

# AMERICA'S ARMY: THE STRENGTH OF THE NATION™



## Cost Benefit Analysis Training Brief

5 April 2010





# Class Participation Guidelines

Participants are expected to:

- ❑ Arrive on time
- ❑ Attend all the hours of training class
- ❑ Participate freely in discussions
- ❑ Try to relate your own experiences
- ❑ Ask questions when needing clarification
- ❑ Listen to other viewpoints
- ❑ Avoid distracting behaviors including side conversations
- ❑ Turn cell phones to either “off” or “vibrate.” Do not interrupt the class by walking in or out of the classroom to answer the phone. Wait until the next break.
- ❑ Refrain from using e-mail on wireless devices during the class



# Teaching Objectives

WHAT

- What is Cost Benefit Analysis (CBA)?

WHY

- Why do we need CBA?

WHEN

- What Army processes call for CBA?

HOW

- What are the processes and methodologies used in developing a CBA?

Sources and References



# WHAT?



# What is CBA?

- ❑ A structured methodology of forecasting and comparing the anticipated costs and benefits of alternative courses of action in order to identify the most effective manner of achieving a stated goal or objective.
- ❑ In English... weighing the consequences, both good and bad, of potential actions.

**Source: CBA Guide**



# WHY?



# Department of Army Directive

**ODASA**  
**Cost &**  
**Economics**

Department of Army has directed that all unfunded requirements and new or expanded program proposals be accompanied by a thorough cost benefit analysis



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



# 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 bill-payers or trade-offs.
  - ❑ Consider second- and third-order effects.

## **Objective:**

***Produce a value proposition – a clear statement that the benefits more than justify the costs, risks, and trade-offs.***





# 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.
- ❑ What do senior leaders expect?
  - ❑ Collaborative and thoughtful problem solving.
  - ❑ Analytical rigor and innovative thinking.

**This is adaptation NOT transformation**



# What is in a Quality CBA?

**A quality CBA is a structured package that contains:**

- ❑ Problem statement, assumptions, and constraints
- ❑ Documentation of the current state and all alternatives, to include their costs
- ❑ Identification of benefits
- ❑ Definition of alternative selection criteria
- ❑ A comparison of the alternatives
- ❑ A report that summarizes the results and presents a clear recommendation



# **CBA REVIEW BOARD (CBARB)**



# DASA(CE) Responsibility: Review and Approve CBAs

ODASA  
Cost &  
Economics



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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)).

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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) intent is to establish a Cost Benefit Analysis Review Board (CBARB) to support this task
- Detailed procedures for CBARB still evolving – these slides provide a high-level description

## The CBA Review Board (CBARB) and Process is Evolving



U.S. ARMY

# CBARB Review: Technical and Functional

ODASA  
Cost &  
Economics

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

- ❑ Does the CBA address a sound requirement?
  - ❑ Does the recommended COA represent the *best value* for the Army?
  - ❑ Does the recommended COA adequately address second- and third-order effects?
- ❑ CBARB does not usurp PEG's responsibility for "validating" requirements
  - ❑ Will address questions such as:
    - ❑ Is the requirement redundant or duplicative?
    - ❑ Does the requirement have a useful life that justifies the expenditure of resources?
    - ❑ Does the recommended COA fully satisfy the requirement without "gold plating"?
  - ❑ Best value COA: The course of action that provides the optimum balance of performance, cost, schedule, and risk



# CBARB Composition

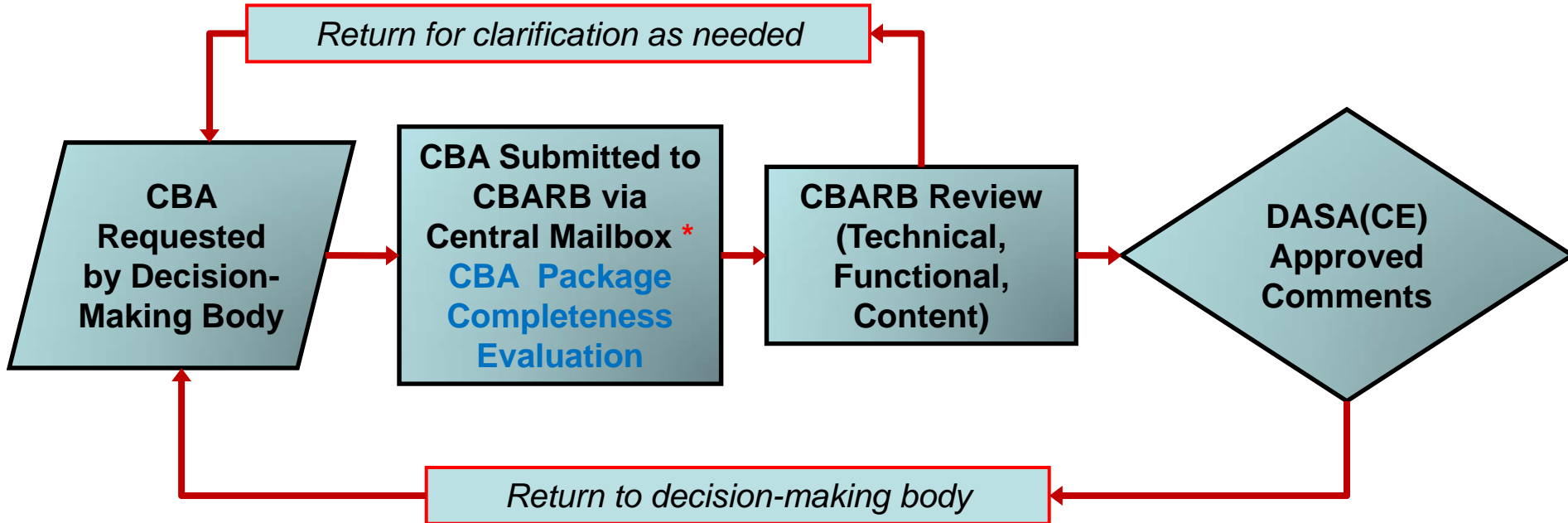
- ❑ Board chair: DASA(CE) division chief
- ❑ Standing members:
  - ❑ Army Budget Office (ABO)
  - ❑ PAED
  - ❑ G-3/5/7
- ❑ Other members, as needed based on the subject matter:
  - ❑ Appropriate DASA(CE) divisions
  - ❑ PEG representatives (as determined by PAED)
  - ❑ ABO appropriation sponsors (BUI, BUO, BUR)
  - ❑ HQDA functional proponents
  - ❑ Manpower specialist from G-1



# CBARB Process

ODASA  
Cost &  
Economics

*Process is notional – CBARB procedures are under development*



- \* Submit unclassified CBAs and questions to [CBAGuidebook@conus.army.mil](mailto:CBAGuidebook@conus.army.mil).
- \* Submit classified CBAs and questions to [CBAGuidebook@hqda-s.army.smil.mil](mailto:CBAGuidebook@hqda-s.army.smil.mil).

