Lean Construction Institute

Provider Number H561

Choosing By Advantages

20141007CBA

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Course Description

Choosing By Advantages is a process for making sound decisions for both simple and complex situations in project management. Participants will learn Choosing By Advantages Fundamentals, how to select only one from a set of alternatives, and how to soundly prioritize the use of time or funds. The class consists of both lecture and hands-CBA classwork and participants will be provided with tools to put CBA to work right away.

Learning Objectives

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

1. Participants will utilize sound decision methods that simplify complex decision making.

2. Participants will be able to identify the correct use of data and money with sound decision making methods and discussion.

3. Participants will apply sound decision making methods to analyze several alternatives and recognize a single choice.

4. Participants will be able to assess proposals and funding, and demonstrate the ability to properly prioritize them.

Introducing the CBA Sound Decisionmaking System

by John Koga
The Boldt Company

Introducing
The CBA Sound Decisionmaking System

 john.koga@boldt.com

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.

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BOLDT®

Introducing
The CBA Sound Decisionmaking System

 john.koga@boldt.com

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: 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

BOLDT

John Koga Margaret Suhr Jim Suhr

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.

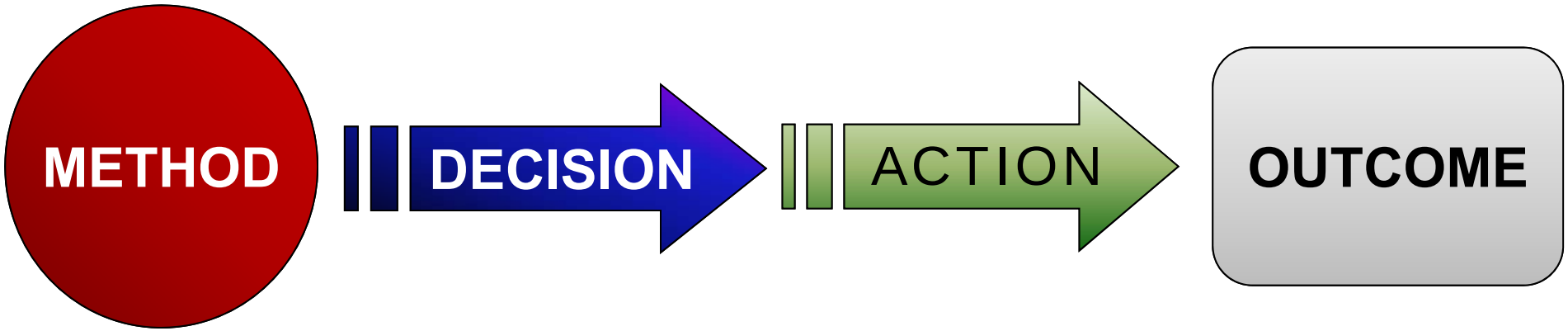
Handout: Our Decisionmaking Roots

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.

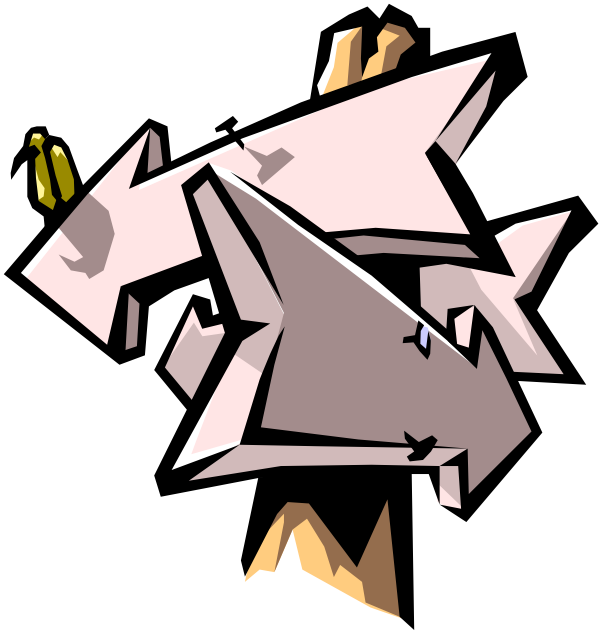
Proficiency in CBA requires complete training, proper mentoring and regular practice.

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.

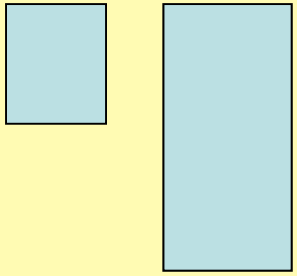


CBA does!

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

High Order Abstraction: Openings



Low Order Abstraction: Model 27, cherry stained ext stile and rail door with 3-40 SI lites…

CBA does!

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?

	Alt K	Alt R
Factor A	6	4
Factor B	4	6
Total	**10**	**10**

Do Not Use this Method

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.

- Agree ○ Disagree
- Agree ○ Disagree
- Agree ○ Disagree

- 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.

- Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree

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.
- The basic concepts that initially stimulated development of CBA came from the book, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* by Alfred A. Korzybski (1933).
- 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!)

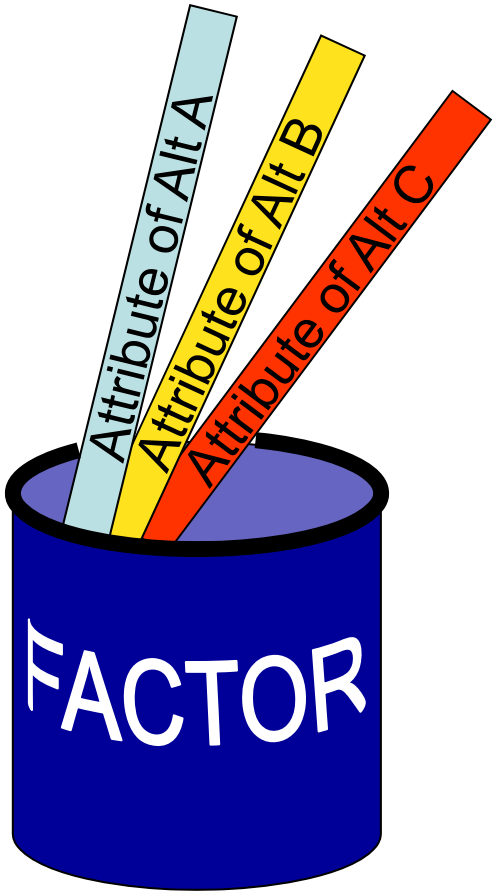
Definitions used in CBA

- **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**	**Arm B**
Factor:	**Strength**	**Strength**
Attribute:	**1 strength unit**	**3 strength units**
Difference in strength:	**2 units**	
Criterion:	**More strength is better**	
Advantage:	**2 *more* strength units**	

The Fundamental Rule of CBA

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

Recognition-Response CBA

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.

Advantages of edible cone	Advantages of plastic dish
•More flavor complexity	•Less potential leakage and mess for me
•More food to eat	
•More degradable	

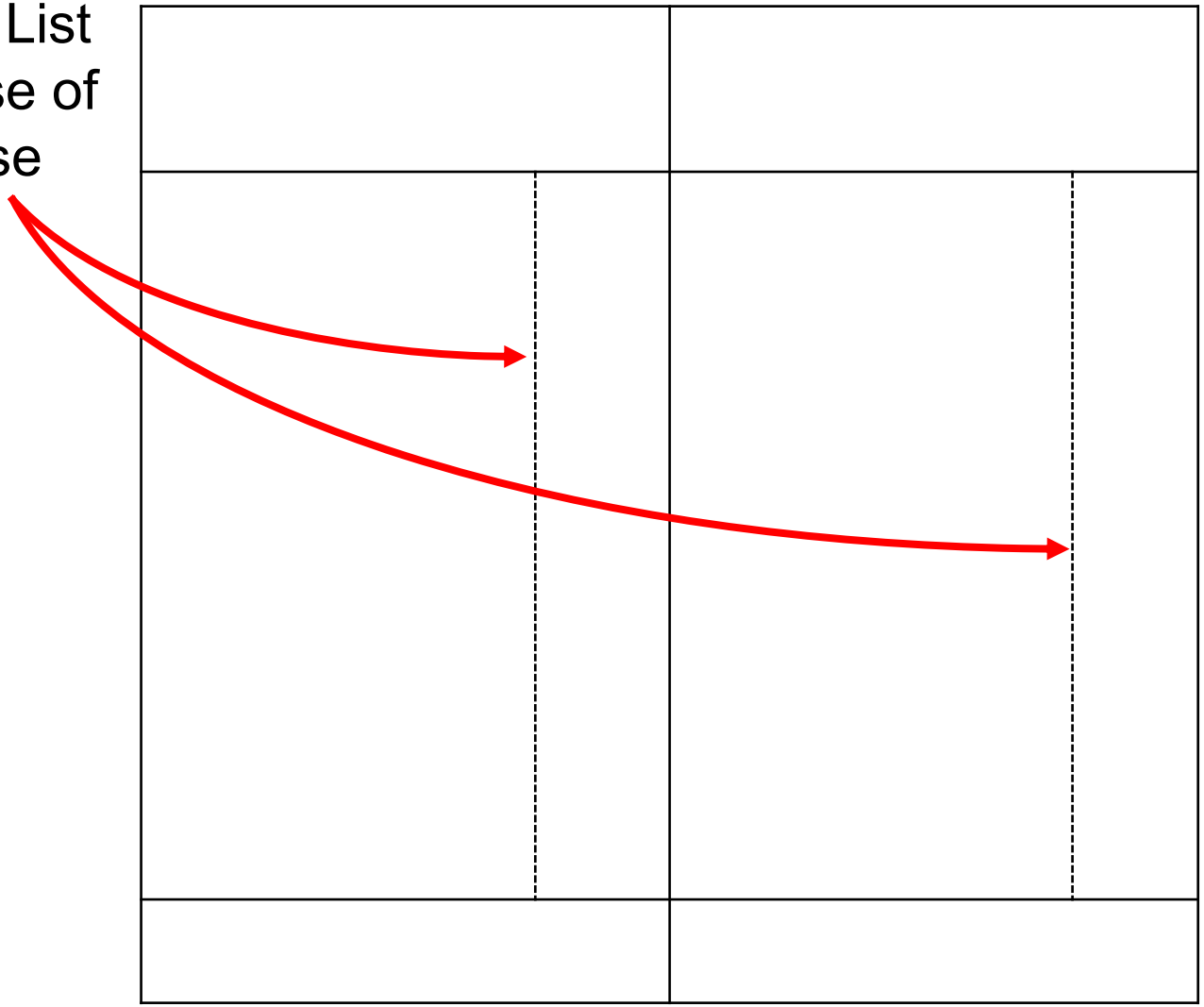
Choosing either set is possible!

Simplified Two List Method: Try it!

1. Draw the CBA Two List format.

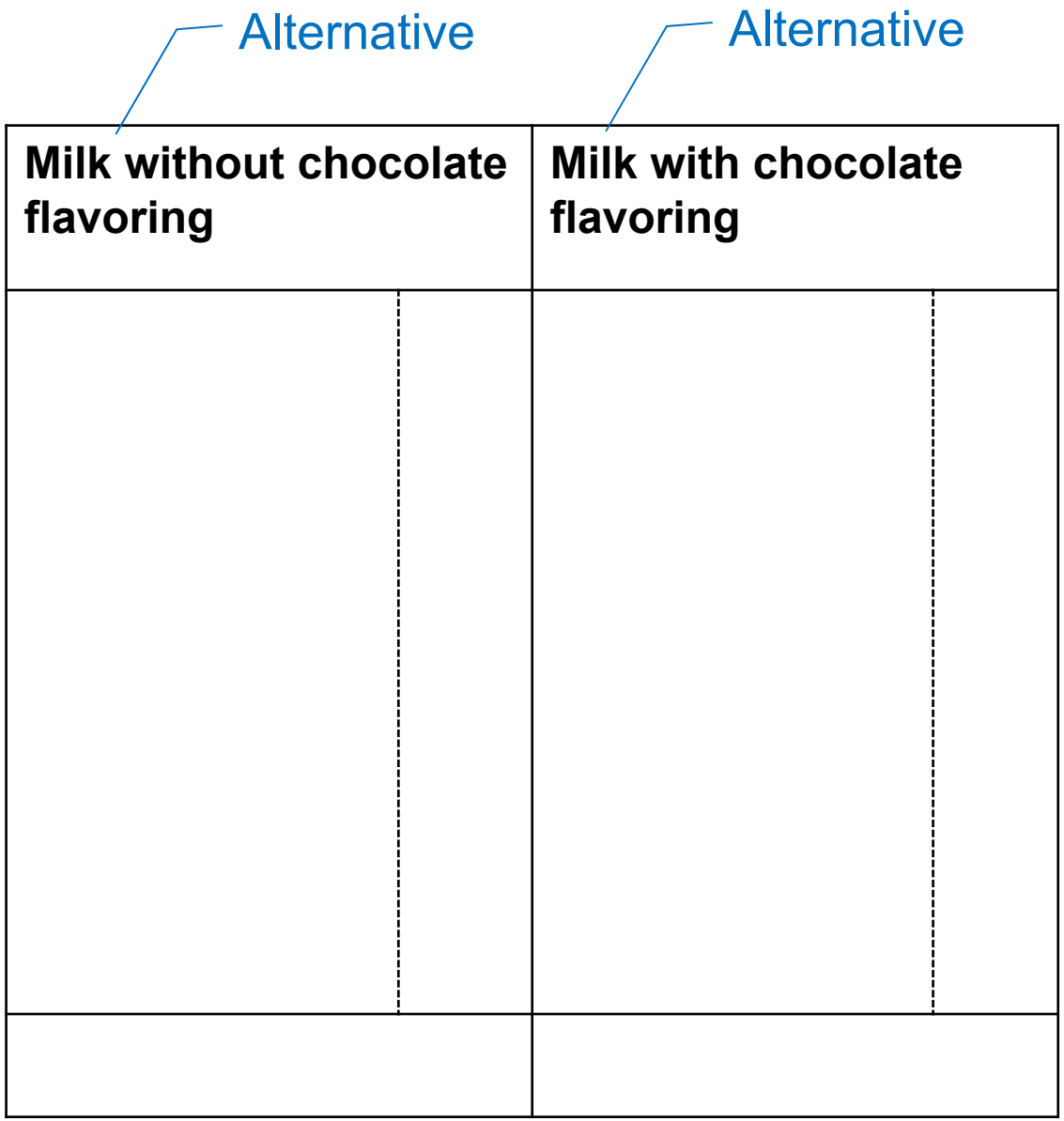
Simplified Two List Method: Try it!

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.



Simplified Two List Method: Try it!

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

Attribute - a characteristic of one alternative.

Advantage - a difference between two attributes.

Milk without chocolate flavoring	**Milk with chocolate flavoring**

Simplified Two List Method: Try it!

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

Milk without chocolate flavoring	**Milk with chocolate flavoring**
	•More chocolaty flavor

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.

Milk without chocolate flavoring	**Milk with chocolate flavoring**
	•More chocolaty flavor

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).

Milk without chocolate flavoring	**Milk with chocolate flavoring**
•Less chocolaty flavor	•More chocolaty flavor

You might be tempted to also write this phrase. Should you? Let's find out.

