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Application of MCA Methods: A seven step process

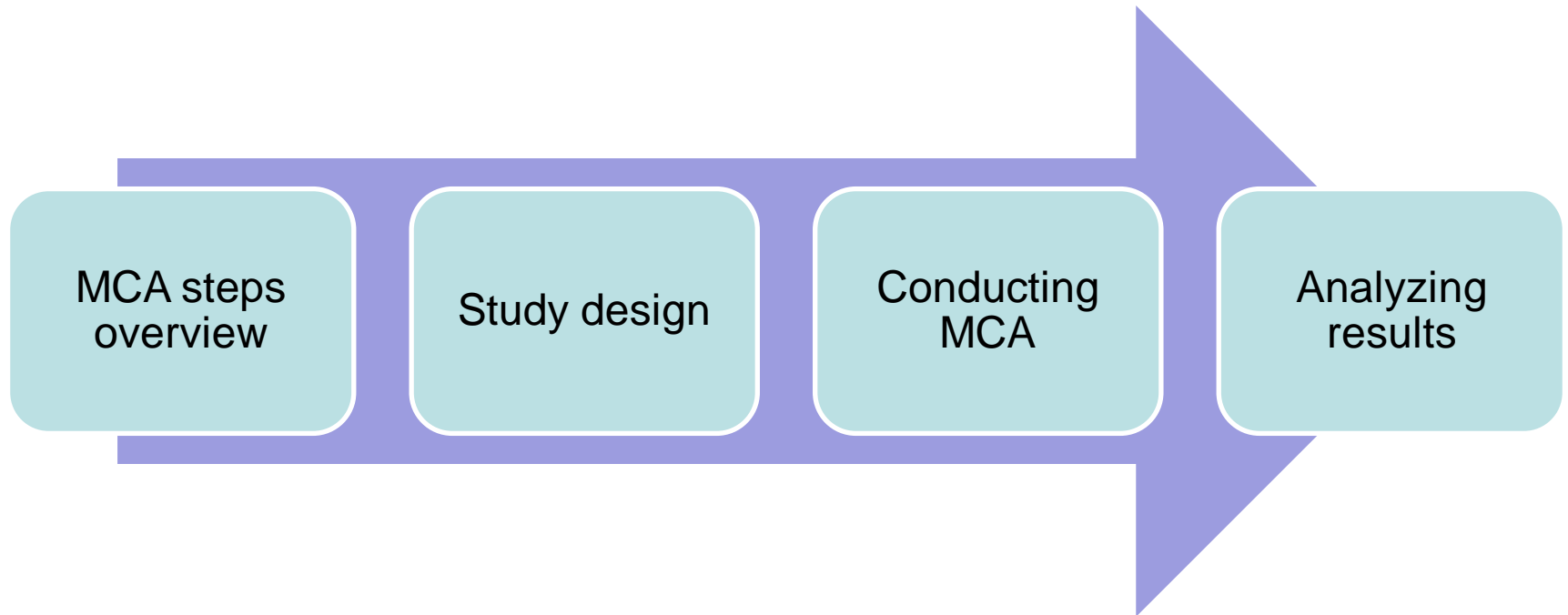MCA steps overview → Study design → Conducting MCA → Analyzing results

Establish the decision context

Identify objectives, options, and components

Develop measures and outcomes

Score

Weight

Calculate total scores

Analyze the results

Establish decision context for MCA

- Start the process by learning the context for the decision

- What? Why? Who?

Understanding decision context is important for:

- Setting up the MCA

- Collecting data

- Analyzing the results

What and why?

- **What** is the decision?

- **Why** is the decision necessary?

- What is the overall goal?
- What social and political forces affect the decision?

Who?

- Who are the decision makers?

- Who is affected by the decision (stakeholders)?
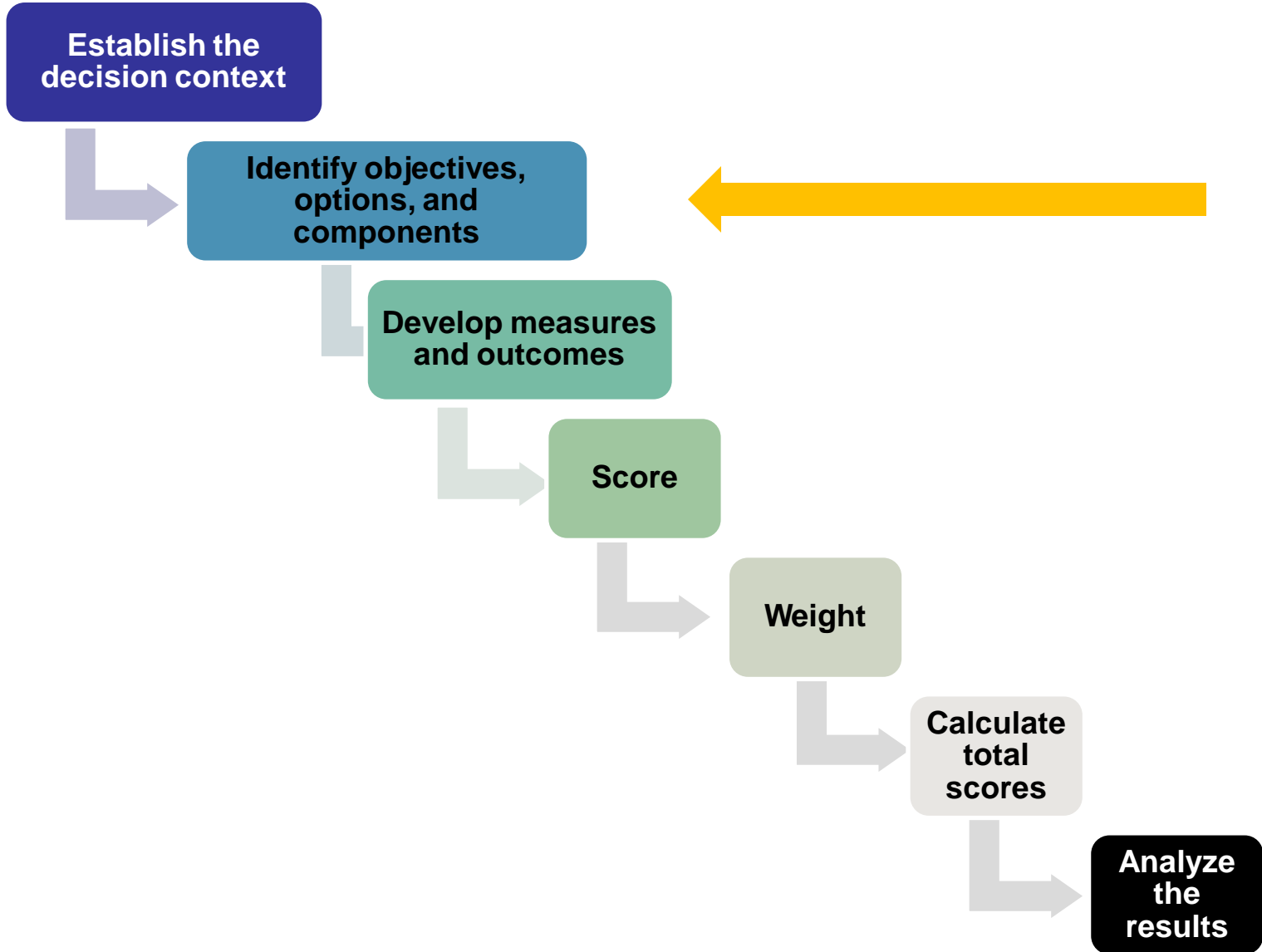
- Who else can provide information needed for the MCA?

