This abbreviated instruction is based upon our training and years of experience applying The Choosing By Advantages Sound Decisionmaking System (CBA) originated by Jim Suhr. The Choosing By Advantages Decisionmaking System is in the public domain. Permission to use CBA daily is not required. People of all ages are encouraged to use Choosing By Advantages. Only associated presentation materials can be copyrighted. Permission to share this presentation with employees and business associates of The Boldt Company is granted if it remains in this original form.

Lessons
1  Process
2  Methods
3  Preview
Workshop
The CBA Sound Decisionmaking System
Module 1 for Teams: Mutually-Exclusive Alternatives

This presentation is focused on the use of CBA by design and construction teams. But the methods are usually applicable to any decision in life.

Like many skills, mastery of The Choosing By Advantages Sound Decisionmaking System requires training, significant practice and mentoring.

Mr. Suhr has mentored Mr. Koga in CBA for years. John has in turn mentored hundreds of others in correctly using CBA.

Develop your understanding and usage of CBA through our training modules. Visit Suhr’s website for more information, training and books:
www.DecisionInnovations.com

Suhr’s professional level book is available on Amazon. You can order Suhr’s 3-volume set through Quality Quick Print
801-528-3747
Endorsement

“I believe CBA is the most powerful and effective approach for making decisions available. I am most impressed with the way it uses both objective and subjective data. Once you can understand and apply CBA, I challenge you to find a decision making process that offers a more important advantage. We use the approach informally for all manner of daily choices and more formally when the stakes are large.”

Gregory A. Howell, MSCE Stanford
President, Lean Construction Institute
Feb 8, 2011
What you should focus on today:

- **Differences between attributes**
  - Learn to identify attribute statements.
  - Learn to soundly leverage them in decisionmaking.

- **Importance of differences**
  - Learn sound methods for comparing importance.
  - Learn when to weigh importance.

**Decide to be proficient in Choosing By Advantages**
- Learn the Definitions, Principles, Models, Methods
- Practice CBA with our mentoring to develop skill.
- Advance by studying Suhr’s books.

*Handout: Our Decisionmaking Roots*
Lesson 1

Process Matters

Presenting CBA as a unified sound decisionmaking system . . .

. . . in fact, the only one known!
Do Decision Methods Matter?

Yes!
The Pivotal Cornerstone Principle of CBA

Decisionmakers must learn and skillfully use sound methods.

Would you prefer to use an unsound method to establish your decision?

Nothing, not even correct use of a sound CBA method, can guarantee a decision is sound.

CBA can use and enhance, but not replace, sound professional counsel or protocol.

Incorrect use of CBA is not a sound CBA method.

Proficiency in CBA requires complete training, proper mentoring and regular practice.

This seminar is intended to train teams to have CBA at the center of their culture.

It re-states information from Suhr’s 3-day CBA training and books by permission.
A sound decision method will...

- Use correct data
- Use data correctly
- Anchor decisions to the relevant facts
  - Such as connecting to applicable criteria and appropriate viewpoints.
- Avoid critical mistakes
  - Such as double-counting, distortions, omissions, and weighing of factors.

CBA does!
A sound decision method will...

- Encourage vital thinking skills:
  - **Specifying** versus generalizing
  - **Low Order Abstractions** vs. High Order
  - **Relevant Facts** vs. Low Order Assumptions
  - **Anchored Questions and Judgments** vs. Unanchored

CBA does!

**High Order Abstraction: Openings**

**Low Order Abstraction:** Model 27, cherry stained ext stile and rail door with 3-40 S1 lites…
Replace unsound decision methods

Unlearn unsound methods such as:
- Weighing advantages and disadvantages
- Weighing non-specific labels such as those in pros and cons
- Weighing factors, criteria, goals, roles, categories, attributes, objectives

Learn
- Definitions that enable stating and explaining sound principles.
- Sound models that demonstrate those principles.
- Sound methods that apply the models to real life decisions.
Example of an unsound method

- Alternatives K and R each total 10.
  - Are they equivalent solutions?
- Do the numbers represent attributes, degrees of compliance, percentages, advantages, disadvantages or something else?
  - Can you be certain the meanings are consistent?
  - Does that information affect the outcome?
- Does the difference in each factor have significance?
  - Is the amount of difference important?
  - Does this method correctly recognize the difference?
  - Is this similar to methods like voting with dots?
- Is the information soundly connected to the facts?

<table>
<thead>
<tr>
<th></th>
<th>Alt K</th>
<th>Alt R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor A</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Factor B</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

This is an unsound method as shown. Some methods include multiplication in the technique compounding the error.
Some scaling methods not used as intended

- **Louis Leon Thurstone**
  - 1927 Theory and method of paired comparisons
  - 1928 “Law” of comparative judgment
    - A model measuring the perception of objects.
    - Later used in the Analytic Hierarchy Process.
  - 1928 Thurstone Scale
    - Originally measuring favorable/unfavorable attitudes toward religion to find the mean
    - Requires large set of candidate statements to prepare scale
    - Indeterminate at one-zero proportions (so often omitted).
    - Used in psychology and sociology; advanced by others.

- **Rensis Likert** (pron. lick-urt)
  - 1932 Likert Scale
    - Simple sum responses to a set of related symmetrical agree-disagree questions.
    - Uses relative position but not magnitude of difference. Assumes distances are equal.
    - Not the same as unsound Likert-type rating scales (1-10). *(e.g. Everyone, Grade your last vacation on 1-10).*
  - Critics say more than one rating scale is required to measure an attitude and Researcher cannot evaluate reliability of answers; cannot avoid sampling errors; cannot enable accuracy.

Trying to solve: 1. **What to compare** and 2. **How to compare**?
CBA corrects the development of decisionmaking

**FORMER UNSOUND PATH**
- **Unsound Ancient Methods**
  - Find favor with gods
  - 1619 Winning depends on natural laws (Gataker)
  - 1654 Winning depends on probability (Pascal and Fermat)
- **Unsound Modern Methods**
  - 1776 Exchange vs Use value (Adam Smith) comparing high order abstractions (diamonds or water)
  - 1927 Preference Comparisons (fresh apple, rotten apple)

**SOUND CBA PATH**
- 1887 Decisions based on increases (Wellington’s rule) not factors, criteria, or attributes nor Benefit/Cost Ratios
- 1933 Difference between high and low-order abstractions (Korzybski)
- 1938-1970 Only prospective differences are relevant (Grant)
- 1958 Vocabulary matters (Suhr)
- 1981 Importance of Advantages matters (Suhr)
Brief History of CBA

- CBA was built upon centuries of decisionmaking practices.
- In 1959, as an engineer in the California Department of Water Resources, Jim Suhr began experiments in decisionmaking.
- In 1965, while Suhr was as an engineer in the U.S. Forest Service, the leadership team supported a 4-year pilot test.
- A second pilot test began in 1969, but questions remained. Suhr obtained help while a post-graduate student at the University of Michigan.
- With Ross Carder’s encouragement, CBA development continued. Graduate student Mac McKee at Utah State University assisted.
- In 1981, Suhr recognized the Fundamental Rule, a breakthrough improvement upon conventional theory at that time. Through lengthy discussions with economists, he also realized decisions must not be based on the importance of dollars. In subsequent years, the system was developed.
- 1986, chose Choosing By Advantages name.
- Suhr’s services are often sought.
- Jim Suhr retired from the U.S. Forest Service in 1990 to write the book.
- CBA’s growth in government and private sectors has depended upon its champions. Notable efforts include reports to the U.S. Senate, numerous federal projects, and resolution of public issues for construction of the 2002 Winter Olympics. It has also been acknowledged in a UN document.
- Boldt applying CBA since 2002. e.g. 2007-2011 design of the Cathedral Hill Hospital, San Francisco, CA. Introduced it to the Lean Construction Institute. Since applied to many projects in USA and Canada.
Choosing By Advantages (CBA) is . . .

• A Decisionmaking **System** unified by
  – Definitions
  – Principles
  – Models
  – Methods
• A Decisionmaking **Process** that produces improvement in decisionmaking.
• A set of **skills** vital in a complex society.
• Replaces fragmented, unconnected, ambiguous processes and those that use incorrect data or use data incorrectly.
• The CBA system has been tested as valid and sound.

*This CBA is not Cost Benefit Analysis, the California Bar Association, or the Commonwealth Bank of Australia!*
Definitions used in CBA

- **Factor**: A container for criteria, attributes, advantages and other types of data. An element of a decision.

- **Criterion** (pl Criteria): A requirement (must or want). A standard on which a judgment is based.

- **Attribute**: A characteristic, quality or consequence of one alternative.

- **Advantage**: A beneficial difference between two alternatives.
Advantage: a beneficial difference

Alternative: Arm A
Factor: Strength
Attribute: 1 strength unit

Alternative: Arm B
Factor: Strength
Attribute: 3 strength units

Difference in strength: 2 units
Criterion: More strength is better
Advantage: 2 more strength units
Decisions must be based on the importance of advantages.

Discovered by Jim Suhr in 1981

Fact: The advantage exists.

Question: Do we care about it? Is it important to us? If yes, how much do we care? How much do we care relative to all the other advantages?
Lesson 2
CBA Methods for Mutually-exclusive Alternatives

This lesson demonstrates:
• Very simple sound methods for very simple decisions
• Methods for making certain complex decisions simpler and sound
• The sound way to consider money in most decision scenarios
• How to consistently make sound decisions in this context
Given a choice between two mutually exclusive alternatives of equal cost such as these ice cream containers:

Observe, recognize the situation and respond with a decision.

If the basis of your decision was soundly considered information from previous experience, you have used one of the very simple Choosing By Advantages methods for very simple decisions.

It is called **Recognition-Response**.
Instant CBA

Given a choice between two mutually exclusive alternatives of equal cost such as these ice cream containers:

Mentally form clear, accurate, sensory-rich perceptions of the ADVANTAGES of the alternatives, and at the same time, choose the alternative having the more important set of advantages.

If performed in a sound manner, this is a simple method for simple decisions. It is called Instant CBA.
Simplified Two List Method

For simple decisions involving only two alternatives of equal cost that could be clarified by writing:

1. **Mentally perceive the attributes of each alternative, one factor at a time, simultaneously deciding the least-preferred attribute.**

2. **Write each advantage (difference from each least-preferred attribute) in a list beneath each alternative.**

3. **Without deciding the importance of each advantage individually, choose the alternative having the more important set of advantages.**

<table>
<thead>
<tr>
<th>Advantages of edible cone</th>
<th>Advantages of plastic dish</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More flavor complexity</td>
<td>• Less potential leakage and mess for me</td>
</tr>
<tr>
<td>• More food to eat</td>
<td></td>
</tr>
<tr>
<td>• More degradable</td>
<td></td>
</tr>
</tbody>
</table>

Choosing either set is possible!
Simplified Two List Method: Try it!

1. Draw the CBA Two List format.
Simplified Two List Method: Try it!

1. Draw the CBA Two List format. Note the use of dashed lines at these two locations.
Simplified Two List Method: Try it!

1. Draw the CBA Two List format.
2. State the alternatives, usually putting “without” on the left.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk without chocolate flavoring</td>
<td>Milk with chocolate flavoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Simplified Two List Method: Try it!**

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the **advantage** (beneficial difference).

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Attribute** - a characteristic of one alternative.

**Advantage** - a difference between two attributes.
Simplified Two List Method: Try it!

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• More chocolaty flavor</td>
</tr>
</tbody>
</table>
Simplified Two List Method: Try it!

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).
4. Choose the alternative having the more important set of advantages.