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





# Resources

- ❑ DASA-CE has put together the following set of enablers:
  - ❑ Cost Benefit Analysis Guide
  - ❑ CBA Briefing Template
  - ❑ CBA Examples and Case Studies
  - ❑ Question and Answer Mailbox
- ❑ All documents are posted in the CBA Files Center in AKO:  
<https://www.us.army.mil/suite/files/21066882>
- ❑ Also, you will find the Guide and Template on the ASA(FM&C) – Cost & Economics Homepage:  
<http://www.asafm.army.mil/offices/office.aspx?OfficeCode=1400>
- ❑ Question and Answer Mailbox (24-hour turn around)  
[cbaguidebook@conus.army.mil](mailto:cbaguidebook@conus.army.mil) ([cbaguidebook@hqda-s.army.smil.mil](mailto:cbaguidebook@hqda-s.army.smil.mil) for classified issues.)

**You will find most things in this brief in the CBA Guide**



# WHEN?



# CBAs in the APGM

PEGS

- ❑ CBA required for new or increased program proposals with FY12 costs  $\geq$  \$25 million or FY12-17 costs  $\geq$  \$100 million
  - ❑ In addition to cost and functional criteria, COA analysis must address how each COA contributes to the ARFORGEN process, is consistent with the ACP, and represents a “must pay” bill from an external source over which the Army has no control.
- ❑ CBA requirements are not waived when funding requests are in direct response to guidance from the Senior Leaders of the Department of the Army (the SA, CSA, USA, and VCSA).

PAED

- ❑ POM/BES decision briefing to SA/CSA. PAED will:
  - ❑ Present unfunded and underfunded high-priority programs, along with candidate bill-payers.
  - ❑ Present multiple COAs that provide alternative funding solutions.
  - ❑ Recommend a COA.



# When CBAs are Required

- ❑ As noted by USA/VCSA memo
- ❑ Per APGM and TGM
- ❑ With Force Design Updates
- ❑ 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



# HOW?



# Cost Benefit Analysis

## Cost Benefit Analysis—Making 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. Develop the Problem Statement;  
Define the Objective and the Scope

2. Formulate Assumptions; and  
Identify Constraints

3. Document Current State  
(*Status Quo*)

4. Define Alternatives with  
Cost Estimates

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**



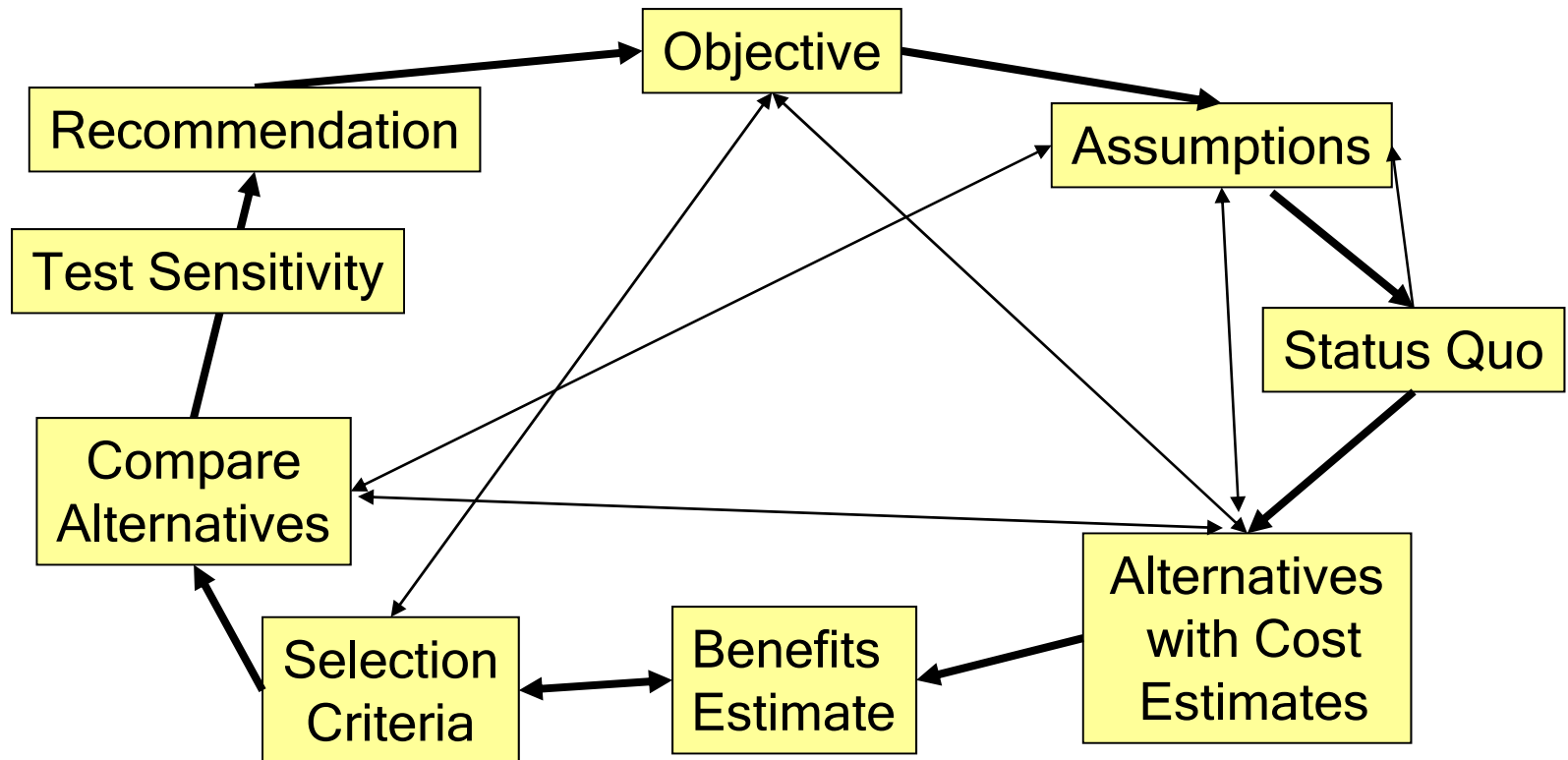
# Elements of a Cost Benefit Analysis

1. Problem Statement, Objective and Scope
2. Assumptions and Constraints
3. Current State (the Status Quo)
4. Alternatives with Cost Estimates
5. Quantifiable and Non-Quantifiable Benefits
6. Alternative Selection Criteria
7. Comparison of Alternatives
  - a. Costs and Benefits Comparison
  - b. Trade-offs / Billpayers
  - c. Second and Third Order Effects
  - d. Sensitivity Analysis and Risk Assessment
8. Results and Recommendations