Simplified Two List Method: Mistakes

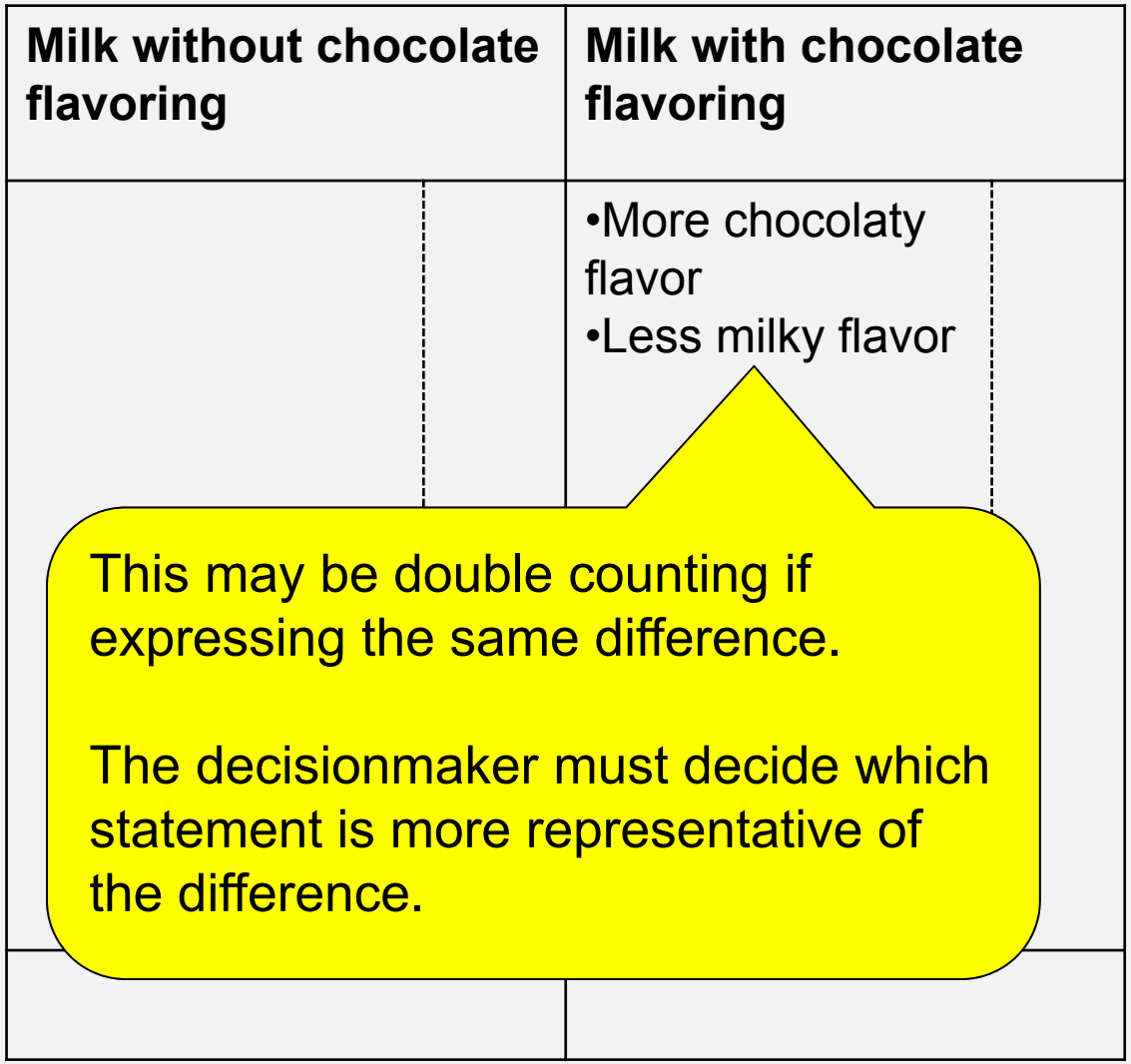
1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the **advantage** (beneficial difference).

Milk without chocolate flavoring	**Milk with chocolate flavoring**
•~~Less chocolaty flavor~~	•More chocolaty flavor

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).



Simplified Two List Method: Viewpoint of person wanting to avoid milk flavor

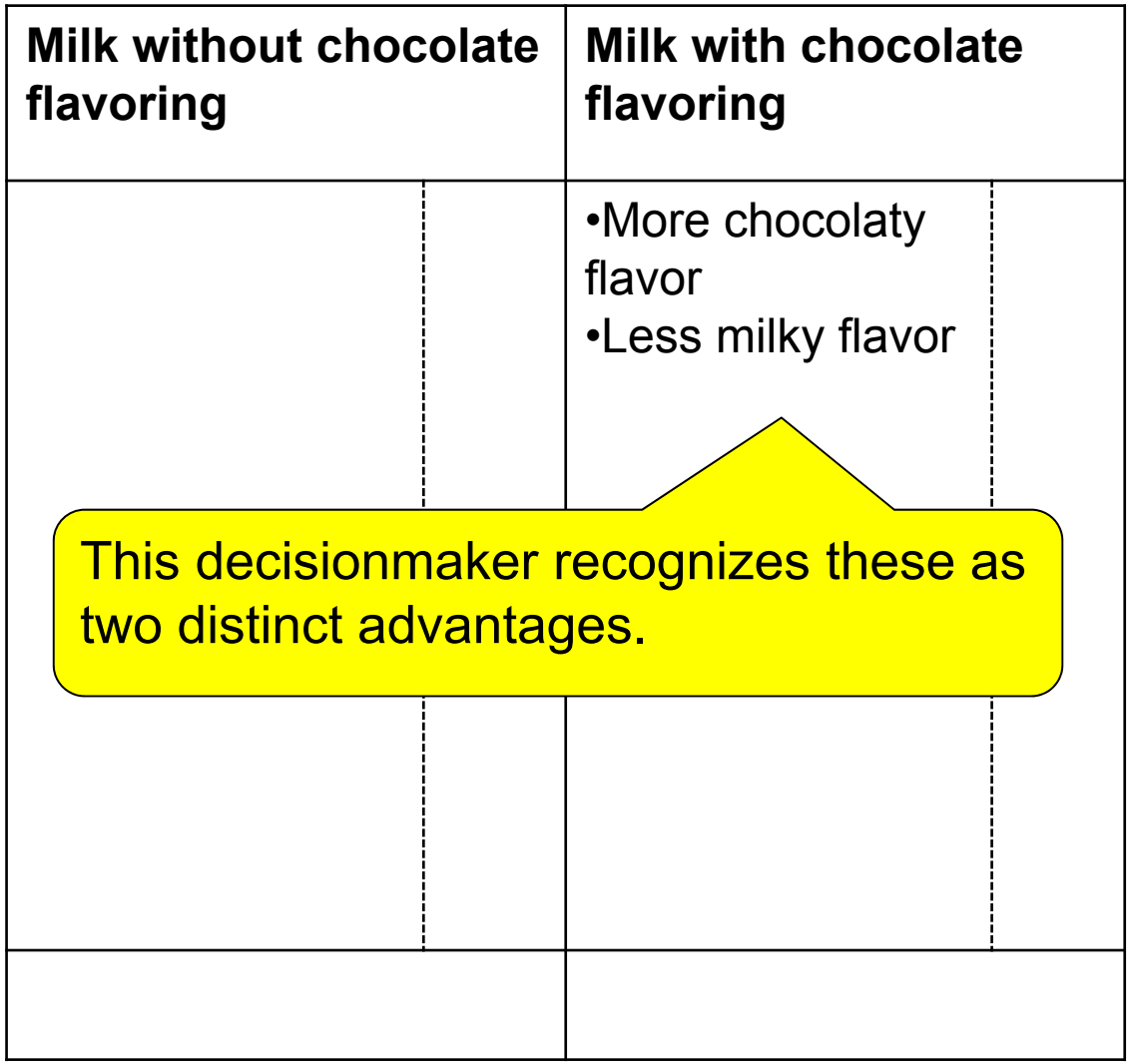
1. Draw the CBA Two List format.
2. State the alternatives.
3. Perceive a comparable attribute of each alternative, decide the least preferred, and write the **advantage** (beneficial difference).

Milk without chocolate flavoring	**Milk with chocolate flavoring**
	•Less milky flavor

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).



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).

Milk without chocolate flavoring	**Milk with chocolate flavoring**
•Less chocolaty flavor •More milky flavor	

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.

Milk without chocolate flavoring	**Milk with chocolate flavoring**
	•More chocolaty flavor

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.

Milk without chocolate flavoring	**Milk with chocolate flavoring**
•Fewer calories	•More chocolaty flavor •Less milky flavor •More intense color

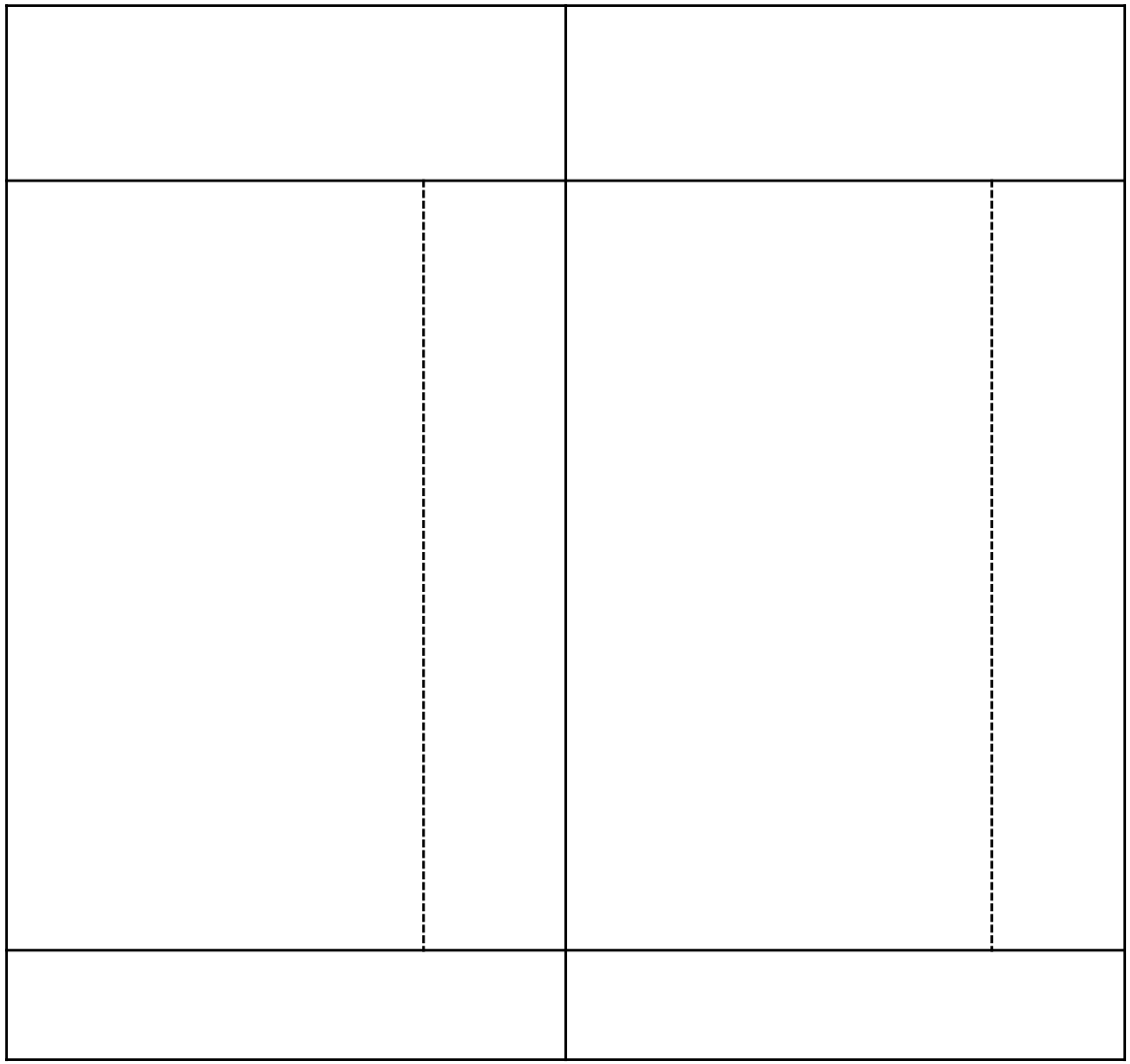
The importance of one advantage can be greater than the importance of a set of advantages. Do you agree?

Simplified Two List Method: Try one more!

1. Draw the CBA Two List format.

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.

Extension Cord without inspector’s tape.	**Extension Cord with white inspector’s tape.**

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.

Extension Cord without inspector's tape. It's January.	**Extension Cord with white inspector's tape. It's January.**
	•More compliant cord

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.

Advantages of edible cone		Advantages of plastic dish	
•More flavor complexity	8	•Less potential leakage and mess for me	4
•More food to eat	1		
•More degradable	10		
	19		4

Weighing Importance of the 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. 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.

Scale of Importance	
10	More degradable
9	
8	More flavor complexity
7	
6	
5	
4	Less potential leakage and mess for me
3	
2	
1	More food to eat
0	

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		Advantages of plastic dish	
•More flavor complexity	1	•Less potential leakage and mess for me	10
•More food to eat	1		
•More degradable	6		
	8		10

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.

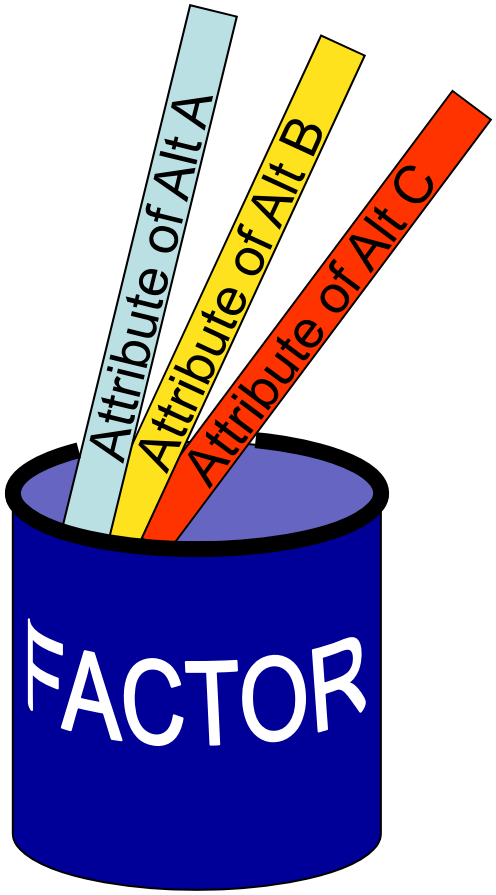
Complex Decisions involving only Mutually Exclusive Alternatives

- 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.

Review a 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 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.

Attribute

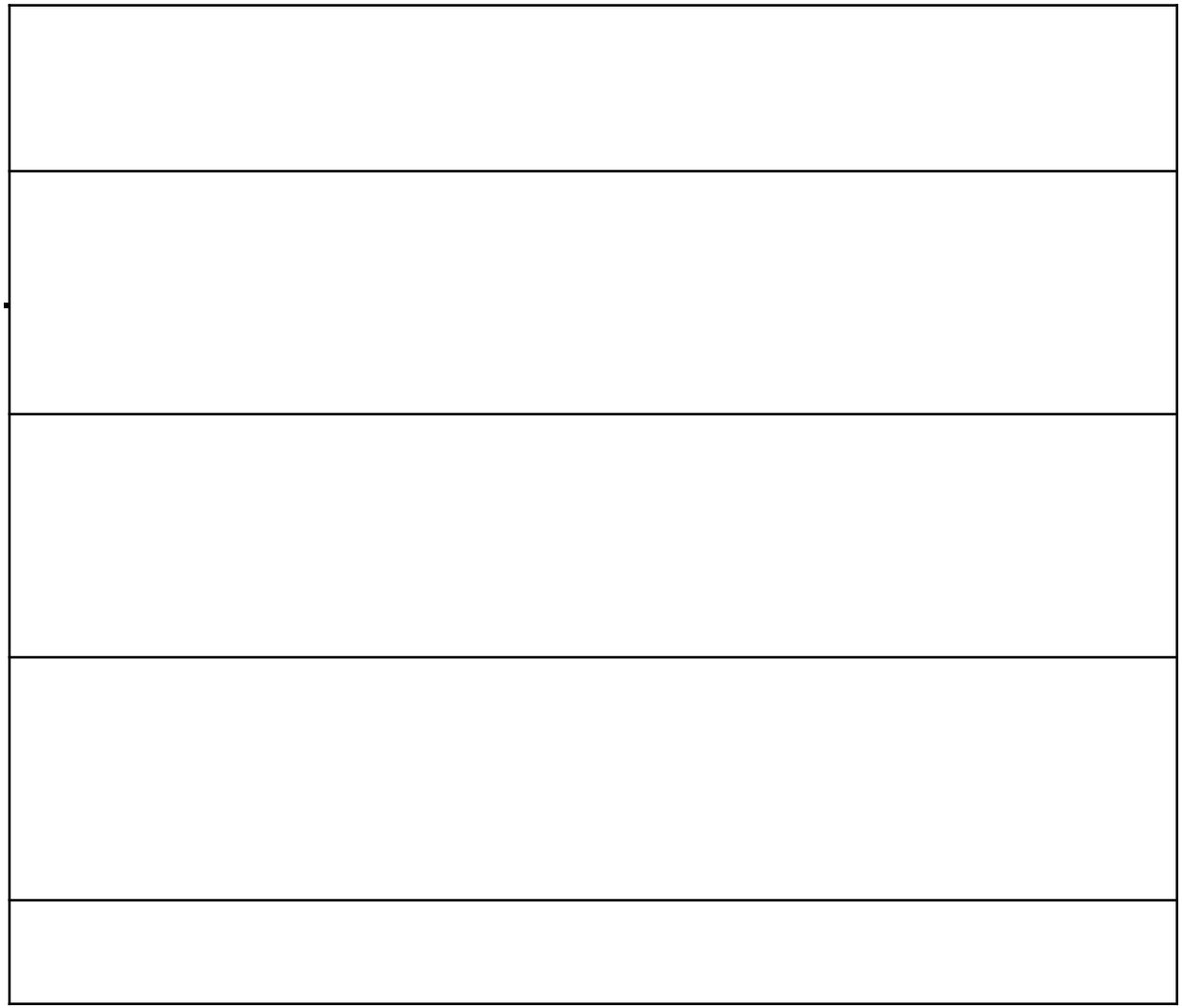
Advantage

	Alternative 1: edible cone		Alternative 2: plastic dish	
Factor: **FLAVOR**	Ice cream & cone		Ice cream	
Criterion: I like merging flavors	•More flavor complexity	8		
Factor: **MESS**	Container broken down		Container intact	
Criterion: Less mess is better			•Less potential leakage	4
Factor: **HUNGER**	Ice cream & cone		Ice cream	
Criterion: More food is better	•More food to eat	1		
Factor: **WASTE**	Container eaten		Discard non-degradable container	
Criterion: Less waste is better	•More degradable	10		
Total Importance:		**19**		**4**

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.