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>•More chocolaty flavor</td>
<td></td>
</tr>
</tbody>
</table>
Simplified Two List Method: Mistakes

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>•Less chocolaty flavor</td>
<td>•More chocolaty flavor</td>
</tr>
</tbody>
</table>

You might be tempted to also write this phrase. Should you? Let’s find out.
Simplified Two List Method: Mistakes

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Less chocolaty flavor</td>
<td>• More chocolaty flavor</td>
</tr>
</tbody>
</table>

This is double counting because it is stating the same difference in flavor from two viewpoints (differing criteria). That is a critical mistake. Use the relevant facts. Since this decisionmaker likes chocolate, keep the beneficial difference statement that uses that information. Don’t write “less chocolaty flavor” if you already know it is double counting.
Simplified Two List Method: Mistakes

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More chocolaty flavor</td>
<td>• More chocolaty flavor</td>
</tr>
<tr>
<td>• Less milky flavor</td>
<td>• Less milky flavor</td>
</tr>
</tbody>
</table>

This may be double counting if expressing the same difference.

The decisionmaker must decide which statement is more representative of the difference.
Simplified Two List Method: Viewpoint of person wanting to avoid milk flavor

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>•Less milky flavor</td>
</tr>
</tbody>
</table>

This decisionmaker recognizes “less milky flavor” as an advantage but does not recognize “More chocolaty flavor” as an advantage. Also, advantages are not always stated as “increases”.
Simplified Two List Method: Viewpoint recognizing two distinct differences

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More chocolaty flavor</td>
<td>• More chocolaty flavor</td>
</tr>
<tr>
<td>• Less milky flavor</td>
<td>• Less milky flavor</td>
</tr>
</tbody>
</table>

This decisionmaker recognizes these as two distinct advantages.
Simplified Two List Method: Viewpoint of a person not liking chocolate

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Less chocolaty flavor</td>
<td></td>
</tr>
<tr>
<td>• More milky flavor</td>
<td></td>
</tr>
</tbody>
</table>

Another decisionmaker might have decided less chocolaty AND more milky flavor are preferred. It’s important to represent the preferences of the correct decisionmaker, but be careful about double-counting.
Simplified Two List Method

1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the advantage (beneficial difference).
4. Choose the alternative having the more important set of advantages.

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More chocolaty flavor</td>
<td></td>
</tr>
</tbody>
</table>

This is all that had to be written if there is just one advantage. Don’t get in the habit of searching for several ways to express the same difference. That is double-counting.
Simplified Two List Method: Many Advantages

The decisionmaker may consider more advantages.

Now which alternative has the more important set of advantages now? Either alternative is a possible solution.

The quantity of advantages doesn’t matter.

*Numbers and mathematical systems do not decide. People decide.*

*This method can improve understanding when negotiating.*

<table>
<thead>
<tr>
<th>Milk without chocolate flavoring</th>
<th>Milk with chocolate flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fewer calories</td>
<td>• More chocolaty flavor</td>
</tr>
<tr>
<td></td>
<td>• Less milky flavor</td>
</tr>
<tr>
<td></td>
<td>• More intense color</td>
</tr>
</tbody>
</table>

The importance of one advantage can be greater than the importance of a set of advantages. Do you agree?
Simplified Two List Method: Try one more!

1. Draw the CBA Two List format.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Simplified Two List Method: Try one more!

1. Draw the CBA Two List format. Note the dashed lines.
Simplified Two List Method: Extension Cord

1. Draw the CBA Two List format.

2. State the alternatives, usually putting “without” on the left.

The tape refers to the OSHA required Assured Grounding Program. Boldt’s program color codes by season:
   - White for Jan-March,
   - Green for April-June,
   - Red for July-Sept,
   - Orange for Oct-Dec.

<table>
<thead>
<tr>
<th>Extension Cord without inspector’s tape.</th>
<th>Extension Cord with white inspector’s tape.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Simplified Two List Method: Extension Cord

1. Draw the CBA Two List format.

2. State the alternatives.

3. Using relevant facts, perceive the advantages.

4. Choose the alternative having the most important set of advantages.

This could have been decided by mentally using Recognition-Response CBA or Instant CBA. Either would be a way to simplify this decision by taking fewer steps.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• More compliant cord</td>
</tr>
</tbody>
</table>

It’s January.
Slightly more complex decisions

- Some decisions require more analysis
  - Try Two List Method
Two List Method

For simple decisions involving only two alternatives of equal cost:

1. Mentally perceive the attributes of each alternative, one factor at a time, simultaneously deciding the least-preferred attribute.
2. Write each and all advantages.
3. Decide the IMPORTANCE of each advantage by first selecting the paramount advantage to establish a scale of importance. Weigh all advantages on the same scale. (see next slide)
4. Choose the alternative having the greatest Total Importance (sum) of advantages.

<table>
<thead>
<tr>
<th>Advantages of edible cone</th>
<th>Advantages of plastic dish</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More flavor complexity</td>
<td>• Less potential leakage and mess for me</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>• More food to eat</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>• More degradable</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>
3. Decide the IMPORTANCE of each advantage by first selecting the paramount advantage to establish a scale of importance. Weigh all advantages on the same scale. Always include zero.

It is possible for more than one advantage to have the same weight of importance (same number on scale).

When using a spreadsheet and Excel formula such as VLOOKUP, I prefer differentiation in weight. I set the scale large enough to allow finer increments.

Note: The scale is not a grading scale.

This is called a Preference Chart. It is more often used in non-numerical, quality-valued factors.
Two List Method

For simple decisions involving only two alternatives of equal cost:

1. Mentally perceive the attributes of each alternative, one factor at a time, simultaneously deciding the least-preferred attribute.
2. Write each and all advantages.
3. Decide the IMPORTANCE of each advantage by first selecting the paramount advantage to establish a scale of importance. Weigh all advantages on the same scale.
4. Choose the alternative having the greatest Total Importance (sum) of advantages.

Advantages of edible cone
- More flavor complexity
- More food to eat
- More degradable

Advantages of plastic dish
- Less potential leakage and mess for me

<table>
<thead>
<tr>
<th>Advantages of edible cone</th>
<th>Advantages of plastic dish</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More flavor complexity</td>
<td>• Less potential leakage and mess for me</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>• More food to eat</td>
<td>1</td>
</tr>
<tr>
<td>• More degradable</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

Different circumstances cause different totals.
Can sound decisionmaking be simplified?

It has been!

- Simplify all decisions by learning and skillfully applying CBA.
- Simplify simple decisions by taking fewer steps. CBA helps you.
- Simplify complex decisions by taking smaller steps. CBA helps you.
- Practicing the CBA methods will increase your familiarity with them, helping you see how simple they really are!
The CBA Process for complex decisions (abbreviated)

• Phase I  **Stage Setting Phase**
  – Define purpose, circumstances, root cause, appropriate viewpoints, relevant facts, factors, must and want criteria

• Phase II  **Innovation Phase**
  – Formulate range of alternatives, determine attributes

• Phase III  **Decisionmaking Phase** (Thoughtfully Choosing)
  – Summarize attributes, decide advantages, importance and total importance

• Phase IV  **Reconsideration Phase** (Emotionally Choosing)
  – Review the decision basis; Form clear accurate sensory-rich, motivational perceptions; make a reliable commitment to implement.

• Phase V  **Implementation Phase** (Physically Choosing)
  – Implement, check, adjust, evaluate process, learn and share.
Complex Decisions involving only Mutually Exclusive Alternatives

- Multiple alternatives in Phase III Decisionmaking?
- Too much information to juggle mentally?
- Need to document a large amount of data?
- Facilitating a complex group decision?

Use the Tabular Method.
Another definition used in CBA

- **Factor**: A container for criteria, attributes, advantages and other types of data. An element of a decision.
- **Criterion** (pl Criteria): A requirement (must or want). A standard on which a judgment is based.
- **Attribute**: A characteristic, quality or consequence of one alternative.
- **Advantage**: A beneficial difference between two alternatives.
- **Alternative**: Two or more mutually-exclusive persons, things or plans.

*Keep it simple and clear. Develop a culture that uses CBA vocabulary.*

*Just say Alternative - not alternates, options, choices, motifs, etc.*

*Sometimes use “Option” for a variation in the attribute of an alternative.*
Tabular Method *(abbreviated)* for two or more alternatives, equal cost.

1. Perform Phase I and II to identify factors, criteria, and alternatives.
2. Summarize the **Attributes**. Considering the criterion, **underline the least preferred attribute** in each factor. Compare other attributes in the factor to the least preferred attribute to decide the **Advantage**.
3. Decide the **Importance**.
   a. **Circle** most important advantage.
   b. **Select** the paramount advantage.
   c. **Weigh** all advantages on the same scale of importance, starting with the most important ones.
   d. **Decide** importance of remaining.
4. Choose the preferred alternative.
   a. **Sum** **Total Importance** *(TI)*.
   b. **Use Money data correctly**.
      i. If equal cost: choose greatest TI.
      ii. If unequal cost: chart increments.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Alternative 1: edible cone</th>
<th>Alternative 2: plastic dish</th>
<th>Total Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mess</strong></td>
<td>Container broken down</td>
<td>Container intact</td>
<td></td>
</tr>
<tr>
<td><strong>Waste</strong></td>
<td>Container eaten</td>
<td>Discard non-degradable container</td>
<td></td>
</tr>
<tr>
<td><strong>Hunger</strong></td>
<td>Ice cream &amp; cone</td>
<td>Ice cream</td>
<td></td>
</tr>
<tr>
<td><strong>Flavor</strong></td>
<td>•More flavor complexity</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Importance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You can highlight the cell instead of circling the most important advantage in each factor.
Tabular Method: Let’s try it!

Draw the CBA Tabular Format. There is more to draw. Spreadsheets work well. Boldt has a standard Excel template.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
</tr>
</tbody>
</table>
Tabular Method  (applies to 2 or more alternatives)

Draw the CBA Tabular Format.

<table>
<thead>
<tr>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Tabular Method (applies to 2 or more alternatives)

Draw the CBA Tabular Format. Note the dashed lines.
**Tabular Method**

1. List the factors.
2. State must and want criteria.
3. List the alternatives.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Unflavored 1% Milk</th>
<th>Milk with chocolate flavoring</th>
<th>Milk with strawberry flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavor (Want chocolate)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calories (Want low calories)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual Appeal (Want it intense)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tabular Method

1. List the factors.
2. State must and want criteria.
3. List the alternatives.
4. List the attributes.

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</tr>
<tr>
<td>Calorie</td>
<td>130</td>
<td>230</td>
<td>190</td>
</tr>
<tr>
<td>Visual Appeal</td>
<td>White</td>
<td>Dark brown color</td>
<td>Pale pink color</td>
</tr>
</tbody>
</table>
Tabular Method

1. List the alternatives.
2. List the factors.
3. State must and want criteria.
4. List the attributes.
5. Underline the least preferred attribute in each factor.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Unflavored 1% Milk</th>
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Tabular Method

1. List the alternatives.
2. List the factors.
3. State must and want criteria.
4. List the attributes.
5. Underline the least preferred attribute in each factor.
6. Anchoring always to the least preferred attribute, write the beneficial difference (advantage).

<table>
<thead>
<tr>
<th>Factors</th>
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<th>Milk with strawberry flavoring</th>
</tr>
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</tr>
<tr>
<td></td>
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<td>Much more intense color</td>
<td></td>
</tr>
</tbody>
</table>
Tabular Method

7. Highlight or circle the most important advantage within each factor row.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Unflavored 1% Milk</th>
<th>Milk with chocolate flavoring</th>
<th>Milk with strawberry flavoring</th>
</tr>
</thead>
<tbody>
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<tr>
<td></td>
<td>More intense color</td>
<td>Much more intense color</td>
<td></td>
</tr>
</tbody>
</table>
7. Highlight or circle the most important advantage within each factor row.