**Defined by USA/VCSA**  
**Memo dated**  
**30 December 2009**



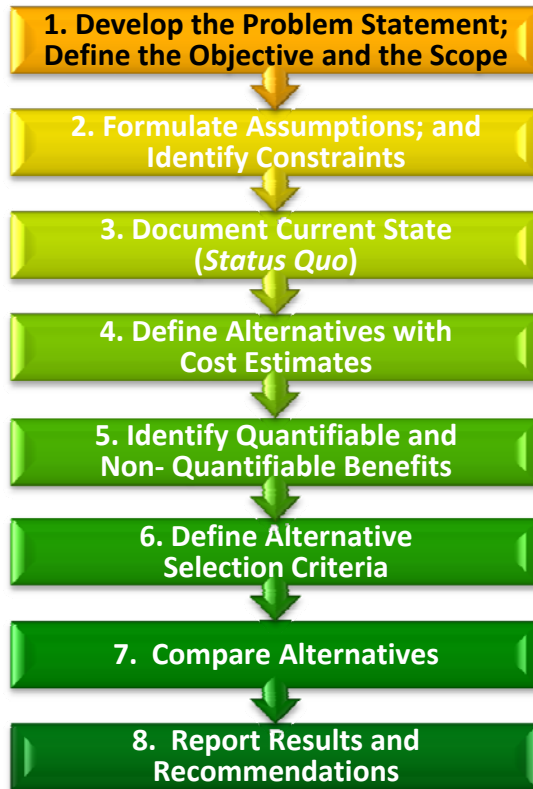
# CBA is a Non-Linear Process







# PROCESS STEPS



# STEP 1



# Step 1: Problem Statement, Objective and Scope

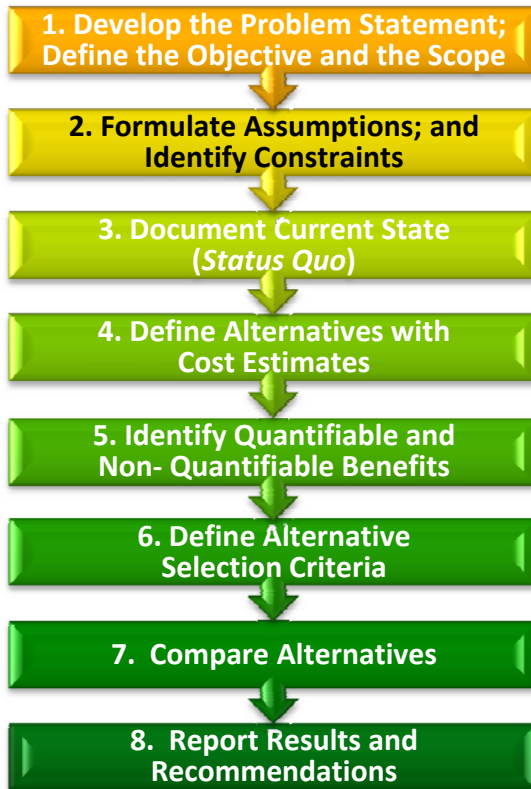
- ❑ The problem statement clearly defines the problem, need, or opportunity that requires a solution and describes what the effort intends to accomplish.
- ❑ The objective of the effort is to improve, reduce, or increase some aspect of a process, procedure, or program. Objectives should be measurable, realistic, achievable, and results-oriented. Simply put, objectives are measurable outcomes.
- ❑ Scope defines and limits the range of coverage encompassed by an initiative or proposal along specific dimensions like time, location, organization, technology or function.



# Questions for Step 1

- ❑ Do the problem statement and scope define a clear, unambiguous issue?
- ❑ Are the objectives consistent with other organizational objectives?
- ❑ Is the requirement temporary or permanent?
- ❑ Has the requirement been evaluated previously or been subject to other forms of analysis, e.g. risk analysis or value management?
- ❑ Is the requirement part of a larger program or strategy?
- ❑ What major stakeholders are likely to be impacted?

**Results of Step 1 and Step 2 are validated with the leader before other steps are undertaken**



# STEP 2



## Step 2: Formulate Assumptions and Identify Constraints

- ❑ Assumptions are factors or conditions that are essential to the success of the solution and are beyond the control of the organization and impose risk.
- ❑ Constraints usually refer to limits placed on resources to be devoted to the project. Constraints or barriers are normally beyond the control of the analyst and provide limitations within which analyses take place.



# Questions for Step 2

- ❑ Do the assumptions and constraints clearly identify the natural and/or artificial limits or expansions placed on the solution set?
- ❑ Were the assumptions developed by an appropriate subject matter expert?
- ❑ Are the assumptions clearly stated and realistic?
- ❑ Are all relevant constraints identified?
- ❑ Are the assumptions and constraints structured in a manner that is clearly intended to favor one COA?
- ❑ If needed, are assumptions concerning information technology included?

