



# Building a Blueprint for Using Data more Effectively

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SIXTH ANNUAL  
AD BY 25 NETWORK  
CONFERENCE 2019

**INFORMING ACTION,  
IMPROVING OUTCOMES**  
DATA, STORYTELLING, AND  
COMMUNITY BUILDING

**FEBRUARY 5-6, 2019**  
Collinsville, Illinois

# Session Overview

1. Session Objectives
2. Foundational Concepts
3. Analytics Method
4. Wrap-Up and Q&A



# Session Objectives

1

Differentiate between metrics and analytics

2

Examine relationship between data analytics problem-solving

3

Look at analytics as a resource to improve decision-making

4

Identify key concepts or data needed to deliver actionable results

# Promise of Analytics

**Big Data, Better Hiring: 10 Ways HR Can Use Analytics To Find The Perfect Employee**

**LEARNING ANALYTICS AND ITS POTENTIAL TO BRIDGE EDUCATION SILOS**

**Data Analytics Helps Boston Schools Better Serve Students**

**Algorithm Is Gonna Get You: The Advantages of Video Analytics**



*Great!*



What could possibly go wrong?

# Reasons Analytic Initiatives Fail



# Session Handout



Informing **Action**  
Improving **Outcomes**



## Activity Guide

### Analytics Terms and Notes to Self

#### Analytics

- Descriptive analytics (metrics)
- Diagnostic analytics
- Predictive analytics
- Prescriptive (advisory) analytics

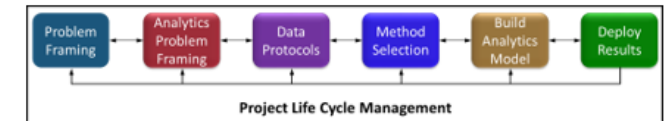
#### Evidence-Based Practices

- Scientific literature
- Organizational data
- Professional experience
- Stakeholder concerns

#### Components of Data Analytics

- Technology
- Algorithms
- Methodology
- People
- Industry

### Summary of Data Analytics Methodology



#### Step 1: Problem Framing

- Identify and refine the problem
- Identify stakeholders
- Refine problem statement and delineate constraints
- Determine the value and benefit of answering the question
- Agree on the problem statement or research questions

#### Step 2: Analytics Problem Framing

- Reformulating the problem statement as an analytics problem
- Develop a proposed set of predictors and relationships to outputs
- Define the key metrics of success
- Agree on proposed analytic solution to the problem

#### Step 3: Data Protocols

- Identify and prioritize data needs and resources
- Identify means of data collection and acquisition
- Determine how and why to combine, rescale, clean, and share data
- Determine the documentation and reporting of findings

#### Step 4: Method Selection

- Identify available problem solving approaches
- Select model testing approaches

#### Step 5: Build Analytics Model

- Test relationships among predictors and outcomes
- Examine and evaluation model fit of analytic models (i.e., run analyses)

#### Step 6: Deploy Results

- Deliver findings
- Support dissemination
- Support ongoing data use

#### Step 7: Project Life Cycle Management

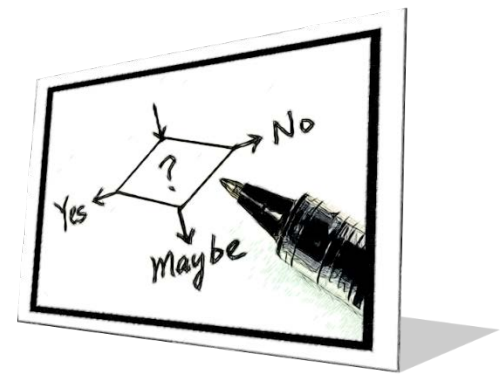
- Document the process so results can be replicated
- Ensure that the project and resulting model are providing usable results
- Recalibrate, update, and maintain the analytic model to ensure the intended impact
- Support training activities so personnel know how to use results for continuous improvement
- Evaluate the outcome(s) of the project now and over time |

# Analytics: What is it?

Scientific process of transforming *data* into *insights* for making *better decisions*