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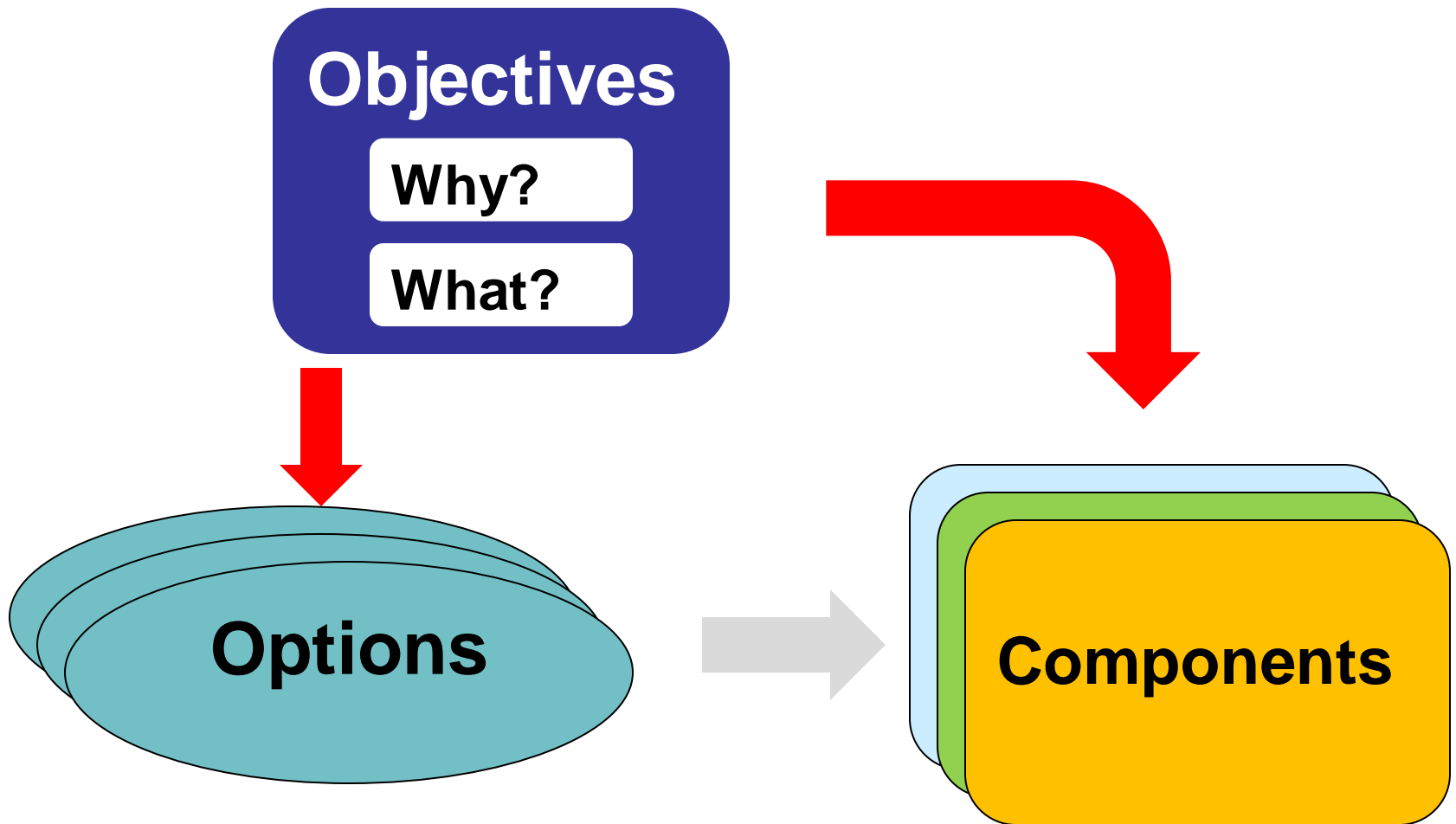
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Identify objectives, options, and components

How to **identify** the **objectives** of a MCA

- Two major questions:

  - ◆ What is important (to me) about this decision?

  - ◆ Why is it important?

- Ask these questions until all important objectives have been identified
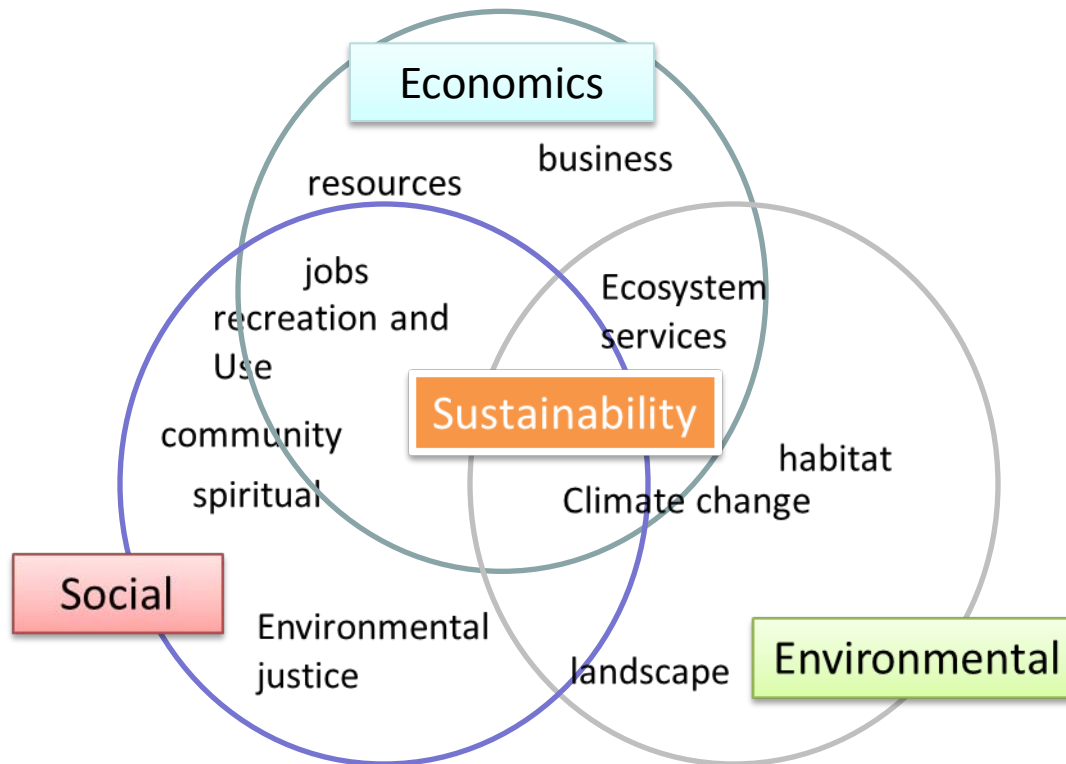
Who should identify the objectives of a MCA?