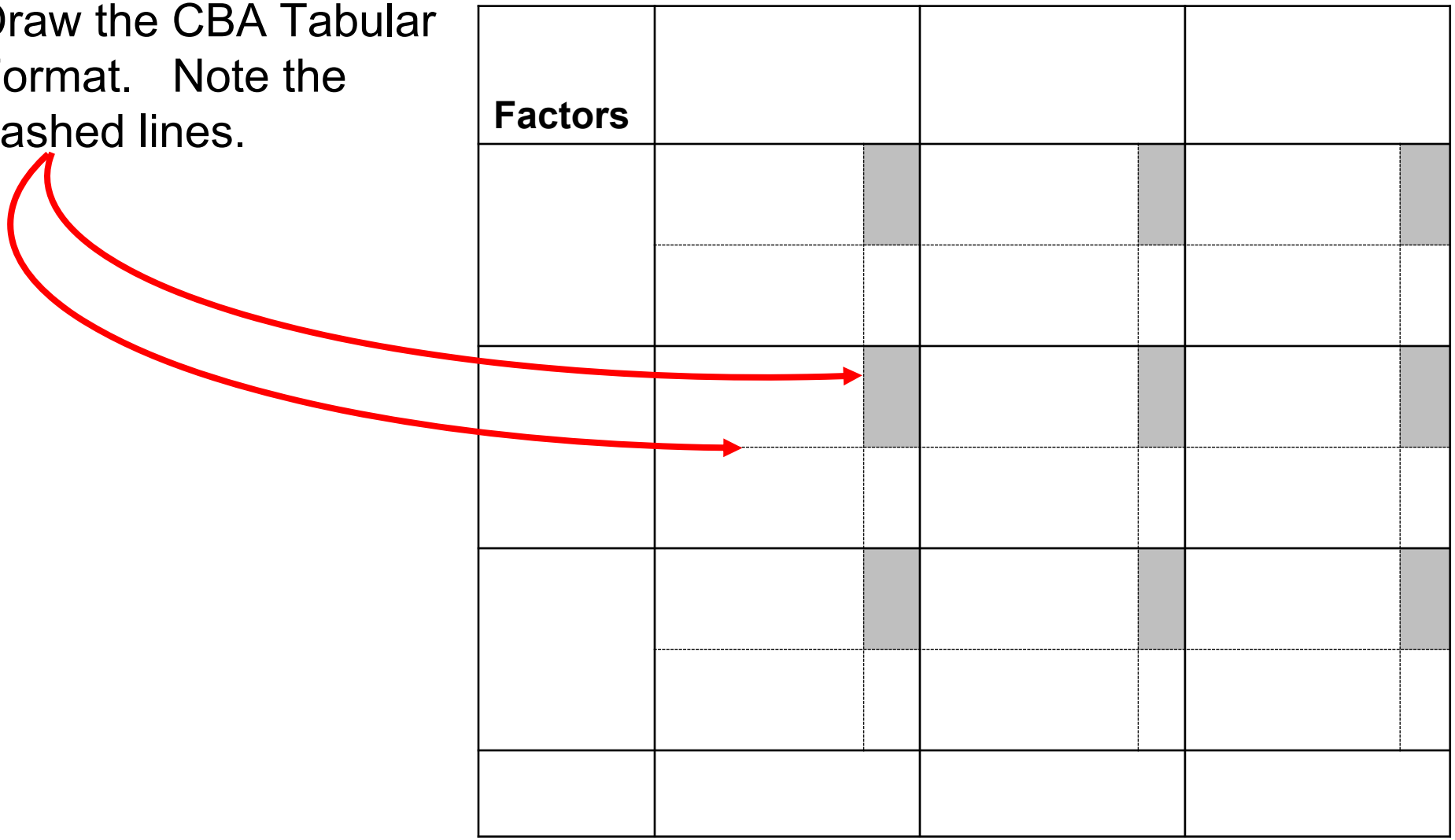
Tabular Method (applies to 2 or more alternatives)

Draw the CBA Tabular Format.

Factors			

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.

Factors	**Unflavored 1% Milk**	**Milk with chocolate flavoring**	**Milk with strawberry flavoring**
Flavor (Want chocolate)			
Calories (Want low calories)			
Visual Appeal (Want it intense)			

Tabular Method

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

Factors	Unflavored 1% Milk		Milk with chocolate flavoring		Milk with strawberry flavoring	
Flavor (Want chocolate)	Milky flavor		Chocolate flavor		Strawberry flavor	
Calories (Want low calories)	130		230		190	
Visual Appeal (Want it intense)	White		Dark brown color		Pale pink color	

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.

Factors	Unflavored 1% Milk	Milk with chocolate flavoring	Milk with strawberry flavoring
Flavor (Want chocolate)	Milky flavor	Chocolate flavor	Strawberry flavor
Calories (Want low calories)	130	230	190
Visual Appeal (Want it intense)	White	Dark brown color	Pale pink color

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).

Factors	**Unflavored 1% Milk**	**Milk with chocolate flavoring**	**Milk with strawberry flavoring**
Flavor (Want chocolate)	<u>Milky flavor</u>	Chocolate flavor	Strawberry flavor
		More chocolaty	
Calories (Want low calories)	130	<u>230</u>	190
	100 fewer calories		40 fewer calories
Visual Appeal (Want it intense)	White	Dark brown color	<u>Pale pink color</u>
	More intense color	Much more intense color	

Tabular Method

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

Factors	Unflavored 1% Milk		Milk with chocolate flavoring		Milk with strawberry flavoring	
Flavor (Want chocolate)	Milky flavor		Chocolate flavor		Strawberry flavor	
			More chocolaty			
Calories (Want low calories)	130		230		190	
	100 fewer calories				40 fewer calories	
Visual Appeal (Want it intense)	White		Dark brown color		Pale pink color	
	More intense color		Much more intense color			

Tabular Method

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.)

Factors	Unflavored 1% Milk		Milk with chocolate flavoring		Milk with strawberry flavoring	
Flavor (Want chocolate)	Milky flavor		Chocolate flavor		Strawberry flavor	
			More chocolaty	10		
Calories (Want low calories)	130		230		190	
	100 fewer calories				40 fewer calories	
Visual Appeal (Want it intense)	White		Dark brown color		Pale pink color	
	More intense color		Much more intense color			

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.

10	More chocolaty
9	
8	
7	
6	Much more intense color
5	100 fewer calories
4	
3	
2	
1	
0	

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.

10	More chocolaty
9	
8	
7	
6	Much more intense color
5	100 fewer calories
4	
3	More intense color
2	40 fewer calories
1	
0	

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

9. Enter the number representing the relative weight of importance.
10. Sum the Total Importance (TI).
11. Choose greatest TI

Factors	Unflavored 1% Milk		Milk with chocolate flavoring		Milk with strawberry flavoring	
Flavor (Want chocolate)	Milky flavor		Chocolate flavor		Strawberry flavor	
			More chocolaty	10		
Calories (Want low calories)	130		230		190	
	100 fewer calories	5			40 fewer calories	2
Visual Appeal (Want it intense)	White		Dark brown color		Pale pink color	
	More intense color	3	Much more intense color	6		
Total Importance		8		**16**		2

Negligible difference in cost was assumed.

Tabular Method

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.

Factors	Unflavored 1% Milk		Milk with chocolate flavoring		Milk with strawberry flavoring	
Flavor (Want chocolate)	Milky flavor		Chocolate flavor		Strawberry flavor	
			More chocolaty	8		
Calories (Want low calories)	130		230		190	
	100 fewer calories	10			40 fewer calories	2
Visual Appeal (Want it intense)	White		Dark brown color		Pale pink color	
	More intense color	3	Much more intense color	7		
Total Importance		13		**15**		2

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

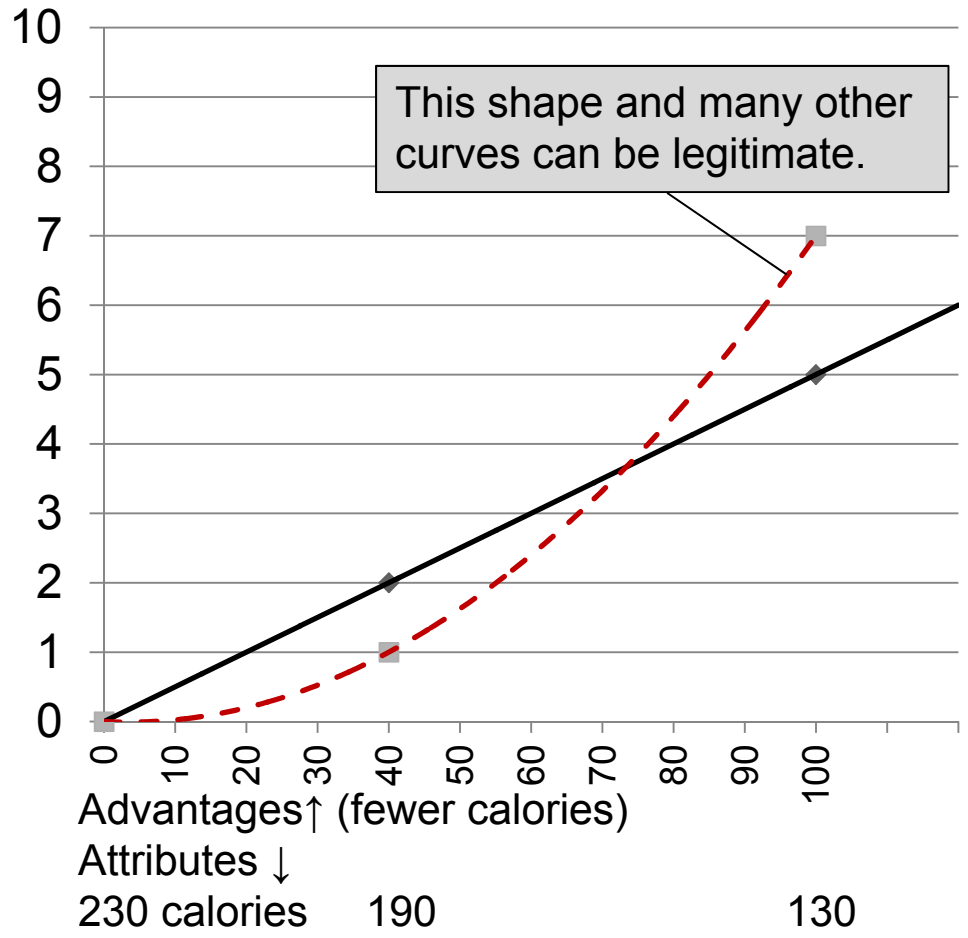
Match the vertical axis to the Preference Chart.

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.

Preference Curve

Factor: Calories



Tabular Method when using Preference Curves

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

Factors	Unflavored 1% Milk		Milk with chocolate flavoring		Milk with strawberry flavoring	
Flavor (Want chocolate)	Milky flavor		Chocolate flavor		Strawberry flavor	
			More chocolaty	10		
Calories (Want low calories)	130		230		190	
	100 fewer calories	7			40 fewer calories	1
Visual Appeal (Want it intense)	White		Dark brown color		Pale pink color	
	More intense color	3	Much more intense color	6		
Total Importance		10		**16**		1

Peer-reviewed Process Variations

Suhr's Tabular Method

Factors	Alternative		Alternative		Alternative	
Factor	Least-Preferred Attribute		Attribute		No difference Attribute	
			Paramount Advantage	10		
Factor	Attribute		Least-Preferred Attribute		Attribute	
	Most Important Advantage in this Factor	7			Advantage	1
Total Importance		7		**10**		1

Paramount

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

Adapted Tabular Method

Factors and Criteria	Alternative		Alternative		Alternative	
Factor (Criterion)	Least-Preferred Attribute		Attribute		No difference Attribute	
			Paramount Advantage	10		
Factor (Criterion)	Attribute		Least-Preferred Attribute		Attribute	
	Most Important Advantage in this Factor	7			Advantage	1
Total Importance		7		**10**		1

Paramount

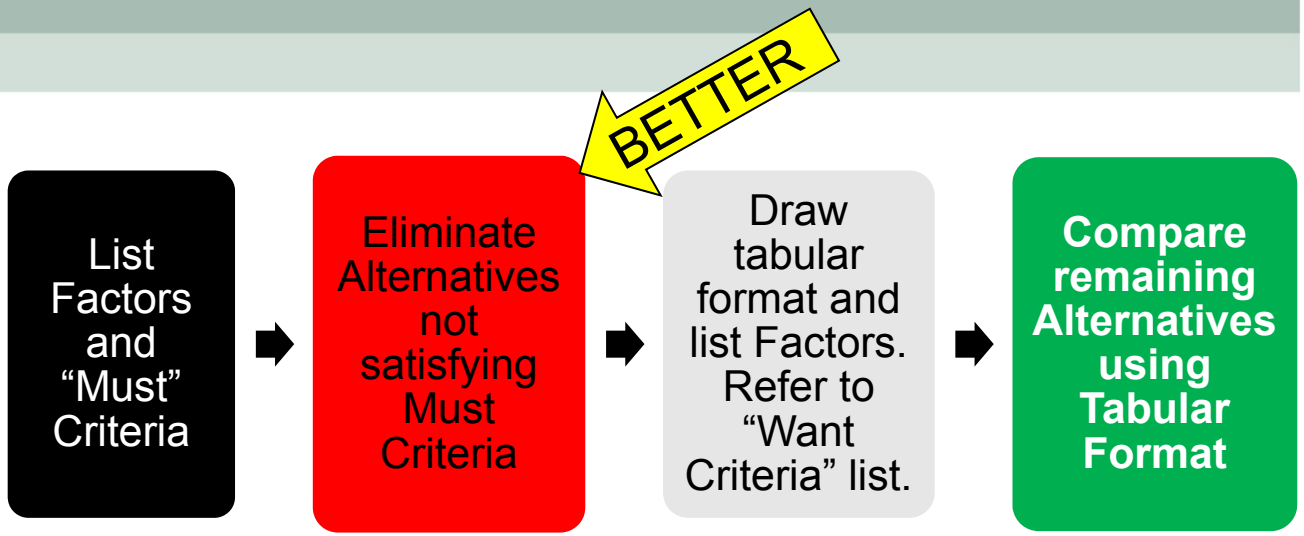
"Double A-IT" and "Highlight, Circle, Weigh, Decide"

Establish Paramount Advantage and anchor to it when weighing importance.

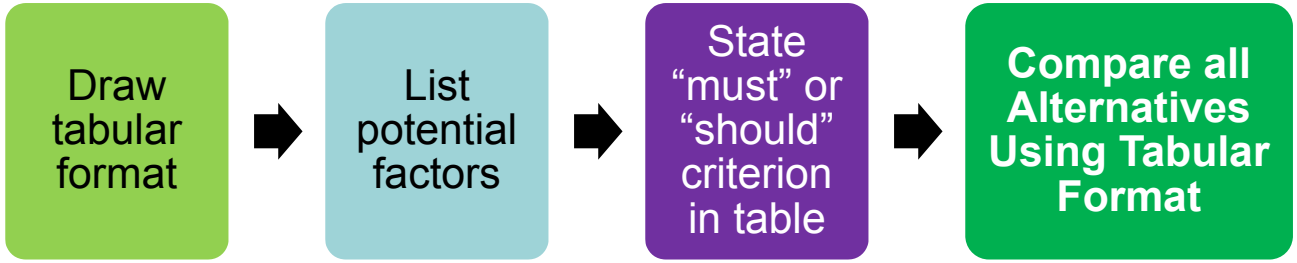
Peer-reviewed Process Variations

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.