Explore



Visualize



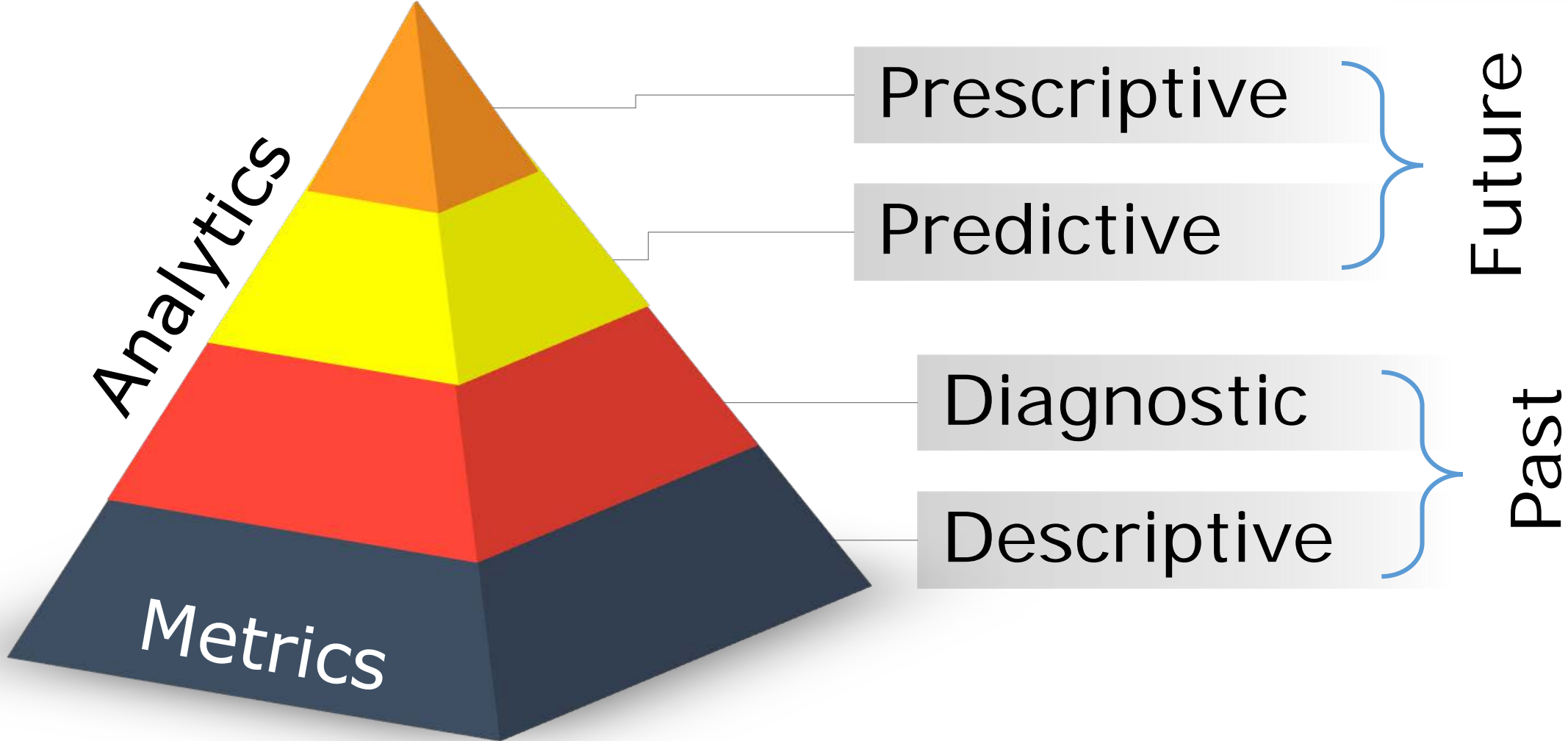
Discover



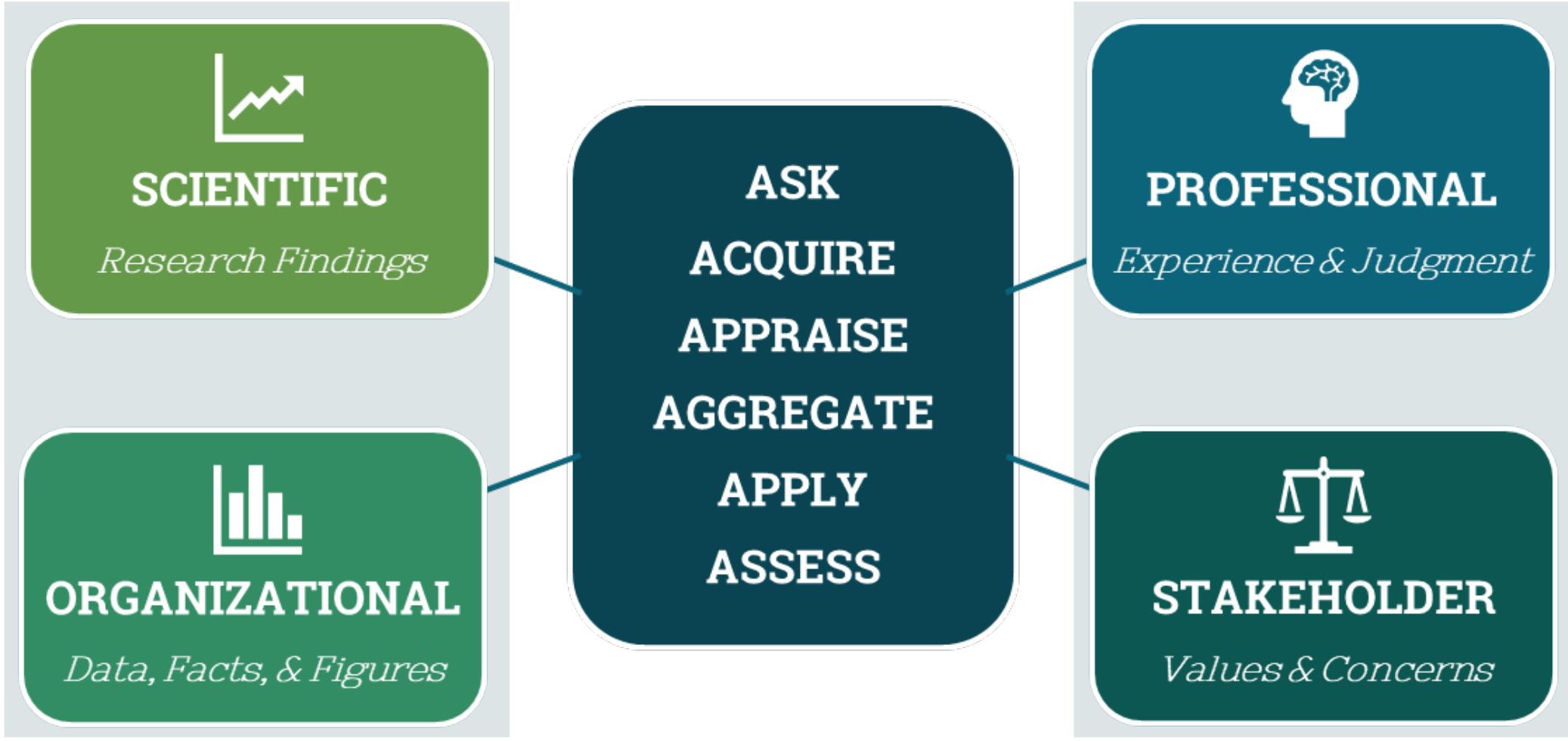
Communicate



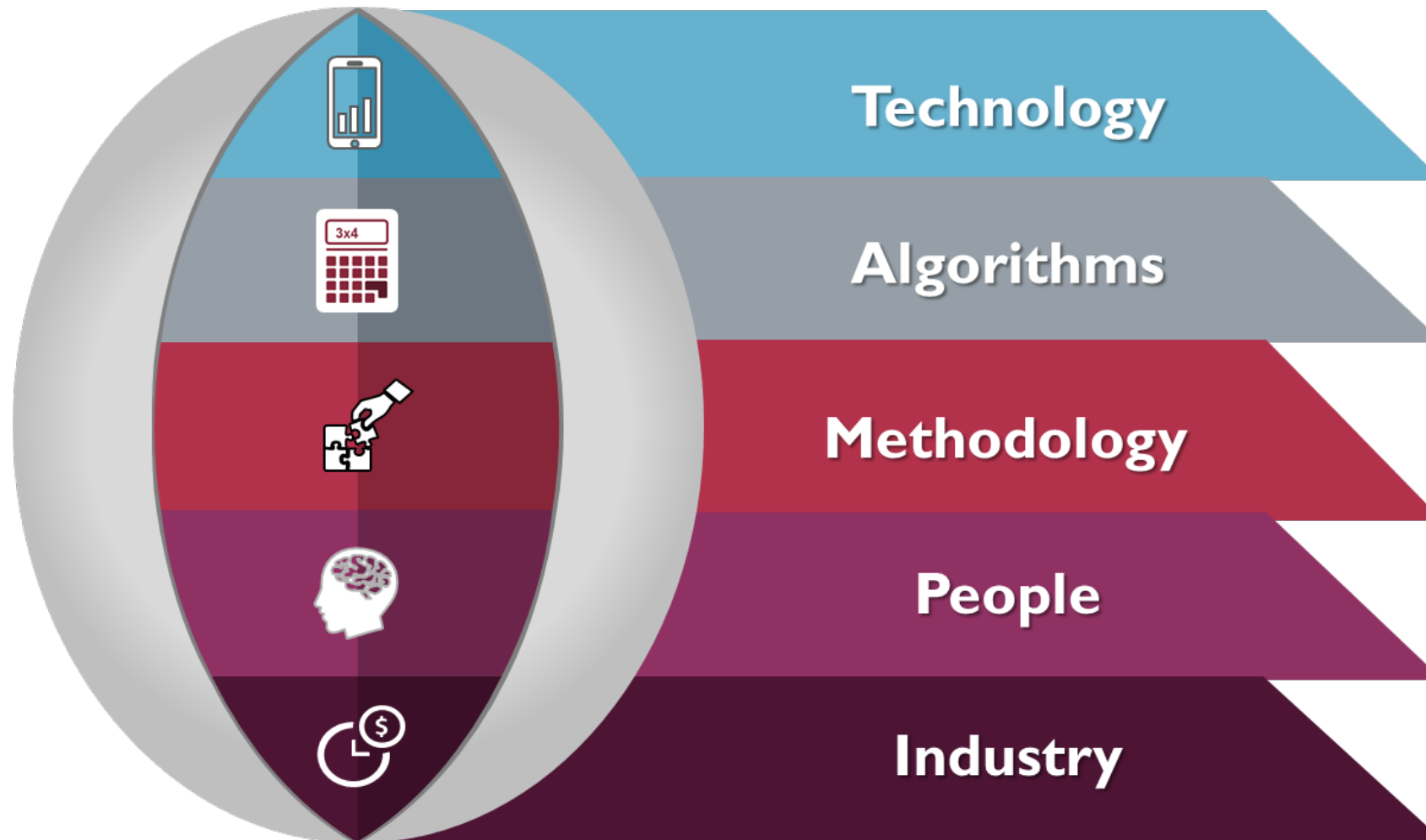
# Four Analytic Applications



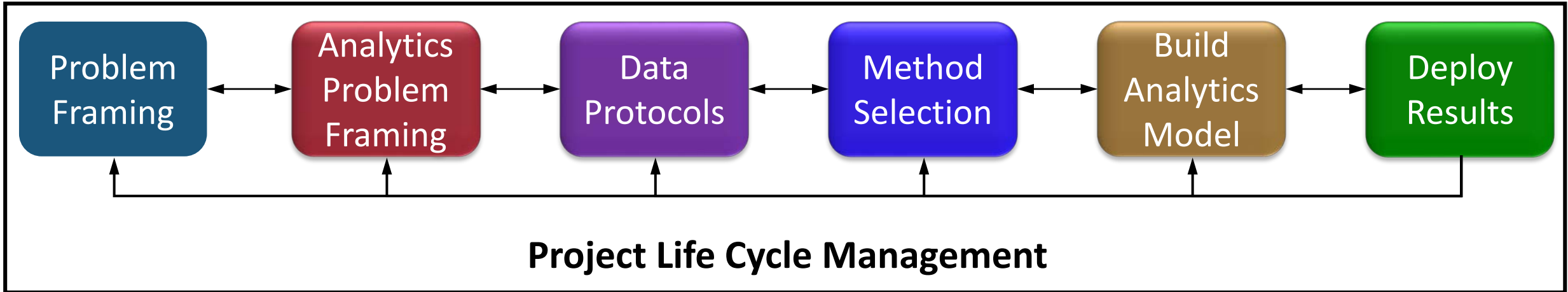
# Evidence-Based Practices



# Five Components of Data Analytics

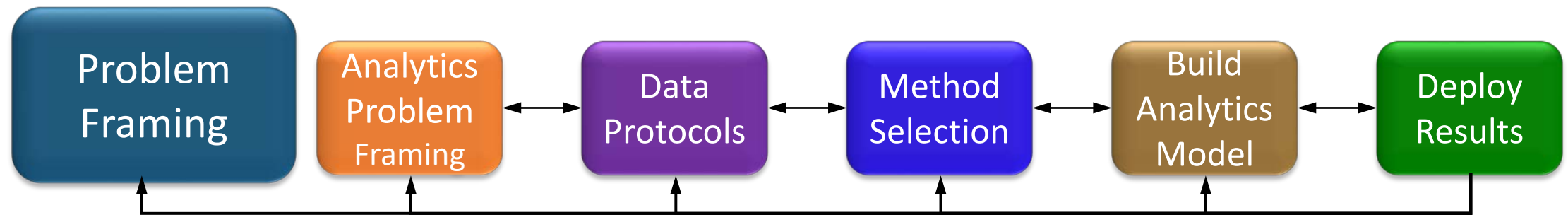