- Input from stakeholders can be an important part of identifying objectives

  - Helps to make sure that all important objectives are being considered

  - Helps gain support for the MCA and participation in the analysis

To integrate with triple bottom line (TBL)

Identify options (options are your alternatives or choices)

Options are ranked and prioritized in a MCA

- Some options may already be defined

- Try to identify new possible options

- Objectives can guide development of options

Option A

Option B

Option C

Choosing between projects

Implementing management actions

Evaluating alternative policies

Allocating resources

Option A

Option B

Option C

How to **identify components** of MCA objectives

- Components are identified for each objective

- Components break objectives down into things that can be more easily measured

- Helps determine what is important within each objective

```
         ┌──────────────┐
         │  Objective   │
         └──────┬───────┘
        ┌───────┴───────┐
  ┌───────────┐   ┌───────────┐
  │ Component │   │ Component │
  └───────────┘   └───────────┘
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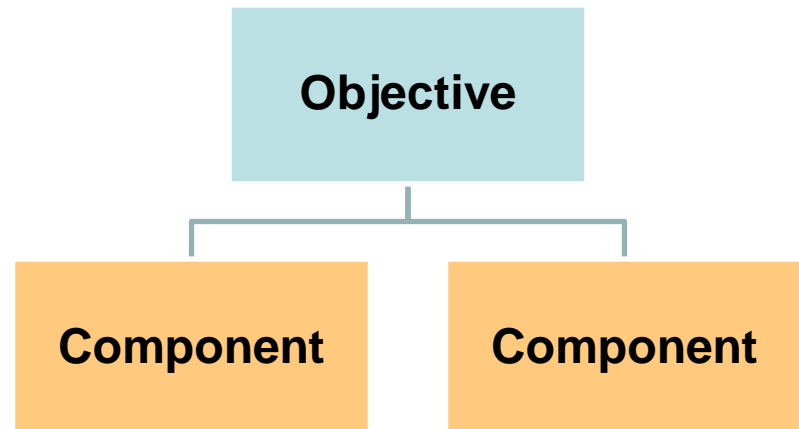
How to identify components….

- For each objective, ask "What is important to me about this objective?"

- Generate a list of components in this way

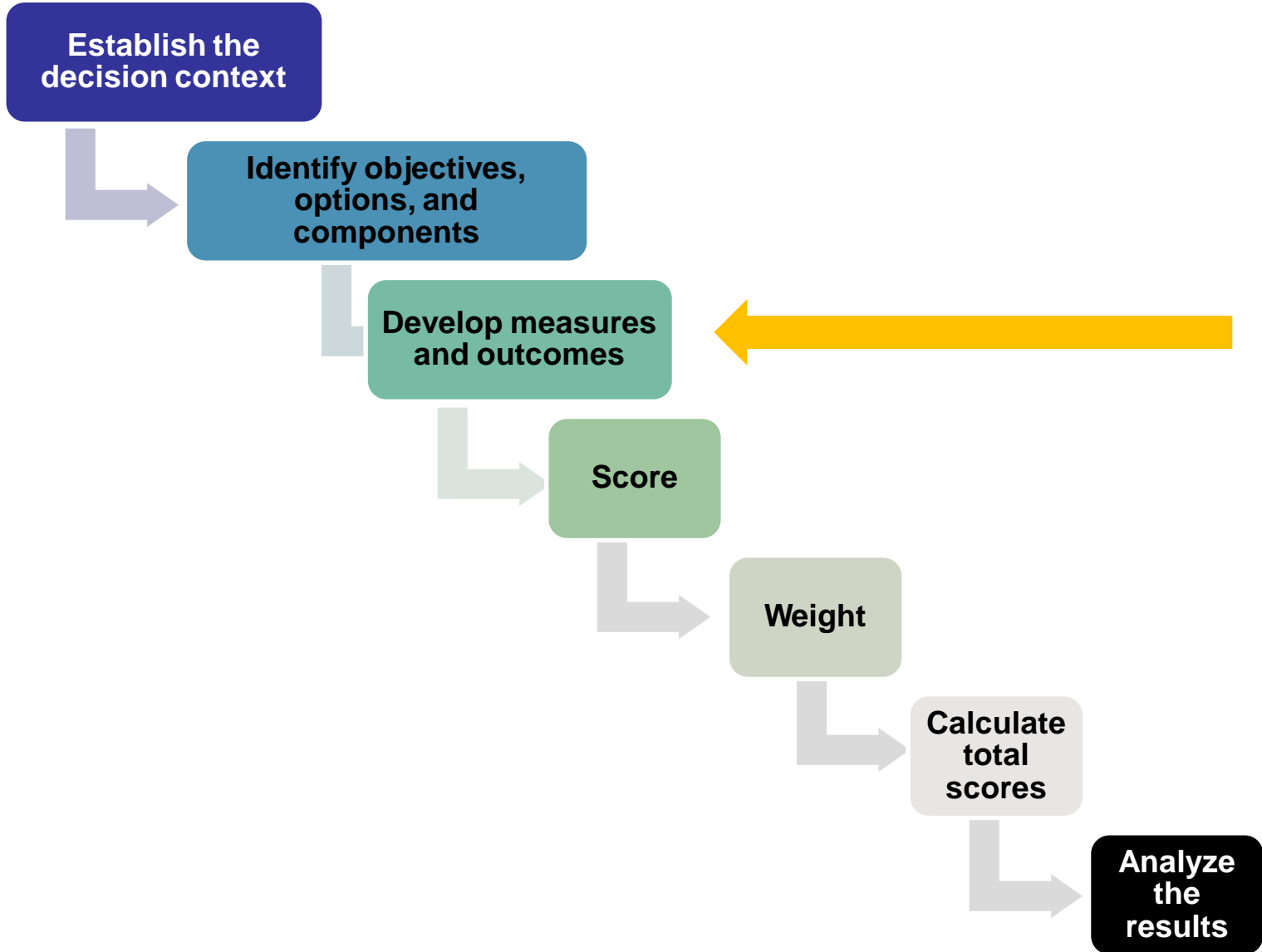## How to identify components (continued)…

- Once you have a list of components, look to see if any can be removed from the list

  - Are there components that measure the same thing?

  - Are there any components that cannot be measured?

  - Are there any components that are the same across all options?

