Cost Benefit Analysis (CBA) and the Commonwealth Technology Portfolio (CTP)

Pat Reynolds
Project Management Division
July 2017
Today we will cover…

• Cost-Benefit Analysis (CBA)
  – Costs
  – Benefits
  – Analysis
  – Return on Investment (ROI)
  – Total Cost of Ownership (TCO)
  – Payback period
  – Spreadsheet example
  – CTP procedures

• And…

So What?
Better, Faster, Cheaper, Smarter, Secure...

• *Guess what:* Information Technology can enable agencies to do all of the above.

• So, the Commonwealth INVESTS taxpayer money in information technology projects to serve its citizens better, faster, cheaper, etc.

• IT Projects (and Project Management) is the best method we know by which agencies develop and implement new capabilities.
Consequently, the Commonwealth currently has more than 1/4 of a BILLION dollar investment in IT Projects.

Wow! That’s a lot of money.

$257,766,853 as of July 2017

37 Commonwealth-level IT Projects
CBA: Required!

- Supports the financial justification for choosing a given alternative IT investment.
- It’s not the ONLY reason to choose a given alternative.
- We owe it to the Commonwealth citizens to make smart, justifiable IT investments.
CBA: Required!

COV ITRM Project Management Standard CPM 112-03.6:

- Cost Benefit Analysis required for Category 1, 2, 3 projects.

- Category 4 project:
  - “While a detailed Cost Benefit Analysis is not required for Category Four projects, the Business Case and Alternatives Analysis should, as a minimum, list the potential tangible and intangible benefits that are expected to accrue from completion of the project and the expected Return on Investment (ROI).”
### Cost Benefit Analysis:

#### VITA PMD Example Project

<table>
<thead>
<tr>
<th>Period of Analysis</th>
<th>Do Nothing</th>
<th>Alt 1: In house</th>
<th>Alt 2: Separate RFP</th>
<th>Alt 3: “Free” software</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$1,060,000</td>
<td>$800,000</td>
<td>$520,000</td>
</tr>
<tr>
<td>Project Cost</td>
<td>$7,200,000</td>
<td>$3,630,000</td>
<td>$5,100,000</td>
<td>$5,100,000</td>
</tr>
<tr>
<td>Total O&amp;M Cost</td>
<td>$7,200,000</td>
<td>$4,690,000</td>
<td>$5,500,000</td>
<td>$5,620,000</td>
</tr>
<tr>
<td>Cumulative benefits</td>
<td>$-</td>
<td>$4,570,000</td>
<td>$3,100,000</td>
<td>$3,100,000</td>
</tr>
<tr>
<td>Cumulative NET benefits</td>
<td>$-</td>
<td>$3,610,000</td>
<td>$2,300,000</td>
<td>$2,580,000</td>
</tr>
<tr>
<td>ROI (bene/cost)</td>
<td>0%</td>
<td>331%</td>
<td>298%</td>
<td>498%</td>
</tr>
<tr>
<td>Breakeven:</td>
<td>n/a</td>
<td>Year 2</td>
<td>Year 2</td>
<td>Year 1</td>
</tr>
</tbody>
</table>

#### Total Cost of Ownership (TCO)

![Graph showing total cost of ownership over years]

#### Net Benefits and Return on Investment (ROI)

![Graph showing net benefits and ROI over different alternatives]
CBA.xlsx

- CBA.xlsx replaces the CBA form in the Commonwealth Technology Portfolio (CTP)
- Complete the CBA.xlsx (Save As… your own version); upload to CTP when complete
- Analyze at least three scenarios:
  - “Do Nothing”
  - Alternative (Alt.) 1
  - Alternative (Alt.) 2
  - Alternative (Alt.) 3… is there if you need it.
- Period of analysis: Six years from project implementation
  - Use Fiscal Years (July 1 – June 30)
Cost-Benefit Analysis (CBA)

• Simple tool that will help you decide which solution makes the most sense from a financial point of view.

• CBA can help you:
  – Decide whether to make a change.
  – Identify costs associated with potential benefits.
  – Evaluate several options for financial impact.
  – Final selection should return the greatest overall benefit for incurred cost.
Ideally...

- Benefits will outweigh costs. But...

- Mandates may override purely financial analysis

- Maybe *no alternative* has net benefits; It may be a comparison of which alternative costs less.

- Still, CBA will help identify the best financial alternative.
CBA is “silent” on...

- Non-monetary measures.
  - Customer satisfaction
- Probabilities of success.
  - iPhone
- Political considerations.
  - Yes, political considerations.

Based upon these analyses, a solution is proposed in the next step of the process.
More caveats...