# Data Analytics Process



- Provides a way to systematically think about how to use data and analytics
- Helps to ensure projects produce the desired outcomes and results
- Is an iterative process that requires a team working together in collaboration

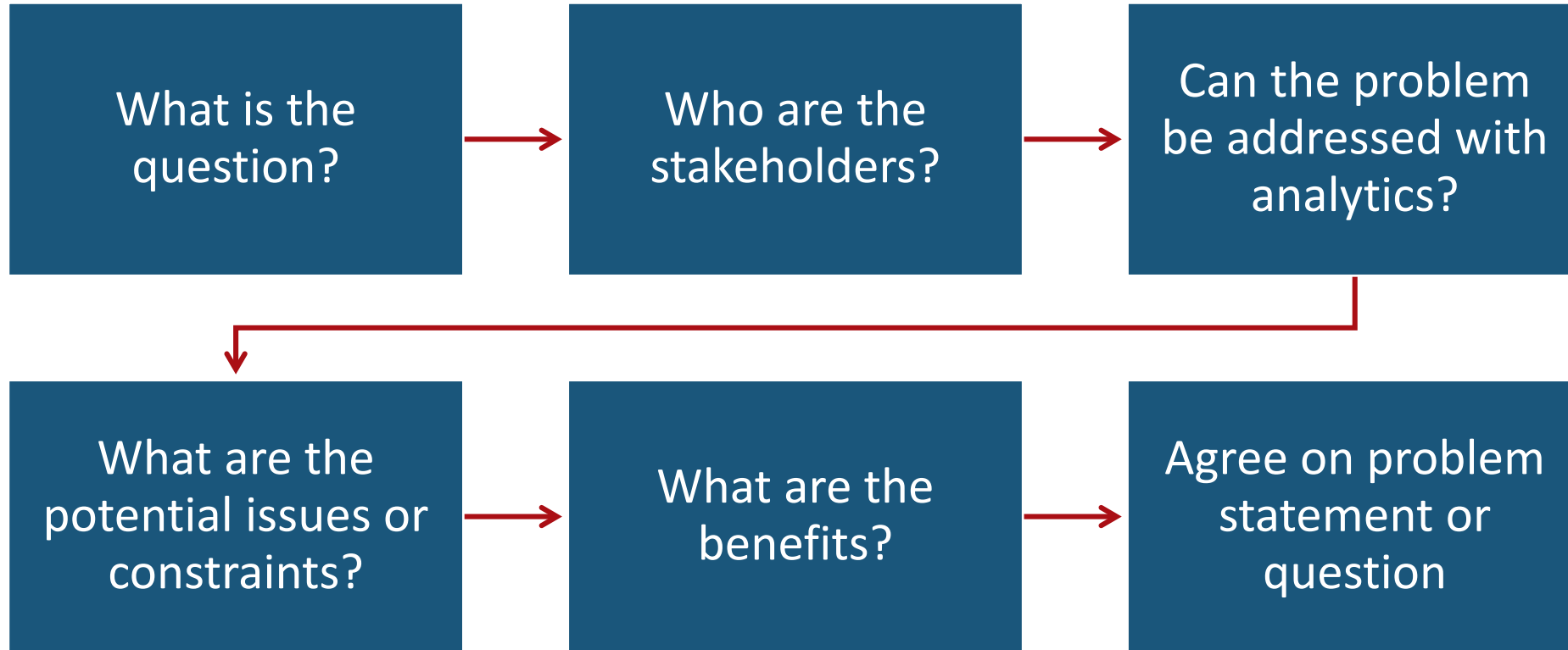
# Step 1



## Project Life Cycle Management

- The **most important**, because it **sets expectations** and limitations
- Establishes a firm foundation on which analytics can be implemented

# Problem Framing: Identify & Refine



# Stakeholder Analysis

Consider interests of all stakeholders who may affect or be affected by project

What issues could disrupt the project?