8. Decide the paramount advantage from those highlighted. (When highlighting cells, we use the circle to designate the paramount advantage.)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Unflavored 1% Milk</th>
<th>Milk with chocolate flavoring</th>
<th>Milk with strawberry flavoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flavor</strong> (Want chocolate)</td>
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</tr>
<tr>
<td></td>
<td>More intense color</td>
<td>Much more intense color</td>
<td></td>
</tr>
</tbody>
</table>
Tabular Method – Scale of Importance

• To establish a scale of importance, assign the paramount advantage an importance score of 10, 100 or other convenient number.

• Weigh the importance of each highlighted most important advantage as compared to the paramount advantage.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>More chocolaty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Much more intense color</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>100 fewer calories</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>1</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tips:
• Arrange the advantages in correct sequence (order) first, then space them out to represent relative difference in importance.
• Do not consider the importance of factors, criteria, or anything other than the advantages as stated.
Tabular Method – Scale of Importance

- To establish a scale of importance, assign the paramount advantage an importance score of 10, 100 or other convenient number.
- Weigh the importance of each highlighted most important advantage as compared to the paramount advantage.
- Decide the importance of each remaining advantage.

<p>| | |</p>
<table>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
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</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>More intense color</td>
</tr>
<tr>
<td>2</td>
<td>40 fewer calories</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Tips:
• Arrange the advantages in correct sequence (order) first, then space them out to represent relative difference in importance.
• Do not consider the importance of factors, criteria, or anything other than the advantages as stated.
9. Enter the number representing the relative weight of importance.
10. Sum the Total Importance (TI).
11. Choose greatest TI

<table>
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<td>40 fewer calories</td>
<td>2</td>
</tr>
<tr>
<td>Visual Appeal (Want it intense)</td>
<td>White</td>
<td>Dark brown color</td>
<td>Pale pink color</td>
</tr>
<tr>
<td>More intense color</td>
<td>3</td>
<td>Much more intense color</td>
<td>6</td>
</tr>
<tr>
<td>Total Importance</td>
<td>8</td>
<td>16</td>
<td>2</td>
</tr>
</tbody>
</table>

Negligible difference in cost was assumed.
If “100 fewer calories” had been selected as having paramount importance, the result at right could occur:

The decisionmaker should participate in establishing factors, criteria, and importance of advantages.

The alternative having the greatest total importance may or may not contain the paramount advantage.

Use the Reconsideration Phase to determine whether the weighing is accurate.

<table>
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<td>Much more intense color</td>
<td>7</td>
</tr>
<tr>
<td>Total Importance</td>
<td>13</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

Total Importance: 68
Preference Curve

• Displays relationships between attributes, advantages and importance of advantages in numerical factors only.
• Weigh only the importance of the advantages. But recognize that the magnitude of the attribute gives it context. Both must be known.
• All advantages must be weighed on the same scale of importance, so relate the scale of the preference chart and preference curve.
• A near-zero advantage will usually have near-zero importance.
• Decide with care and precision.
Preference Curve

- Subjectively deciding the importance of advantages establishes shape.
- Preference curve shapes vary from one factor to another and can even be S-shaped or broken. One typical shape represents the law of diminishing returns (Increased quantity does not improve return).
  - Develop the curve from answers about importance. Do not apply a mathematical formula.
  - The curve is often just a segment of a larger curve.
Constructing a Preference Curve

Preference Chart

More chocolaty 10
Much more intense color 6
More intense color 3

Preference Curve
Factor: Calories

Match the vertical axis to the Preference Chart. Place attributes proportionally on horizontal axis. Draw the preference curve by showing the importance of each change in advantage. The shape is determined subjectively, not mathematically.

This shape and many other curves can be legitimate.
9. Enter the numbers representing the relative weight of importance as determined by both Preference Chart and Preference Curves.

10. Sum the Total Importance (TI).

11. Choose greatest TI

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<td>6</td>
</tr>
<tr>
<td>Total Importance</td>
<td>10</td>
<td>16</td>
<td>1</td>
</tr>
</tbody>
</table>
## Peer-reviewed Process Variations

### Suhr’s Tabular Method

<table>
<thead>
<tr>
<th>Factors</th>
<th>Alternative</th>
<th>Alternative</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
<td>Least-Preferred Attribute</td>
<td>Attribute</td>
<td>No difference Attribute</td>
</tr>
<tr>
<td></td>
<td>Paramount Advantage</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor</th>
<th>Attribute</th>
<th>Least-Preferred Attribute</th>
<th>Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Most Important Advantage in this Factor</td>
<td>7</td>
<td>Advantage</td>
</tr>
</tbody>
</table>

**Total Importance**: 7 10 1

"Double A-IT" and "Circle, Select, Weigh, Decide"

### Adapted Tabular Method

<table>
<thead>
<tr>
<th>Factors and Criteria</th>
<th>Alternative</th>
<th>Alternative</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor (Criterion)</td>
<td>Least-Preferred Attribute</td>
<td>Attribute</td>
<td>No difference Attribute</td>
</tr>
<tr>
<td></td>
<td>Paramount Advantage</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor (Criterion)</th>
<th>Attribute</th>
<th>Least-Preferred Attribute</th>
<th>Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Most Important Advantage in this Factor</td>
<td>7</td>
<td>Advantage</td>
</tr>
</tbody>
</table>

**Total Importance**: 7 10 1

"Double A-IT" and "Highlight, Circle, Weigh, Decide"

---

**Establish Paramount Advantage and anchor to it when weighing importance.**
Peer-reviewed Process Variations

Jim Suhr’s preferred technique simplifies complex decisions. He does not write the criteria in the Tabular Format but refers to it.

When facilitating teams, we often use the Tabular Format to develop and document all the information including the criteria. Simplify when possible.
Unequal Money Decisions

- Money is an official message that serves as a medium of exchange.
- In the CBA process, we make a judgment by considering that the money could be exchanged for something else.
- Money involves The Principle of Interdependency:
  - Money spent for a purchase is not available for a different purchase.
  - Therefore the decisions are interdependent. This can add complexity.
- Unequal money decisions are more complex.
  - Different types of money decisions call for different methods of money decisionmaking.

This course demonstrates a small amount of the material that could be presented. Use it with care.
Tabular Method (abbreviated) for two or more alternatives, unequal cost.

1. Perform same steps as previously described.
2. Chart the Total Importance of Advantages to Cost for these mutually exclusive alternatives.
   a. This is NOT Benefit/Cost ratio.
   b. Do not portray cost as a factor when establishing advantages.
      i. Example: Energy is a cost of operation that should be placed in a life cycle cost analysis. The life cycle cost should be used in the x-axis of the CBA chart.

For non-exclusive proposals, use appropriate CBA method of funding allocation. (See our Module 2 training.)
Tabular Method (abbreviated) for two or more alternatives, unequal cost.

Different cost data causes a different scenario:

The decisionmaker decides whether to spend the additional increment of money to gain the incremental difference in importance of advantages. (Use a uniform interval on both scales of the chart.)

Do not confuse this with preference curves.

Techniques for addressing interdependency follow. This and other significant complexities of money decisions are taught in Suhr’s CBA Sound Decisionmaking workshop and books.
Tabular Method – Unequal Money example

Should we build a mockup of a unique roof courtyard design?
Remember: Cost should not appear in the list of factors. Actual displays can be larger.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Alternative A No Mockup</th>
<th>Alternative B Partial full scale Mockup</th>
<th>Alternative C Extensive full scale Mockup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructability (Must have details that work)</td>
<td>Must study drawings to decide</td>
<td>Can experience building many details</td>
<td>Can experience all typical details</td>
</tr>
<tr>
<td>Maintainability (Should be easy to maintain. Easier is better)</td>
<td>Must study drawings to decide</td>
<td>Can get hands-on with certain details</td>
<td>Can inspect most typical conditions</td>
</tr>
<tr>
<td>Visual Appeal (Want design to aid healing of patient)</td>
<td>Can only view renderings</td>
<td>Can view some appearance, &lt;5%</td>
<td>Can view a 10% elevation and deck</td>
</tr>
</tbody>
</table>
## Tabular Method – Unequal Money example

Should we build a mockup of a unique roof courtyard design?

<table>
<thead>
<tr>
<th>Factors</th>
<th>Alternative A: No Mockup</th>
<th>Alternative B: Partial full scale Mockup</th>
<th>Alternative C: Extensive full scale Mockup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructability</td>
<td>Must study drawings to decide</td>
<td>Can experience building many details</td>
<td>Can experience all typical details</td>
</tr>
<tr>
<td>(Must have details that work)</td>
<td></td>
<td>Greater understanding</td>
<td>Much greater understanding</td>
</tr>
<tr>
<td>Maintainability</td>
<td>Must study drawings to decide</td>
<td>Can get hands-on with certain details</td>
<td>Can inspect most typical conditions</td>
</tr>
<tr>
<td>(Should be easy to maintain. Easier is better)</td>
<td></td>
<td>Somewhat Better testing opportunity</td>
<td>Much better testing opportunity</td>
</tr>
<tr>
<td>Visual Appeal</td>
<td>Can only view renderings</td>
<td>Can view some appearance, &lt;5%</td>
<td>Can view a 10% elevation and deck</td>
</tr>
<tr>
<td>(Want design to aid healing of patient)</td>
<td></td>
<td>Slightly more realistic basis</td>
<td>Much more realistic basis for opinion</td>
</tr>
</tbody>
</table>
Scale of Importance for example

<table>
<thead>
<tr>
<th>Score</th>
<th>Importance Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Much better testing opportunity</td>
</tr>
<tr>
<td>9</td>
<td>Much more realistic basis for opinion</td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Much greater understanding</td>
</tr>
<tr>
<td>5</td>
<td>Somewhat Better testing opportunity</td>
</tr>
<tr>
<td>4</td>
<td>Slightly more realistic basis</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Greater understanding</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
## Tabular Method – Unequal Money example

Should we build a mockup of a unique roof courtyard design?

<table>
<thead>
<tr>
<th>Factors</th>
<th>Alternative A No Mockup</th>
<th>Alternative B Partial full scale Mockup</th>
<th>Alternative C Extensive full scale Mockup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructability</td>
<td>Must study drawings to decide</td>
<td>Can experience building many details</td>
<td>Can experience all typical details</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greater understanding</td>
<td>2</td>
</tr>
<tr>
<td>Maintainability</td>
<td>Must study drawings to decide</td>
<td>Can get hands-on with certain details</td>
<td>Can inspect most typical conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Somewhat Better testing opportunity</td>
<td>5</td>
</tr>
<tr>
<td>Visual Appeal</td>
<td>Can only view renderings</td>
<td>Can view some appearance, &lt;5%</td>
<td>Can view a 10% elevation and deck</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slightly more realistic basis</td>
<td>4</td>
</tr>
</tbody>
</table>

| Total                    | 0                                                                   | 11                                                                      | 25                                                                   |

81
Tabular Method Chart for Unequal Money

- Chart compares the Total Importance of Advantages (y-axis) to the Initial Cost (x-axis).
- Use Life Cycle Cost where significant.
- The decisionmaker must decide whether to spend the difference in cost to achieve the increased importance of advantages.

In CBA, an increment is defined as an increase in cost, coupled with an increase, a decrease or no change in total importance of advantages.

