Miss the wedding •Family discontent	• Lost leisure and business time. •Family goodwill	• Lost leisure time. •Family goodwill	• Lost leisure time. •Family goodwill

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Cost Benefit Analysis

"Choosing A Mode of Transportation"

Step 5: Identify Quantifiable and Non-Quantifiable Benefits

Step 5: Identify quantifiable and non-quantifiable Benefits

COA / BENEFIT	STAY HOME	POV	AIRPLANE	TRAIN
QUANTIFIABLE	• Work related accomplishments	NONE	NONE	NONE
NON QUANTIFIABLE	• More leisure and work related time.	• Trip logistic flexibility ..	• Additional time to spend with family. • Increased leisure time • Spouse interaction.	• Increased leisure time • spouse interaction.

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Cost Benefit Analysis
"Choosing A Mode of Transportation"
Step 6: Define Selection Criteria

Step 6: Define Selection Criteria:

- Time to spend with family
- Driving flexibility throughout trip
- Leisure Time
- Cost

Step 6	Define Alternative Selection Criteria	
	Criteria	Description
	1	Time to spend with family
	2	Driving Flexibility
	3	Leisure Time
	4	Cost

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Cost Benefit Analysis
"Choosing A Mode of Transportation"
Step 7: Compare Courses of Action

Step 7: Compare Courses of Action

Decision Matrix		COA #1			COA #2			COA #3			COA #4		
		Stay Home (status quo)			POV (drive personal vehicle)			Air Travel			Train Travel		
Criteria	Weight	Data	Rank	Score	Data	Rank	Score	Data	Rank	Score	Data	Rank	Score
Time to spend with family	25%		1	0.25		2	0.5		4	1		3	0.75
Driving Flexibility	30%		0	0		4	1.2		2	0.6		1	0.3
Leisure Time	20%		4	0.8		1	0.2		3	0.6		2	0.4
Cost	25%	0	4	1	$985	3	0.75	$1,636	1	0.25	$1,086	2	0.5
				0			0			0			0
				0			0			0			0
				0			0			0			0
				0			0			0			0
				0			0			0			0
				0			0			0			0
				0			0			0			0
	100%			2.05			2.65			2.45			1.95

Rankings	
Best	4
Acceptable	3
Marginal	2
Worst	1

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Cost Benefit Analysis
"Choosing A Mode of Transportation"
Step 8: Results and Recommendations

Step 8: Report results and recommendations:

Executive Summary

Problem: What should I have for lunch today?

COA: Four Courses of Action were developed to determine the method for traveling to the wedding; Stay at home, Car, Train or Plane.

Billpayer: All options utilize funding allocated to the action.

Recommendation: Travel by Car.

Cost to Implement: $ 985.00

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Check on Learning

- What does it meant to define the scope of the CBA?
- How do non-quantifiable benefits impact the decision?

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Cost Benefit Analysis

U.S. Army Cost Benefit Analysis Process

An Army Storage Issue

"Army Pre-Positioned Stock (APS)"

This case has been developed by the Army under the direction of Ms. Cecile Batchelor, CIV, USA ASA FMC for use in the Army Cost Benefit Analysis training program. The Case has been modified to simplify the analysis for this Introduction to Cost Benefit Analysis

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Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Large-Area Maintenance Shelters (LAMS)

Vehicle outside storage

New Construction or Lease

Lease Warehouse

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Cost Benefit Analysis
U.S. Army CBA Process
"Army Pre-Positioned Stock (APS)"

Case Background:
- Army to select TYPE of storage facilities to be used at five pre-selected APS locations based on a National Security Strategy.
- 4,000 tactical vehicles returning from Iraq need to be stored at the predetermined APS sites.
- Storage locations, the number of vehicles to be moved to each site, and timeline for movement is predetermined.
- Storage options Continental United States (CONUS):
  - Lease warehouse, Purchase Large-Area Maintenance Shelters (LAMS), Outside storage
- Storage options Outside Continental United States (OCONUS):
  - Purchase LAMS, outside storage.