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How do we develop measures for components?

- Break component down into measurable value

- Focus on measures that contribute to the objectives

- Focus on measures that can be assessed quantitatively or qualitatively

Who should develop measures in a MCA?

- Develop independently

  or

- Get input from key players

  ♦ Stakeholders may have ideas about how the components should be measured

  ♦ Other key players may be able to provide useful information for developing measures

How to determine the outcomes….

- For each component, define what the result will be under each option

- Also define the result for the component if no decision is made (the "no action" option)
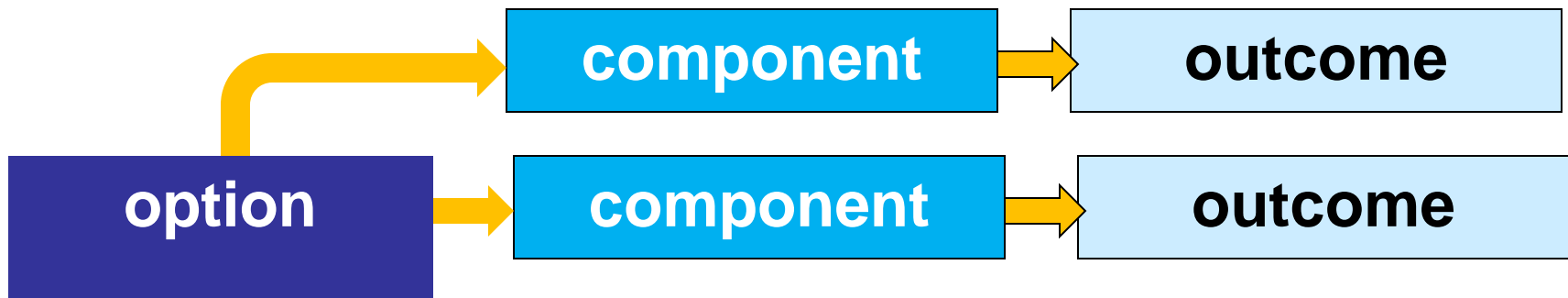
Example

Objective = Environmental Component = Greenhouse gas mitigation

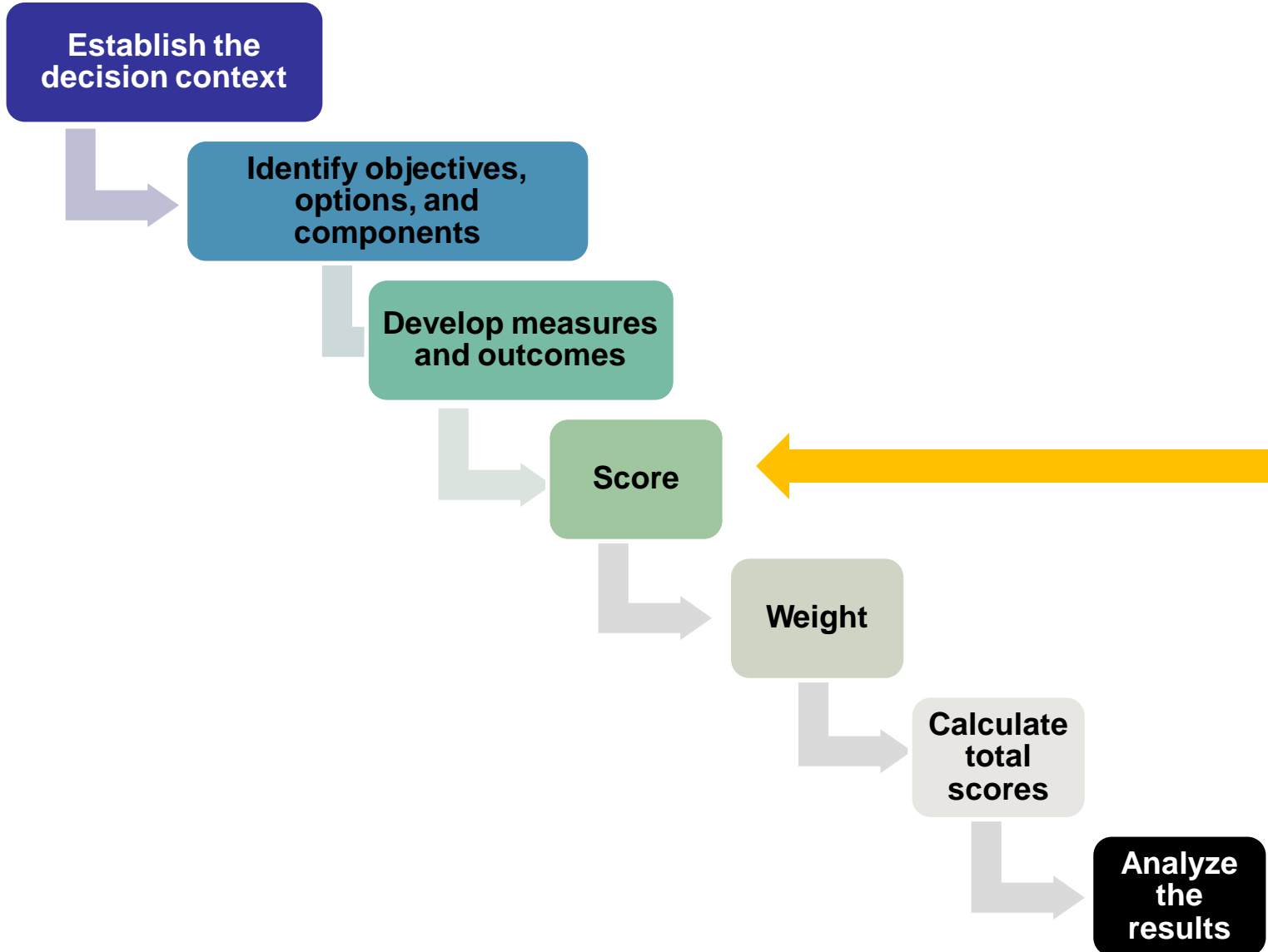**Outcome 1 = No change (status quo)**

Outcome 2 = X tons reduced

Outcome 3 = Y tons reduced

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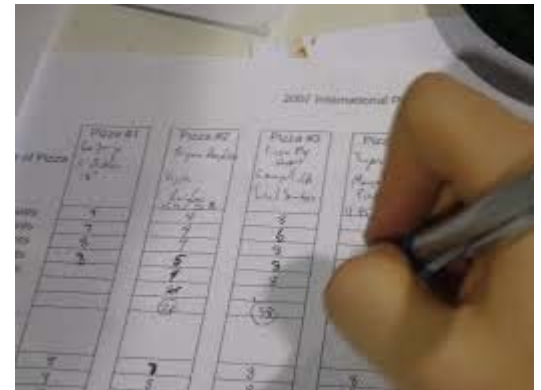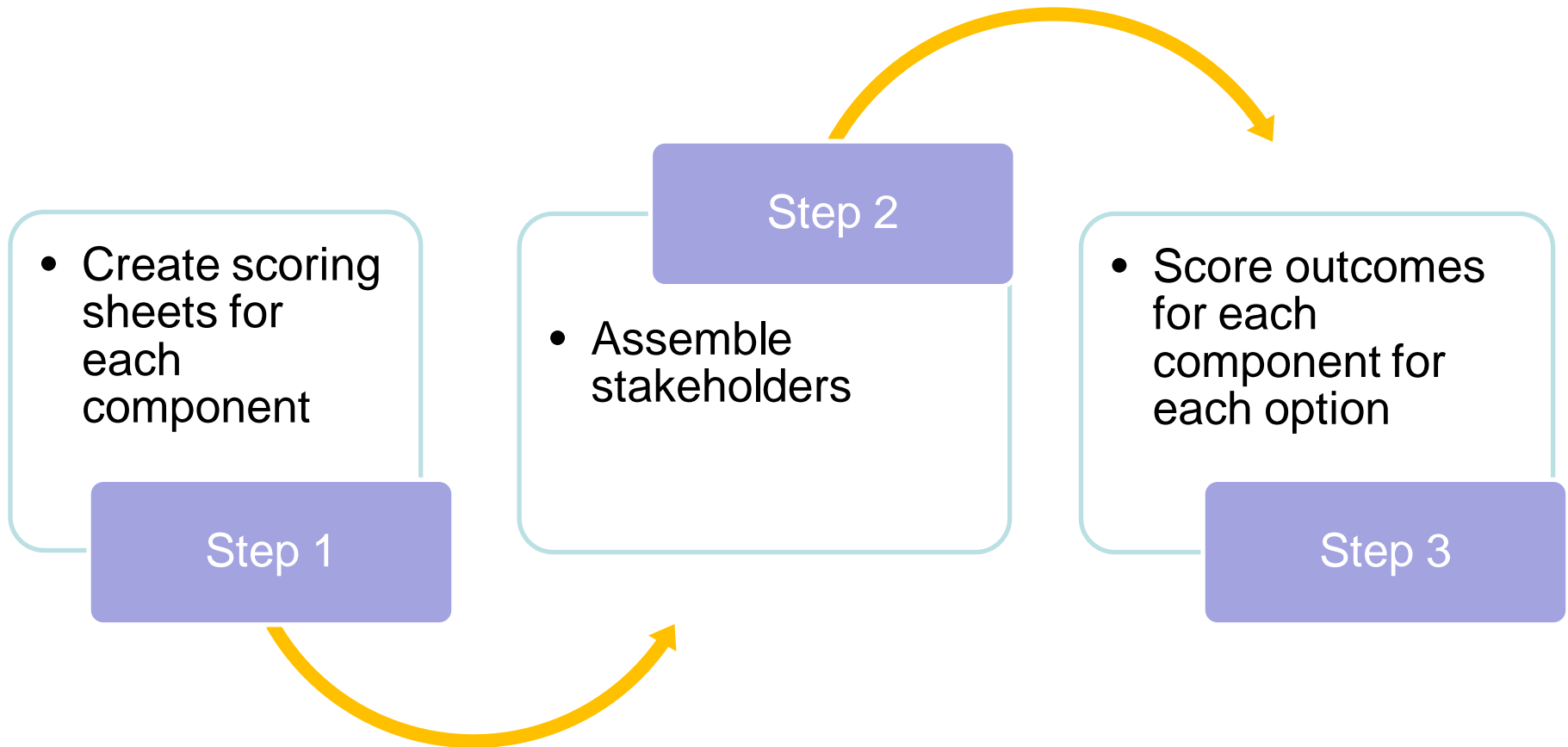**What are benefits of scoring?**

- Provides a way for options in a MCA to be prioritized

- Allows stakeholders to state their preferences for the different options

- Allows for multiple objectives to be compared on the same scale
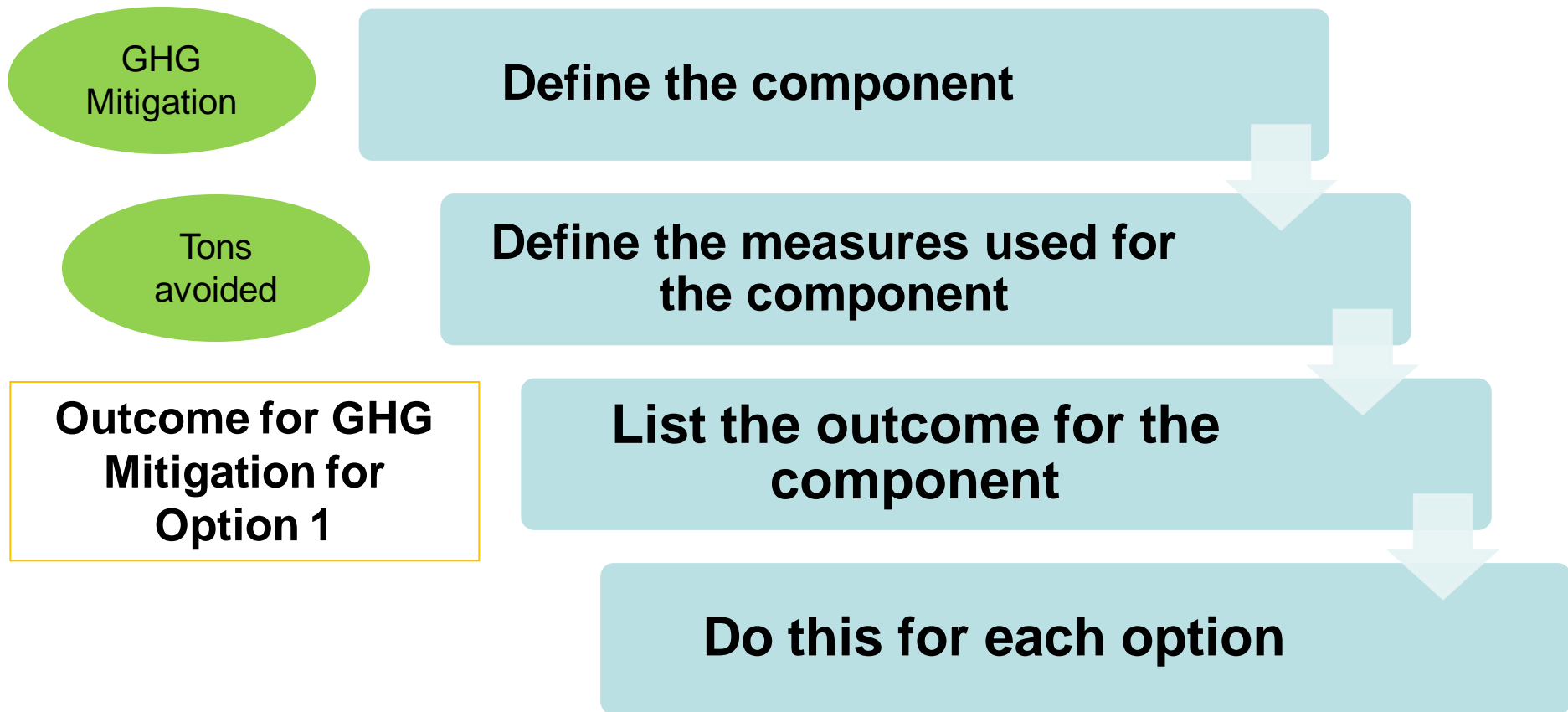
Major steps in scoring a MCA

Step 1
- Create scoring sheets for each component

Step 2
- Assemble stakeholders

Step 3
- Score outcomes for each component for each option

A scoring sheet guides stakeholders through the process of scoring each component. From previous steps…