Who should have access to information?

Who should be involved and when?

Establish communication strategies

How can negative impact be reduced?

Problem Framing

# Problem Framing: *Making the Case*

- Can our goals, methods, and measurable outcomes be explicitly stated in our strategic plan and get support from key personnel?
- What would it take to make this happen?
- What will we do with the answer or solution once we get it?
- Have we considered the unintended consequences that analytics may introduce?



## Activity 1: Pair and share

- Respond to the questions and write down responses.  
*5-10 minutes*
- Share responses with partners at your table.
- Share out some questions with group.  
*5 minutes*

# What do you want to know?

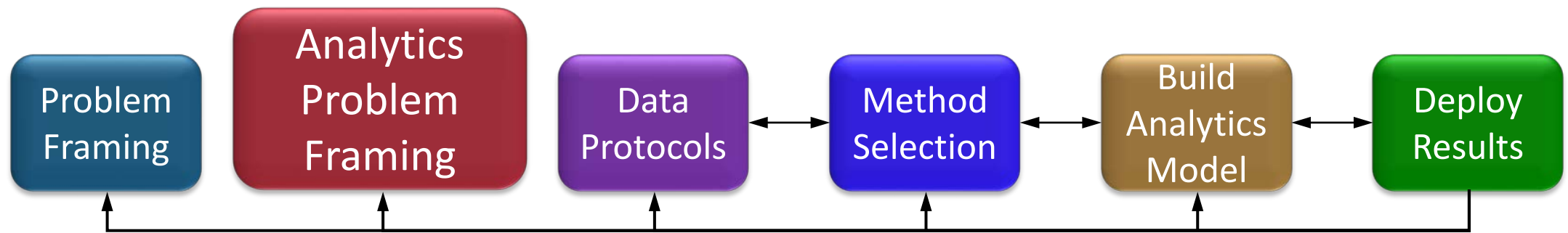
## Question and Action

- What questions do you have about work in your community?
- What actions would you take if you know the answer to those questions?

## Stakeholders

- Who should be involved in helping answer those questions?
- Who should be involved in taking action after you get the answers to those questions?

# Step 2



## Project Life Cycle Management

- Dialogue between the stakeholders who have a problem and the analytics personnel who can provide a solution to that problem

# Reframe Question

Reformulate problem statement into analytics problem

Develop a proposed set of drivers and relationships to outputs

Set the set of assumptions

Define key metrics of success

Obtain agreement on analytics solution

*Framing the problem the right way is imperative for clear thinking, proper planning, and effective communication*

Analytics  
Problem  
Framing

# Analytic Model

- Diagramming methods can be helpful
  - Conceptualize relationships between variables and create a predictive model
- Based on experience, knowledge, and logical relationships
  - Connect desired outcome to input variables and constants