**Results of Step 1 and Step 2 are validated with the leader before other steps are undertaken**



# Pictures for Case Study



Large-Area Maintenance Shelter (LAMS) – Under consideration

MILCON Warehouse—newer construction (Inside/Outside) – Under consideration

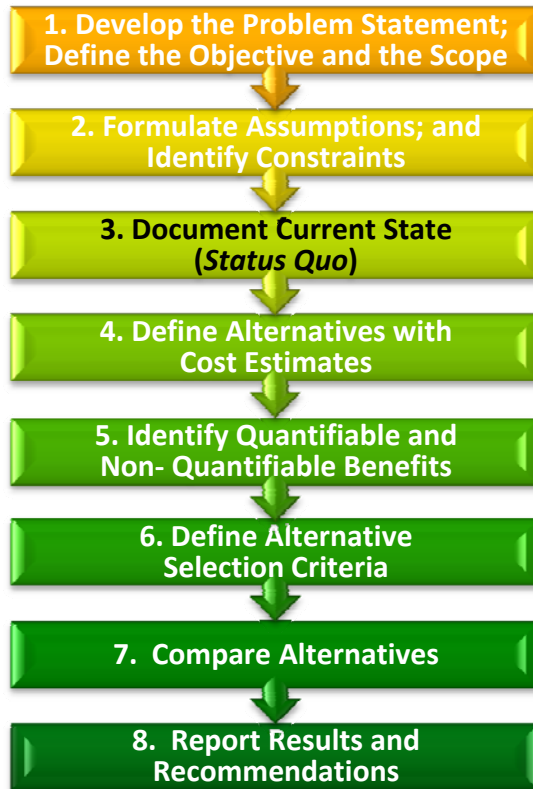






# Practice Steps 1 and 2

- ❑ Read the Army Prepositioned Stock case
- ❑ Look at Steps 1 and 2 in your course material folder and answer the questions.
- ❑ Class Discussion



# STEP 3



# Step 3: Document Current State (Status Quo)

- ❑ This defines and assesses the current state/condition.
- ❑ The status quo alternative of the CBA is the "baseline" program or system against which the costs and benefits of all feasible alternatives are compared.
- ❑ If the problem statement or objective addresses a need that is not currently being met, there might not be a status quo.



# Questions for Step 3

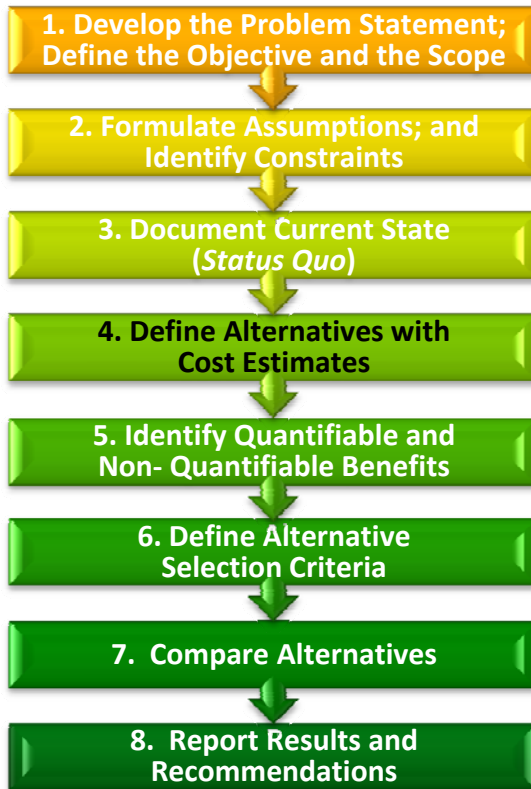
- ❑ Are all relevant costs and benefits included in the baseline?
- ❑ Are the costs and benefits of the status quo sufficiently detailed to support relevant analysis?
- ❑ Have we identified and coordinated with all appropriate parties?

**If there is a status quo, it is always an alternative.**



# Practice Step 3

- ❑ Look at Step 3 in your course material folder and answer the questions.
  
- ❑ Class Discussion



# STEP 4



# Step 4: Define Alternatives with Cost Estimates

- ❑ Alternatives are potential solutions to the problem statement which will be evaluated in the CBA.
- ❑ Alternatives should support the achievement of the mission and strategic goals of the organization.
- ❑ A cost estimate captures the total cost of each alternative over its entire life cycle and is a summation of all relevant cost elements.

**This is not a marketing exercise. The intent is to give the leader broad, thoughtful analysis of other potential solutions.**