GHG Mitigation	**Define the component**
Tons avoided	**Define the measures used for the component**
Outcome for GHG Mitigation for Option 1	**List the outcome for the component**
	Do this for each option

Tips for creating scoring sheets:

- Measure components in a way that is easy for stakeholders to understand

- Make sure all components are measured in the same direction (more = better)

- Measures for components may be either quantitative or qualitative

Example scoring sheet

- Description of the component
- Definition of measure used for component

Climate Regulation

Description: Climate regulation is an important ecosystem service provided by natural areas. Forests provide climate change benefits both by storing carbon that would otherwise be released in the atmosphere and by buffering against natural disasters. Trees absorb carbon dioxide during photosynthesis where some carbon is stored in branches, trunks, and roots, or in the soil and leaves. When trees die or are killed, this carbon is released. Trapping atmospheric carbon, in the form of carbon dioxide, is important because it is the leading greenhouse gas associated with global warming. The amount of vegetation or the hectares of forest in an area are key variables for assessing how a site may trap carbon and help regulate climate. Forests, vegetated areas, and wetlands are also thought to buffer against extreme events. Scientists generally forecast that global warming will lead to an increase in the rate of extreme events (storms, tornadoes, fires, hurricanes, and drought). Vegetated areas (forests and mangroves) and wetlands can help reduce the impacts of these extreme events. This can occur by reducing