• Caveat: *a warning or proviso of specific stipulations, conditions, or limitations.*

• Just because a project is mandated does **not** mean there is only one solution.

• Change in procedure is sometimes more cost effective than developing an automation solution.

• Assumptions abound! (Please annotate them.)
Scenario

- “EPS” system is coming to the end of its useful life.
  - Keeping it running is becoming increasingly expensive.
  - The Feds are offering a grant to upgrade EPS.

- Alt. 1: Build a replacement solution in-house.

- Alt. 2: Purchase and implement a new vendor-supplied solution.

- Alt. 3: Modify an existing system to add EPS functionality. - - “free software”
Cost Benefit Analysis: 3 Steps

1. Determine Costs
2. Calculate Benefits
3. Compare alternatives

• BTW, Assumptions abound!
CBA Step #1: Determine Costs

• Project costs
  – 12 budget categories in CTP (and CBA.xlsx)
    • Project (implementation) costs
    • Remember, include people costs!
  – Use real estimates

• Operation & Maintenance (O&M) Costs:
  – (Additional) Staffing Costs
    • 3 staffing categories in CTP (and CBA.xlsx)
  – Other Operational Costs
    • 9 budget categories in CTP (and CBA.xlsx)
    • Use real estimates; NOT +/- compared to today
  – Six years from project implementation!
Estimating Costs: Project and O&M

• Early estimates of costs in the Select and Initiation phases will be Rough Order of Magnitude, (ROM) with a range of +/- 50% (or more)

• Later in the Planning phase the range should be lower to +/- 10%

• Ballpark
Estimating Costs: Input ideas

- Scope statement
- WBS
- Schedule
- Risks register
- Market conditions
- Your organization’s cost estimating policies
- Cost estimating templates
- Historical information
- Lessons learned
- Your own experiences and judgments
Estimating Costs: Tools, Techniques

- Expert judgement
- Analogous estimating
  - Uses actual costs of previous projects along with expert judgement
- Parametric
  - Uses formulas to determine costs
- Bottom up
  - Estimating individual components of work then adding up
- Three point estimating
  - Most likely, Optimistic, Pessimistic
- Some project management software tools have templates for determining project costs
Determine Costs: ‘Do Nothing’ Alt.

Do Nothing: What does it cost to maintain the current / legacy system?

1. Establishes a baseline cost.
2. The current “system” could be a manual process, an existing IT solution, or a combination of the two.
3. Make assumptions about how costs may change during the period of analysis
   • Maintenance, upgrades
   • Additional staff
4. BTW, ‘Do Nothing’ might be the most economically feasible, but other factors may drive the decision.
Total Cost of Ownership: TCO

- Total Cost of Ownership (TCO) is the price of implementing a project plus the costs of operation & maintenance over a given time period.
- When choosing among alternatives, decision-makers should look not just at an investment's short-term cost, but also at its long-term cost, which is the total cost of ownership.

- Implementation Cost + O&M (for a given time period) = TCO
CBA Step #2: Calculate Benefits

- Value of labor saved
- Quality improvements
- Revenue increase
- Production (efficiency) increase
  - More efficient business processes
- Staffing reduction
  - More efficient staff
- Better information: customer, production, etc.
  - Better data management
  - More secure data - ?
Benefits overview

• Tangible:
  – Cost Savings
  – Cost Avoidance
  – Increased Revenue
  – What about Federal Grants?

• Intangible:
  – Improved quality of life
  – Increase in public safety or accessibility
  – Increased capacity / risk reduction
  – Better data management
  – More secure data - ?

“Don’t go overboard trying to “dollarize” intangible benefits…”
Tangible Benefits

• Cost Savings
  – Increased efficiency / throughput
  – Higher quality = increased effectiveness
  – CBA.xlsx: “Benefit 1. (Note 1.)” = calculated field. O&M savings compared to "Do Nothing" alternative ("Do Nothing" row 38 - row 38)

• Cost Avoidance
  – Avoid hiring staff
  – Avoid technical costs
  – Avoid penalty costs
  – CBA.xlsx: “Benefit 2. (Note 2.)” = Cost Avoidance: If we select this alternative, we will NOT have to purchase ______ in the "Do Nothing" scenario.
Tangible Benefits, cont’d.

• Increased Revenue
  – This only applies to a few agencies…
  – CBA.xlsx: “Benefit 3. (Note 3.)” = Increased Revenues: If we select this alternative, our organization will collect additional revenues.