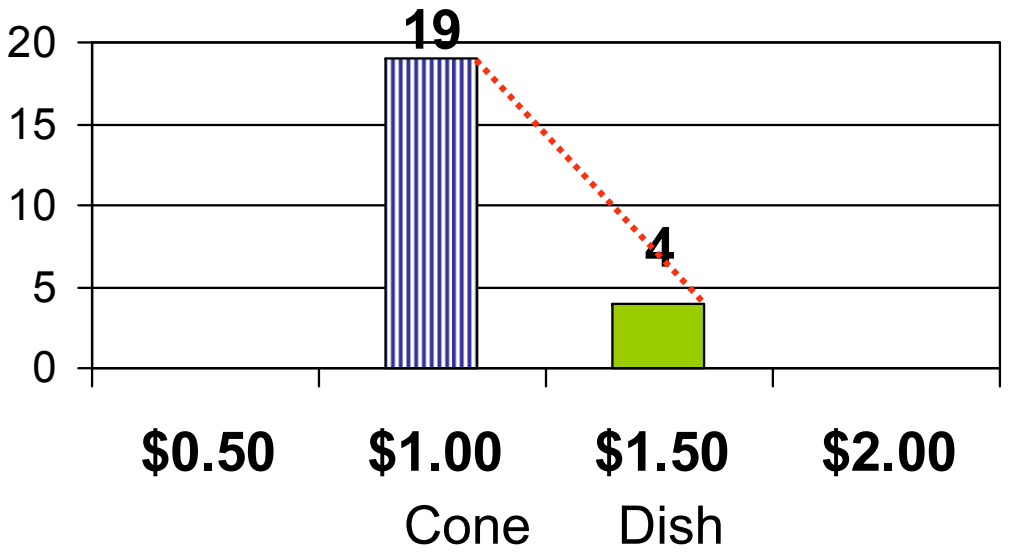
Unequal Money Decisions

- 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.*



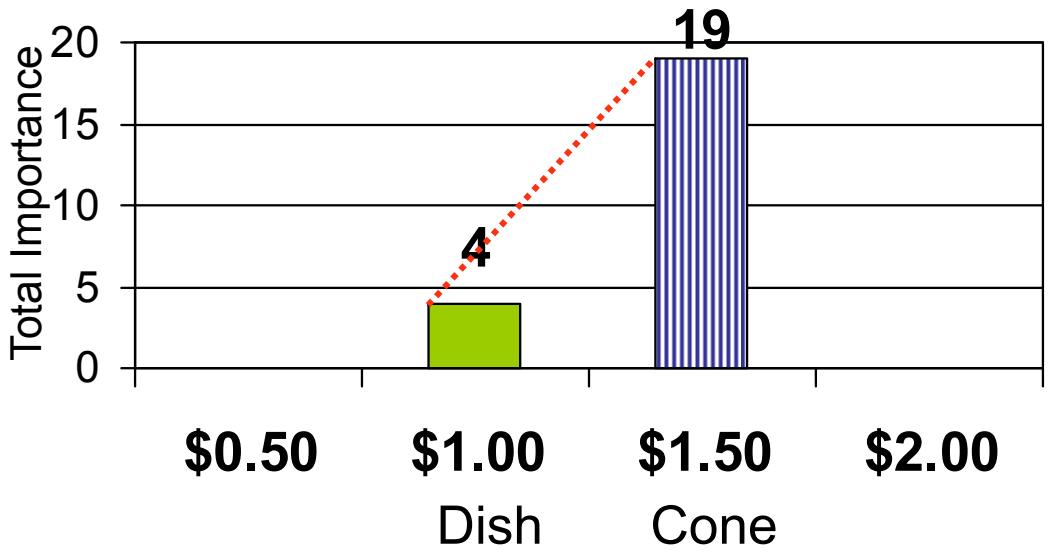
For non-exclusive proposals, use appropriate CBA method of funding allocation. (See our Module 2 training.)

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.

Factors	**Alternative A No Mockup**		**Alternative B Partial full scale Mockup**		**Alternative C Extensive full scale Mockup**	
Constructability (Must have details that work)	Must study drawings to decide		Can experience building many details		Can experience all typical details	
Maintainability (Should be easy to maintain. Easier is better)	Must study drawings to decide		Can get hands-on with certain details		Can inspect most typical conditions	
Visual Appeal (Want design to aid healing of patient)	Can only view renderings		Can view some appearance, <5%		Can view a 10% elevation and deck	

Tabular Method – Unequal Money example

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

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

Scale of Importance for example

10	Much better testing opportunity
9	Much more realistic basis for opinion
8	
7	
6	Much greater understanding
5	Somewhat Better testing opportunity
4	Slightly more realistic basis
3	
2	Greater understanding
1	
0	

Tabular Method – Unequal Money example

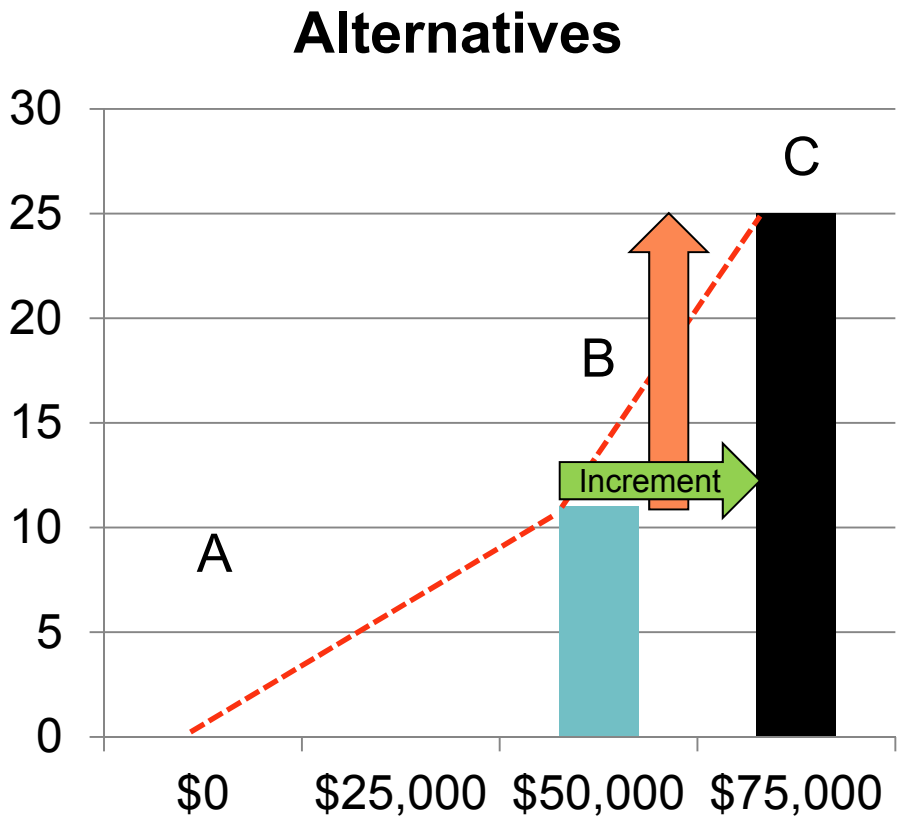
Should we build a mockup of a unique roof courtyard design?

Factors	Alternative A No Mockup		Alternative B Partial full scale Mockup		Alternative C Extensive full scale Mockup	
Constructability (Must have details that work)	Must study drawings to decide		Can experience building many details		Can experience all typical details	
			Greater understanding	2	Much greater understanding	6
Maintainability (Should be easy to maintain. Easier is better)	Must study drawings to decide		Can get hands-on with certain details		Can inspect most typical conditions	
			Somewhat Better testing opportunity	5	Much better testing opportunity	10
Visual Appeal (Want design to aid healing of patient)	Can only view renderings		Can view some appearance, <5%		Can view a 10% elevation and deck	
			Slightly more realistic basis	4	Much more realistic basis for opinion	9
		0		11		25

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.

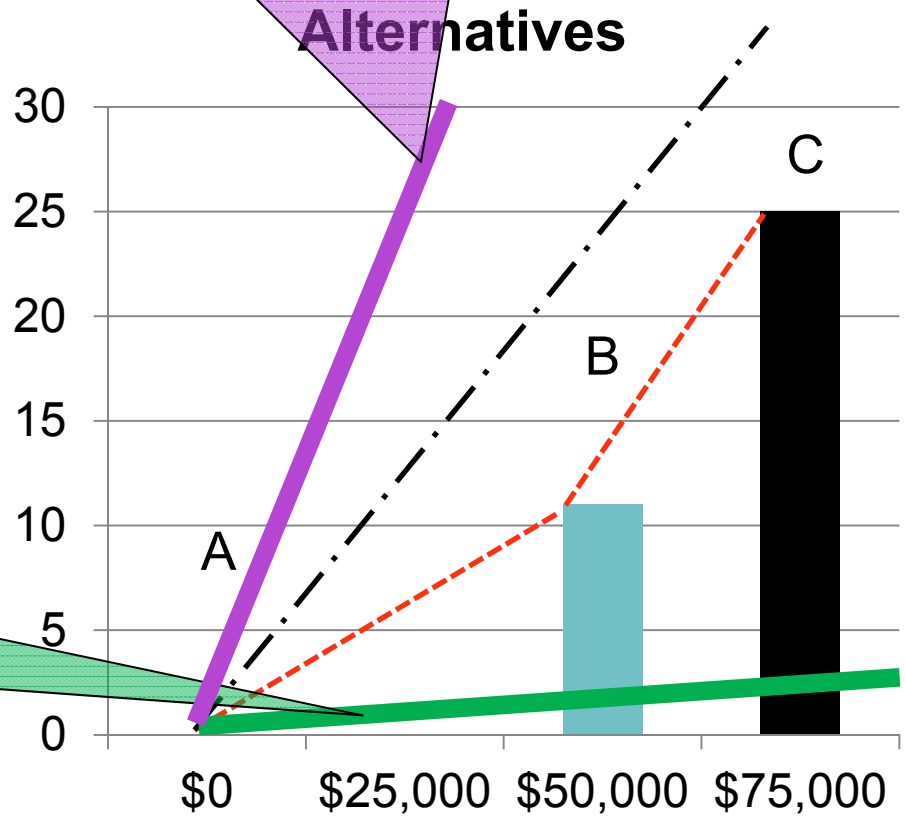


Tabular Method Chart for Unequal Money

- 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 would insist on receiving high tangible importance to authorize spending $25,000.

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



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.

The Fundamental Rule for 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.

The Fundamental Rule for 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 importance of advantages,
not the importance of dollars.

How can we consistently make sound decisions?

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

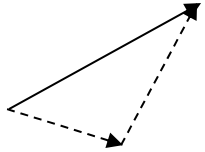
- Principle 2: Decisions must be based on the importance of advantages.
  (The Fundamental Rule of Sound Decisionmaking)

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

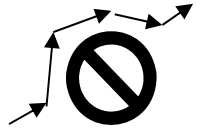
- Principle 4: Different types of decisions call for different sound methods.
  (The Methods Principle)

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.
  - *Explained in Lesson 3.*

Hints about Factors

Borrowing these descriptions from a method called Function Analysis can 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!

- Use more descriptive advantage phrases such as

  “a very small difference in taste appeal”

  in lieu of saying “less tasty.”

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

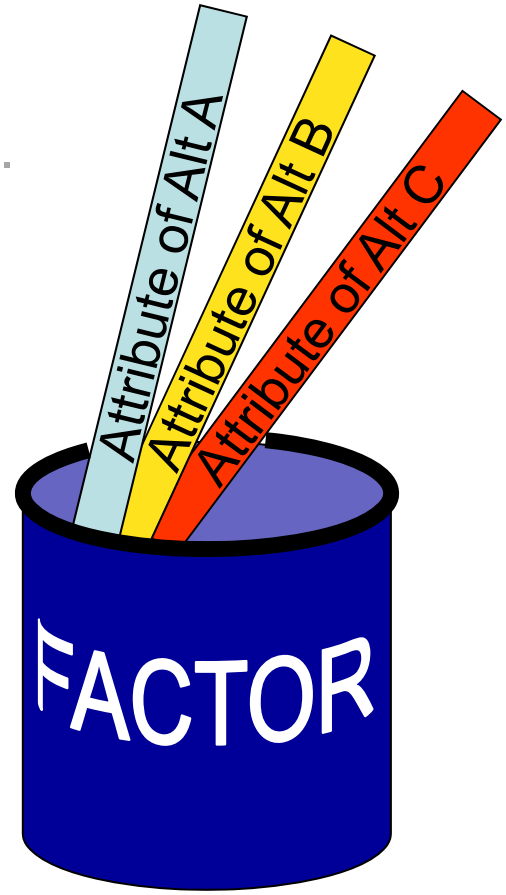
Weighing Importance of Advantages

- 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.

CBA Methods for 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 plans.
- **Proposals**: Two or more nonexclusive plans.

From now on say “proposals” when you mean that the 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:

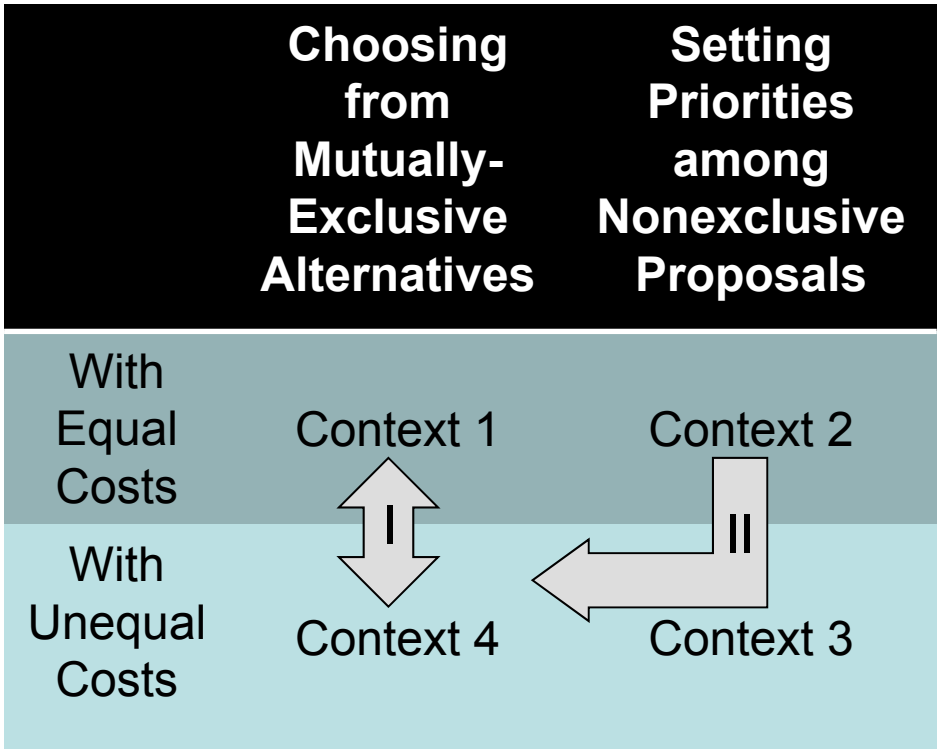
  The programs proposed by each business unit in a corporation compete for a share of the corporate budget.

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.



The Four Basic Decisionmaking Contexts

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
With Equal Costs	Context 1	**Context 2**
With Unequal Costs	**Context 4**	**Context 3**

Read further about this in Jim Suhr's Volume Three book.

The Four Basic Decisionmaking Contexts

In some cases in context 4, the preferred alternative must be simultaneously selected and analyzed as part of the Allocation Decisionmaking process.

Now let's learn about Setting Priorities among Nonexclusive Proposals.