runoff, buffering storm surge, preventing mudslides, and storing or moving floodwaters. Tree roots can hold soil in place and stabilize stream banks. Coastal forests and forested wetlands absorb the energy from storm surges reducing erosion that protects the coastline.

Measures: Amount of land with carbon-storing vegetation and specific actions that help preserve the facets of natural ecosystems that moderate against extreme events.
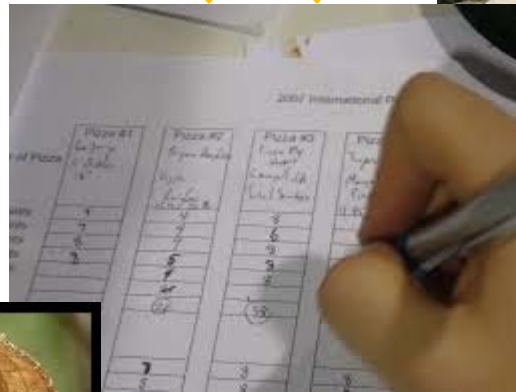
Example scoring sheet

- List of outcomes of component for each option

Outcome	Rank	Score
Outcome of component for Option #1		
Outcome of component for Option #2		
Outcome of component for Option #3		
Outcome of component for Option #4		
Status quo (no change) outcome for component		

Assemble Stakeholders

To **obtain scores** from stakeholders…..

- First, introduce the component and how it is measured

- Have stakeholders rank the outcomes for each component

- Define top-ranked outcome, then bottom-ranked outcome, then rank those in the middle

Ranking helps organize choices for scoring

Outcome	Rank
Outcome #1	4
Outcome #2	1
Outcome #3	3
Outcome #4	2
Status quo	5

To obtain scores from stakeholders…..(continued)

- After ranking outcomes, assign scores to them

- Least preferred = 0

- Most preferred = 100

- Score in between

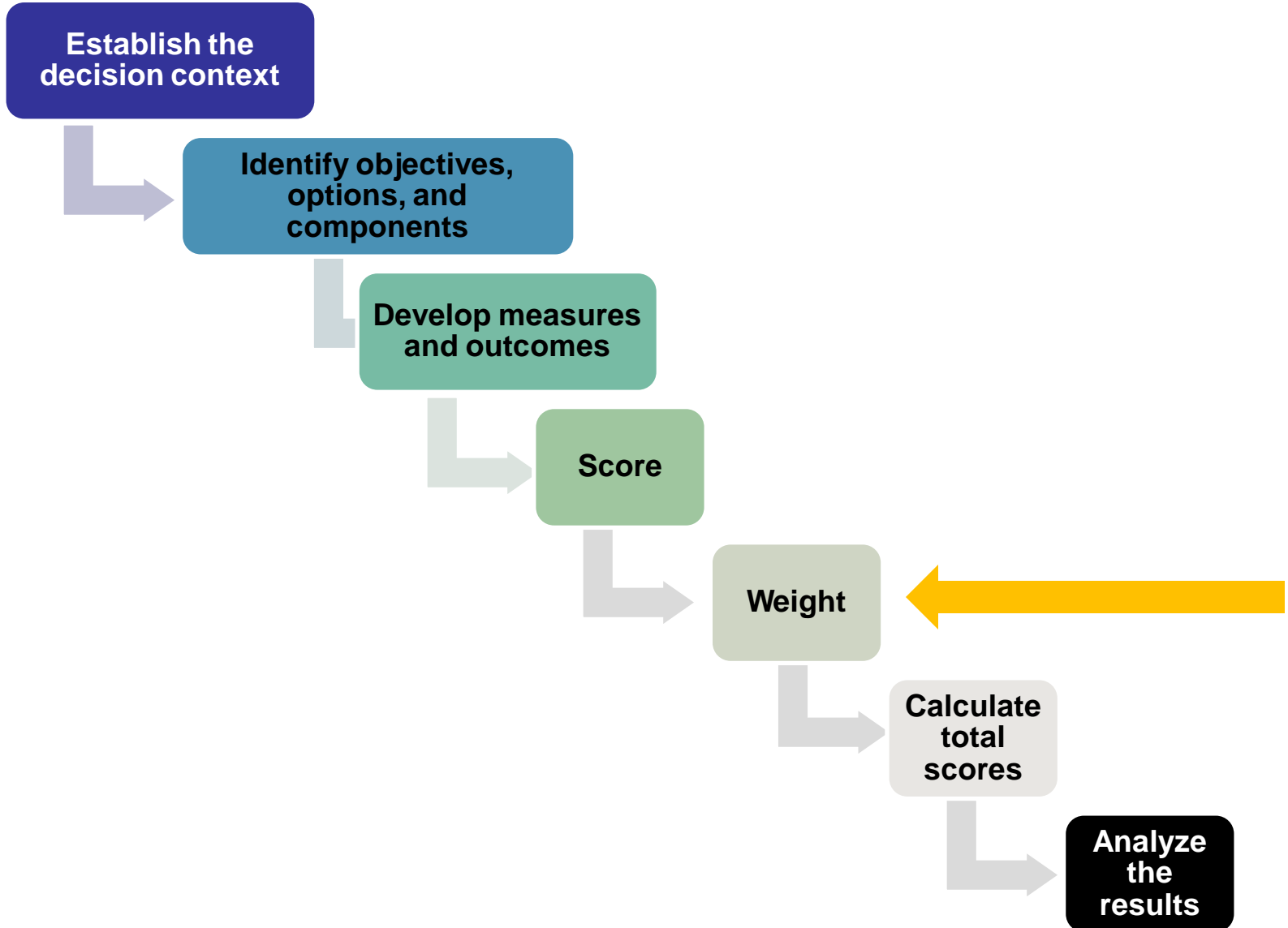| Outcome	Rank	Score
Outcome #1	4	20
Outcome #2	1	100
Outcome #3	3	60
Outcome #4	2	95
Status quo	5	0

Establish the decision context

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Weight

Calculate total scores

Analyze the results

What is weighting in an MCA?

A way to determine how important each component is as compared to others