# Questions for Step 4

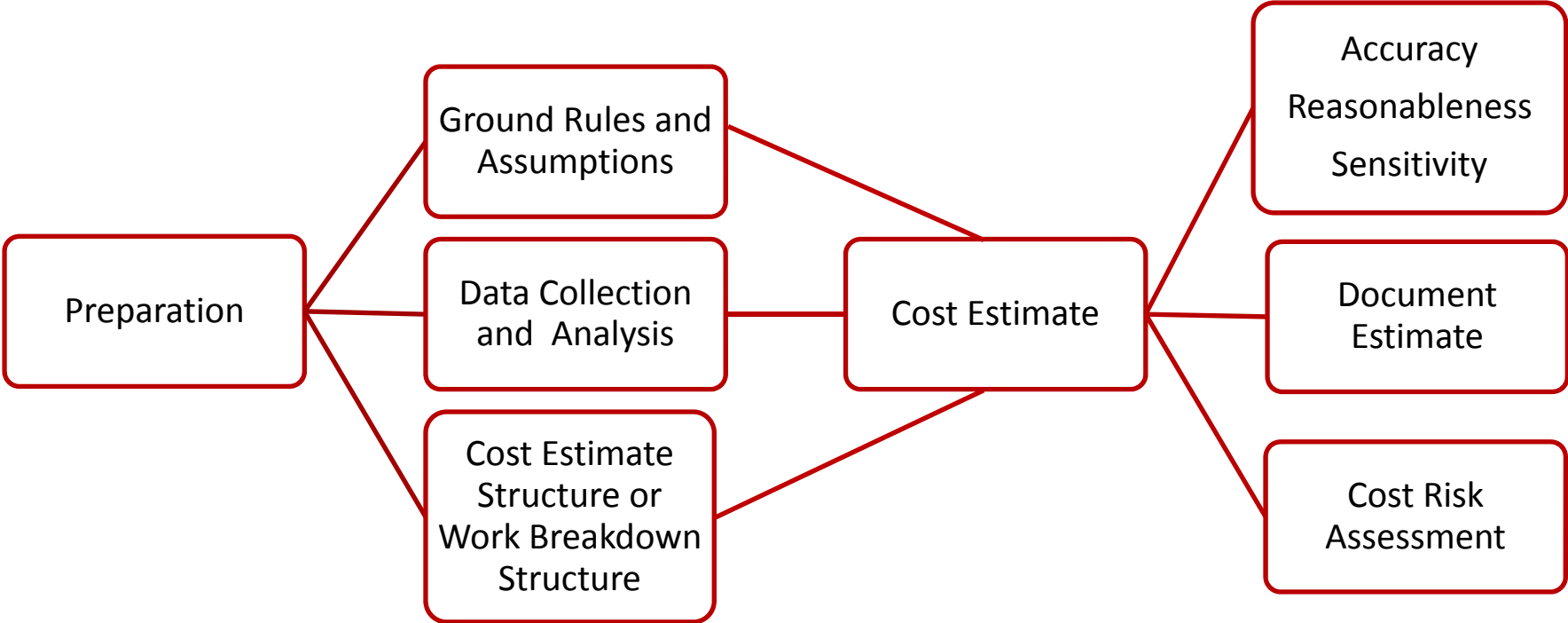
## *Developing Alternatives*

- ❑ Have all feasible alternatives been considered and are they well defined, e.g. service performed by contractor support, other government agency, internal growth?
- ❑ Do the alternatives span a reasonably wide range of possibilities, e.g. varying quantities and levels of service to be provided?
- ❑ Is the status quo presented as an alternative? If not, this needs to be explained in the documentation.





# Cost Estimating Process



**Cost estimating is an iterative process**

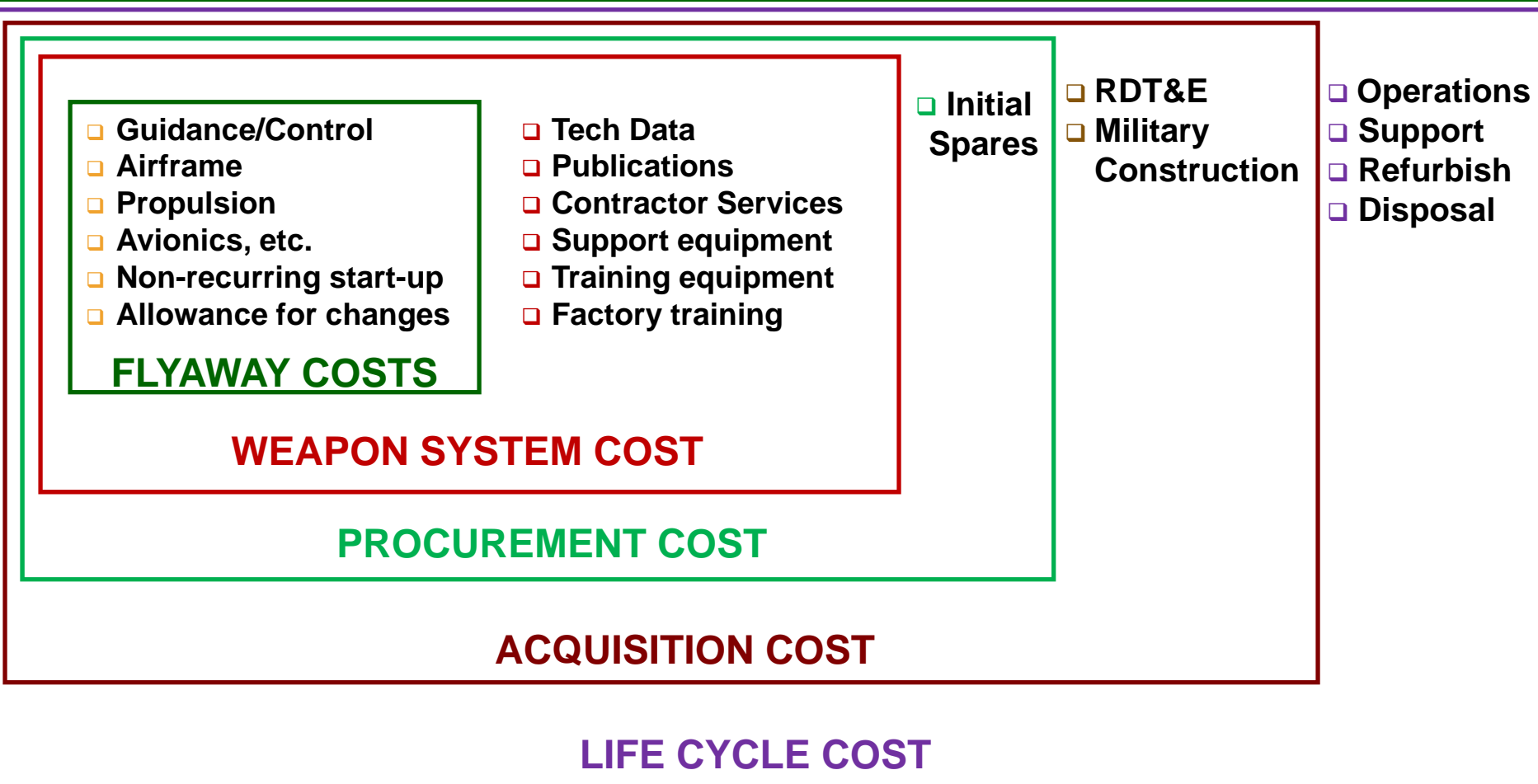


# Guidelines for Cost Estimating

- ❑ Use current dollars, supported by known cost increases or official inflation indices
- ❑ Establish the appropriate timeframe for comparing the alternatives and develop the cost estimate for the entire timeframe
- ❑ Identify one-time costs (also referred to as fixed costs, implementation costs, or investment costs)
- ❑ Identify all recurring costs
- ❑ Ensure apples to apples comparison of alternatives. Don't change scope or assumptions from alternative to alternative.
- ❑ Consider cost impact of security, safety, new maintenance requirements, etc.
- ❑ Develop supporting documentation that can stand alone to explain the cost estimate – a critical element for CBARB reviews