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Cost Benefit Analysis
U.S. Army CBA Process
"Army Pre-Positioned Stock (APS)"

Case Background – Five Predetermined APS Locations

- Two APS locations within the Continental United States (CONUS):
  1. Oakland Army Terminal, California: (L1)
  2. Picatinny Arsenal, New Jersey: (L2)

- Three Outside Continental United States (OCONUS):
  1. Doha International Airport, Qatar: (L3)
  2. Pirmasens Army Depot, Germany: (L4)
  3. Diego Garcia, Indian Ocean: (L5)

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Cost Benefit Analysis
U.S. Army CBA Process
"Army Pre-Positioned Stock (APS)"

Case Background :

- APS costs consist of storage facility purchase or lease, and Care Of Supplies In Storage (COSIS).
- LAMS and/or leased warehouses are available where these storage options exist.
- After five years of use, each LAMS structure requires refurbishment at 20% original purchase price.
- LAMS Useful life = 20 years at which point they must be replaced.
- The LAMS manufacturer has a Government approved price list that shows prices increase 2%/year.
- The cost of leasing a warehouse increases 2% each year.

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Cost Benefit Analysis
U.S. Army CBA Process
"Army Pre-Positioned Stock (APS)"

Case Background

- A Cost Benefit Analysis (CBA) has been requested to determine the best "Cost Informed" decision for the following storage COAs;
    1. Lease warehouse at location L1, L2 and purchase LAMS at location L3, L4, L5.
    2. Purchase LAMS at all locations.
    3. Use outside storage at all locations.
- Life Cycle (FY10-FY34) considered most important decision criteria.
- POM/Budget Cycle (FY10-FY17) an important decision criteria.
- Deployment response time, Long term impact to site, and resale of LAMS also decision criterion to be considered.

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Cost Benefit Analysis
"Army Pre-Positioned Stock (APS)"
Predetermined APS Sites

Oakland army Terminal, California


Diego Garcia, Indian Ocean

Picatinny Arsenal, New Jersey


Doha International Airport, Qatar

Pirmasens Army Depot, Germany

Cost Benefit Analysis
U.S. Army CBA Process
"Army Pre-Positioned Stock (APS)"

Class Assignment:

Using the Army CBA Cost Benefit Analysis Process shown:

- ✓ Develop a response to each of the items in the eight step CBA process.
- ✓ Conduct a Cost Benefit Analysis to determine the "best" APS storage scenario based on guidance provided.
- ✓ Use the Decision Matrix provided to address Item # 7 and develop Item # 8

Army Cost Benefit Analysis Process

1. Define and scope the problem/opportunity
2. Formulate assumptions and constraints.
3. Define Courses of Action.
4. Develop cost estimates for Courses of Action.
5. Identify quantifiable and non-quantifiable benefits.
6. Define Courses of Action selection criteria.
7. Compare Courses of Action.
8. Report results/recommendations

Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Investment and Operating Cost (Millions of FY10 Dollars, Except Where noted

Location	Lease Warehouse Annual	Purchase LAMS	Annual Care of Supplies in Storage (COIS)* "Indoor Storage"	Annual COSIS* "Outdoor Storage"	LAMS Refurbishment Cost (Current Dollars)
L1	19.2	43.5	8.0	14.5	20% of original purchase price every five years
L2	**14.9**	32.7	15.4	27.8	"
L3	Not an option	3.7	.7	1.3	"
L4	Not an option	3.7	.7	1.3	"
L5	Not an option	14.5	2.8	9.7	"

* Annual COSIS cost if location is at full capacity.
Cost is proportional to the % utilization. (e.g. , at 25% utilization, cost is 25% of the value shown.