- Weights are used with the scores to calculate the final, total scores for each option
- Weights are measured on a scale from 0 to 1

How to **weight components** in a MCA

- Rank and score each component based on how important it is to you

- Use a simple formula to calculate weights from these scores

How to create a **weighting sheet** (continued)

- A weighting sheet guides stakeholders through the weighting process

- List all of the components (and a row for "None") in a table in rows

This is different from previous scoring efforts

Component	Highest=1 Lowest = 4 **Rank**	Highest = 100 Lowest = 0 **Rate**
Component #1		
Component #2		
Component #3		
None		

How to create a weighting sheet (continued)

This is different from previous <u>scoring</u> efforts

=

Previous sheets focused on scoring the outcomes of components

This effort focuses on prioritizing the components

Major steps in weighting a MCA

- Rank the components

- Convert these ranks to ratings (like the scoring sheets)

Rank (or order) the components based on what's important to YOU…

Think: If you could have only one component, which would you choose?

Component	Rank	Rate
Component #1	2	90
Component #2	1	100
Component #3	3	25
None	4	0

After components have been rated, use the scores to calculate the weights

- Divide the rate for each component by the total to get the weight

Rank	Rate	Weight

Component	Rank	Rate	Weight
Component #1	2	90	$90 \div 215 = 0.42$
Component #2	1	100	$100 \div 215 = 0.46$
Component #3	3	25	$25 \div 215 = 0.12$
None	4	0	$0 \div 215 = 0.00$

TOTAL = 215

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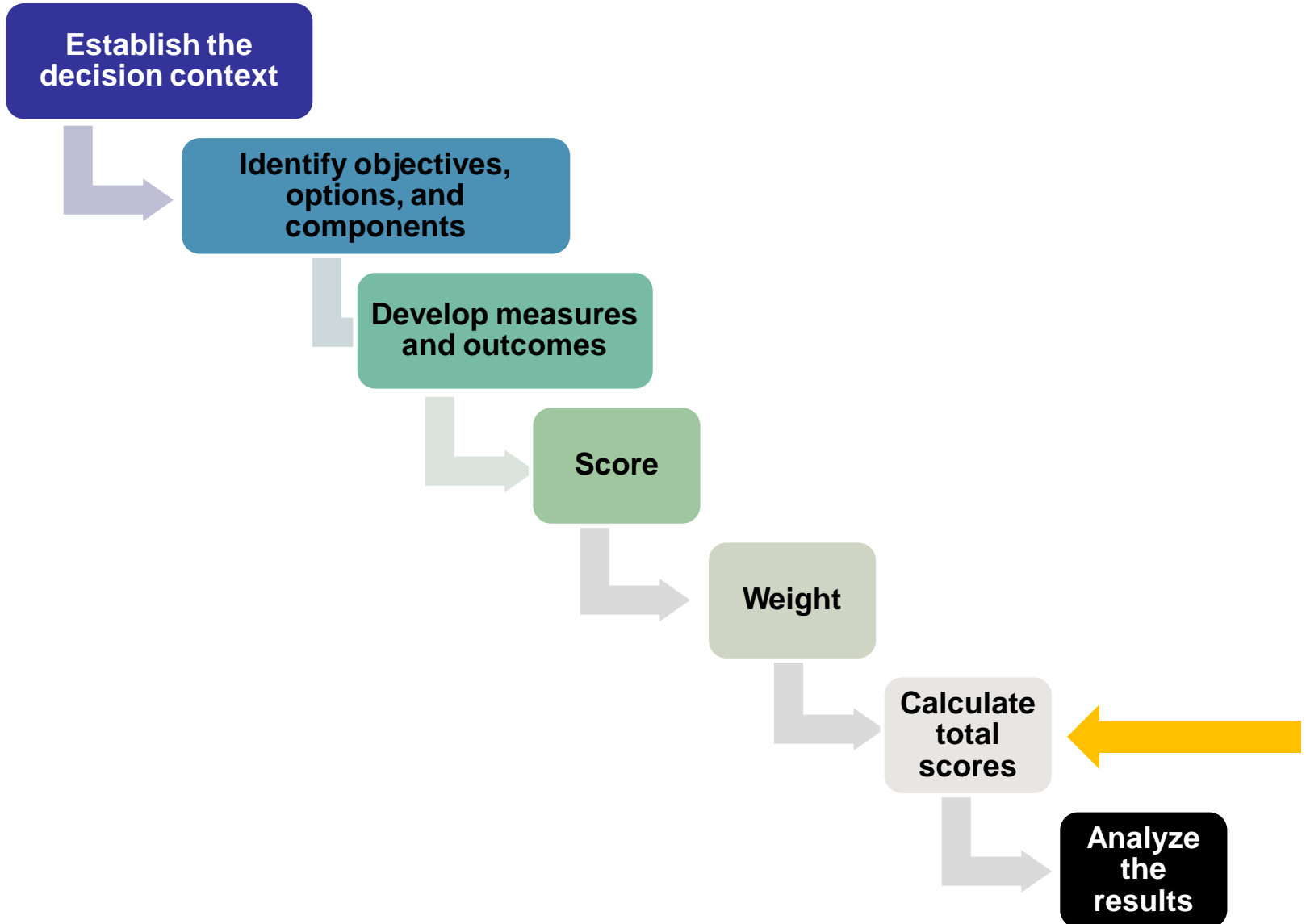