	Choosing from Mutually-Exclusive Alternatives	Setting Priorities among Nonexclusive Proposals
With Equal Costs	Context 1	Context 2
With Unequal Costs	Context 4	Context 3

Allocation Decisionmaking

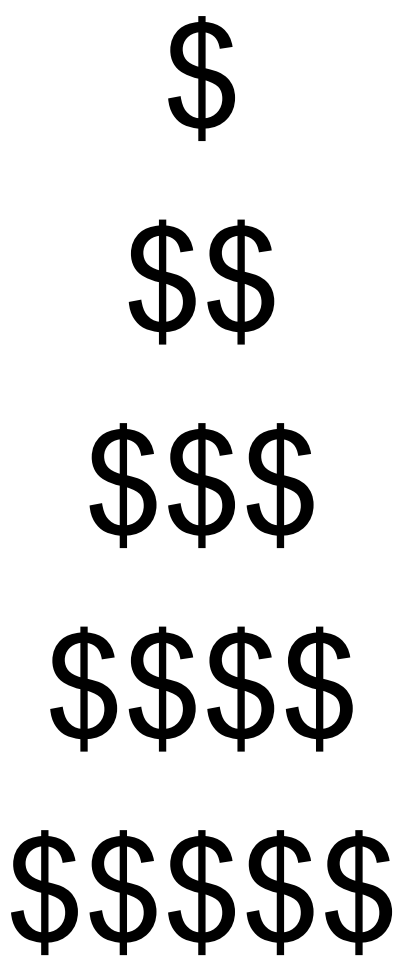
How do we soundly sequence the selection?

"…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."

Suhr, Jim (1999). The Choosing By Advantages Decisionmaking System, Westport CN: Quorum Books, p254.

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."



Suhr, Jim (1999). The Choosing By Advantages Decisionmaking System, Westport CN: Quorum Books, p254.

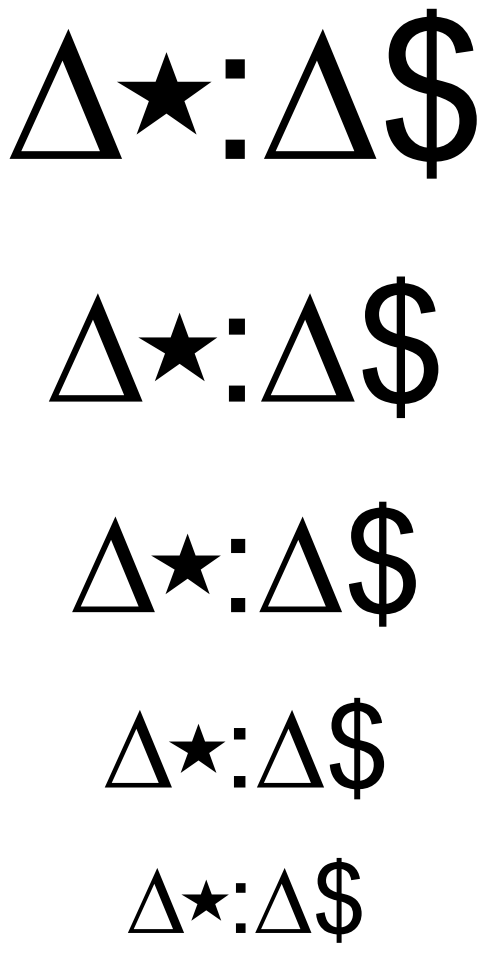
How do we soundly sequence the selection?

"…the increments must be arranged, within each category, according to their

[incremental] importance to incremental-cost **ratios**.

…it maximizes individual and organization performance."

CBA defines this ratio as "**Priority**."



Suhr, Jim (1999). The Choosing By Advantages Decisionmaking System, Westport CN: Quorum Books, p254.

How do we soundly sequence the selection?

Two methods:

- Graphically with sloping lines, and/or
- Calculate ratios in a tabular format.

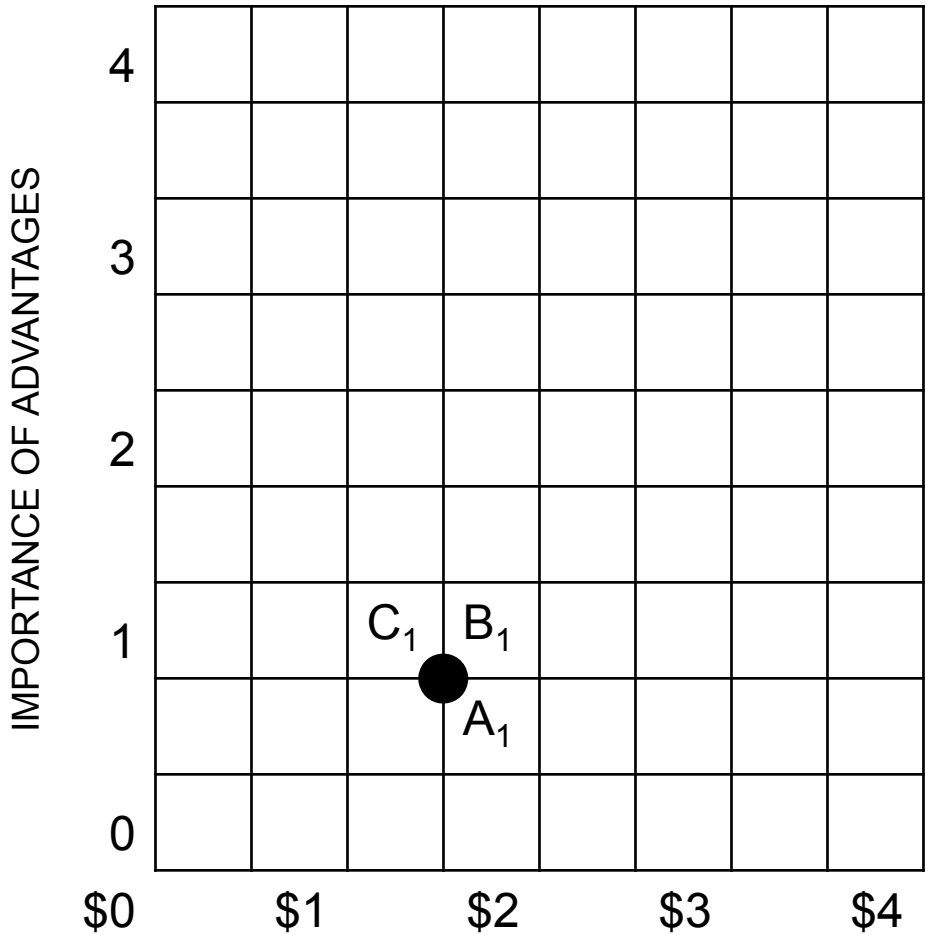
Proposals having equal cost and equal importance of advantages.

By CBA definition, proposals are two or more non-exclusive plans.

Stating a proposal generates two mutually exclusive alternatives:

- **with** each plan (doing the plan)
- **without** each plan (not doing the plan).

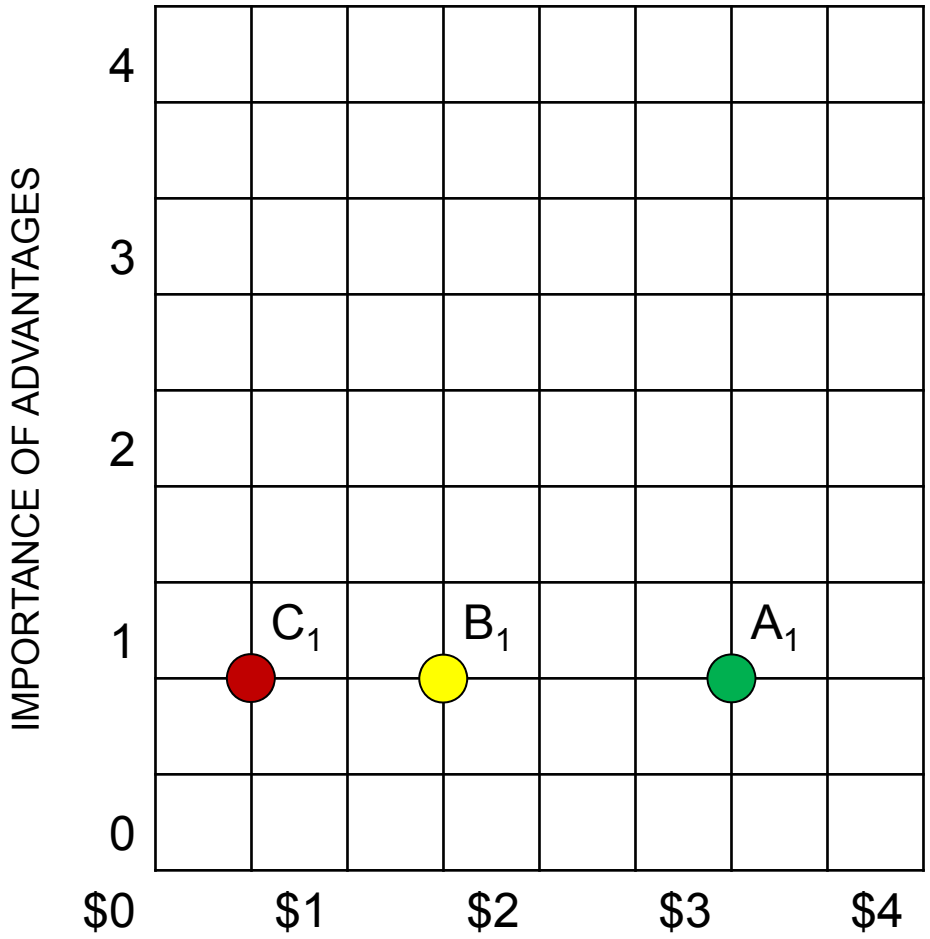
If the advantages of each proposal A_1, B_1 and C_1 have the same total importance, then all 3 can be chosen if the total cost ($6)
is within funding limitations.



Proposals having different cost and equal importance of advantages

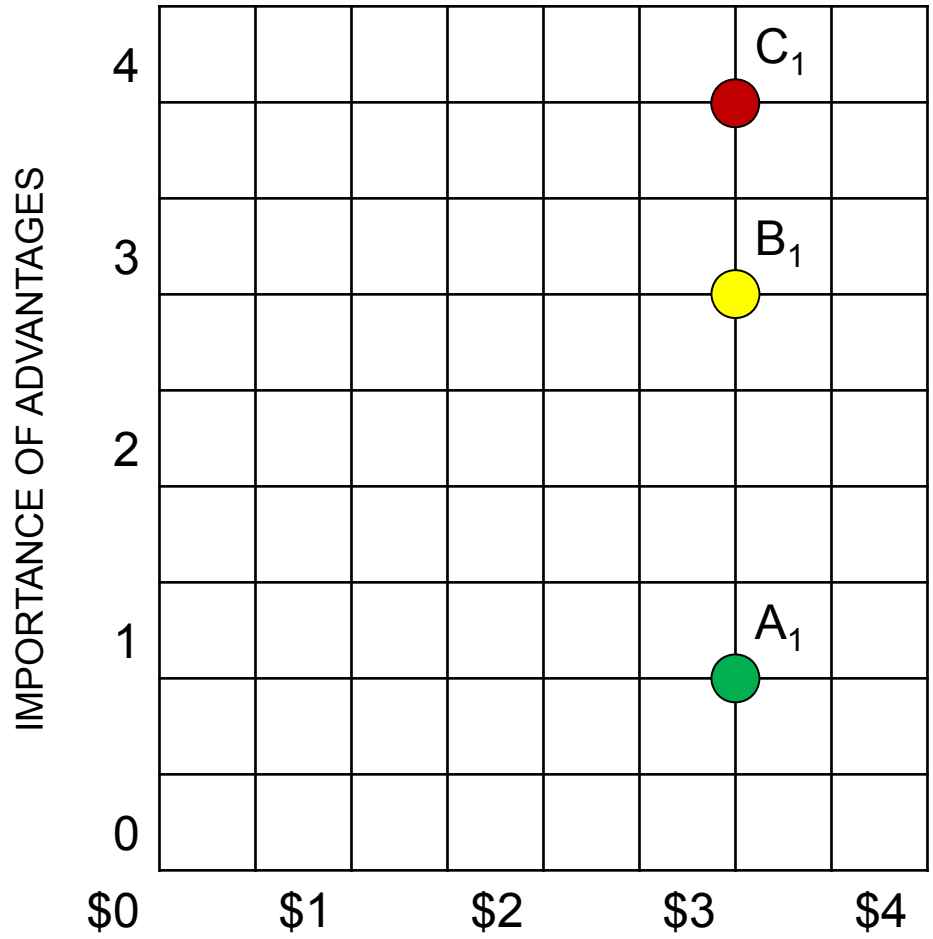
For this condition, choose an appropriate combination of cost within funding limitations.

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.

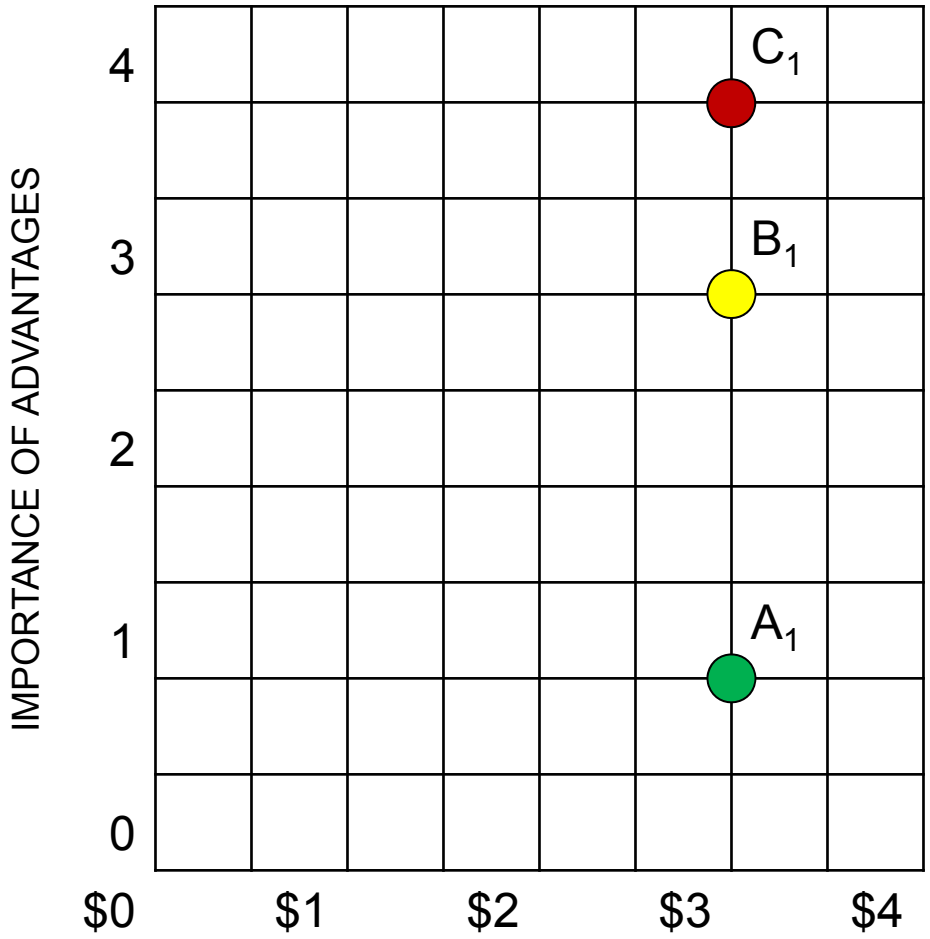


Example of Priority when cost is equal

Equal Cost Proposals

Proposal	Cost	Total Importance
C_1	$3	4
B_1	$3	3
A_1	$3	1

In this unique condition, set priority by arranging the proposals in order of decreasing Total Importance of Advantages, then choose within funding limitations. The basis for this method is explained in the next slide.