Alternatives

$0 $25,000 $50,000 $75,000

0 5 10 15 20 25 30

A B C

Increment
• Should the money be spent on something not charted here that has greater total importance of advantages?

• How available are funds?
  Draw a line indicating the threshold of importance of advantages required to allow expenditure of funds given the buyer’s current financial condition. Then compare line slopes.

This buyer could spend as much as $75,000 for something offering low tangible importance.

This buyer would insist on receiving high tangible importance to authorize spending $25,000.
Review: Money-differences

- Money decisions are interdependent decisions.
- Money-differences are abstract messages, not advantages.
- A money-scale is not a valid importance-scale.
- Do not assign importance scores to money-attributes or money-differences.

- Assign importance scores to advantages (tangible realities).
- In sound methods, the vertical scale on the chart pertains to the importance of advantages, not the importance of money.
- There are many types of money decisions.
Different types of decisions, including different types of money decisions, require different methods of decisionmaking.

But for all types of decisions, the fundamental rule of sound decisionmaking is the same:

Decisions must be based on the _________ of __________, not the importance of dollars.
Different types of decisions, including different types of money decisions, require different methods of decisionmaking.

But for all types of decisions, the fundamental rule of sound decisionmaking is the same:

Decisions must be based on the importance of advantages, not the importance of dollars.
Hints about Factors

Borrowing these descriptions from a method called Function Analysis will help provide a comprehensive set of CBA factors.

- Achieve Basic Purpose
- Assure Dependability
- Assure Convenience
- Satisfy User
- Attract People
Hints about Advantages

Accurately portraying the amount of difference matters!
• A phrase such as “a very small difference in taste appeal” is a better description than the phrase “less tasty.”

A very specific advantage statement is best.
• Use phrases such as “the large improvement in cleanliness at all patient room corners” rather than “a large difference in cleanliness.”
  – The advantage whose importance is weighed should be a specific, relevant, factual difference between only two correct, real attributes.
  – Do not weigh the importance of generalizations, high order abstractions, assumptions, advantages vs disadvantages, non-specific labels, factors, criteria, goals, roles, categories, attributes, or objectives.
Advantage Statement Examples

• Very much more+___
• Very much more ___
• Much more ___
• More___
• Somewhat more___

• Much more___ (quantify diff)
• More___ (quantity diff)

• V. Large improvement in___
• Large improvement in___
• Small improvement in___

• Large beneficial difference in___
• Small beneficial difference in___

• Large difference in___
• Some difference in___
• Small difference in___

The word “less” can be substituted for more if it describes an advantage.
Hints about Importance

Weighing Importance of Advantages

- Do not weigh the importance of factors, criteria, goals or roles.
- Weigh the importance of advantages using anchored questions.
- Select the advantage having paramount importance first.
- Weigh the importance of advantages precisely not arbitrarily.
- Use an adequately sized scale of importance.
- Very small differences usually have very low importance.
How can we consistently make sound decisions?

• Principle 1: Decisionmakers must learn and skillfully use sound methods. (The Pivotal Cornerstone Principle)

• Principle 2: Decisions must be based on the importance of advantages. (The Fundamental Rule of Sound Decisionmaking)

• Principle 3: Decisions must be anchored to the relevant facts. (The Principle of Anchoring)

• Principle 4: Different types of decisions call for different sound methods. (The Methods Principle)
How can we simplify sound decisionmaking?

- **Principle 5**: Simplify simple decisions by taking fewer steps.
  - *Example: Use Instant CBA or Simplified Two List Method.*
  - *Example: Exclude the Easy-to-Exclude Alternatives*

- **Principle 6**: Simplify complex decisions by taking smaller steps.
  - *Example: Use the Tabular Format to break the decision into parts.*

- **Principle 7**: Simplify all decisions by correctly using correct data.
How can we correctly use money data?

- **Principle 8**: Money decisions call for special methods.
  - *Example:* Chart Total Importance vs. Cost.

- **Principle 9**: Different money-decisionmaking contexts call for different money-decisionmaking methods.
  - *Our Module 2 of CBA Sound Decisionmaking training illustrates the 4 different decision contexts.*
• **Factor**: A container for criteria, attributes, advantages and other types of data. An element of a decision.

• **Criterion** (pl Criteria): A requirement (must or want). A standard on which a judgment is based.

• **Attribute**: A characteristic, quality or consequence of one alternative.

• **Advantage**: A beneficial difference between two alternatives.

• **Alternative**: Two or more mutually-exclusive plans.

• **Proposals**: Two or more nonexclusive plans.

From now on say “proposals” when you mean that the plans are nonexclusive.
When setting priorities among nonexclusive proposals, the decisionmaker can choose none, one or many of the proposals. *When many proposals are chosen, they coexist rather than exclude one another.*

- **Example:**
  A person must allocate time to a variety of demands

- **Example:**
  Personal or company purchases compete for a share of the budget.

*This and Life Cycle Costing are taught in Module 2*
Principle 13 of *The Toyota Way*
“Make Decisions Slowly by Consensus, thoroughly considering all options;…”

The author wrote

“Use a set-based approach:
– Find out what is really going on;
– Understand underlying **cause**;
– Broadly consider **alternatives**
– Develop a detailed **rationale**;
– Build **consensus** within the team;
– Use very efficient **communication** vehicles.”

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CBA supporting Lean is taught in Module 2
Learn and Skillfully Use CBA methods

- Consider attending more in-depth training by Suhr (*pronounced Sir*)
  - **Sound** Decisionmaking Workshop
  - **Congruent** Decisionmaking Workshop
  - **Effective** Decisionmaking Workshop

- Consider Jim and Margaret Suhr’s books for adults and children about *The Choosing By Advantages Decisionmaking System*
Concluding Reminders

- CBA methods range from swift ones performed mentally to those using a five phase process, plus those in Module 2.
- Technique must be correct.
- Identify the decision context (mutually exclusive or non-exclusive).
- Have all relevant information
- Consider all necessary alternatives.
- Accurately identify advantages and their importance.
Concluding Reminders

Obtain the Decisionmaker’s viewpoint.
Decisions must be anchored to the relevant facts.
Decisions must be based on the importance of advantages.

All decisions deserve to be made using a sound method.

CBA is a learned set of skills based upon:
– A sound decisionmaking system unified by
– Definitions, principles, models and methods

CBA makes good decisionmakers even better
And will build a more peaceful world.
Questions about Choosing By Advantages?

We can help.

Thank you!

The Boldt Company

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Cell Ph 415 265 3048
Classwork

• CBA Assignment – Mutually Exclusive Alternative Design Concepts
• CBA Assignment – Mutually Exclusive Alternative Contractors

You can customize the storylines a little.

Plus/Delta
This concludes The American Institute of Architects Continuing Education Systems Course

Lean Construction Institute  info@leanconstruction.org
Choosing By Advantages (module 2)

John Koga, Boldt
October 4, 2016
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Choosing by Advantages (CBA) is a decision making system proven to contain sound methods. It is especially useful in project development and management. This two-day class addresses simplifying complex decisions, selecting one from a set of alternatives, using money data correctly and setting priorities among proposals. It addresses avoiding unsound practices. The class combines lecture and hands-on activity to enable applying CBA right away.
Learning Objectives

At the end of the this course, participants will be able to:

1. Participants will learn about using sound decision methods that simplify complex situations.

2. Participants will learn about correctly using data and money in decision making.

3. Participants will learn about, and practice, sound methods for choosing only one from many alternatives.

4. Participants will learn about and practice methods for setting priorities among proposals, considering the importance of their differences and cost.
This abbreviated instruction is based upon our training and years of experience applying The Choosing By Advantages Sound Decisionmaking System (CBA) originated by Jim Suhr.

Prerequisite: Module 1

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Lessons

4 Methods for Setting Priority Workshop

5 Complex Allocation Decisionmaking Workshop

6 Decisions involving Life Cycle Cost

7 Integrating CBA and Lean’s A3

8 Supplementary CBA Information
How can we consistently make sound decisions?

• **Principle 1:** Decisionmakers must learn and skillfully use sound methods. *(The Pivotal Cornerstone Principle)*

• **Principle 2:** Decisions must be based on the importance of advantages. *(The Fundamental Rule of Sound Decisionmaking)*

• **Principle 3:** Decisions must be anchored to the relevant facts. *(The Principle of Anchoring)*

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How can we simplify sound decisionmaking?

• Principle 5: **Simplify simple decisions by taking fewer steps.**
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  – *Example:* Exclude the Easy-to-Exclude Alternatives

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How can we correctly use money data?

- Principle 8: Money decisions call for special methods.
  - Example: Chart Total Importance vs. Cost.

- Principle 9: Different money-decision-making contexts call for different money-decision-making methods.
The Four Basic Decisionmaking Contexts

1. Choose from alternatives with equal costs.
2. Set priorities among proposals with equal costs.
3. Set priorities among proposals with unequal costs.
4. Choose from alternatives with unequal costs.

We move among them thus:
• Stage I: Context 1 and 4a.
• Stage II: Context 2, 3 and 4b setting priorities.
• Stage III: All contexts allocating funds and resources.
Types 2, 3 and 4 call for determining increment lines and reference lines. These concepts are ignored in Benefit/Cost ratios. But sound methods for money decisions require them.

Remember:

a. Money is not a commodity. Money is a message.

b. A money-scale is not a valid scale of importance.

c. Money decisions are interdependent decisions.

Choosing from Mutually-Exclusive Alternatives | Setting Priorities among Nonexclusive Proposals

<table>
<thead>
<tr>
<th>With Equal Costs</th>
<th>Context 1</th>
<th>Context 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Unequal Costs</td>
<td>Context 4</td>
<td>Context 3</td>
</tr>
</tbody>
</table>

Read further about this in Jim Suhr's Volume Three booklet.
In some cases in context 4, the preferred alternative must be simultaneously selected and analyzed as part of the Allocation Decisionmaking process.

But first, let’s learn about Setting Priorities among Nonexclusive Proposals.
Lesson 4
Methods for prioritizing Nonexclusive Proposals

• **Factor**: A container for criteria, attributes, advantages and other types of data. An element of a decision.

• **Criterion** (pl Criteria): A requirement (must or want). A standard on which a judgment is based.

• **Attribute**: A characteristic, quality or consequence of one alternative.

• **Advantage**: A beneficial difference between two alternatives.

• **Alternative**: Two or more mutually-exclusive persons, things or plans.

• **Proposals**: Two or more nonexclusive persons, things or plans.

Say “proposals” when you mean that persons, things or plans are nonexclusive.
Decisionmakers set priorities among Nonexclusive Proposals

When setting priorities among nonexclusive proposals, the decisionmaker can choose none, one or many of the proposals. *When many proposals are chosen, they coexist rather than exclude one another.*

- **Example:**
  A person must allocate time to a variety of demands

- **Example:**
  The purchases at the right compete for a share of a weekly budget.

- **Example:**
  The programs proposed by each business unit in a corporation compete for a share of the corporate budget.
Nonexclusive Proposals

CBA methods for deciding from among nonexclusive proposals:

- Do not violate rules as do many other decisionmaking methods.
- Enable sound allocation of limited funding or time.
- Do recognize differences in decisionmaking concepts such as
  - most important,
  - highest priority,
  - first-in-sequence.
How do we soundly sequence the selection?

“...arranging the proposals according to importance, with the greatest total importance at the top of the list, would create an irrational bias in favor of large, high cost proposals.”

How do we soundly sequence the selection?

“…arranging them according to cost, with the least cost at the top of the list, would create an irrational bias in favor of small, unimportant proposals.”