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Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Case Background:

Based on the approved transfer timetable, the available capacity for each site is as follows:

Site No.	Location	FY10	FY11	FY12 and beyond
L1	Oakland Army Depot	0%	50%	100%
L2	Picatinny Arsenal	0%	50%	100%
L3	Doha International Airport	0%	100%	100%
L4	Pirmasens Army Depot	0%	100%	100%
L5	Diego Garcia	100%	100%	100%

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Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Step 1: Define the Problem / Opportunity

Allow students 15 minutes to complete Step 1: Define the Problem / Opportunity

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Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Step 2 – Define the Scope, Formulate Facts and Assumptions

Scope:

Assumptions:
CONUS

OCONUS

Facts:

Allow students 20 minutes to Complete Step 2: Define the Scope, Formulate Facts and Assumptions

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Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Step 3 – Define Alternative Courses of Action (COA's)

CONUS APS storage facility options

1.
2.
3.

OCONUS APS storage facility options

1.
2.

Allow students 15 minutes to complete Step 3: Define Alternative Courses of Action

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Cost Benefit Analysis

"Army Pre-Positioned Stock (APS)"

Developing Alternatives

- Be innovative … think creatively
- Consider the complete process that is the subject of the CBA, and be willing to change any of the elements. This includes:
  - Inputs
  - Outputs
  - Performance standards
  - Policies
  - Resources used to perform the process (in-house labor, contractors, automation, supplies, etc.)
- To help address the problem from all perspectives, get active participation by all stakeholders

Think outside the box!

Slides

Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Step 3: Define Alternative Courses of Action:

APS Site	L1 Oakland Army Terminal California	L2 Picatinny Arsenal New jersey	L3 Doha International Airport Qatar	L4 Pirmasens Army Depot Germany	L5 Diego Garcia Indian Ocean
COA #1					
COA #2					
COA #3					

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Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Step 4: Develop Cost Estimates for Each Alternative

- Guidelines for Developing Cost Estimates:
- Develop supporting documentation that can stand alone to explain the cost estimate – a critical element for CBARB reviews
- Current vs. constant dollars
  - Definitions
    - Current: Includes inflation … the cost that will be incurred when the money is used. Also referred to as "then-year dollars" and "inflated dollars."
    - Constant: Cost with inflation removed.
  - Guidance:
    - Develop cost estimate in constant dollars to support decision making. Ensures apples-to-apples comparison of costs over time.
    - Display cost estimate in current dollars to ensure decision maker is aware of impact on POM and budget.

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Cost Benefit Analysis

"Army Pre-Positioned Stock (APS)"

Step 4: Develop Cost Estimate for Each Alternative

- What costs should be included in COA #1?
- Estimate lifecycle costs in constant dollars

COA #1 Lease L1 & L2, Purchase LAMS L3, L4, L5

Cost Analysis	Total	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Whse Lease Cost (total)									
L1									
L2									
LAMS Purch Cost (total)									
L3									
L4									
L5									
LAMS Maint (total)									
COSIS Inside (total									
L1									
L2									
L3									
L4									
L5									

Total

Cost Benefit Analysis

"Army Pre-Positioned Stock (APS)"

Step 4: Develop Cost Estimate for Each Alternative

- Using the previous slide as a guide, complete the lifecycle cost estimate for COA #1 (FY12-36)
  - Don't forget LAMS replacement cost
  - Ignore LAMS resale value
- Prepare lifecycle cost estimates for COAs #2 and #3 (FY12-36)
- Use the "Building Cost Estimates" Excel spreadsheet to prepare POM/Budget cost estimates for all COAs (FY12-19)

Cost Benefit Analysis

"Army Pre-Positioned Stock (APS)"

Step 4: Develop Cost Estimate for Each Alternative

Instructor Support Materials: POM12-19 Calculation

Screenshot of COA#1 using the Building Cost Estimates spreadsheet. Enter the constant dollars calculated in the Lifecycle Costs into the spreadsheet to calculate the POM/Budget cost.