"With minus Without" describes each Increment

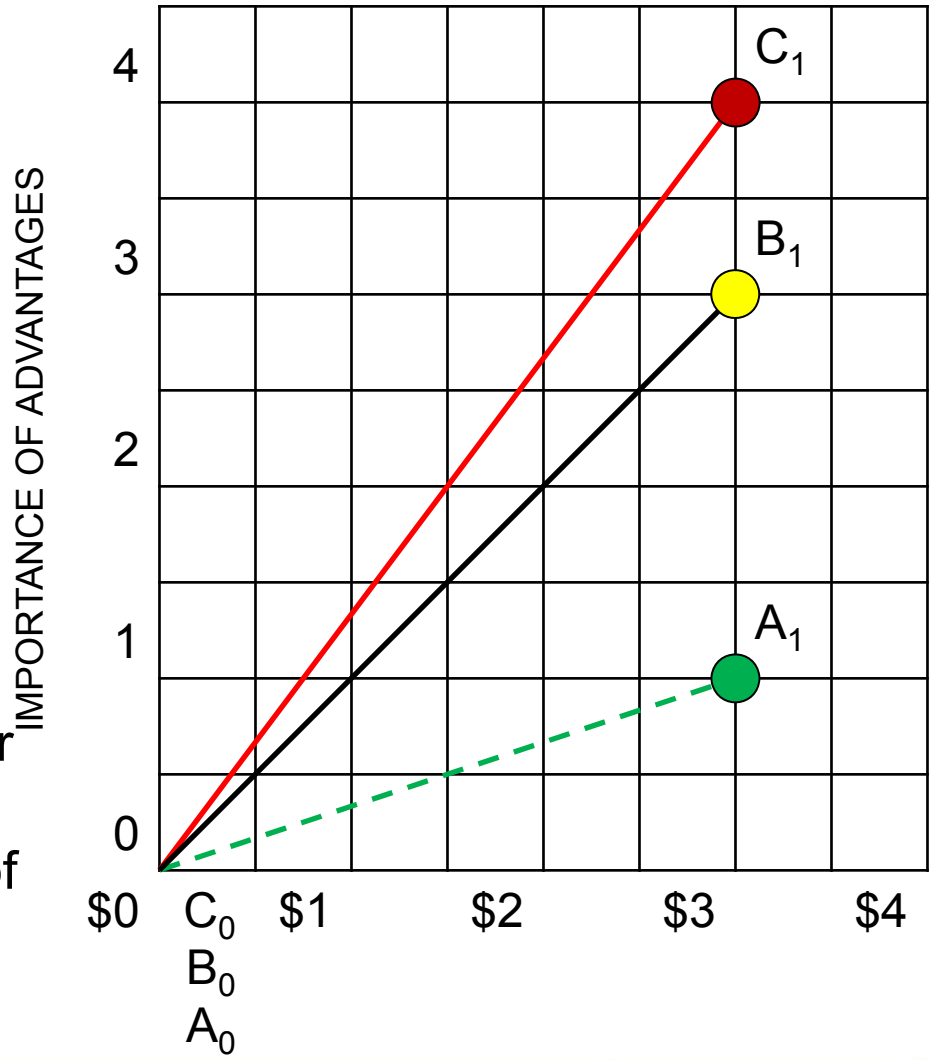
Equal Cost Proposals

Subscript 0 means "without."

Alt	Cost	T. Imp	Priority
C_0	\$0	0	$(C_1 - C_0) / \$ =$
C_1	\$3	4	4/3
B_0	\$0	0	$(B_1 - B_0) / \$ =$
B_1	\$3	3	3/3
A_0	\$0	0	$(A_1 - A_0) / \$ =$
A_1	\$3	1	1/3

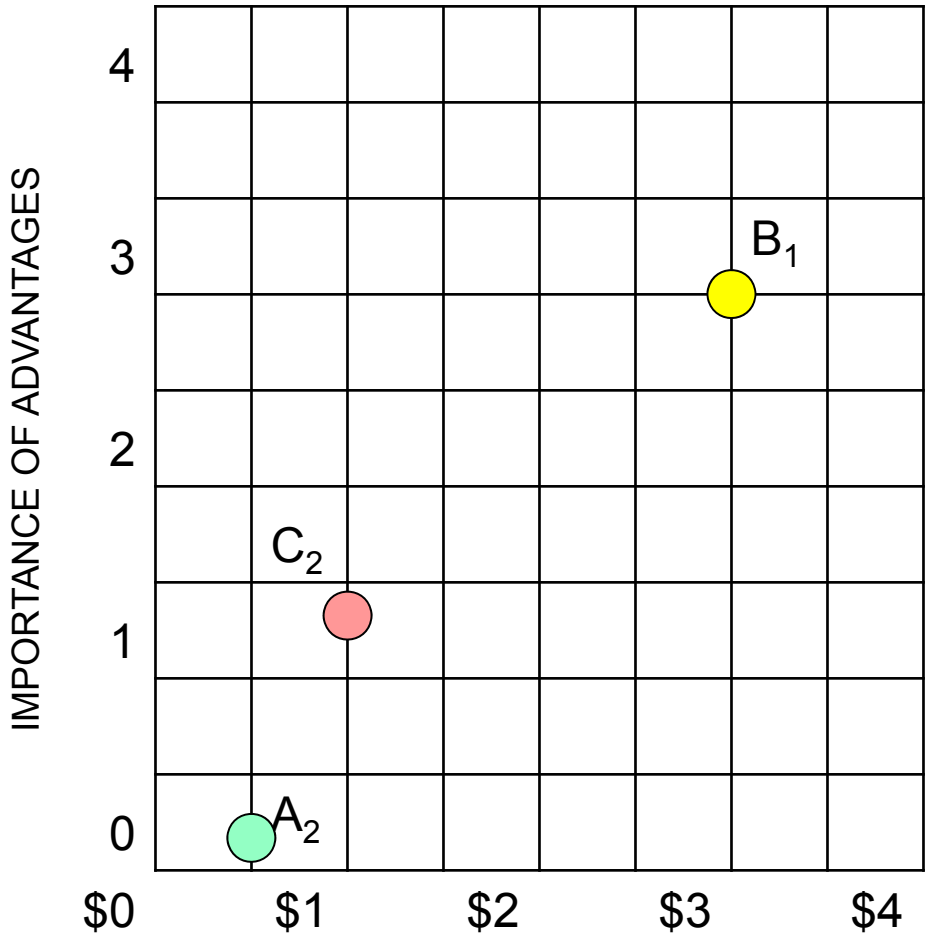
Priority is the ratio of importance to cost for the increment between "with alternative" and "without alternative" and is the slope of the line. Arrange by decreasing priority.

This validates the method previously stated.



Proposals containing Alternatives having unequal cost and unequal total importance of advantages

When you must select some (they must co-exist) of several proposals containing alternatives having unequal importance of advantages and unequal costs, use the CBA method for
Setting Priorities among Nonexclusive Proposals.



Priority when cost and importance vary

Unequal Cost Alternatives

Alt	Cost	T. Imp
B_0	\$0	0
B_1	\$3	3
C_0	\$0	0
C_2	\$1	4/3 = 1.333
A_0	\$0	0
A_2	\$0.50	1/6 = 0.166

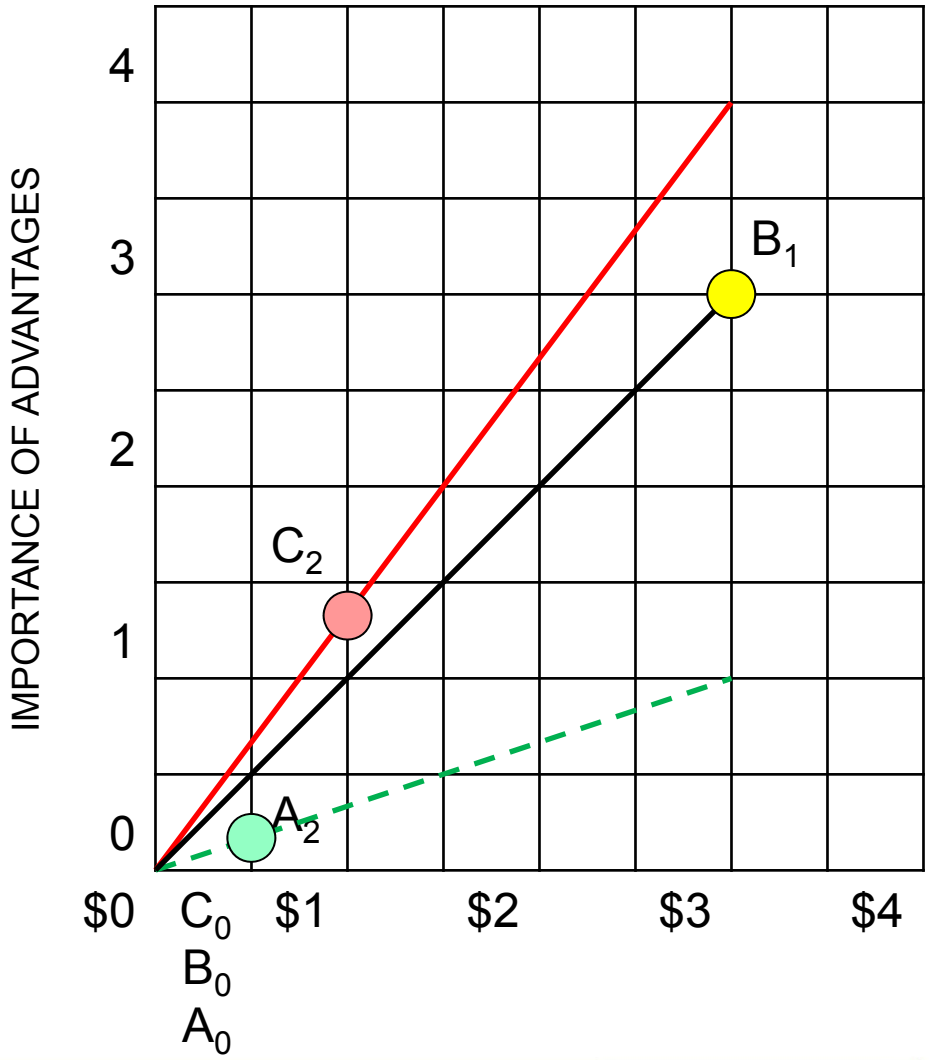
Slope calculations: Δ importance $\div$ Δ cost

B_1 to B_0 is (3-0)/(3-0) = 3/3 = 1.0

C_2 to C_0 is (4/3-0)/(1-0) = 1.333/1 = 1.333

A_2 to A_0 is (.1666-0)/(.5-0)=.166/.5=0.333

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



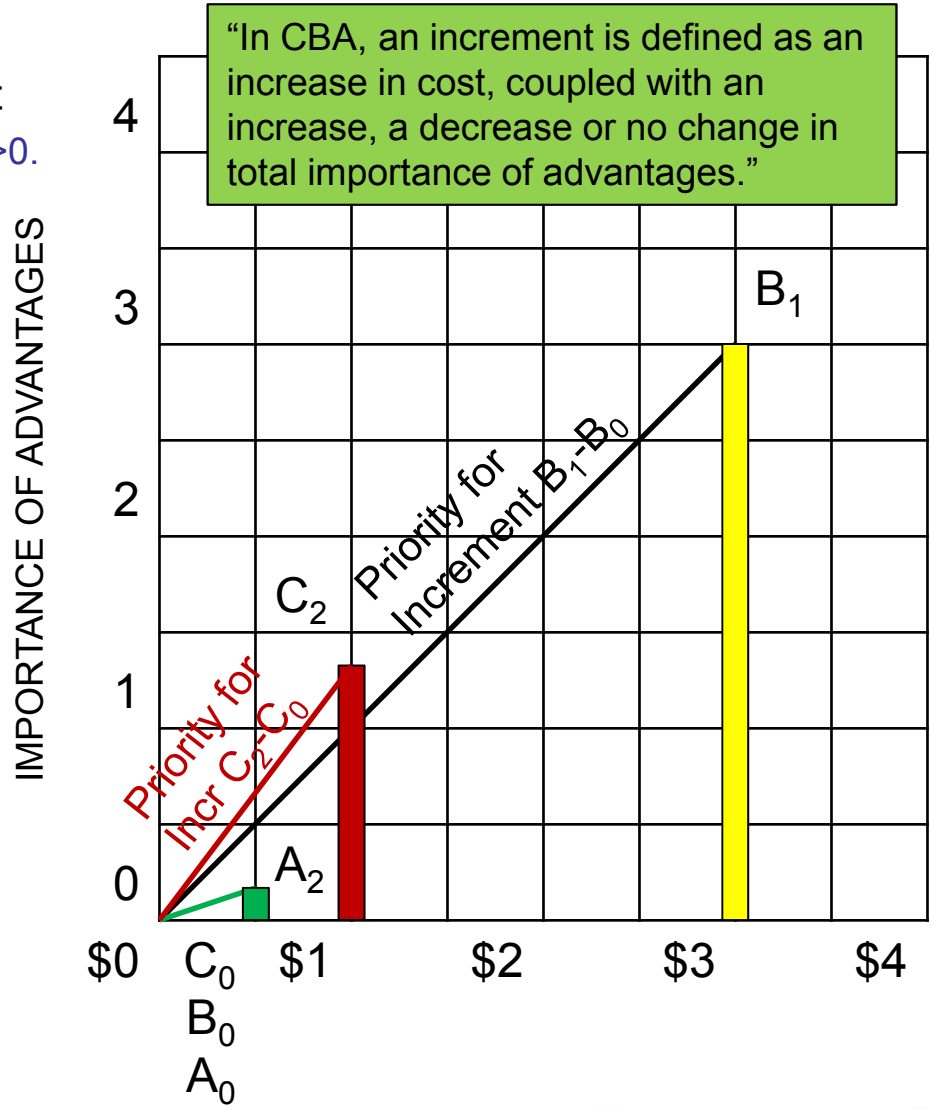
Graphical Format displaying Priority

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	Δ Calculation
Imp A_2-A_0	0.166 - 0 = .166
Cost A_2-A_0	$0.50 - $0 = $.50
Priority A_2-A_0	**0.166 ÷ 0.50 = 0.332**
Imp C_2-C_0	1.333 - 0 = 1.333
Cost C_2-C_0	$1 - $0 = $1
Priority C_2-C_0	**1.333 ÷ 1 = 1.333**
Imp B_1-B_0	3 - 0 = 3
Cost B_1-B_0	$3 - $0 = $3
Priority B_1-B_0	**3 ÷ 3 = 1**

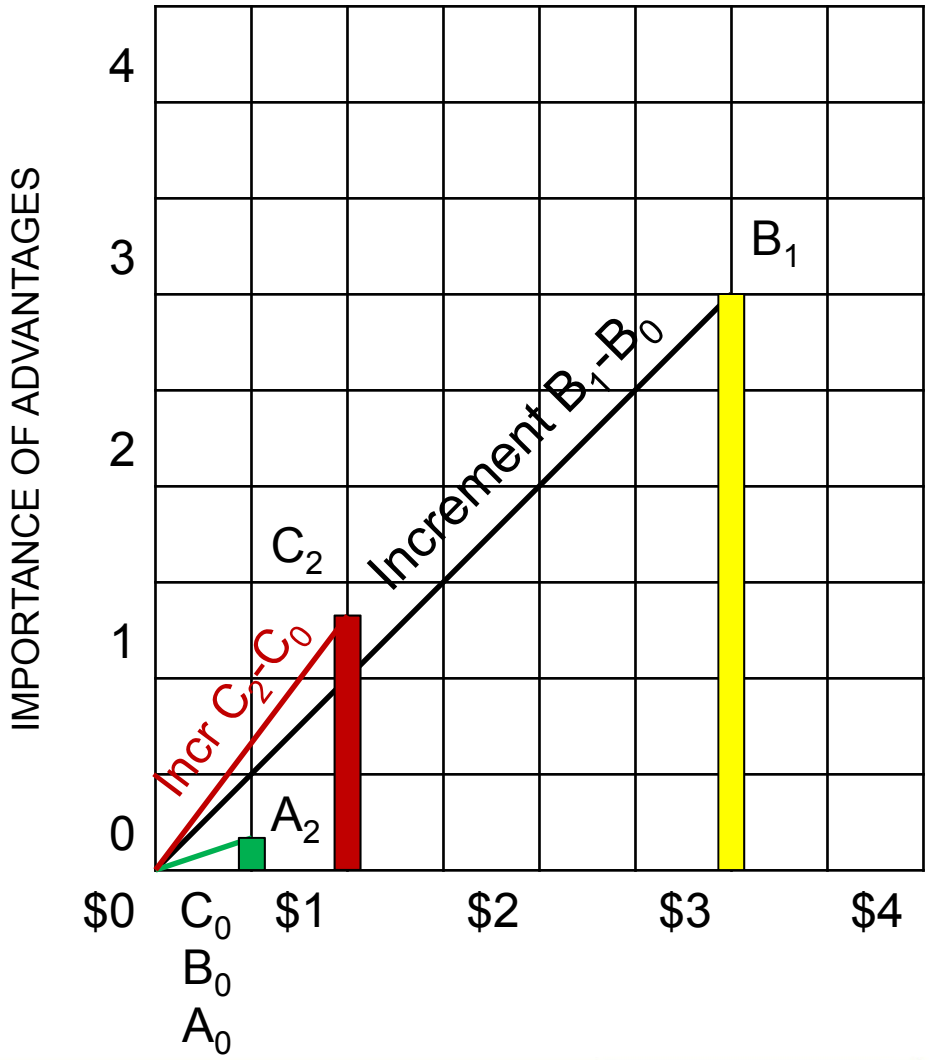


Graphical Format displaying Priority

Priority Calculations

(Calculate using "with" minus "without.")