• What about Federal Grants?
  – Consider this a benefit
  – Explain in the Benefit Notes
Qualify & Quantify Benefits

- Who are the beneficiaries (stakeholders)?
  - They should be identified in the charter

- **Interview** the stakeholders and identify the benefit to the stakeholder and how it is derived.
  - (Enter all notes, formulas and calculations in the BCAA)

- Identify all Business Objectives and Tangible Benefits in Measures of Success
  - What does success look like (Qualify)
  - How will it be measured (Quantify)

*Remember: Better, Faster, Cheaper, Smarter, More Secure, etc.*
Brainstorming Project Benefits

• If you know the product, Does another state use it? If so, research to see if they have done a CBA for that product.

• If you know the product, look at the vendor marketing material; it can give you ideas on how it can benefit your organization.

• Look at other projects in CTP for ideas; talk to PMD Consultant for ideas.

• Interview stakeholders, users, customers…
CBA Step #3: Compare Alternatives

CBA.xlsx automatically calculates (cumulative and total):

- Project costs
- Operations & Maintenance costs
- TCO
- Benefits:
  - Cost Savings
  - Cost Avoidance
  - Increased Revenues
- ROI
- Pretty graphs
- YOU have to calculate Breakeven point – but it is easy.
Return on Investment (ROI)

- The difference between the cost of a project and the net financial benefits that the completed project provides.
- (PM Standard = over a six year period)
- ROI = (Project Benefits – Project Cost) / Project Cost
- ROI often expressed as a percentage:
  
  \[ \frac{(Benefits - Cost)}{Cost} \times 100\% = \%ROI \]
- CBA.xlsx calculates ROI automatically.
Breakeven Point

- Breakeven Point: The year when the ROI changes from negative to positive.
- Represents when the IT investment “pays for itself”
- Sooner = better
- On CBA.xlsx, examine the ROI over the six years of analysis; observe when the ROI becomes positive
- ROI might not become positive in six years
Business Case and Alternatives Analysis (BCAA)

• BCAA provides an opportunity to elaborate on information in the CBA.
  – Explain summarized cost and benefit amounts.
  – Highlight intangible benefits and qualify mandates.
  – Document efforts to identify solutions in other organization or collaboration with other organization on a common solution.

• Allows the project team to further justify the proposed solution with details not evident in the CBA.
BCAA – Business Problem

**Business Problem** – a Question, Issue, or Situation which needs to be answered or resolved.

- Often to get the correct perspective you might phrase the statement beginning, “The problem exists that…”
- Do not enter the description of the solution here. That will come later.
**Project Scope** – defines all of the products, services or results provided by a project and identifies the limits of the project. In this block enter:

<table>
<thead>
<tr>
<th>Project Scope Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Project Scope defines all of the products and services provided by a project, and identifies the limits of the project. The Project Scope establishes the boundaries of a project and addresses the who, what, where, when, and why of a project.</td>
</tr>
</tbody>
</table>

- High Level Project Requirements
- Project Boundaries – What is IN and OUT of scope
- Project Strategy – Development methodology
- Project Deliverables
- Acceptance Criteria
- Project Assumptions - circumstances and events that need to occur for the project to be successful, but are outside the total control of the project team.
- Cost Estimates
Recommended Solution & Justification

- Intangible Weighting Justification of Solution
- Specify the Recommended Solution selected as a result of the analysis
- Explain why the Recommended Solution was chosen over the other solutions considered
### Comparison of Solutions

Based on the analysis performed, rate how each solution measured up against each decision criterion. A recommended rating is **Good**. Compare the rating results to determine which solution to recommend. Enter in the Solution Identifier in Boxes that are not filled.

#### Project Analysis - Solution Comparison

<table>
<thead>
<tr>
<th>Decision Criteria</th>
<th>Solution 1</th>
<th>Solution 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process Impact</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Technical Feasibility</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Maturity of Solution</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Resources Required</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Constraints Impact</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Cost Benefit Analysis</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Return on Investment</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Other</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CTP Project Charter: Changes

“Resources & CBA” Tab:
- Project Resources table: Copy & paste Budget figures directly from CBA.xlsx
- O&M Resources table: Copy & paste O&M figures directly from CBA.xlsx
- CBA Summary:
  - Delete the CBA table and…
  - Add two text boxes:
    - Cost Benefit Analysis Summary: Copy & paste from the “Cost Benefit Analysis Summary” text block for the chosen solution in the BCAA form.
    - Return on Investment (ROI) Summary: Summarize the results of the ROI Analysis for the chosen solution. Copy & paste from the “Return on Investment (ROI) Summary” text block for the chosen solution in the BCAA form.
Summary: A Cost Benefit Analysis provides:

• An opportunity to:
  – identify the costs of a solution.
  – identify the benefits of a solution.
  – compare solutions from a financial perspective.

• Helps you identify a solution that makes the most sense for your particular situation.