Constant Dollar Cost ignores inflationary impact for decision maker

Build Cost Estimate in constant dollars

Cost in nth Year = Constant Cost

this is a cost eler	year 1	2	3	4	5	6	7	8
Whse Lease	-	17.05	34.10	34.10	34.10	34.10	34.10	34.10
LAM Purcha	14.5	7.4	0	0	0	0	0	0
LAM Maint	0	0	0	0	0	2.9	1.5	0.0
LAM Resale (ignore)								
COSIS Insid	2.8	15.9	27.6	27.6	27.6	27.6	27.6	27.6
--								
--								
total	17.30	40.35	61.70	61.70	61.70	64.60	63.18	61.70

Current Dollar Cost includes inflationary impact that budgeters and POM builders need to know

Use this template to translate cost above into current year dollars

	% annual increase	year 1	2	3	4	5	6	7	8
Whse Lease	2%	0.00	17.39	35.48	36.19	36.91	37.65	38.40	39.17
LAM Purcha	2%	14.50	7.55	0.00	0.00	0.00	0.00	0.00	0.00
LAM Maint	2%	0.00	0.00	0.00	0.00	0.00	3.20	1.67	0.00
LAM Resale	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COSIS Insid	3%	2.80	16.38	29.28	30.16	31.06	32.00	32.96	33.94
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
total	476.68	17.30	41.32	64.76	66.35	67.97	72.85	73.02	73.11

Cost Benefit Analysis

"Army Pre-Positioned Stock (APS)"

Step 4: Develop Cost Estimate for Each Alternative

The data to the right shows the cost estimate for three COAs:

- FY12-14
- POM/Budget FY12-FY19
- Entire 25 year Life cycle

Which course of action is the least costly:

- FY12-14?
- POM/Budget FY12-19?
- Life Cycle 25 years?

Note how cost decisions are impacted when costs are considered through time.

COA #1	Lease L1 & L2, Purchase LAMS L3, L4, L5		
Cost Analysis	Lifecycle	POM12-19	FY12-14
Whse Lease Cost	801.4	241.2	51.2
LAMS Purchase Cost	43.8	22.0	21.9
LAMS Maint	13.1	4.9	0.0
LAMS Resale (ignore)			
COSIS Inside	653.5	208.6	46.3
	1,511.8	**476.7**	**119.4**

COA #2	Purchase LAMS all 5 locations		
Cost Analysis	Lifecycle	POM12-19	FY12-14
LAMS Purchase Cost	196.2	100.5	98.1
LAMS Maint	58.9	22.2	0
LAMS Resale (ignore)			
COSIS Inside	653.5	208.6	46.3
	908.6	**331.3**	**144.4**

COA #3	Use Outside Storage at all locations		
Cost Analysis	Lifecycle	POM12-19	FY12-14
Lease Cost	-	-	-
COSIS Outside	1,299.0	418.8	97.8
	1,299.0	**418.8**	**97.8**

Step 4: Develop Cost Estimate for Each Alternative

Step 4: Develop Quantifiable and Non-Quantifiable Cost estimate for each Courses of Action

	COA #1	COA #2	COA #3
QUANTIFIABLE COST (Life Cycle) FY12-FY36			
QUANTIFIABLE COST POM/Budget FY12-FY19			
NON-QUANTIFIABLE COST (POM/Budget) FY12-FY19			
NON-QUANTIFIABLE COST (Life Cycle) FY12-FY36			

- Does Cost estimate span appropriate life cycle?
- Is there supporting documentation for our cost estimates?

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tep 5 – Develop Quantifiable and Nc Quantifiable Benefits

Objective Benefits

- Cost (wide range of cost data can be developed)
- Cycle time or material usage
- Revenue generated from sales of assets
- Readiness ratings
- Number of documents processed

All objective benefits are quantifiable

Subjective Benefits

- Customer satisfaction
- Morale
- Mission capability

Usually quantifiable

- Quality of service
- Risk to Soldiers and other personnel
- Public perception of the Army

Usually not quantifiable

The analysis should clearly identify what the Army will get in return for the costs that will be incurred.

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Cost Benefit Analysis
"Army Pre-Positioned Stock (APS)"
Step 5 – Develop Quantifiable and Non-Quantifiable Benefits

	COA #1	COA #2	COA #3
QUANTIFIABLE BENEFIT			
NON-QUANTIFIABLE BENEFIT			

Allow class time to discuss and suggest potential benefits of each COA, then proceed to the next slide.