# Life Cycle Cost Composition

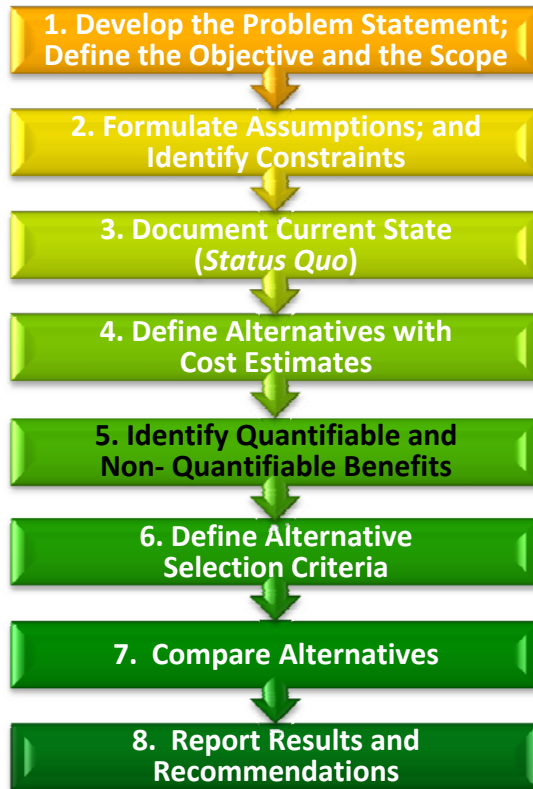


**Fix the temporal frame of the estimate;  
all alternatives use the same cost estimating timeframe.**



# Practice Step 4

- ❑ Look at Step 4 in your course material folder and answer the questions.
  - ❑ You'll need a calculator for this exercise. If you didn't bring one, we have a few available for your use
  - ❑ If you need scratch paper, use the reverse side of the APS narrative
  
- ❑ Class Discussion



# STEP 5



# Step 5: Quantifiable and Non-Quantifiable Benefits

- ❑ Benefits are the quantitative and qualitative results or improvements expected by implementing an alternative. The benefits provide the starting point for identifying alternative selection criteria in Step 6.
- ❑ Quantifiable benefits are measurable ... they can be assigned a numeric value.
  - ❑ Includes objective benefits (e.g., dollars, physical count of tangible items, or percentage change).
  - ❑ Can also include subjective benefits (e.g., morale, customer satisfaction).
- ❑ Non-quantifiable benefits cannot be measured with any reasonable accuracy or possibly at all. An example of a subjective non-quantifiable benefit is aesthetics.



# Questions for Step 5

- ❑ Do the perceived benefits contribute to organizational goals and objectives?
- ❑ Are the benefits consistent with the problem statement?
- ❑ Are any benefits transferred from another party and is that clearly noted?



# Typical Types of Benefits

## Objective Benefits

- ❑ Cost reductions
- ❑ Improvements in cycle time or material usage
- ❑ Revenue generated from sales of assets
- ❑ Positive impacts on readiness

All objective benefits are quantifiable

## Subjective Benefits

- ❑ Improved customer satisfaction
- ❑ Improved morale
- ❑ Improved mission capability
- ❑ Improved quality of service
- ❑ Reduced risk to Soldiers and other personnel
- ❑ Improved public perception of the Army

Usually quantifiable

Usually not quantifiable

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





# Practice Step 5

- ❑ Look at Step 5 in your course material folder and answer the questions.
  
- ❑ Class Discussion



# STEP 6



# Step 6: Alternative Selection Criteria

- ❑ Alternative selection criteria are those standards/bases on which a decision should be based. CBAs must contain documentation that outlines recommended decision criteria and identifies the extent to which each alternative satisfies each of the criteria.

**This is an opportunity to think collaboratively about what is truly important and judge the best solution based on analysis.**



# One Approach to Identifying Selection Criteria

- ❑ Develop list of candidate 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 slide 56)
- ❑ Pare the list down to the handful of factors that should be taken into account in selecting a COA. (Any “benefits” that don’t survive this scrub are not relevant benefits.)



# Questions for Step 6

- ❑ Are the selection criteria appropriately tailored to the problem statement or requirement?
- ❑ Has appropriate consideration been given to both cost and non-cost criteria?
- ❑ Has the leader agreed with the priority (weighting) of the criteria?
- ❑ Do the selection criteria appear unrealistically skewed to favor one alternative?

**Confirm selection criteria and their weights with the leader. The analyst may want to re-confirm all prior CBA items (objective, assumptions, constraints, weights) at this time, too.**



# Possible Selection Criteria to Include in Step 6

What non-financial decision criteria are to be considered?

- ❑ Contribution to ARFORGEN
- ❑ Consistency with ACP
- ❑ External “must pay” bill
- ❑ Accuracy rate
- ❑ Time to delivery or fielding
- ❑ Interoperability with current systems
- ❑ Maintainability
- ❑ Political goodwill
- ❑ Combat effectiveness

*APGM specifies these criteria for CBAs prepared to support the FY12-17 POM/BES*

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



# Possible Selection Criteria to Include in Step 6

What financial decision criteria are to be calculated?

- ❑ **Net Present Value (NPV):** Computed by subtracting the present value of costs from the present value of benefits.
- ❑ **Benefit-Cost Ratio:** Compares the present value of total benefits with the present value of total costs.
- ❑ **Break-even Point (payback period):** The point at which the cumulative costs of two alternatives are equal.
- ❑ **Rank Order / Weight Based:** Allows for selection to be based on quantifiable and non-quantifiable costs and benefits, and allows decision makers to adjust criteria based on perceived importance.

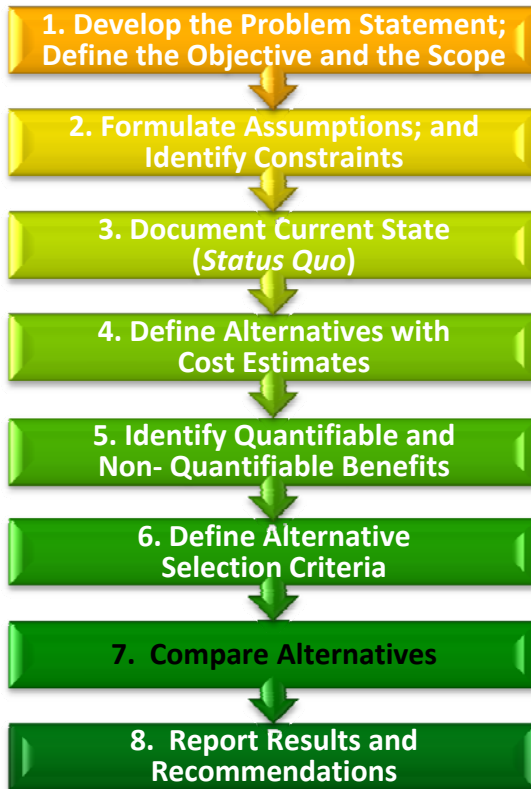


# Practice Step 6

- ❑ Look at Step 6 in your course material folder and answer the questions.
  