How do we soundly sequence the selection?

“...the increments must be arranged, within each category, according to their incremental importance to incremental-cost ratios.

...it maximizes individual and organization performance.”

In CBA, this ratio is called “Priority.”

How do we soundly sequence the selection?

Two methods:
• Graphically with sloping lines, and/or
• Calculate ratios in a table or spreadsheet format.
Proposals having equal cost and equal importance of advantages.

If the advantages of each proposal $A_1$, $B_1$ and $C_1$ have the same total importance, then all 3 can be chosen if the total cost ($6) is within funding limitations.
Proposals having different cost and equal importance of advantages

For this condition, choose an appropriate combination of cost within funding limitations.

Establishing first-in-sequence to implement the choice would rely on other information. For example, one proposal may have to physically occur first.
Proposals having equal cost and unequal importance of advantages

For this condition, set priorities among the proposals (as illustrated in the next slide) to establish the set of acceptable proposals within funding limitations.
### Example of Priority when cost is equal

#### Equal Cost Proposals

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Cost</th>
<th>Total Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>C₁</td>
<td>$3</td>
<td>4</td>
</tr>
<tr>
<td>B₁</td>
<td>$3</td>
<td>3</td>
</tr>
<tr>
<td>A₁</td>
<td>$3</td>
<td>1</td>
</tr>
</tbody>
</table>

In this unique condition, set priority by arranging the proposals in order of decreasing Total Importance of Advantages, then choose within funding limitations.
“With minus Without” describes each Increment

Stating a proposal also generates two mutually exclusive alternatives:

- with each plan (choosing the plan)
- without each plan (not choosing the plan).

Alt
C₀
C₁
B₀
B₁
A₀
A₁

Subscript 0 means “without.”
"With minus Without" describes each increment.

Equal Cost Proposals

<table>
<thead>
<tr>
<th>Alt</th>
<th>Cost</th>
<th>T. Imp</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>C₀</td>
<td>$0</td>
<td>0</td>
<td>(C₁ - C₀) / $ =</td>
</tr>
<tr>
<td>C₁</td>
<td>$3</td>
<td>4</td>
<td>4/3</td>
</tr>
<tr>
<td>B₀</td>
<td>$0</td>
<td>0</td>
<td>(B₁ - B₀) / $ =</td>
</tr>
<tr>
<td>B₁</td>
<td>$3</td>
<td>3</td>
<td>3/3</td>
</tr>
<tr>
<td>A₀</td>
<td>$0</td>
<td>0</td>
<td>(A₁ - A₀) / $ =</td>
</tr>
<tr>
<td>A₁</td>
<td>$3</td>
<td>1</td>
<td>1/3</td>
</tr>
</tbody>
</table>

Priority is the ratio of importance to cost for the increment between "with alternative" and "without alternative." It is the slope of the line. Choose by decreasing priority.
Proposals containing Alternatives having unequal cost and unequal total importance of advantages

When you must select none or some of several nonexclusive proposals containing alternatives having unequal importance of advantages and unequal costs, use the CBA method for Setting Priorities among Nonexclusive Proposals.

If you know you will select none or all, don’t waste time determining priority. But you may need to determine first in sequence (a different procedure).
Priority when cost and importance vary

Unequal Cost Alternatives

<table>
<thead>
<tr>
<th>Alt</th>
<th>Cost</th>
<th>T. Imp</th>
</tr>
</thead>
<tbody>
<tr>
<td>B₀</td>
<td>$0</td>
<td>0</td>
</tr>
<tr>
<td>B₁</td>
<td>$3</td>
<td>3</td>
</tr>
<tr>
<td>C₀</td>
<td>$0</td>
<td>0</td>
</tr>
<tr>
<td>C₂</td>
<td>$1</td>
<td>4/3 = 1.333</td>
</tr>
<tr>
<td>A₀</td>
<td>$0</td>
<td>0</td>
</tr>
<tr>
<td>A₂</td>
<td>$0.5</td>
<td>1/6 = 0.166</td>
</tr>
</tbody>
</table>

Slope calculations: \( \Delta \) importance \( \div \) \( \Delta \) cost

B₁ to B₀ is \((3-0)/(3-0) = 3/3 = 1.0\)

C₂ to C₀ is \((4/3-0)/(1-0) = 1.333/1 = 1.333\)

A₂ to A₀ is \((0.166-0)/(0.5-0) = 0.166/0.5 = 0.333\)

(This slide only used here to calculate data position. It is not a normal step in the method of prioritization.)
Graphical Format displaying Priority

Priority = Incremental Importance ÷ Incremental Cost
(The lower limit of incremental cost and importance may be >0. First make all mutually exclusive choices. This method also allows simultaneous choosing. See Vol 3 by Jim Suhr.)

Step 1: Calculate priority.

Increment  | △ Calculation  | Priority
--- | --- | ---
Imp A₂-A₀  | 0.166 - 0 = .166 | \(0.166 \div 0.50 = 0.332\)
Cost A₂-A₀  | $0.50 - $0 = $.50 | 
Priority A₂-A₀  | \(0.166 \div 0.50 = 0.332\)

Imp C₂-C₀  | 1.333 - 0 = 1.333 | 
Cost C₂-C₀  | $1 - $0 = $1 | 
Priority C₂-C₀  | \(1.333 \div 1 = 1.333\)

Imp B₁-B₀  | 3 - 0 = 3 | 
Cost B₁-B₀  | $3 - $0 = $3 | 
Priority B₁-B₀  | \(3 \div 3 = 1\)

“In CBA, an increment is defined as an increase in cost, coupled with an increase, a decrease or no change in total importance of advantages.”
**Priority Calculations**

(Calculate using “with” minus “without.”)

<table>
<thead>
<tr>
<th>Increment</th>
<th>∆ Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imp $A_2-A_0$</td>
<td>.166 (Incremental Importance)</td>
</tr>
<tr>
<td>Cost $A_2-A_0$</td>
<td>$.50 (Incremental Cost)</td>
</tr>
<tr>
<td><strong>Priority $A_2-A_0$</strong></td>
<td>0.332 ($\Delta$ Imp / $\Delta$ Cost)</td>
</tr>
</tbody>
</table>

| Imp $C_2-C_0$ | 1.333 ($\Delta$ Imp)  |
| Cost $C_2-C_0$   | $1$ ($\Delta$ Cost)   |
| **Priority $C_2-C_0$** | 1.333 ($\Delta$ Imp / $\Delta$ Cost) |

| Imp $B_1-B_0$ | 3 ($\Delta$ Imp)  |
| Cost $B_1-B_0$   | $3$ ($\Delta$ Cost)   |
| **Priority $B_1-B_0$** | 1 ($\Delta$ Imp / $\Delta$ Cost) |
Unequal Cost Proposals

Step 2: Sort in decreasing order of priority.

Step 3: Calculate running total of cost

<table>
<thead>
<tr>
<th>Increment</th>
<th>Priority</th>
<th>Cost Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>C₂-C₀</td>
<td>1.333</td>
<td>$1.00</td>
</tr>
<tr>
<td>B₁-B₀</td>
<td>1</td>
<td>$4.00</td>
</tr>
<tr>
<td>A₂-A₀</td>
<td>0.332</td>
<td>$4.50</td>
</tr>
</tbody>
</table>

Step 4: Accept the proposals from top down until funds are exhausted.

Draw one Reference Line (such as either the green or purple lines shown) to represent actual funding conditions, with its slope correctly portraying conditions. Increment Lines having a slope steeper than the Reference Line indicate that the “with” proposal can be accepted within funding limitations.
### Tabular Format displaying Priority

<table>
<thead>
<tr>
<th>Increment</th>
<th>∆ Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imp $C_2-C_0$</td>
<td>1.333 (Δ Imp)</td>
</tr>
<tr>
<td>Cost $C_2-C_0$</td>
<td>$1 (Δ Cost)$</td>
</tr>
<tr>
<td><strong>Priority $C_2-C_0$</strong></td>
<td>1.333 (Δ Imp / Δ Cost)</td>
</tr>
<tr>
<td>Imp $B_1-B_0$</td>
<td>3 (Δ Imp)</td>
</tr>
<tr>
<td>Cost $B_1-B_0$</td>
<td>$3 (Δ Cost)$</td>
</tr>
<tr>
<td><strong>Priority $B_1-B_0$</strong></td>
<td>1 (Δ Imp / Δ Cost)</td>
</tr>
<tr>
<td>Imp $A_2-A_0$</td>
<td>0.166 (Incremental Importance)</td>
</tr>
<tr>
<td>Cost $A_2-A_0$</td>
<td>$.50 (Incremental Cost)</td>
</tr>
<tr>
<td><strong>Priority $A_2-A_0$</strong></td>
<td>0.332 (Δ Imp / Δ Cost)</td>
</tr>
</tbody>
</table>

### Display of Priorities (sorted by descending priority)

<table>
<thead>
<tr>
<th>Increment</th>
<th>Choose</th>
<th>Incremental (Δ) Importance</th>
<th>Incremental (Δ) Cost ($)</th>
<th>Priority (ΔImp / Δ$)</th>
<th>Running Total Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_2-C_0$</td>
<td>$C_2$</td>
<td>1.333</td>
<td>$1.00</td>
<td>1.33</td>
<td>$1.00</td>
</tr>
<tr>
<td>$B_1-B_0$</td>
<td>$B_1$</td>
<td>3.0</td>
<td>$3.00</td>
<td>1.00</td>
<td>$4.00</td>
</tr>
<tr>
<td>$A_2-A_0$</td>
<td>$A_2$</td>
<td>0.166</td>
<td>$0.50</td>
<td>0.332</td>
<td>$4.50</td>
</tr>
</tbody>
</table>
Margin: the place where something stops, such as an edge, border or boundary.
Priority across Sets of Proposals

To soundly set priorities across sets of proposals submitted by competing business units or social entities, find the margin (edge) where priorities are approximately equal. Accept proposals above it.

The group seeking the funds is likely to have too much bias to determine priority of their requests relative to the entire enterprise. They can participate in presenting relevant facts, but allocation must be made at a higher level using CBA carefully and rigorously.

The basis can be time instead of cost.

Comply with CBA Principle 2b. "In Context 2, 3, and 4: All advantages of all the alternatives, in all the factors, in all the proposals, must be weighed on the same scale of importance (even across departments)."

Priority across Sets of Proposals

Draw a line in the list to indicate the margin thus:
(a) where priorities are approximately equal (the margin) and
(b) funds remain available.

Select those proposals above the margin.
In the example below, if funding is $800,000 select A1, E1, C1, D1, R1, and S1.

<table>
<thead>
<tr>
<th>Department X Proposals</th>
<th>Department Y Proposals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increment</td>
<td>Priority</td>
</tr>
<tr>
<td>A₁-A₀</td>
<td>904</td>
</tr>
<tr>
<td>E₁-E₀</td>
<td>667</td>
</tr>
<tr>
<td>C₁-C₀</td>
<td>573</td>
</tr>
<tr>
<td>D₁-D₀</td>
<td>556</td>
</tr>
<tr>
<td>B₁-B₀</td>
<td>491</td>
</tr>
</tbody>
</table>
In a different example (handout) workload was balanced (assuming same skills) as the nonexclusive proposals were prioritized. Low priority proposals ($F_1$ and $B_1$) requiring more time than available were permanently discarded.