Increment	Δ Calculation
Imp A_2-A_0	.166 (Incremental Importance)
Cost A_2-A_0	$.50 (Incremental Cost)
Priority A_2-A_0	**0.332 (Δ Imp / Δ Cost)**
Imp C_2-C_0	1.333 **(Δ Imp)**
Cost C_2-C_0	$1 **(Δ Cost)**
Priority C_2-C_0	**1.333 (Δ Imp / Δ Cost)**
Imp B_1-B_0	3 **(Δ Imp)**
Cost B_1-B_0	$3 **(Δ Cost)**
Priority B_1-B_0	**1 (Δ Imp / Δ Cost)**



Graphical Format displaying Priority

Unequal Cost Proposals

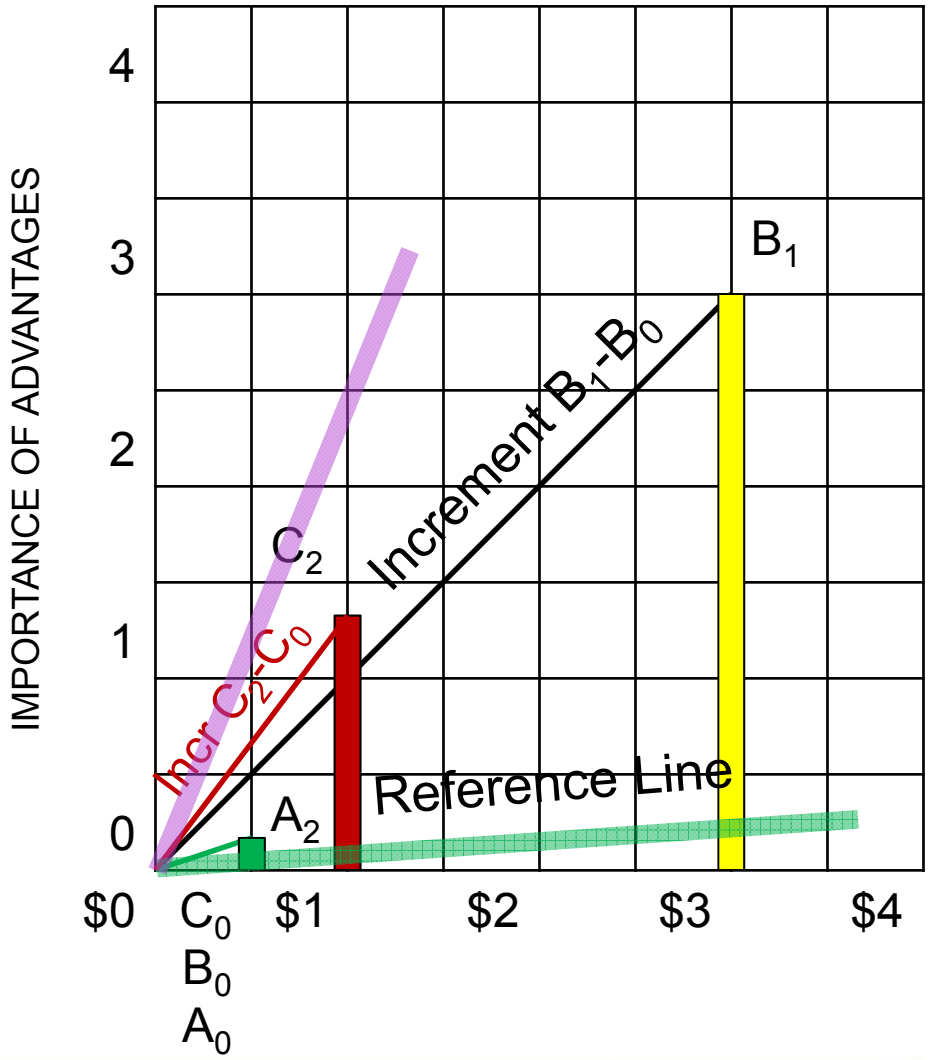
Step 2: Sort in decreasing order of priority.

Step 3: Calculate running total of cost

Increment	Priority	Cost Sum
C_2-C_0	**1.333**	**$1.00**
B_1-B_0	**1**	**$4.00**
A_2-A_0	**0.332**	**$4.50**

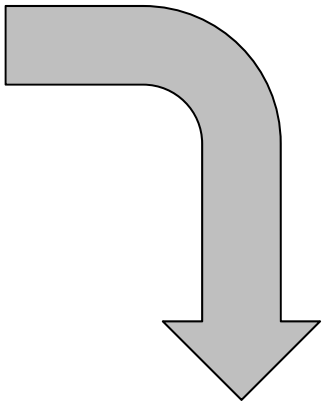
Step 4: Accept the proposals from top down until funds are exhausted.

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

Increment	Δ Calculation
Imp C_2-C_0	1.333 **(Δ Imp)**
Cost C_2-C_0	$1 **(Δ Cost)**
Priority C_2-C_0	**1.333 (Δ Imp / Δ Cost)**
Imp B_1-B_0	3 **(Δ Imp)**
Cost B_1-B_0	$3 **(Δ Cost)**
Priority B_1-B_0	**1 (Δ Imp / Δ Cost)**
Imp A_2-A_0	.166 (Incremental Importance)
Cost A_2-A_0	$.50 (Incremental Cost)
Priority A_2-A_0	**0.332 (Δ Imp / Δ Cost)**



Display of Priorities (sorted by descending priority)					
Increment	Choose	Incremental (Δ) Importance	Incremental (Δ) Cost ($)	Priority (ΔImp / Δ$)	Running Total Cost ($)
C_2-C_0	C_2	1.333	$1.00	1.33	$1.00
B_1-B_0	B_1	3.0	$3.00	1.00	$4.00
A_2-A_0	A_2	0.166	$0.50	0.332	$4.50

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)."

- Suhr, Jim (1999). The Choosing By Advantages Decisionmaking System, Westport CN: Quorum Books, p202-203;218-219

Priority across Sets of Proposals

Draw a line in the list to indicate the margin thus:
a) where priorities are approximately equal 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.

Department X Proposals				Department Y Proposals			
Increment	Priority	Cost	Sum	Increment	Priority	Cost	Sum
A_1-A_0	904	63,000	63,000	R_1-R_0	857	21,000	21,000
E_1-E_0	667	450,000	513,000	S_1-S_0	550	20,000	41,000
C_1-C_0	573	150,000	663,000	T_1-T_0	447	150,000	191,000
D_1-D_0	556	47,000	710,000	U_1-U_0	294	231,000	422,000
B_1-B_0	491	407,000	1,117,000				

Priority across Sets of Proposals

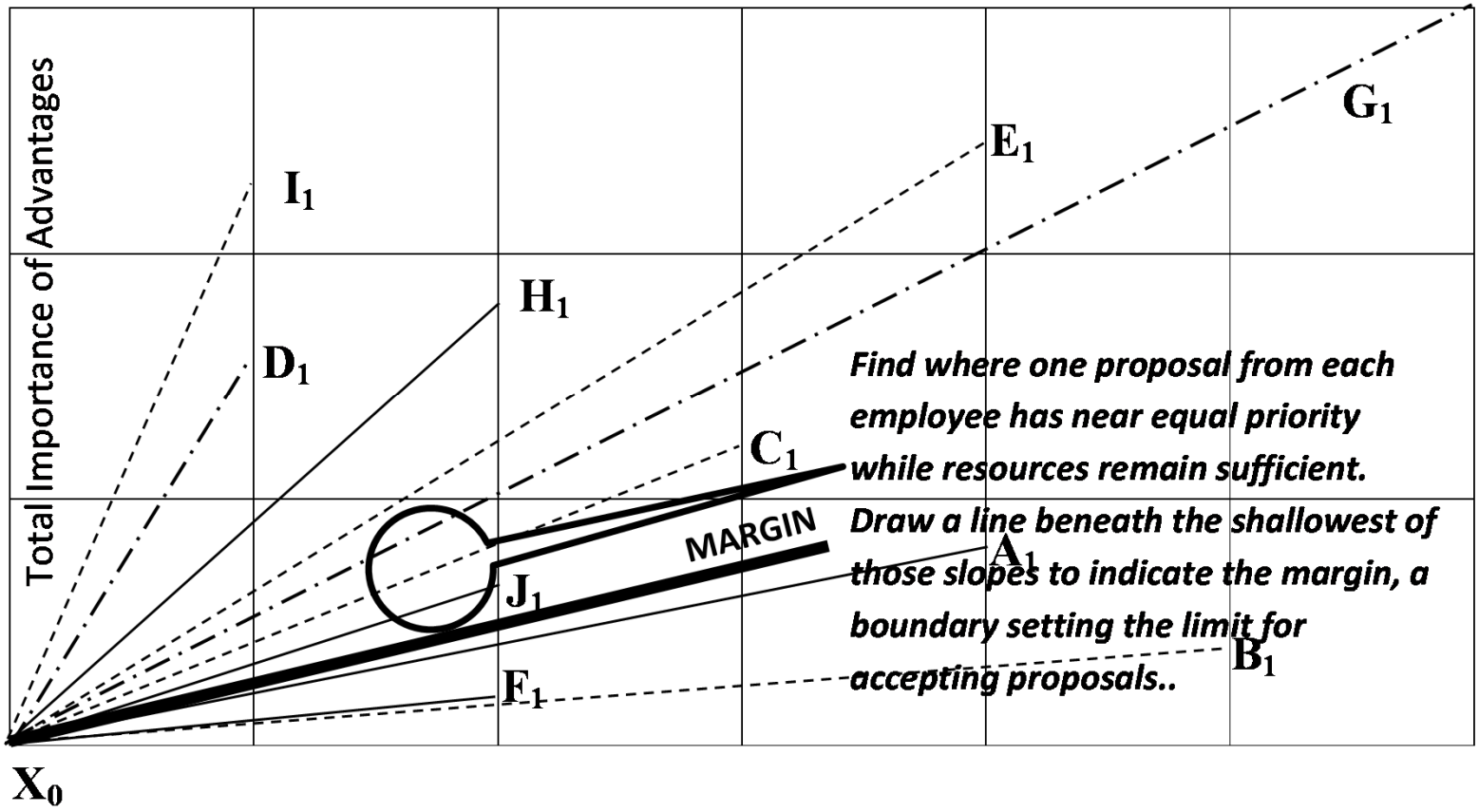
In a different example (handout) workload was balanced (assuming same skills) as the nonexclusive proposals were prioritized. Low priority proposals (F_1 and B_1) requiring more time than available were permanently discarded.

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

Priority across Sets of Proposals

In the example handed out, a graph illustrates selection of the margin.

A_1 is below the margin and could have been excluded. It provides less effectiveness.



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

Suhr, Jim (1999). The Choosing By Advantages Decisionmaking System, Westport CN: Quorum Books, p202-203;218-219

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 can have any cost.
    - If importance is low relative to cost, should the decisionmaker accept it? Consider improving its design to improve priority and therefore effectiveness.
- Use Boldt's workbook shown next to simplify the assignment of importance scores in complex scenarios.
  - 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
(The CBA Tabular Format for Allocation Decisionmaking)

	Proposal	Without Proposal		With Proposal			Priority			
ID#	Description of Nonexclusive Proposals J Koga: DO NOT put Mutually Exclusive Alternatives on this Worksheet. That would be unsound. Use a CBA Method for Mutually Exclusive Alternatives.	Advantages without the Attributes of the Alternative in this Proposal J Koga: Weigh the advantages of all the alternatives on the same Scale of Importance (Use the tab).	Total Wt of Importance Without	D-B Cost Without	Advantages with the Attributes of the Alternative in this Proposal J Koga: Weigh the advantages of all alternatives on the same Scale of Importance (Use the tab).	Total Wt of Importance With	D-B Cost With	ΔIMP Difference In Importance (With minus Without)	Δ$ Difference in D-B Cost (With - Without)	Priority (ΔIMP/Δ$) Formula is adjusted to $1 million. Use descending sort.	Running Total Δ$ in D-B Cost J Koga: After sorting by descending priority, adjust formula in this cost column to correctly display running total.
D	Water Treatment for Surgical Instruments	None	1	$ -	Longer instrument life	206	$ 30,000	205	$ 30,000	6,833	$ 30,000
C	Graphic Projection at Imaging ceilings	Easier ceiling design detailing.	75	$ -	Much greater patient calmness in certain situations	1000	$ 200,000	925	$ 200,000	4,625	$ 230,000
A	Add sensors and motors to automate selected window shades	More control of sunlight by room occupant	50	$ -	Less breakage of shades by occupants and more uniform exterior appearance	275	$ 60,000	225	$ 60,000	3,750	$ 290,000
E	Extend Premium Finishes further down public corridor 101.	None	1	$ -	More appealing Corridor 101 appearance.	250	$ 100,000	249	$ 100,000	2,490	$ 390,000
B	Expedited Dispatch Controls for Public Elevators	Less confusion about elevator selection	300	$ -	Large improvement in elevator utiltization	375	$ 40,000	75	$ 40,000	1,875	$ 430,000

This example displays unanchored pseudo-information.
Do not use this data for decisions on your project.

Boldt's Nonexclusive Proposal Prioritization Workbook
(The CBA Tabular Format for Allocation Decisionmaking)

J Koga:
DO NOT put Mutually Exclusive Alternatives on this Worksheet. That would be unsound. Use a CBA Method for Mutually Exclusive Alternatives.

J Koga:
Weigh the advantages of all the alternatives on the same Scale of Importance (Use the tab).

ID#	Description of Nonexclusive Proposals	Advantages without the Attributes of the Alternative in this Proposal	Total Wt of Importance Without	D-B Cost Without
D	Water Treatment for Surgical Instruments	None	1	$ -
C	Graphic Projection at Imaging ceilings	Easier ceiling design detailing.	75	$ -
A	Add sensors and motors to automate selected window shades	More control of sunlight by room occupant	50	$ -
E	Extend Premium Finishes further down public corridor 101.	None	1	$ -
B	Expedited Dispatch Controls for Public Elevators	Less confusion about elevator selection	300	$ -

Boldt's Nonexclusive Proposal Prioritization Workbook
(The CBA Tabular Format for Allocation Decisionmaking)

J Koga:
DO NOT put Mutually Exclusive Alternatives on this Worksheet. That would be unsound. Use a CBA Method for Mutually Exclusive Alternatives.

ID#	Description of Nonexclusive Proposals	Advantages with the Attributes of the Alternative in this Proposal	Total Wt of Importance With	D-B Cost With
D	Water Treatment for Surgical Instruments	Longer instrument life	206	$ 30,000
C	Graphic Projection at Imaging ceilings	Much greater patient calmness in certain situations	1000	$ 200,000
A	Add sensors and motors to automate selected window shades	Less breakage of shades by occupants and more uniform exterior appearance	275	$ 60,000
E	Extend Premium Finishes further down public corridor 101.	More appealing Corridor 101 appearance.	250	$ 100,000
B	Expedited Dispatch Controls for Public Elevators	Large improvement in elevator utiltization	375	$ 40,000

Boldt's Nonexclusive Proposal Prioritization Workbook
(The CBA Tabular Format for Allocation Decisionmaking)

J Koga:
DO NOT put Mutually Exclusive Alternatives on this Worksheet. That would be unsound. Use a CBA Method for Mutually Exclusive Alternatives.

ID#	Description of Nonexclusive Proposals	ΔIMP Difference in Importance (With minus Without)	Δ$ Difference in D-B Cost (With - Without)	Priority (ΔIMP/Δ$) Formula is adjusted to $1 million. Use descending sort.	Running Total Δ$ in D-B Cost
D	Water Treatment for Surgical Instruments	205	$ 30,000	6,833	$ 30,000
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E	Extend Premium Finishes further down public corridor 101.	249	$ 100,000	2,490	$ 390,000
B	Expedited Dispatch Controls for Public Elevators	75	$ 40,000	1,875	$ 430,000

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.

Supplementary CBA Information

Many unsound methods do not anchor decisions about importance to the relevant facts.