- ❑ Class Discussion

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





# STEP 7

Step 7 has four sub-steps:

- 7a. Compare Costs and Benefits
- 7b. Define Trade-offs and Billpayers
- 7c. Identify 2<sup>nd</sup>- and 3<sup>rd</sup>-Order Effects
- 7d. Perform Sensitivity Analysis



# Intent of Step 7

## *By Sub-steps*

- 7a. Compare alternatives along cost and benefit dimensions.
- 7b. What differentiates one alternative over others? Is it affordable? Are there reasonable divestments to fund the preferred alternative?
- 7c. Every decision has first- second- and third-order effects; anticipate them. The leader needs to know if this decision forces or limits future decisions.
- 7d. How robust are the conclusions? How would a small change in assumptions or weights change conclusions? Would they?



# Questions for Step 7

- ❑ Is the preferred alternative based on robust analysis?
- ❑ Is the alternative affordable? Have billpayers been offered? Is the alternative “gold plated”?
- ❑ Does this alternative constrain future decisions?
- ❑ Are the risks associated with the preferred alternative clearly stated?



# Step 7a: Compare Costs and Benefits

- ❑ The essence of the CBA process is in comparing the costs and benefits of at least two courses of action (to include the status quo, if one exists) 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.



# A Note About Net Present Value (NPV)



- ❑ Costs may be compared by performing a net present value (NPV) calculation, which takes into account the time value of money.
- ❑ NPV is affected by economic conditions and inflation rates. Through analysis, DASA(CE) has determined that in the current economic environment NPV calculations do not have a material impact on CBA results. In recognition of this fact, and in order to simplify the CBA process, NPV is not required and is not addressed in this training or in the case study.
- ❑ Using the NPV approach might be described as the *perfect* solution, but not using NPV is certainly *good enough*.
- ❑ Agencies may apply NPV if they wish. Tables to support NPV calculations are included in the course materials, printed on bright green card stock. Questions regarding NPV should be sent to CBAGuidebook@conus.army.mil. Self-study problems and solutions are provided at the CBA website (<https://www.us.army.mil/suite/files/21066882>).



# Aids in Completing Step 7a

- The following situations may result when comparing "raw costs and benefits" associated with two or more alternatives
  1. When the results yield equal costs and unequal benefits, the recommendation should be the alternative that provides the greatest benefits for a given level of cost
  2. When the results yield unequal costs and equal benefits, the recommendation would be simply the alternative that is the least costly
  3. When the results yield unequal costs and unequal benefits, there is no single criterion for ranking alternatives. In this situation all alternatives, including the status quo, may be ranked in decreasing order of their benefit/cost ratios
  4. When the results yield equal costs and equal benefits the recommendation for the preferred alternative may be based on other factors, such as a fortiori analysis subjective reasoning, and/or point systems

Costs	Benefits	Selection Criteria
Equal	Unequal	Alternative that provides greatest benefits for given cost
	Equal	Subjective reasoning and <i>a fortiori</i> analysis
Unequal	Unequal	Alternatives ranked in order of benefit/cost ratios, or largest to smallest net present value
	Equal	Least costly alternative



# Step 7b: Trade-offs / Billpayers

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

- ❑ Trade-offs / billpayers are the funding sources that have been identified which will cover (partially or entirely) the costs of an alternative.
  - ❑ In most cases, the individual or team developing the CBA won't have the authority to identify bill-payers or trade-offs. This requires collaboration with the organization's resource managers and others
- ❑ Second and third order effects are the results (consequences and/or impacts) stemming from a decision. They include the opportunity costs of pursuing one alternative over another. Second and third order effects identify what a decision maker can do or not do as a result of a decision.



# Step 7d: Sensitivity Analysis and Risk Assessment

- ❑ Sensitivity analysis explains what the effect is on the cost/benefit model should assumptions change, risks become issues and/or dependencies not be met.
- ❑ Risk assessment describes all risks that can impact the achievement of stated benefits or the cost of solving the business problem. Each risk has an associated mitigation strategy and an assessment of likelihood of occurrence.





# Sample Questions to Answer in Step 7d

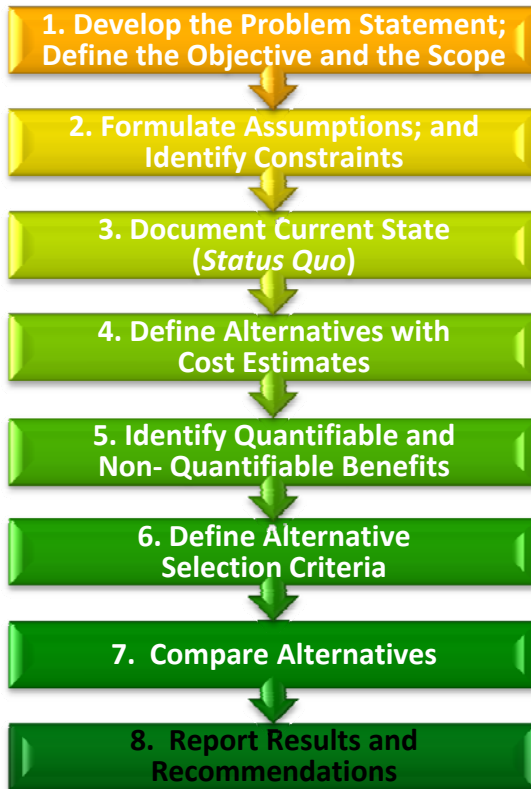
- ❑ What are the major areas of uncertainty and risk in the project? How have these been dealt with, i.e. specific analyses?
- ❑ Which assumptions need to be tested?
- ❑ What are the ranges of values which are appropriate for testing?
- ❑ Is there a need for sensitivity analysis based on optimistic and pessimistic estimates of costs and benefits?
- ❑ How are the results affected if different estimates and assumptions are used?
- ❑ What are the plausible upper and lower limits of cost / benefit items subject to uncertainty?
- ❑ How are the results affected if selection criteria are weighted differently?



# Practice

## Steps 7a through 7d

- ❑ Look at Step 7 in your course material folder and answer the questions.
  
- ❑ Class Discussion



# STEP 8



# Step 8: Results and Recommendations

- ❑ Results and recommendations summarize the findings of the analysis and make conclusive statements about the comparisons of alternatives.
- ❑ The conclusions should demonstrate the cost/benefit relationships between each alternative.
- ❑ 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.