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CBA Training Slides

Step 6 – Define Selection Criteria

APS – Selection Criteria

1.
2.
3.
4.
5.
6.

Class discussion to agree upon Selection Criteria

The leader must validate the priority or weighting of the evaluation criteria.

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Step 7: Comparison of Alternatives

7a. **Compare COAs using alternative selection criteria to identify the preferred COA.**

7b. If there is a bill associated with the recommended COA, identify the billpayer.

7c. Identify the positive and negative impacts of the second- and third-order effects. What must be done to manage the negative impacts?

7d. **Determine the robustness of the conclusions. If anything changes – assumptions, costs, benefits, etc.. – would the recommendation change?**

7e. Identify the high-risk aspects of the recommended COA and define appropriate risk mitigation measures.

Step 7: Comparison of Alternatives

A Decision Matrix tool is provided for comparing alternatives.

Decision Matrix		COA #1			COA #2			COA #3		
		Lease L1, L2, LAMS L3,L4,L5			LAMS L1-L5			Outside Storage L1-L5		
Criteria	Weight	Data	Rank	Score	Data	Rank	Score	Data	Rank	Score
Total Life Cycle Cost (Long Term)	25%	1511.8	1	0.25	908.6	4	1	1299.0	2	0.5
FY12-FY19 Cost (Short Term)	40%	476.7	1	0.4	331.3	4	1.6	418.8	3	1.2
Response Time	15%		3	0.45		3	0.45		2	0.3
Vehicle Impact	15%		4	0.6		3	0.45		1	0.15
LAMS Resale	5%	27.3	3	0.15	122.4	4	0.2	0	1	0.05
				0			0			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
	100%			1.85			3.7			2.2

Rankings	
Best	4
Acceptable	3
Marginal	2
Worst	1

Reporting Results

- You return to your senior leader to report the results of your CBA
- Senior leader provides new information
  - Funding for new military construction (MILCON) is available
  - POM/Budget cost should reflect additional appropriation requirements
  - Resale value of LAMS should be considered
- How do you respond?

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CBA Training Slides

Instructor Support Materials: Lifecycle Cost Calculation

COA #1 — Lease L1 & L2, Purchase LAMS L3, L4, L5

Cost Analysis	Total	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	Resale
Whse Lease Cost	801.35	-	17.05	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	34.10	
LAMS Purchase Cost	43.80	14.5	7.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.5	7.4	0.0	0	0	
LAMS Maint	13.14	0	0	0	0	0	2.9	1.5	0.0	0	0	2.9	1.5	0.0	0	0	2.9	1.5	0.0	0	0	0.0	0.0	0	0	0	
LAMS Resale (ignore)																											-10
COSIS Inside	653.50	2.8	15.9	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	
	1,511.79																										

COA #2 — Purchase LAMS all 5 locations

Cost Analysis	Total	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	Resale
LAMS Purchase Cost	196.20	14.5	45.5	38.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.5	45.5	38.1	0	0	
LAMS Maint	58.86	0	0	0	0	0	2.9	9.1	7.6	0	0	2.9	9.1	7.6	0	0	2.9	9.1	7.6	0	0	0.0	0.0	0	0	0	
LAMS Resale (ignore)	-																										-25
COSIS Inside	653.50	2.8	15.9	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	
	908.56																										

COA #3 — Use Outside Storage at all locations

Cost Analysis	Total	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36
Lease Cost	-																									
COSIS Outside	1,298.95	9.7	33.45	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6	54.6
	1,298.95																									

Costs to include:
- storage facility purchase or lease
- cosis
- LAMS Maint 20% Purch Price every 5 yrs
- whse lease inc 2% / yr
- Life fy10-fy36
- LAMS life = 20yrs
- LAMS resale after 5 years = $5mm
- LAMS purch price inc 2% / yr

COSIS costs:

Capacity	inside	outside					inside			outside		
Location	if @ 100%	if @ 100%	FY12	FY13	FY14 and +	FY12	FY13	FY14 +	FY12	FY13	FY14 +
L1		4	14.5	0%	50%	100%	-	4.00	8.00	-	7.25	14.50
L2		15.4	27.6	0%	50%	100%	-	7.70	15.40	-	13.90	27.80
L3		0.7	1.3	0%	100%	100%	-	0.70	0.70	-	1.30	1.30
L4		0.7	1.3	0%	100%	100%	-	0.70	0.70	-	1.30	1.30
L5		2.8	5.2	100%	100%	100%	2.80	2.80	2.80	9.70	9.70	9.70
							2.80	15.90	27.60	9.70	33.45	54.60

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Instructor Support Materials: FY12-14 Calculation

COA #1 — Lease L1 & L2, Purchase LAMS L3, L4, L5

Cost Analysis	Total	FY12	FY13	FY14
Whse Lease Cost	51.15	-	17.05	34.10
LAMS Purchase Cost	21.90	14.5	7.4	0
LAMS Maint	-	0	0	0
LAMS Resale (ignore)				
COSIS Inside	46.30	2.8	15.9	27.6
	119.35			

COA #2 — Purchase LAMS all 5 locations

Cost Analysis	Total	FY12	FY13	FY14
LAMS Purchase Cost	98.10	14.5	45.5	38.1
LAMS Maint	-	0	0	0
LAMS Resale (ignore)				
COSIS Inside	46.30	2.8	15.9	27.6
	144.40			

COA #3 — Use Outside Storage at all locations

Cost Analysis	Total	FY12	FY13	FY14
Lease Cost	-			
COSIS Outside	97.75	9.7	33.45	54.6
	97.75			

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Instructor Support Materials: POM12-19 Calculation

COA #1 — Lease L1 & L2, Purchase LAMS L3, L4, L5

Cost Analysis	Total	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Whse Lease Cost	241.2	-	17.4	35.5	36.2	36.9	37.6	38.4	39.2
LAMS Purchase Cost	22.0	14.5	7.5	-	-	-	-	-	-
LAMS Maint	4.9	-	-	-	-	-	3.2	1.7	-
LAMS Resale (ignore)									
COSIS Inside	208.6	2.8	16.4	29.3	30.2	31.1	32.0	33.0	33.9
	476.7								

COA #2 — Purchase LAMS 5 locations

Cost Analysis	Total	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
LAMS Purchase Cost	100.5	14.5	46.4	39.6	-	-	-	-	-
LAMS Maint	22.2	-	-	-	-	-	3.2	10.2	8.8
LAMS Resale (ignore)									
COSIS Inside	208.6	2.8	16.4	29.3	30.2	31.1	32.0	33.0	33.9
	331.3								

COA #3 — Use Outside Storage at all locations

Cost Analysis	Total	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Lease Cost	-								
COSIS Outside	418.8	9.7	34.5	57.9	59.7	61.5	63.3	65.2	67.2
	418.8								

Assume 2% inflation on lease & LAMS replacement
Assume 3% inflation on COSIS
Assume 2% inflation on LAMS maintenance

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Instructor Support Materials: POM12-19 Calculation

Constant Dollar Cost ignores inflationary impact for decision maker

Build Cost Estimate in constant dollars

Cost in nth Year = Constant Cos

this is a cost ele	year 1	2	3	4	5	6	7	8
LAM Purcha	14.5	45.5	38.1	0	0	0	0	0
LAM Maint	0	0	0	0	0	2.9	9.1	7.6
LAM Resale (ignore)								
COSIS Insid	2.8	15.9	27.6	27.6	27.6	27.6	27.6	27.6
--								
l	17.30	61.40	65.70	27.60	27.60	30.50	36.70	35.22

Screenshot of COA#2 using the Building Cost Estimates spreadsheet.