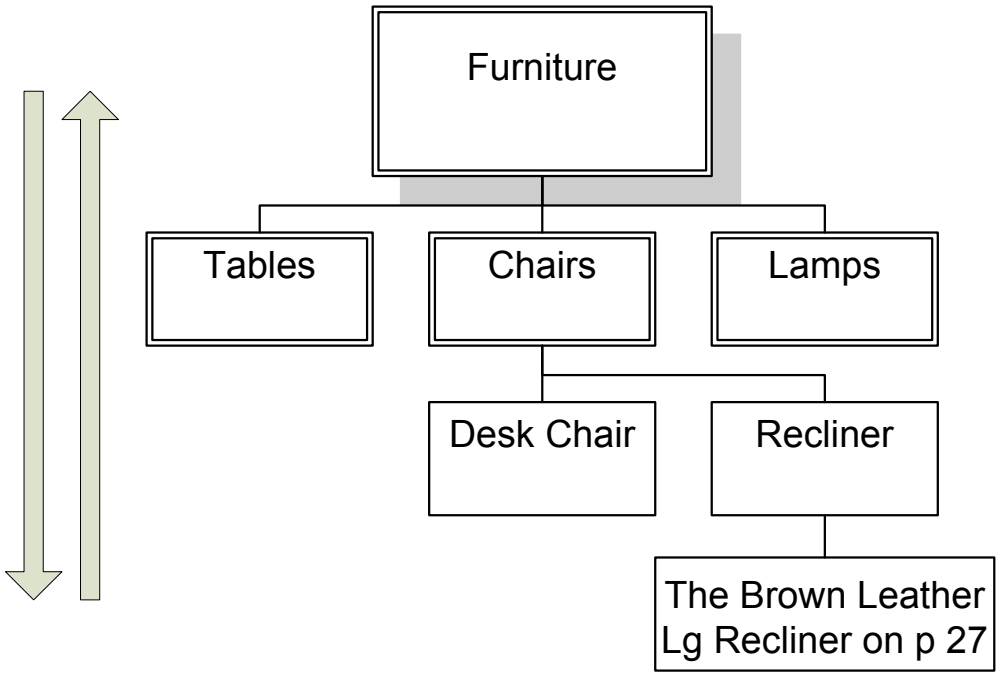
Anchoring requires Four Vital Thinking Skills:

1. **Specifying** vs Generalizing.
2. Using **Low Order Abstractions** vs High Order.
3. Using **Relevant Facts** vs Low Order Assumptions.
4. Using **Anchored Questions and Judgments** vs Unanchored.

Supplementary CBA Information

Four Vital Thinking Skills

1. Specifying vs Generalizing.
   This skill is about our process of describing and interpreting the world we experience.
   It is impossible for two persons to experience the same thing exactly the same way.
   CBA contributes to improving understanding by causing us to think and communicate more clearly.

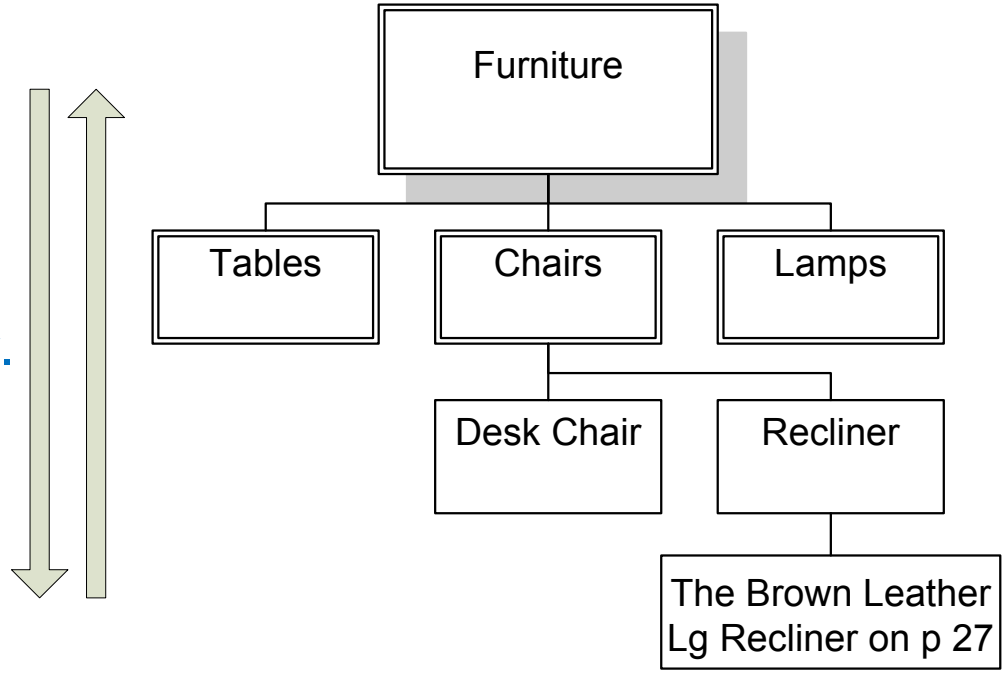


Supplementary CBA Information

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.



Supplementary CBA Information

Four Vital Thinking Skills

1. Specifying vs Generalizing.
2. Using Low Order vs High Order Abstractions.
3. Using Relevant Facts vs Low Order Assumptions.

   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.

   We must refine our information until it consists of relevant facts.

Supplementary CBA Information

Four Vital Thinking Skills

1. Specifying vs Generalizing.
2. Using Low Order vs High Order Abstractions.
3. Using Relevant Facts vs Low Order Assumptions.
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 large difference in size between the brown leather recliner on page 27 and the white cloth recliner on page 28 of the catalog? Shouldn't we sit in them?"

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.

Supplementary CBA Information

- CBA is sound. It is fast in most cases.
  - With practice you will be able to use the quicker CBA sound methods to mentally form perhaps 90% of your decisions.
  - Many other decisions can be clarified using the Two-List Method.
  - Only the more complex situations will require the Tabular Method or Allocation Method. Thankfully, those sound methods will help simplify and clarify those complex situations.

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.

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 interesting or different?

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)
  - Collective Abuse of Power (Majority won't listen to the individual)
  - Power Struggle (Misuse of debating, voting, striking, warring by group)
  - Individual Abuse of Power (Use of power more important)
  - Severe Collective Misjudgment (Like Groupthink, but everyone is aware)

Supplementary CBA Information

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.

Suhr, Jim (1999). The Choosing By Advantages Decisionmaking System, Westport CN: Quorum Books

Supplementary CBA Information

- CBA produces improvement, not perfection.
- It is a set of skills vital in our complex, rapidly-changing world.
- Billions of decisions occur daily. CBA provides a new opportunity!

Lesson 6

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:
    - Shook, John (2008). Managing to Learn, Cambridge, MA: The Lean Enterprise Institute, Inc.
    - Sobek, Durward K. and Art Smalley (2008). Understanding A3 Thinking, New York: Productivity Press.
- 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."[1]

[1] Liker, Jeffrey, The Toyota Way, p238-9.

CBA is compatible with Principle 13 of The Toyota Way in many ways.

[redacted] A3 Report

Motors and Sensors for Shades in Non-Patient Rooms

1 Base

Brief: At Validation **motorized** shades were not part of the scope in non-patient rooms.

a. **Baseline provides manually operated shades in non-patient rooms.**

2 Analysis

Brief: To obtain necessary energy reduction as well as reduce staff labor to operate shades, we analyzed **adding motors and solar sensors** to shades in specific non-patient rooms.

a. A high-degree of solar shading control is needed in the Family Rooms and Family Alcoves Cafeteria, Physician Dining, Physician Lounge, Education Rooms and Executive Admin Board Room.
b. The control system should maximize energy management, view and personal comfort based on micro-climatic conditions.
c. It is practical and efficient to have a single point of authorized control to operate multiple shades in public spaces, such as cafeteria, physician dining, education rooms, family rooms and family alcoves. It is not recommended that the public be given access to control in those spaces.
d. It is practical and efficient that shades in large conference spaces, such as education rooms and board rooms, be interconnected to AV/IT controls.
e. Providing motorized shades ***with solar sensor*** in the family rooms and family alcoves that have a large glazing assures energy savings.
f. Alternatives 1 & 2 rely on humans to correctly operate the shades. The probability that this will correctly occur over the years is low.
g. The shades are programmable to desired user settings and can be manually overridden by authorized staff.

RELEVANT INFORMATION

Post-Validation, providing labor-saving controls that enhance public and staff experience as well as energy-efficiency to support LEED Certification has become a stated goal. If unsolved, public and staff satisfaction will suffer. Staff labor efficiency will be lower. Higher levels of energy consumption will result.

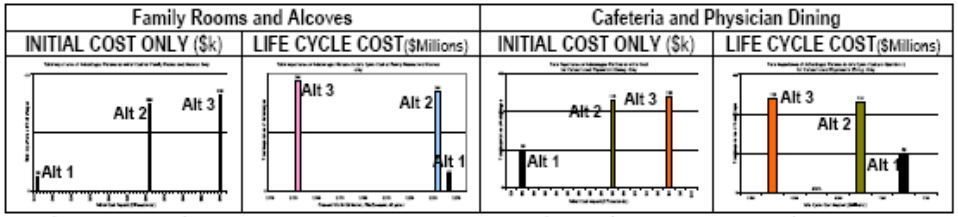
"MUST CRITERIA" The solution must have the characteristics below (no variance can be tolerated):
a. Removable for maintenance and/or replacement.
b. Education Rooms and Executive Admin Board Room must have double shades for black-out shade feature.
c. Manual shade controls in public areas must be secured to avoid damage and for safety precautions.

"SHOULD CRITERIA" The solution should have the characteristics below (some latitude can be tolerated):
a. Operate multiple shades in public spaces, such as Cafeteria, Physician Dining, Education Rooms, Family Rooms and Family Alcoves, from a single point of control.
b. Shade controls in Education Rooms and Executive Admin Board Room should be interconnected to AV/IT controls.
c. Shades with solar sensor in Family Rooms and Family Alcoves should automatically adjust to provide maximum reduction in solar heat gain.
d. With Alternative 3, system should allow user to override the automated deployment of shades.

OTHER FACTS, ASSUMPTIONS AND UNKNOWNS:
a. Manual roller shades are already part of the baseline budget. This proposal is only for the additional cost for motorized and/or sensorized shade capability.
b. The motorized window shade manufacturer should provide the shades for the non-motorized portions as well.
c. Motorized shades for patient rooms are part of a separate A3 that was rejected and are not included in this proposal.
d. The project has sufficient electrical capacity to incorporate motorized shades.

IDEA GENERATION
a. No shades in non-patient rooms. (Not Standard Practice in Healthcare Design. Solar shading must be provided to meet TJEG's system design parameters.)
b. Alternative 3 except manual shades in Cafeteria and Physician Dining.
c. Alternative 3 except motorized shades without solar sensor in Cafeteria and Physician Dining.
d. Alternative 3 except manual shades in Education Rooms, Physician Lounge and Executive Admin Board Room.
e. Alternative 3 except motorized shades without solar sensor in Education Rooms, Physician Lounge and Executive Admin Board Room.
f. Alternative 3 except manual shades in Family Rooms and Family Alcoves.
g. Alternative 3 except motorized shades without solar sensor in Family Rooms and Family Alcoves.

ITEM #	LINE ITEM DESCRIPTION	MANUAL SHADES BASELINE COST	MOTORIZED SHADES ADD'L COST	MOTORIZED SHADES W/SOLAR SENSOR ADD'L COST
1	Family Rooms	$ 55,617	$ 146,754	$ 171,038
2	Family Alcoves	$ 54,742	$ 148,702	$ 172,984
3	Physician Lounge, 3rd Floor	$ 4,315	$ 13,687	$ 15,204
4	Education/Conference Rooms, 3rd floor	$ 13,707	$ 33,023	$ 40,179
5	Cafeteria and Physician Dining, 2nd Floor	$ 22,671	$ 40,767	$ 44,346
6	Board Room, 14th Floor	$ 6,958	$ 13,755	$ 17,738
7	Waiting Area - Level 4	$ 14,971	$ 38,191	$ 42,664
8	Solar Sensor & Control System			$ 159,585
		$ 172,981	$ 434,878	$ 663,716



- Life Cycle Cost assumptions: Sensor operated shades capture full calculated energy savings. Motorized shades capture 75% of savings. Manual capture 50%.
- Initial Installed Cost, Warranties and replacements are included in Life Cycle calculations.
- Life Cycle calculations demonstrate that Sensor operated shades are most cost-effective and produce significant cost savings over the building life.
- Separate calculations adding the impact on staff effectiveness were made, but not charted. See information in table of advantages.

3 Advantages

	Alternative 1 (Baseline) Manually Operated Shades	Alternative 2 Motorized Shades	Alternative 3 Motorized with Solar Sensor
	• Much lower risk to reduce Trade damage	• Much better interconnectivity • Easier to gain privacy in Family Rooms • Better ability to limit access	• **Greater probability of closure** • **Much less use of staff labor** • Easier to gain privacy in Family Rooms • Much better interconnectivity • Much better coordination • Better ability to limit access
	Life Cycle Savings (Present Worth)	$2,513 PW at Family Rooms and Alcoves; $121,997 at Cafeteria and Physician Dining	$135,704 PW at Family Rooms and Alcoves; $264,785 at Cafeteria and Physician Dining
	Payback Period, no staff cost, if Alternative accepted	44 years at Family Rooms and Alcoves; 6 years at Cafeteria and Physician Dining	26 years; 5 years at Cafeteria and Physician Dining
	Impact on Operations (conservative estimate of time to walk room to room and operate shades)	$648,754 (PW) savings at Fam Rm & Alcoves in staff time (quicker) + $58,388 (PW) savings at Cafeteria and Dining	$1,946,261 (PW) savings at Fam Rm & Alcoves in staff time not required to operate shades + $97,313 (PW) savings at Cafeteria and Physician Dining
	$172,981 Cost for shades in listed non-patient rooms	**$434,878** Cost increase from baseline to furnish and install motorized option (power and switch circuiting included) in listed non-patient rooms.	**$663,716** Cost increase from baseline to furnish and install motorized option and solar sensors (power, switch and sensor circuiting included) in listed non-patient rooms.

4 Proposal

Add combination of motorized shades plus solar sensor motorized shades (highlighted in yellow at left) to baseline manual shades:

Add **$646,586** (installed) to Value Added List.

5 Fwd

[redacted]

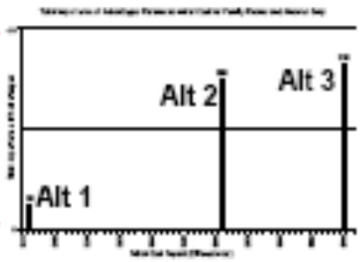
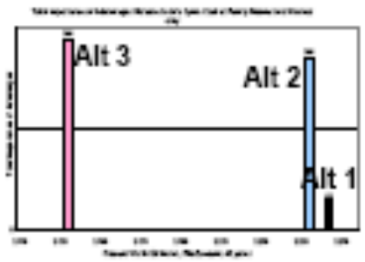
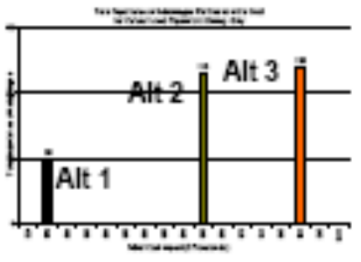
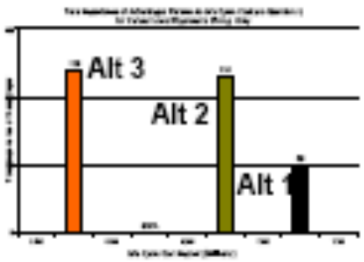
1. Add motorized shades in Non-Patient Rooms to Added Value List.
2. Final Circuit drawings by S&L can be completed after OSHPD submittal.
3. Continue to track emerging technology and pricing for motorized component against overall window coverings budget.

[redacted]

To inform the decision, produce this part of the A3 by blending Value Analysis and Choosing By Advantages (CBA) techniques.

TOTAL IMPORTANCE OF ADVANTAGES

MONEY

Family Rooms and Alcoves		Cafeteria and Physician Dining	
INITIAL COST ONLY ($k)	LIFE CYCLE COST ($Millions)	INITIAL COST ONLY ($k)	LIFE CYCLE COST ($Millions)
			

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3 Advantages	Alternative 1 (Baseline) Manually Operated Shades	Alternative 2 Motorized Shades	Alternative 3 Motorized with Solar Sensor
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osal	**Add combination of motorized shades plus solar sensor motorized shades (highlighted in yellow at left) to baseline manual shades:**

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 sound, congruent and effective.

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!

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