<table>
<thead>
<tr>
<th>Task</th>
<th>Task Name</th>
<th>Adv With</th>
<th>Imp With</th>
<th>Adv W/o</th>
<th>Imp W/o</th>
<th>Net Δ Imp</th>
<th>Performer</th>
<th>Hrs With</th>
<th>Hrs W/o</th>
<th>Net Δ Hrs</th>
<th>Priority</th>
<th>Ben Cum Hrs</th>
<th>Lisa Cum Hrs</th>
<th>Jack Cum Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>I</td>
<td>*</td>
<td>225</td>
<td></td>
<td>225</td>
<td>0</td>
<td>Ben</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>45.0</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>D</td>
<td>*</td>
<td>160</td>
<td></td>
<td>160</td>
<td>0</td>
<td>Lisa</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>32.0</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>H</td>
<td>*</td>
<td>180</td>
<td></td>
<td>180</td>
<td>0</td>
<td>Jack</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>18.0</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>E</td>
<td>*</td>
<td>240</td>
<td></td>
<td>240</td>
<td>0</td>
<td>Ben</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>12.0</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>G</td>
<td>*</td>
<td>300</td>
<td></td>
<td>300</td>
<td>0</td>
<td>Lisa</td>
<td>30</td>
<td>0</td>
<td>30</td>
<td>10.0</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>C</td>
<td>*</td>
<td>120</td>
<td></td>
<td>120</td>
<td>0</td>
<td>Ben</td>
<td>15</td>
<td>0</td>
<td>15</td>
<td>8.0</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>J</td>
<td>*</td>
<td>63</td>
<td></td>
<td>63</td>
<td>0</td>
<td>Jack</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>6.3</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>A</td>
<td>*</td>
<td>80</td>
<td></td>
<td>80</td>
<td>0</td>
<td>Jack</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>4.0</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>*</td>
<td>20</td>
<td></td>
<td>20</td>
<td>0</td>
<td>Jack</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>*</td>
<td>40</td>
<td></td>
<td>40</td>
<td>0</td>
<td>Ben</td>
<td>25</td>
<td>0</td>
<td>25</td>
<td>1.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Priority across Sets of Proposals

In the example handed out, a graph illustrates selection of the margin. A₁, F₁, B₁ are below the margin and are excluded. They provide less effectiveness.

The margin where one proposal from each employee has near equal priority while resources remain sufficient.
In-class Assignments

• CBA Assignment O – Graphical Format for Nonexclusive Proposals
  1 hour

(Note: A proposal may have an advantage having importance =>0 and any cost.)
Lesson 5
Complex Allocation Decisionmaking

- Scenarios containing more than a few proposals are complex.
- The complexity can introduce multiple sources of variability.
- People can establish the sequence of importance of advantages.
- They can approximate proportional importance to some degree.

- **People naturally treat large and small as if they were average.**
  - People often overestimate small risks and underestimate large risks.
  - People often overstate the importance of small advantages and understate the importance of large advantages.
  - People often spend too much time on minor decisions and inadequate time on major decisions

Soundly establish Importance in Proposals

- Decisionmakers must learn and practice sound decisionmaking methods to become skillful.

- **Priority is different than importance.** Priority measures effectiveness. It compares the difference in importance to the difference in cost.
  - Carefully consider the importance of advantages with and without each proposal.
    - A proposal having highly important advantages might have any cost.
    - If importance is low relative to its cost, should the decisionmaker accept it? Consider improving proposal design to improve priority and effectiveness.

- Boldt’s workbook shown next can help carefully assign weights of importance in complex scenarios and calculate priority.
  - It is a guide. Don’t create distortion by over-reaching its capability.
  - Remember! Numbers don’t make decisions. People do.
**Boldt’s Nonexclusive Proposal Prioritization Workbook**
(Special Format for Allocation Decisionmaking applying CBA)

<table>
<thead>
<tr>
<th>NONEXCLUSIVE PROPOSAL</th>
<th>DATA FOR &quot;WITHOUT PROPOSAL&quot;</th>
<th>DATA FOR &quot;WITH PROPOSAL&quot;</th>
<th>SELECT THE ALTERNATIVE FROM EACH I.C. INCREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ID#</strong></td>
<td><strong>Site</strong></td>
<td><strong>Description of Nonexclusive Proposals</strong></td>
<td><strong>Advantages WITHOUT Proposal</strong></td>
</tr>
<tr>
<td>A</td>
<td>SAMPLE</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>More control of sunlight by room occupant</td>
</tr>
<tr>
<td>B</td>
<td>SAMPLE</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>Less confusion about elevator selection</td>
</tr>
<tr>
<td>C</td>
<td>SAMPLE</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>Easier ceiling design detailing.</td>
</tr>
<tr>
<td>D</td>
<td>SAMPLE</td>
<td>Water Treatment for Surgical Instruments</td>
<td>None</td>
</tr>
<tr>
<td>E</td>
<td>SAMPLE</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>None</td>
</tr>
</tbody>
</table>

This example displays unanchored pseudo-information.
Do not use this data for decisions on your project.
## Boldt’s Nonexclusive Proposal Prioritization Workbook
(Special Format for Allocation Decisionmaking applying CBA)

### NONEXCLUSIVE PROPOSAL

<table>
<thead>
<tr>
<th>ID#</th>
<th>Site</th>
<th>Description of Nonexclusive Proposals</th>
<th>Advantages WITHOUT Proposal</th>
<th>Importance WITHOUT</th>
<th>Initial Cost WITHOUT</th>
<th>Total Life Cycle Cost WITHOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SAMPLE</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>More control of sunlight by room occupant</td>
<td>50</td>
<td>$</td>
<td>$ 280,000</td>
</tr>
<tr>
<td>B</td>
<td>SAMPLE</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>Less confusion about elevator selection</td>
<td>300</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>C</td>
<td>SAMPLE</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>Easier ceiling design detailing.</td>
<td>75</td>
<td>$</td>
<td>$ 2,165,000</td>
</tr>
<tr>
<td>D</td>
<td>SAMPLE</td>
<td>Water Treatment for Surgical Instruments</td>
<td>None</td>
<td>0</td>
<td>$</td>
<td>$ 476,000</td>
</tr>
<tr>
<td>E</td>
<td>SAMPLE</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>None</td>
<td>1</td>
<td>$</td>
<td>$ 108,000</td>
</tr>
<tr>
<td>ID#</td>
<td>Site</td>
<td>Description of Nonexclusive Proposals</td>
<td>Advantages WITH Proposal</td>
<td>Importance WITH</td>
<td>Initial Cost WITH</td>
<td>Life Cycle Cost WITH</td>
</tr>
<tr>
<td>-----</td>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>A</td>
<td>SAMPLE</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>Less breakage of shades by occupants and more uniform exterior appearance</td>
<td>275</td>
<td>$60,000</td>
<td>$255,000</td>
</tr>
<tr>
<td>B</td>
<td>SAMPLE</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>Large improvement in elevator utilization</td>
<td>375</td>
<td>$40,000</td>
<td>$75,000</td>
</tr>
<tr>
<td>C</td>
<td>SAMPLE</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>Much greater patient calmness in certain situations</td>
<td>1000</td>
<td>$200,000</td>
<td>$1,369,000</td>
</tr>
<tr>
<td>D</td>
<td>SAMPLE</td>
<td>Water Treatment for Surgical Instruments</td>
<td>Longer instrument life</td>
<td>206</td>
<td>$30,000</td>
<td>$52,000</td>
</tr>
<tr>
<td>E</td>
<td>SAMPLE</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>More appealing Corridor 101 appearance.</td>
<td>250</td>
<td>$100,000</td>
<td>$100,000</td>
</tr>
</tbody>
</table>
Boldt’s Nonexclusive Proposal Prioritization Workbook (Special Format for Allocation Decisionmaking applying CBA)

<table>
<thead>
<tr>
<th>Greater Initial Cost Alternative</th>
<th>Direction of Initial Cost Improvement</th>
<th>Direction of Total Weight of Importance</th>
<th>Reference Line Comparison</th>
<th>Alternative Selected from the pair for Initial Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
</tbody>
</table>

I.C. means Initial Cost

These columns fill automatically.

- Select proposal on the right
- Select proposal on the left
- Cost Improvement WITHOUT ← WITH
- Cost Improvement WITHOUT ← WITH
## Conditions of Initial Cost Proposals

<table>
<thead>
<tr>
<th>Condition</th>
<th>CostDiff</th>
<th>GreaterCostAlt</th>
<th>DirectionCostDecrease</th>
<th>DirectionChangeInImportance</th>
<th>ImpViewedFrom_To_</th>
<th>RefLineComparison</th>
<th>ChooseAlt</th>
</tr>
</thead>
<tbody>
<tr>
<td>COND01</td>
<td>EqualCost</td>
<td>Same Initial Cost</td>
<td>No Cost Improvement</td>
<td>No Improvement in Imp</td>
<td>Either Alternative</td>
<td>NA</td>
<td>Either With or Without</td>
</tr>
<tr>
<td>COND02</td>
<td>EqualCost</td>
<td>Same Initial Cost</td>
<td>No Cost Improvement</td>
<td>Importance Decreases</td>
<td>Without to With</td>
<td>NA</td>
<td>The Without Proposal</td>
</tr>
<tr>
<td>COND03</td>
<td>EqualCost</td>
<td>Same Initial Cost</td>
<td>No Cost Improvement</td>
<td>Importance Increases</td>
<td>Without to With</td>
<td>NA</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>COND04</td>
<td>EqualCost</td>
<td>Same Initial Cost</td>
<td>No Cost Improvement</td>
<td>Importance Decreases</td>
<td>Without to With</td>
<td>NA</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>COND05</td>
<td>EqualCost</td>
<td>Same Initial Cost</td>
<td>No Cost Improvement</td>
<td>Importance Increases</td>
<td>Without to With</td>
<td>NA</td>
<td>The Without Proposal</td>
</tr>
<tr>
<td>COND06</td>
<td>DifferentCost</td>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>No Improvement in Imp</td>
<td>Without to With</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>COND07</td>
<td>DifferentCost</td>
<td>The With Proposal</td>
<td>With to Without</td>
<td>No Improvement in Imp</td>
<td>Without to With</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The Without Proposal</td>
</tr>
<tr>
<td>COND08</td>
<td>DifferentCost</td>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Decreases</td>
<td>Without to With</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>COND09</td>
<td>DifferentCost</td>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Decreases</td>
<td>Without to With</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The Without Proposal</td>
</tr>
<tr>
<td>COND10</td>
<td>DifferentCost</td>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Without to With</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The Without Proposal</td>
</tr>
<tr>
<td>COND11</td>
<td>DifferentCost</td>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>With to Without</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The Without Proposal</td>
</tr>
<tr>
<td>COND12</td>
<td>DifferentCost</td>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>With to Without</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The Without Proposal</td>
</tr>
<tr>
<td>COND13</td>
<td>DifferentCost</td>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Increases</td>
<td>With to Without</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The Without Proposal</td>
</tr>
</tbody>
</table>
Establish the Reference Lines at the Conditions tab

- Use this table to carefully set the minimum amount of importance that expenditures at various price points must have so that you would choose them instead of the proposal being studied at that price point.

REFERENCE LINE (Adjust Min. Total Importance to Team’s Preference. Make sure that cost row exceeds largest proposed initial cost.)