Define the input/output functions of the problem

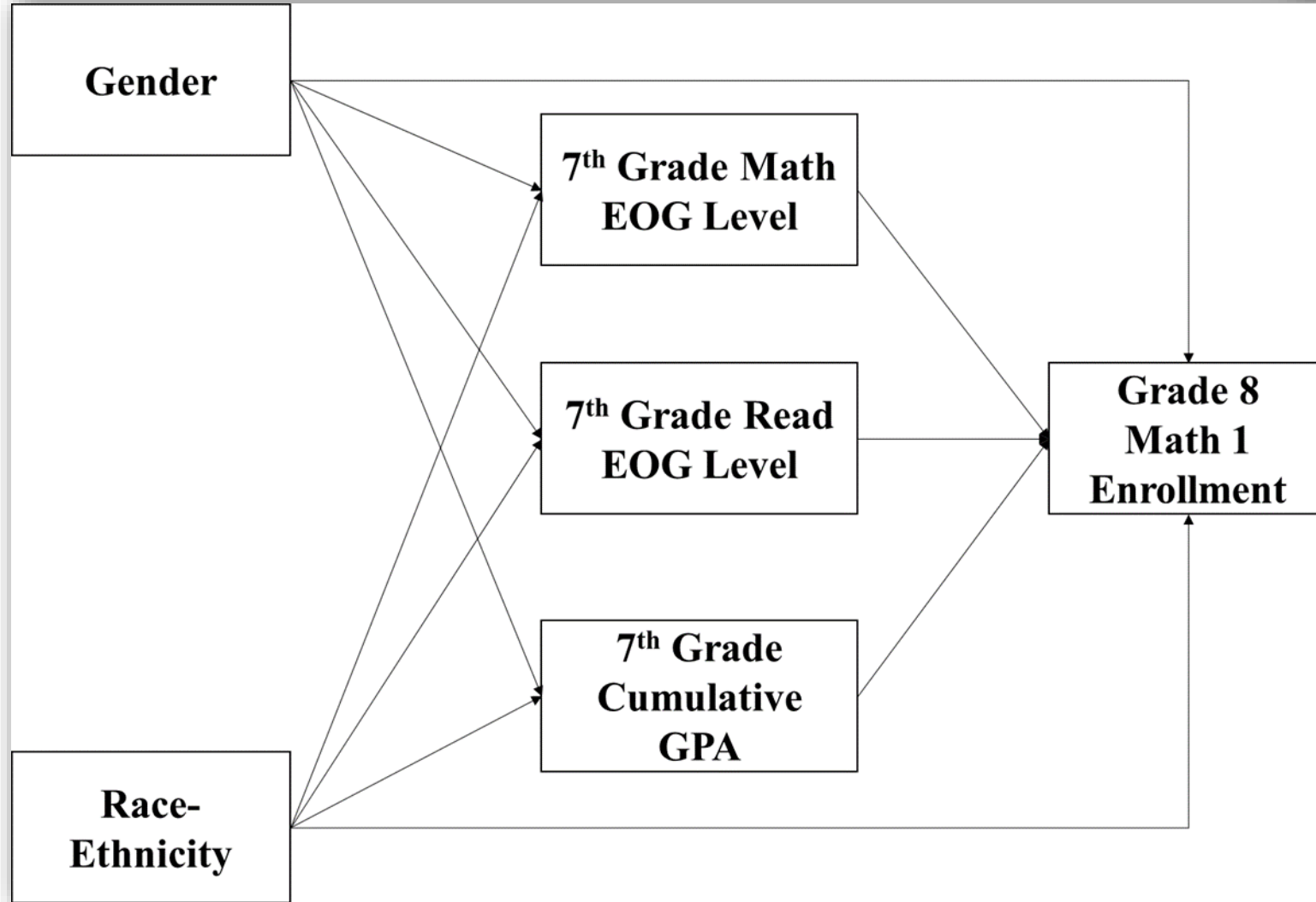
- Communicate them to stakeholders
- Sketches & diagrams

Gather a sense of their possible effects and how to communicate them

- Simple table
- Black box sketch

Analytics  
Problem  
Framing

# Model Example



Analytics  
Problem  
Framing

## Activity 2: Build a model

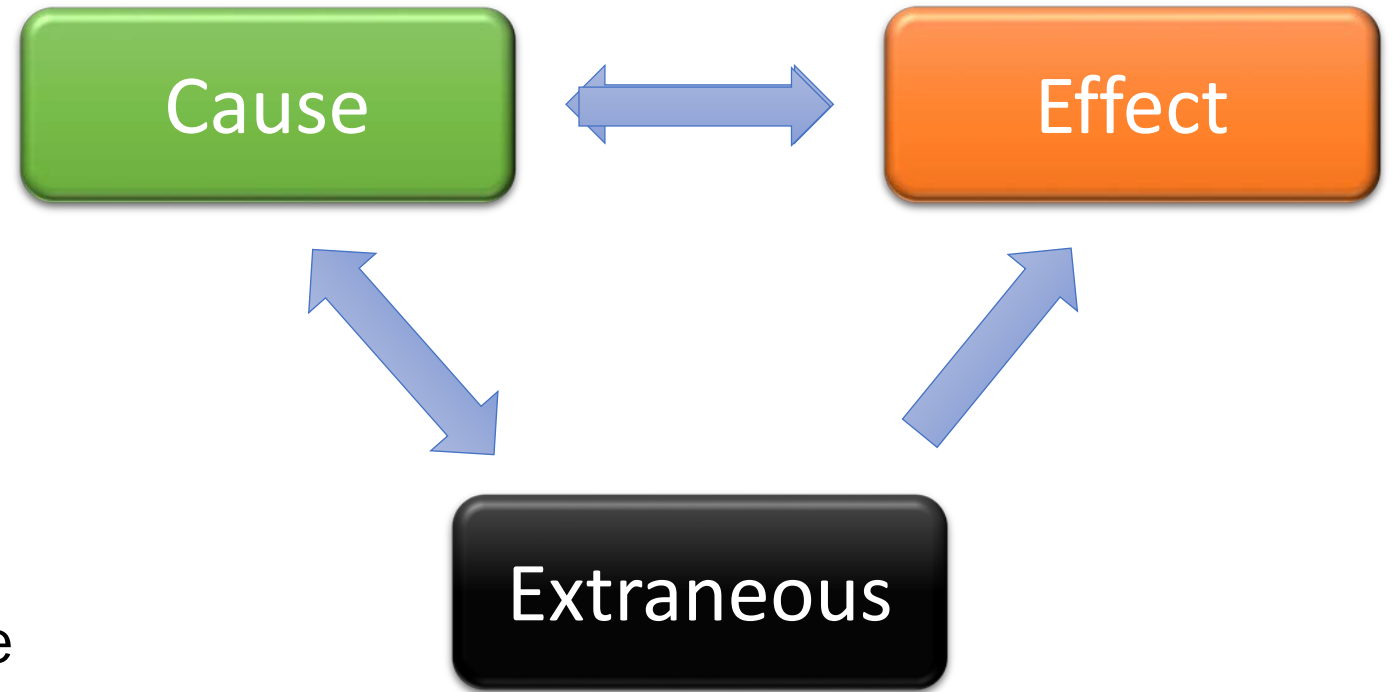
- For one problem in Activity 1: create a analytic-model diagram or table  
*5 minutes*
- Share your model with members of group  
*5 minutes*
- Discuss the ease and/or difficulty of putting an analytic-model together  
*5 minutes*

# Build a Model

- Identify the outcome(s) for the question
- What are the drivers (factors) that influence the outcome?
- What is the relationship(s) between the drivers and outcomes?
- Can you provide rationale or justification for those relationships?