Current Dollar Cost includes inflationary impact that budgeters and POM builders need to know

Use this template to translate cost above into current year dollars

	% annual increase	year 1	2	3	4	5	6	7	8
LAM Purcha	2%	14.50	46.41	39.64	0.00	0.00	0.00	0.00	0.00
LAM Maint	2%	0.00	0.00	0.00	0.00	0.00	3.20	10.25	8.75
LAM Resale	2%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COSIS Insid	3%	2.80	16.38	29.28	30.16	31.06	32.00	32.96	33.94
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
total	331.33	17.30	62.79	68.92	30.16	31.06	35.20	43.20	42.70

Instructor Support Materials: POM12-19 Calculation

Constant Dollar Cost ignores inflationary impact for decision maker

Build Cost Estimate in constant dollars

Cost in nth Year = Constant Cos

this is a cost ele	year 1	2	3	4	5	6	7	8
bst								
uts	9.7	33.45	54.6	54.6	54.6	54.6	54.6	54.6
--								
--								
total	9.70	33.45	54.60	54.60	54.60	54.60	54.60	54.60

Screenshot of COA#3 using the Building Cost Estimates spreadsheet.

Current Dollar Cost includes inflationary impact that budgeters and POM builders need to know

Use this template to translate cost above into current year dollars

	% annual increase	year 1	2	3	4	5	6	7	8
Lease Cost	2%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COSIS Outs	3%	9.70	34.45	57.93	59.66	61.45	63.30	65.20	67.15
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
--		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
total	418.84	9.70	34.45	57.93	59.66	61.45	63.30	65.20	67.15

Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Step 8: Report results and Recommendations*:

"Purchase Large-Area Maintenance Shelters (LAMS) at all APS sites".

* This recommendation is based on the selection criteria, ranking, and application of the supporting decision matrix by the author. Different selection criteria and ranking may result in a different recommendation.

It should be recognized that the CBA is a structured thought process and should be simply considered as a "tool" to support the selection of a **"cost informed"** decision.

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Cost Benefit Analysis

U.S. Army CBA Process

"Army Pre-Positioned Stock (APS)"

Step 8: Report Results and Recommendations Executive Summary

- The Army is required to update prepositioned stocks to respond to global contingencies, incorporating vehicles from Iraq.
- Three Courses of Action (COAs) were developed to determine the best way to update APS.
- All COAs require additional resourcing.
- Recommendation: Implement COA #2: Purchase Temporary Storage Facilities. Least cost to the Army. Greatest benefit: provides greatest flexibility for providing assets on short notice; supports availability for contingencies; maintains highest quality vehicle response readiness for the least cost to the Army.
- Cost to implement COA 2:
  - FY 10: $ 100.9M
  - POM (FYs 12-17): $ 320M
  - Life Cycle (FY10-FY34): $ 1,041M

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Cost Benefit Analysis

Army CBA Cost Estimate Resources

Tool/Model	URL	Purpose
FORCES Cost Models	https://www.osmisweb.army.mil/forces/login.aspx	Suite of models that provides quick and reasonable unit cost estimates to a wide variety of users
Army Military-Civilian Cost System (AMCOS)	https://www.osmisweb.army.mil/amcos/app/home.aspx	Personnel costs for military, civilian, contractor
ASA(FM&C) Website	http://asafm.army.mil/Documents/OfficeDocuments/CostEconomics/rates/indices.xls	Inflation indices
Capabilities Knowledge Base	http://asafm.army.mil/Documents/officedocuments/costeconomics/guidances/ckb-ui.pdf http://asafm.army.mil/offices/CE/Ckb.aspx?OfficeCode=1400	Research, development, and acquisition costing for major weapon/materiel systems
Automated Cost Estimating Integrated Tools (ACEIT)	http://www.aceit.com/Pages/Products/ProductPage.aspx?id=f638a6d8-60e9-414a-9970-7fed249b9d25	
Automated Cost Data Base (ACDB)	http://www.aceit.com/Pages/Products/ProductPage.aspx?id=a08e4c84-8c48-49c7-9f67-d1146b4784ac	
Operating & Support Management Information System (OSMIS)	https://www.osmisweb.army.mil/osmisrdb/login.aspx	Operating and support information for major weapon/materiel systems

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