<table>
<thead>
<tr>
<th>COST</th>
<th>$ -</th>
<th>$ 500,000</th>
<th>$ 1,000,000</th>
<th>$ 1,500,000</th>
<th>$ 2,000,000</th>
<th>$ 2,500,000</th>
<th>$ 3,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Total Importance of Alt</td>
<td>0</td>
<td>0.256</td>
<td>1.28</td>
<td>6.4</td>
<td>52</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>Ref Line SLOPE (tep per $Million)</td>
<td>0.00</td>
<td>0.51</td>
<td>2.05</td>
<td>12.24</td>
<td>5120</td>
<td>126.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Ref Line SLOPE to cost limit</td>
<td>0.51</td>
<td>2.05</td>
<td>10.24</td>
<td>71.60</td>
<td>136.00</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

Only adjust the cost or beige cells.
Boldt’s Nonexclusive Proposal Prioritization Workbook (Special Format for Allocation Decisionmaking applying CBA)

- Sort entire rows by descending priority and adjust the tally formulae.
- Make the cutoff where the cumulative cost would exceed funding.
- If no life cycle cost to consider, you are finished.

<table>
<thead>
<tr>
<th>ID#</th>
<th>Site</th>
<th>Description of Nonexclusive Proposals</th>
<th>Alternative Selected from the pair for Initial Cost</th>
<th>ΔIMP</th>
<th>Δ$</th>
<th>Incremental Priority (line slope)</th>
<th>Cumulative Total Δ$</th>
<th>Cumulative Total Initial D-B Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>SAMPLE</td>
<td>Water Treatment for Surgical Instruments</td>
<td>The With Proposal</td>
<td>206</td>
<td>$30,000</td>
<td>6,866.66667</td>
<td>$</td>
<td>30,000</td>
</tr>
<tr>
<td>C</td>
<td>SAMPLE</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>The With Proposal</td>
<td>925</td>
<td>$200,000</td>
<td>4,625.00000</td>
<td>$</td>
<td>230,000</td>
</tr>
<tr>
<td>A</td>
<td>SAMPLE</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>The With Proposal</td>
<td>225</td>
<td>$60,000</td>
<td>3,750.00000</td>
<td>$</td>
<td>290,000</td>
</tr>
<tr>
<td>E</td>
<td>SAMPLE</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>The With Proposal</td>
<td>249</td>
<td>$100,000</td>
<td>2,490.00000</td>
<td>$</td>
<td>390,000</td>
</tr>
<tr>
<td>B</td>
<td>SAMPLE</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>The With Proposal</td>
<td>75</td>
<td>$40,000</td>
<td>1,875.00000</td>
<td>$</td>
<td>430,000</td>
</tr>
</tbody>
</table>

Each incremental cost difference is an amount above “the unavoidable minimum.”

These columns fill automatically.
Soundly establish Importance in Proposals

• Weigh importance carefully.
  – Boldt’s workbook is based on CBA’s sound method for working with the complexity of nonexclusive proposals.
  – It is a guide. Don’t create distortion by over-reaching its capability.
  – Remember! Numbers don’t make decisions. People do.

CBA Assignment P – Allocation Decisionmaking using the Workbook (Ignore columns that refer to Life Cycle Cost. That is the next lesson.)
Life Cycle Costing is the process of making an economic assessment by considering significant costs of ownership over an economic life, expressed in terms of equivalent costs.

- **Initial Cost**: Initial Capital Investment in project (pre-occupancy)
- **Occasional Cost**: Alterations and Replacements (post-occupancy)
- **Annual Cost**: Consistent Costs such as Energy or Maintenance

We use the Present Worth Method, zero inflation constant dollars approach converting all costs to a baseline of today’s costs. A simple calculation can also convert the result to an annualized figure.

Use the answers in any of the four CBA Contexts.

Our spreadsheet format is modeled after that found in LCC books by Dell’Isola and Kirk.
Decisions involving Life Cycle Cost

• Inputs
  – Life Cycle (Amortization) Period (usually <25 years; “always” <40 years)
  – Discount Rate for the business (depends upon loan rates, rate of return.)
  – Alternatives to compare and associated cost data
  – May require existing operational cost data
  – Identification of any cost that may escalate faster than inflation
  – Salvage values

• Exclusions
  – Insurance (not licensed)
  – Taxes (not licensed)
  – Inflation (it usually just increases all numbers uniformly)

• Some LCC requires complex computer calculations. But many LCC situations can be determined using Boldt’s spreadsheet format.
### Life Cycle Cost Calculations — one of the proposals

<table>
<thead>
<tr>
<th>Discount Rate</th>
<th>LC Period</th>
<th>Initial Costs</th>
<th>Occasional</th>
<th>Annual</th>
<th>Total Cost for LC Period in current dollars</th>
</tr>
</thead>
</table>
### NONEXCLUSIVE PROPOSAL DATA FOR "WITHOUT PROPOSAL" DATA FOR "WITH PROPOSAL"

<table>
<thead>
<tr>
<th>ID#</th>
<th>Site</th>
<th>Description of Nonexclusive Proposal</th>
<th>Advantages WITHOUT Proposal</th>
<th>Importance WITHOUT</th>
<th>Initial Cost WITHOUT</th>
<th>Total Life Cycle Cost WITHOUT</th>
<th>Advantages WITH Proposal</th>
<th>Importance WITH</th>
<th>Initial Cost WITH</th>
<th>Total Life Cycle Cost WITH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SAMPLE</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>More control of sunlight by room occupant</td>
<td>50</td>
<td>$</td>
<td>$280,000</td>
<td>Less breakage of shades by occupants and more uniform exterior appearance</td>
<td>275</td>
<td>$60,000</td>
<td>$255,000</td>
</tr>
<tr>
<td>B</td>
<td>SAMPLE</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>Less confusion about elevator selection</td>
<td>300</td>
<td>$</td>
<td>$</td>
<td>Large improvement in elevator utilization</td>
<td>375</td>
<td>$40,000</td>
<td>$75,000</td>
</tr>
<tr>
<td>C</td>
<td>SAMPLE</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>Easier ceiling design detailing.</td>
<td>75</td>
<td>$</td>
<td>$2,165,000</td>
<td>Much greater patient calmness in certain situations</td>
<td>1000</td>
<td>$200,000</td>
<td>$1,369,000</td>
</tr>
<tr>
<td>D</td>
<td>SAMPLE</td>
<td>Water Treatment for Surgical Instruments</td>
<td>None</td>
<td>0</td>
<td>$</td>
<td>$476,000</td>
<td>Longer instrument life</td>
<td>206</td>
<td>$30,000</td>
<td>$52,000</td>
</tr>
<tr>
<td>E</td>
<td>SAMPLE</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>None</td>
<td>1</td>
<td>$</td>
<td>$108,000</td>
<td>More appealing Corridor 101 appearance.</td>
<td>250</td>
<td>$100,000</td>
<td>$100,000</td>
</tr>
</tbody>
</table>
The spreadsheet processes life cycle cost information similarly.  
- Life cycle cost input must be total LCC, not amount saved (e.g. energy)  
- Savings is determined and considered in the cells’ formulae.  
- Check Conditions for LCC Reference Line.  
- See Instructions (hidden Row 2) to sort priority (negatives first).  
- Choose the priority column (LCC not IC) to sort in descending order.  
- Tally $LCC is difference exceeding the unavoidable minimum.  
- Initial Spend is sum of actual initial costs of selected proposals.

<table>
<thead>
<tr>
<th>Greater Life Cycle Cost Alternative</th>
<th>Direction of Life Cycle Cost Improvement</th>
<th>Direction of Total Weight of Importance</th>
<th>Reference Line Comparison</th>
<th>Alternative Selected from the pair for Total LCC.</th>
<th>∆IMP</th>
<th>∆$ LCC</th>
<th>Incremental Priority (line slope) involving LCC.</th>
<th>Cumulative Total $LCC</th>
<th>Cumulative Total Initial D-B Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
<td>-225</td>
<td>$ 25,000</td>
<td>-9,000,000.00</td>
<td>25,000 $</td>
<td>60,000</td>
</tr>
<tr>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The With Proposal</td>
<td>75</td>
<td>$ 75,000</td>
<td>1,000,000.00</td>
<td>100,000 $</td>
<td>100,000</td>
</tr>
<tr>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
<td>-925</td>
<td>$ 796,000</td>
<td>-1,162,0603.0</td>
<td>896,000 $</td>
<td>300,000</td>
</tr>
<tr>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
<td>-206</td>
<td>$ 424,000</td>
<td>-485,84906.0</td>
<td>1,320,000 $</td>
<td>330,000</td>
</tr>
<tr>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
<td>-249</td>
<td>$ 8,000</td>
<td>-31,125,000.0</td>
<td>1,328,000 $</td>
<td>430,000</td>
</tr>
</tbody>
</table>

**Σ$LCC Differences** (cost + savings) before sorting
Establish the LCC Reference Lines (Conditions tab)

REFERENCE LINE (Adjust Min. Total Importance to Team’s Preference. Make sure that cost row exceeds largest proposed life cycle cost.)

<table>
<thead>
<tr>
<th>COST</th>
<th>0</th>
<th>$1,000,000</th>
<th>$2,000,000</th>
<th>$3,000,000</th>
<th>$4,000,000</th>
<th>$5,000,000</th>
<th>$6,000,000</th>
<th>$7,000,000</th>
<th>$8,000,000</th>
<th>$9,000,000</th>
<th>$10,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Total Importance of Alt</td>
<td>0</td>
<td>1.28</td>
<td>32</td>
<td>156</td>
<td>200</td>
<td>250</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>450</td>
<td>500</td>
</tr>
<tr>
<td>Ref Line SLOPE (Imp per $Mills LCC)</td>
<td>0.00</td>
<td>1.28</td>
<td>30.72</td>
<td>118.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
</tr>
<tr>
<td>Ref Line SLOPE to cost limit</td>
<td>1.28</td>
<td>30.72</td>
<td>118.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
<td>50.00</td>
</tr>
</tbody>
</table>

REFERENCE LINE
Minimum Required Total Importance of a Different Expenditure
These columns use the LCC and fill automatically.

<table>
<thead>
<tr>
<th>ID#</th>
<th>Description of Nonexclusive Proposals</th>
<th>Greater Life Cycle Cost, Alternative</th>
<th>Direction of Life Cycle Cost Improvement</th>
<th>Direction of Total Weight of Importance</th>
<th>Reference Line Comparison</th>
<th>Alternative Selected from the pair for Total LCC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>B</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>The With Proposal</td>
<td>With to Without</td>
<td>Importance Decreases</td>
<td>Incr Priority &gt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>C</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>D</td>
<td>Water Treatment for Surgical Instruments</td>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
<tr>
<td>E</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>The Without Proposal</td>
<td>Without to With</td>
<td>Importance Increases</td>
<td>Incr Priority &lt; Ref Line Slope</td>
<td>The With Proposal</td>
</tr>
</tbody>
</table>

This example displays unanchored pseudo-information. Do not use this data for decisions on your project.
Before sorting from high to low priority involving LCC

<table>
<thead>
<tr>
<th>ID#</th>
<th>Description of Nonexclusive Proposals</th>
<th>Alternative Selected from the pair for Total LCC.</th>
<th>∆IMP</th>
<th>∆$ LCC</th>
<th>Incremental Priority (line slope) involving LCC.</th>
<th>TALLY ∆$LCC</th>
<th>INITIAL SPEND</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>The With Proposal</td>
<td>-225</td>
<td>$25,000</td>
<td>-9,000.00000</td>
<td>$</td>
<td>25,000</td>
</tr>
<tr>
<td>B</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>The With Proposal</td>
<td>75</td>
<td>$75,000</td>
<td>1,000.00000</td>
<td>$</td>
<td>100,000</td>
</tr>
<tr>
<td>C</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>The With Proposal</td>
<td>-925</td>
<td>$796,000</td>
<td>-1,162.06030</td>
<td>$</td>
<td>896,000</td>
</tr>
<tr>
<td>D</td>
<td>Water Treatment for Surgical Instruments</td>
<td>The With Proposal</td>
<td>-206</td>
<td>$424,000</td>
<td>-485.84906</td>
<td>$</td>
<td>1,320,000</td>
</tr>
<tr>
<td>E</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>The With Proposal</td>
<td>-249</td>
<td>$8,000</td>
<td>-31,125.00000</td>
<td>$</td>
<td>1,328,000</td>
</tr>
</tbody>
</table>

This example displays unanchored pseudo-information.
Do not use this data for decisions on your project.
After sorting from high to low priority involving LCC, then adjusting formulae for Tally and Spend columns.