How to calculate overall total scores

- For each option, add the weighted scores for each component to get a total score the option

Individual → Stakeholder group → Everyone!

How to calculate overall total scores (continued)
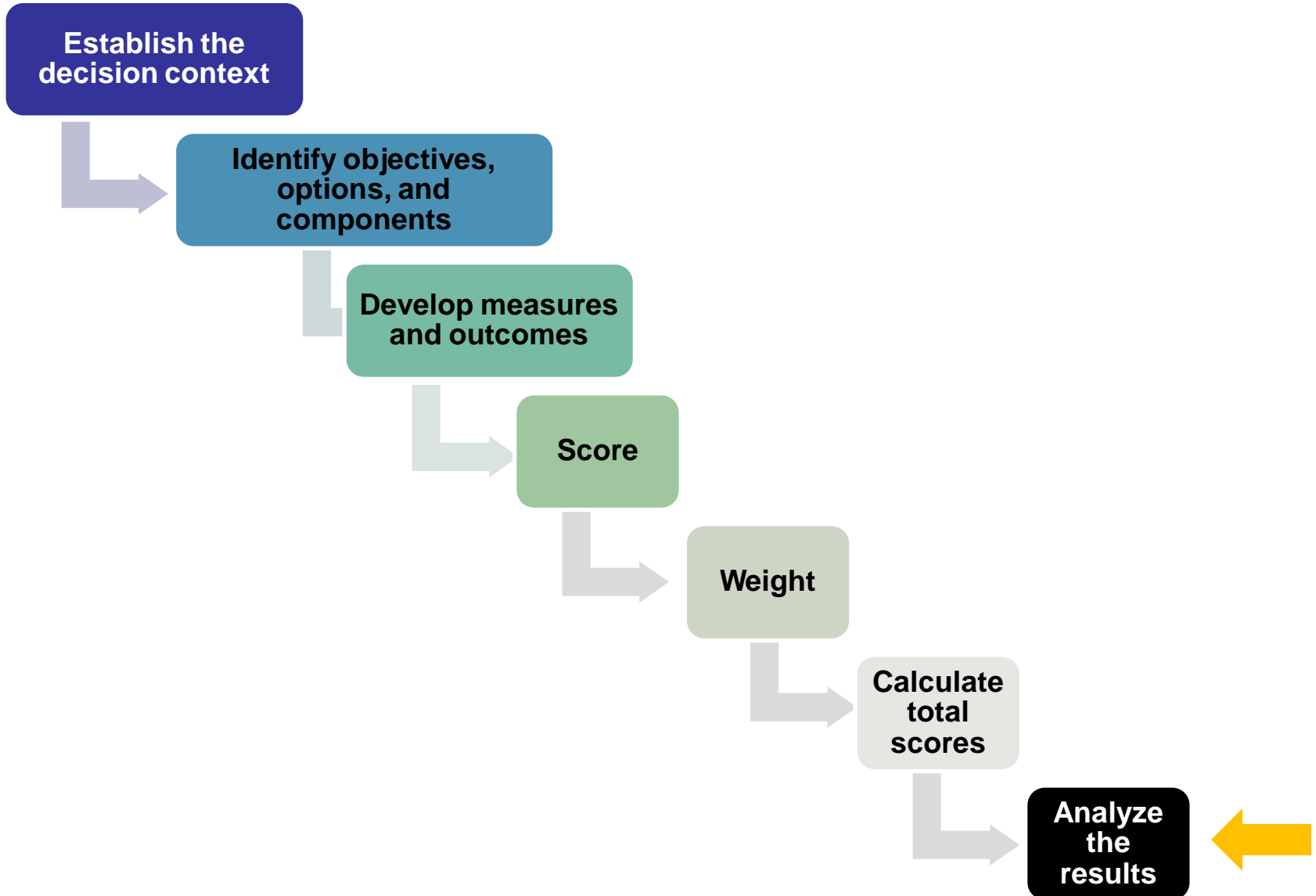
- Average the results for each stakeholder group

- This approach assumes that all stakeholder groups have equal influence and importance

- More on this later…

Establish the decision context

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Weight
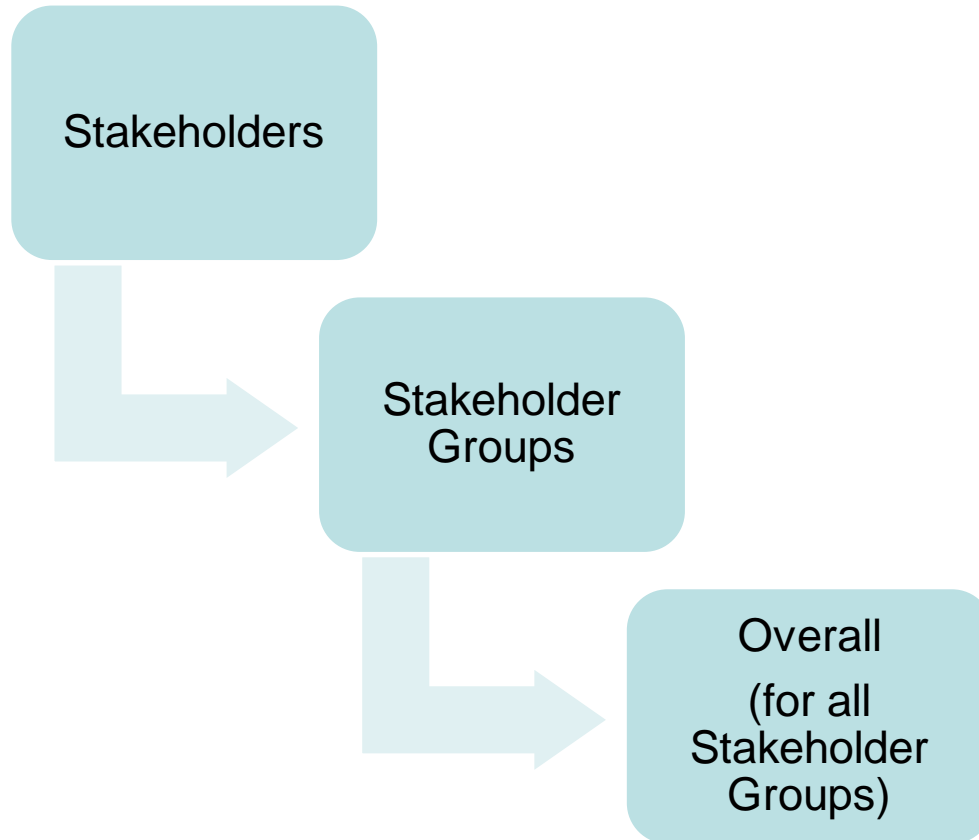
Calculate total scores

Analyze the results

How to **use results** of an MCA….

- Determine the most-preferred option
- Determine the set of top-ranked options
- Identify all options above a certain score
- Develop a short list of options

Results can be analyzed at different levels

Thing to consider….

- Weighting of individual stakeholders

- Weighting of stakeholder group
  - ♦ Size of stakeholder group
  - ♦ "Importance" of stakeholder group

Use qualitative approaches to tell the story behind the results

- Consider the highest and lowest ranked options and what was behind the scores they received

- Consider results of stakeholder groups and what these results tell you about what is important to those groups

- Do the results suggest than any additional options should be considered?

Scores obtained from stakeholders provide information on tradeoffs

- Tradeoffs represent what a stakeholder would be willing to give up of one thing to get something else

- MCA forces stakeholders to consider and express their tradeoffs

- Tradeoffs can be evaluated within an objective, or across objectives

Any **Questions?**