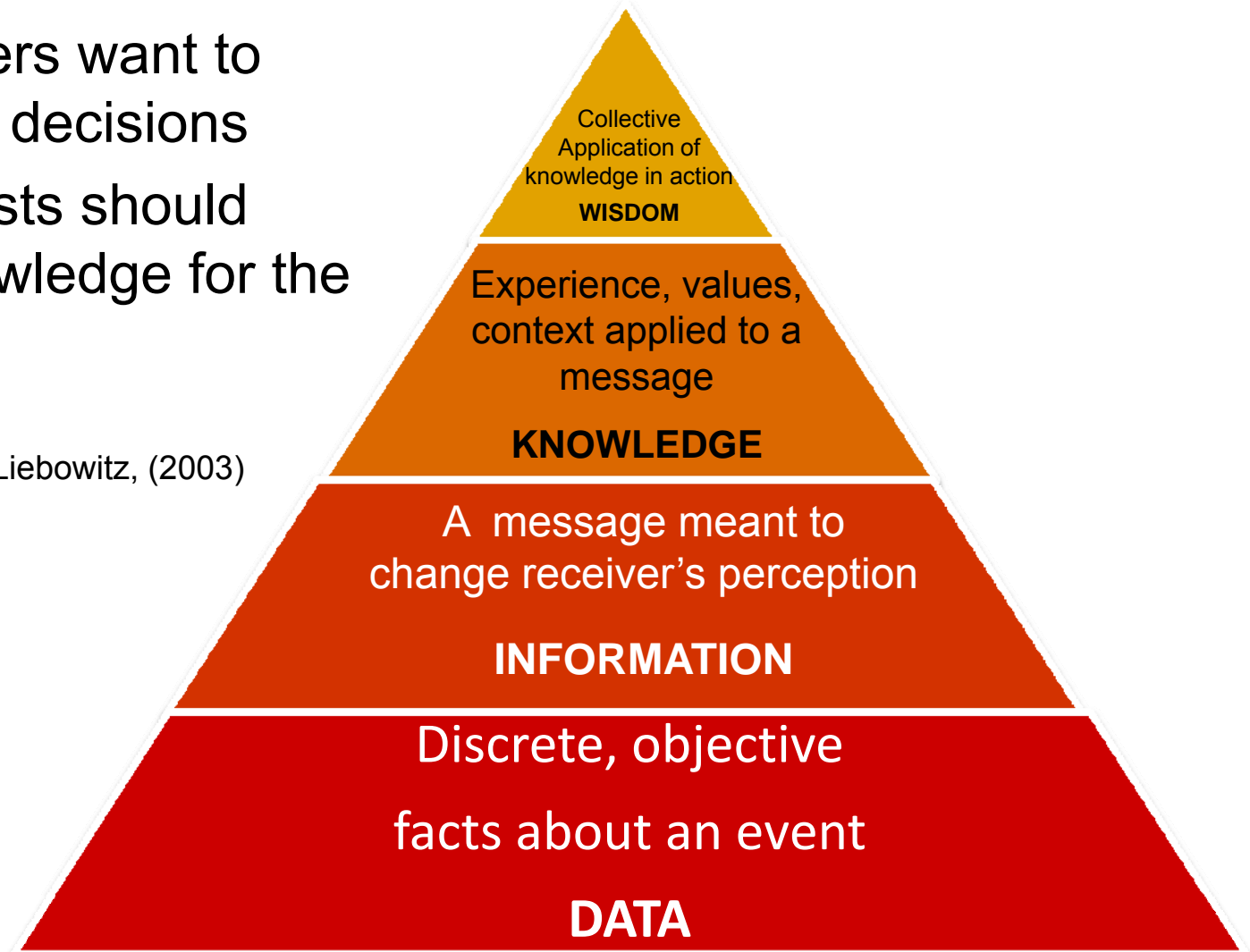


# Intent of Step 8

## *The Information Pyramid*

- ❑ Army leaders want to make wise decisions
- ❑ CBA analysts should impart knowledge for the leader

Source: Adapted from Liebowitz, (2003)





# Practice Step 8

- ❑ Look at Step 8 in your course material folder and answer the questions.
  
- ❑ Class Discussion



# Evaluate Step 8

## Completeness

- ❑ Has everything that is required been included?

## Accuracy

- ❑ Is the CBA technically correct (math, formulas, data sources, models, 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 products) support the recommended COA?

**Does the decision brief contain a value proposition?**



# RESOURCES



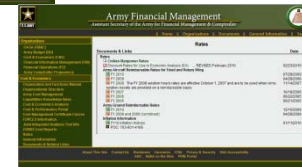
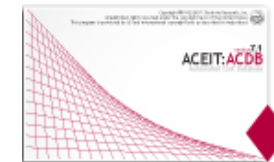
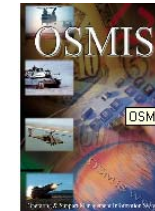
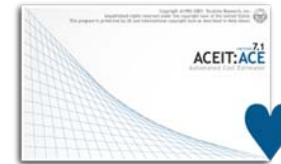


# DASA-CE Resources

*Graphics Contain Hyperlinks*

**ODASA**  
Cost &  
Economics

- AKO CBA Resources
- GFEBs General Fund Enterprise Business System
- Automated Cost Estimating Integrated Tools (ACEIT)
- Operating & Support Management Information System (OSMIS)
- FORCES (CONOPS) Cost Models
- Army Military-Civilian Cost System (AMCOS)
- Automated Cost Data Base (ACDB)
- Joint Integrated Analysis Tool (JIAT)
- Capabilities Knowledge Base (CKB)
- FM&C Website /Inflation Indices
- AKO Cost Management Community Of Practice
- AKO Cost Management Certificate Course





# Other Resources

- ❑ CBA Guide - Appendix A
  - ❑ References to OMB, GAO, DODI, and other DOD documents
  - ❑ References to Army Regulations and Pamphlets
- ❑ CBA Guide - Appendix D
  - ❑ References to other Army cost estimating models and tools

**The CBA Guide is a living document and is updated based on user's comments and suggestions for improvement.**



# Survey

**ODASA**  
**Cost &**  
**Economics**

Please take our short  
(five-minute) survey

**THANK YOU -- Your feedback improves our teaching.**