<table>
<thead>
<tr>
<th>ID#</th>
<th>Description of Nonexclusive Proposals</th>
<th>Alternative Selected from the pair for Total LCC.</th>
<th>IMP</th>
<th>$ LCC</th>
<th>Incremental Priority (line slope) involving LCC.</th>
<th>Cumulative Total $LCC</th>
<th>Cumulative Total Initial D-B Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>The With Proposal</td>
<td>-249</td>
<td>$ 8,000</td>
<td>-31,125.00000</td>
<td>$ 8,000</td>
<td>$ 100,000</td>
</tr>
<tr>
<td>A</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>The With Proposal</td>
<td>-225</td>
<td>$ 25,000</td>
<td>-9,000.00000</td>
<td>$ 33,000</td>
<td>$ 160,000</td>
</tr>
<tr>
<td>C</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>The With Proposal</td>
<td>-925</td>
<td>$ 796,000</td>
<td>-1,162.06030</td>
<td>$ 829,000</td>
<td>$ 360,000</td>
</tr>
<tr>
<td>D</td>
<td>Water Treatment for Surgical Instruments</td>
<td>The With Proposal</td>
<td>-206</td>
<td>$ 424,000</td>
<td>-485.84906</td>
<td>$ 1,253,000</td>
<td>$ 390,000</td>
</tr>
<tr>
<td>B</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>The With Proposal</td>
<td>75</td>
<td>$ 75,000</td>
<td>1,000.00000</td>
<td>$ 1,328,000</td>
<td>$ 430,000</td>
</tr>
</tbody>
</table>

Sequence the priorities from large to small negatives then large to small positives.

This example displays unanchored pseudo-information. Do not use this data for decisions on your project.
## The proposal order from IC sort changed. (It was D, C, A, E, B)

This example displays unanchored pseudo-information. 
Do not use this data for decisions on your project.
Using LCC, initial money spent can include different ID#.

<table>
<thead>
<tr>
<th>ID#</th>
<th>Description of Nonexclusive Proposals</th>
<th>Alternative Selected from the pair for Total LCC.</th>
<th>CALC PRIORITY for LCC</th>
<th>TALLY Δ$LCC</th>
<th>INITIAL SPEND</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ΔIMP</td>
<td>Δ$LCC</td>
<td>Cumulative Total Δ$LCC</td>
</tr>
<tr>
<td>E</td>
<td>Extend Premium Finishes further down public corridor 101.</td>
<td>The With Proposal</td>
<td>-249 $ 8,000</td>
<td>-31,125.00000</td>
<td>$8,000</td>
</tr>
<tr>
<td>A</td>
<td>Add sensors and motors to automate selected window shades</td>
<td>The With Proposal</td>
<td>-225 $ 25,000</td>
<td>-9,000.00000</td>
<td>$33,000</td>
</tr>
<tr>
<td>C</td>
<td>Graphic Projection at Imaging ceilings</td>
<td>The With Proposal</td>
<td>-925 $ 796,000</td>
<td>-1,162.06030</td>
<td>$829,000</td>
</tr>
<tr>
<td>D</td>
<td>Water Treatment for Surgical Instruments</td>
<td>The With Proposal</td>
<td>-206 $ 424,000</td>
<td>-485.84906</td>
<td>$1,253,000</td>
</tr>
<tr>
<td>B</td>
<td>Expedited Dispatch Controls for Public Elevators</td>
<td>The With Proposal</td>
<td>75 $ 75,000</td>
<td>1,000.00000</td>
<td>$1,328,000</td>
</tr>
</tbody>
</table>

For budget <$300k, buy E and A when using LCC rather than D, C, A using Initial Cost.

This example displays unanchored pseudo-information. Do not use this data for decisions on your project.
Integrating CBA and Lean’s A3

This lesson demonstrates Boldt’s integration of CBA with the A3 technique of Lean Management.

• Toyota developed the Problem-Solving A3 to guide improvement.
  – There are many good books about preparing an A3. Here are two:

• While many decisions can quickly occur using a simple CBA method, CBA can help inform the A3.

• CBA can provide a consistent format for comparison of alternatives and support of the recommendations.
Principle 13 of *The Toyota Way*
*Make Decisions Slowly by Consensus...*

The author wrote

“Use a set-based approach:
– Find out what is really going on;
– Understand underlying *cause*;
– Broadly consider *alternatives*
– Develop a detailed *rationale*;
– Build *consensus* within the team;
– Use very efficient *communication* vehicles.”


*CBA is compatible with Principle 13 of The Toyota Way in many ways.*
To inform the decision, this part of the A3 can be produced primarily using Choosing By Advantages.
To inform the decision, produce this part of the A3 by blending Value Analysis and Choosing By Advantages (CBA) techniques.

### Family Rooms and Alcoves

<table>
<thead>
<tr>
<th>Initial Cost Only ($k)</th>
<th>Life Cycle Cost ($Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alt 1</td>
<td>2513 PW at Family Rooms and Alcoves; $121,997 at Cafeteria and Physician Dining</td>
</tr>
<tr>
<td>Alt 2</td>
<td>44 years at Family Rooms and Alcoves; 6 years at Cafeteria and Physician Dining</td>
</tr>
<tr>
<td>Alt 3</td>
<td>26 years; 5 years at Cafeteria and Physician Dining</td>
</tr>
</tbody>
</table>
Lesson 8
Supplementary CBA Information

• Goal of our training modules
  – Quickly start use of CBA by our team
  – Enable integration of CBA into our team practices
• This introduction has not presented all the information.
  – Read the books and other handouts.
  – Buy Suhr’s professional (hardcover) book or supplementary volumes.
• Recommendations to become proficient
  – Avoid unsound methods and mannerisms. Help others avoid them.
  – Do not confuse unfamiliarity with complexity!
  – **Adopt CBA vocabulary.**
  – **Rigorously practice CBA correctly with the help of a mentor.**
  – Teach it correctly to others to the best of your ability.
Many unsound methods do not anchor decisions about importance to the relevant facts.

Anchoring requires Four Vital Thinking Skills:

1. **Specifying** vs Generalizing.
2. Using **Low Order Abstractions** vs High Order.
4. Using **Anchored Questions and Judgments** vs Unanchored.
Four Vital Thinking Skills

1. **Specifying vs Generalizing.**
   
   This skill is about our process of describing and interpreting the world we experience.

   We cannot be certain that two persons experience the same thing exactly the same way.

   CBA contributes to improving understanding by causing us to think and communicate more clearly.
Four Vital Thinking Skills
1. Specifying vs Generalizing.
2. Using Low Order vs High Order Abstractions.

This skill is about our correct use of the information.

At what level can we realistically and correctly judge importance?

A specific picture in a catalog is a low order abstraction of a real chair. The picture is not the chair itself.
Four Vital Thinking Skills

1. Specifying vs Generalizing.
2. Using Low Order vs High Order Abstractions.

We instinctively assume data for a decision, even when provided facts.

Have you formed an image of the brown leather recliner in your mind?
Did you sense what it might feel like to sit in it?

If so, you instinctively assumed data based on other knowledge.
You assumed its texture, proportion, comfort and operation ease.
Any or all assumptions may be incorrect.
We must refine our information until it consists of relevant facts.
Four Vital Thinking Skills

1. Specifying vs Generalizing.
2. Using Low Order vs High Order Abstractions.
4. Using Anchored Questions and Judgments.

Use sound-decisionmaking patterns of thought and speech to ask questions specifically connected to relevant facts. Anchor decisions to those relevant facts.

“Do we want the longer length of the brown leather recliner on page 27 relative to the length of the white cloth recliner on page 28 of the catalog? Shouldn’t we sit in them?”
Lesson 8
Supplementary CBA Information

• Without the CBA system, decisionmakers would only have a disjointed collection of methods, each with its own philosophy, vocabulary and notation system. Most of these are unsound or inadequate. Some even admit to being unusable by most of society.

• Choosing By Advantages simplifies, clarifies and unifies the art of decisionmaking for everyone, children included.
Lesson 8
Supplementary CBA Information

• CBA is sound. It is fast in most cases.
  – With practice you will be able to use the quicker sound CBA methods to mentally form the majority of your daily decisions.
  – Many other decisions can be clarified using the Two-List Method.
  – Many prioritizations can be performed mentally or with a simple table.
  – Only the more complex situations will require the Tabular Method or Allocation Method spreadsheet. It will be wonderful to realize you now have sound methods to help simplify and clarify situations and correctly consider the role of money.
Lesson 8
Supplementary CBA Information

• CBA must be used correctly… or it is not CBA!
  – If CBA is modified in any way contrary to its tested methods, models, principles and definitions, it is no longer CBA.
  – Most people receiving the training believe it is sound and use it willingly.
  – It is crucial that project leadership receive training. Otherwise morale of people reporting to them will suffer and process errors will not be seen.
  – In my experience, the significant causes of delay in CBA effort are: lack of stable criteria, lack of relevant information, deficient customer contact and politics. Those would delay any process.
Lesson 8
Supplementary CBA Information

• **CBA can support creativity.** Find the factors that may contain important differences. Ask your team to describe the advantages their customer expects to receive by the solution:
  – What will the customer like or dislike?
  – What advantages do they want to receive?
  – What would make the solution better, interesting or unique?
Lesson 8
Supplementary CBA Information

• Teamwork: Keep discussions focused using CBA. It can expedite, improve clarity, unify and avoid **collective misjudgment**.
  – Groupthink *(Trying to please others, critical thinking does not occur)*
  – Individual Abuse of Power *(Use of power itself is more important)*
  – Collective Abuse of Power *(Majority won’t listen to the individual)*
  – Severe Collective Misjudgment *(Like Groupthink, but everyone is aware)*
  – Power Struggle *(Misuse of debating, voting, striking, warring by group)*
This seminar has been an introduction. Additional CBA methods and models already exist.

- Scoring Sheet Method
- One-Text Process
- Prior Anchoring Process
- Other special methods

Find them in Suhr’s book available on Amazon.
Lesson 8
Supplementary CBA Information

• CBA produces improvement, not perfection.
• It is a set of skills vital in our complex, rapidly-changing world.
• Billions of decisions are required daily.
• CBA provides an opportunity to soundly choose!
Supplementary CBA Information

Obtain the Decisionmaker’s viewpoint.
Decisions must be anchored to the relevant facts.
Decisions must be based on the importance of advantages.

All decisions deserve to be made using a sound method.

CBA is a learned set of skills based upon:
- A sound decisionmaking system unified by
- Definitions, principles, models and methods

CBA makes good decisionmakers even better
and will build a more peaceful world.
Questions about Choosing By Advantages?

We can help.

Thank you!

The Boldt Company

John Koga, Approved CBA Trainer
CM-Lean  CVS-Life  AIA  LEED AP BD+C
Vice President, Performance and Innovation Resources

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CA  Ph 415 762 8344
Cell  Ph 415 265 3048