# Causal Validity

- Cause related to effect
  - Statistical validity
- Cause before effect
  - Temporal precedence
- Control extraneous variables
  - Factors that influence the relationship between the cause and effect



Analytics  
Problem  
Framing

# Internal Validity: *Third Variable Problem Examples*



Analytics  
Problem  
Framing



# Internal Validity:

## *Third Variable Problem Examples*



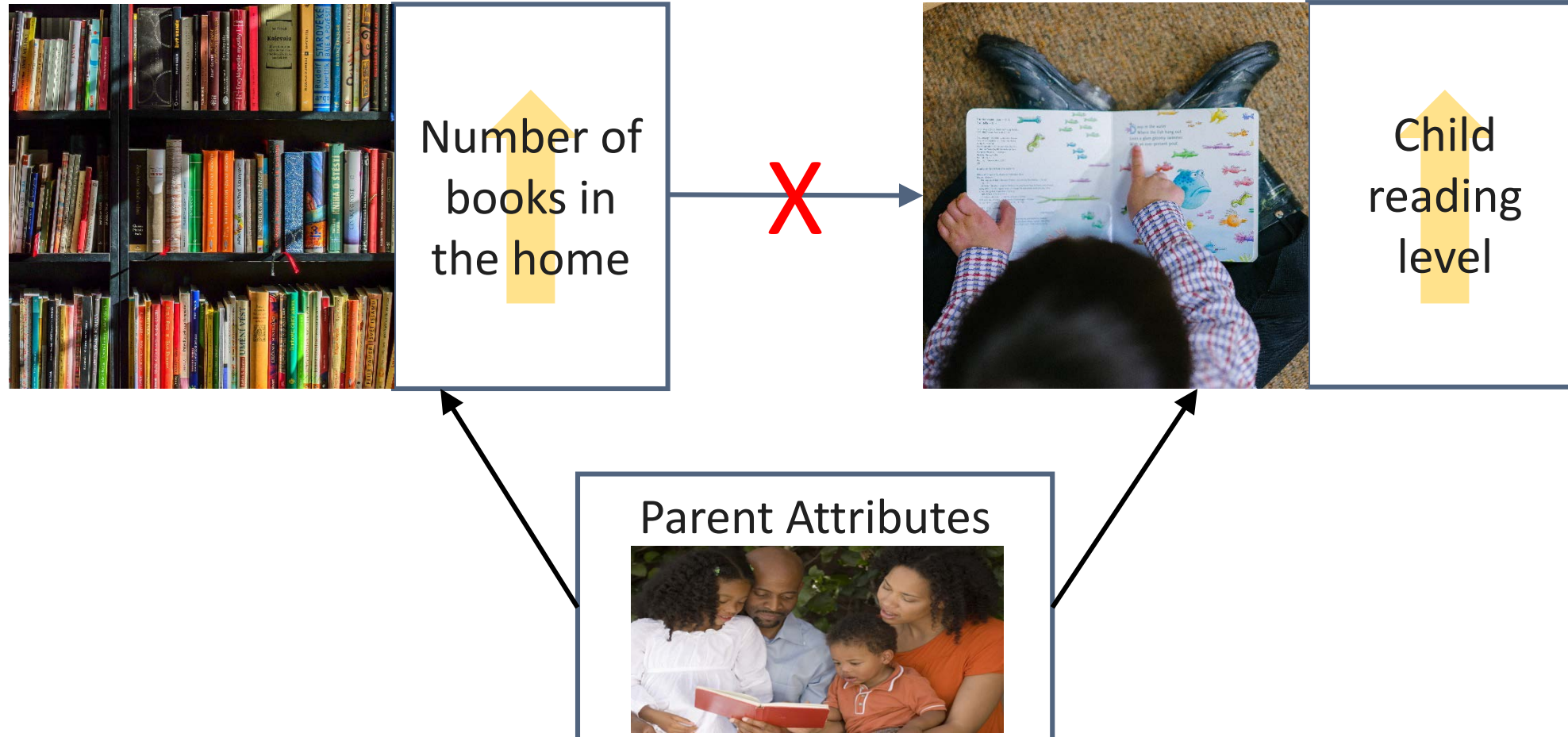
Analytics  
Problem  
Framing

# Internal Validity:

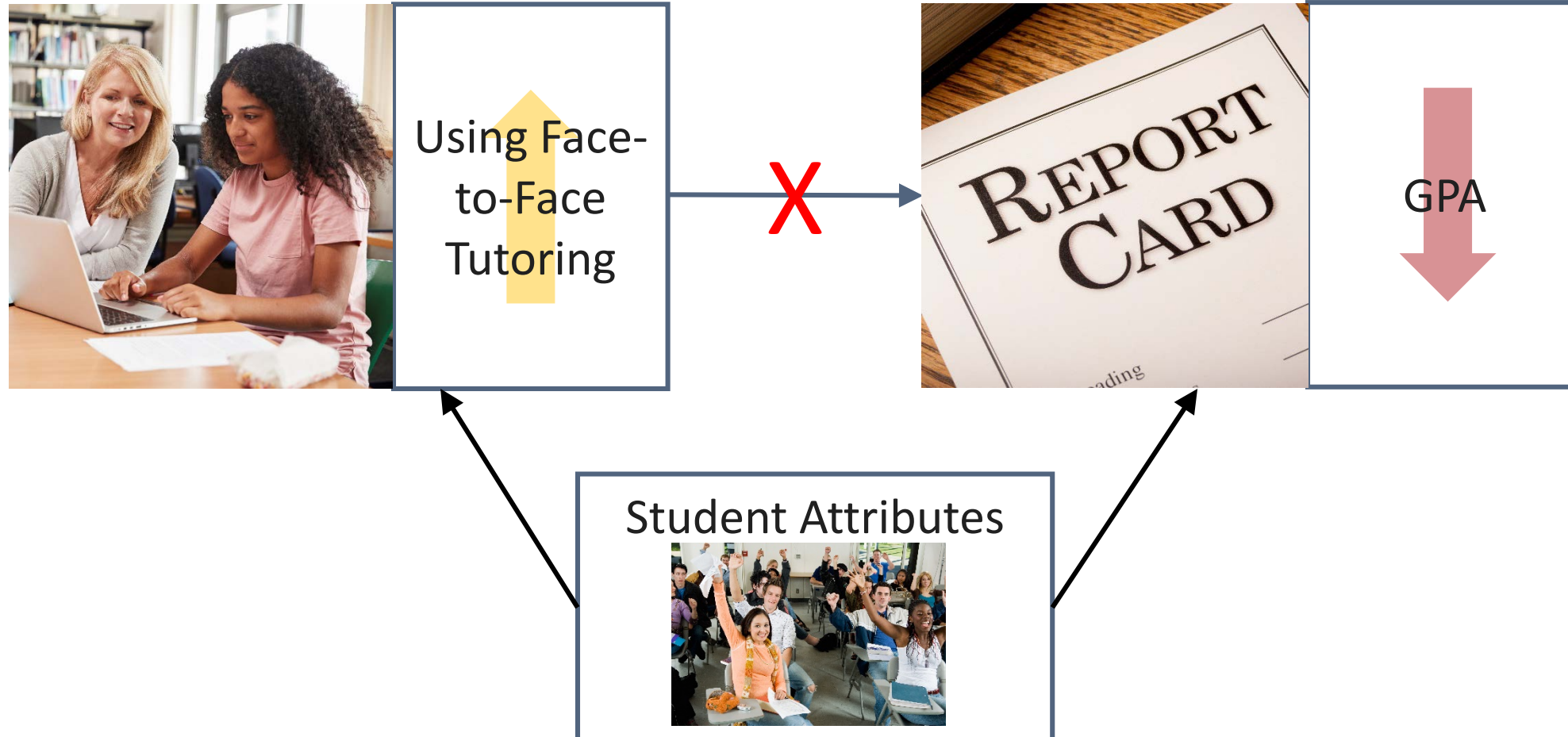
## *Third Variable Problem Examples*



# Extraneous Variables: Common Cause Variables



# Extraneous Variables: Common Cause Variables



## Activity 3: Think About It

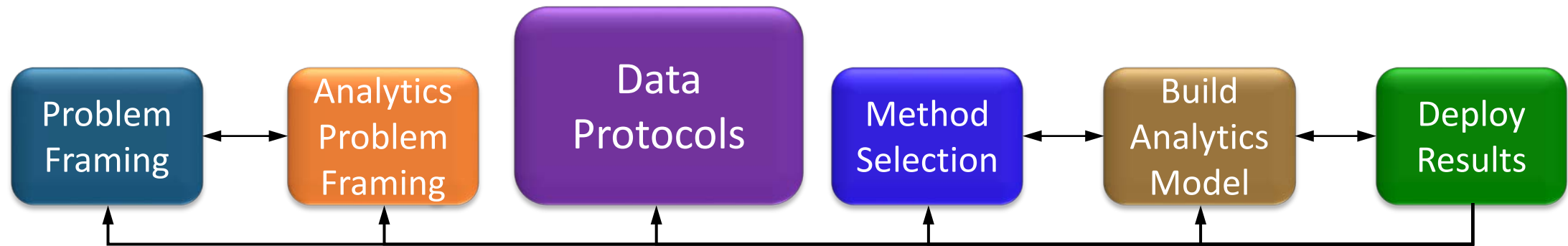
- Respond to the questions by thinking about it and write down responses.  
*5 minutes*
- Report back the ease and/or difficulty of finding unmeasured variables  
*10 minutes*

# What Am I Missing?

For the analytic-model created in Activity 2:

- Re-examine the relationships between the input (driver) factor
  - Should other inputs be added to the model?
- Re-examine the relationships between the model's inputs and outcomes
  - Are there any unmeasured (third) variables that could change the nature of those relationships?

# Step 3



## Project Life Cycle Management

- Determine how data collection and management will support analytic framework
- Make sure data can answer the question and provide actionable results

# Data Protocols



*“If you can't measure it, you can't manage it.”*

-Peter Drucker

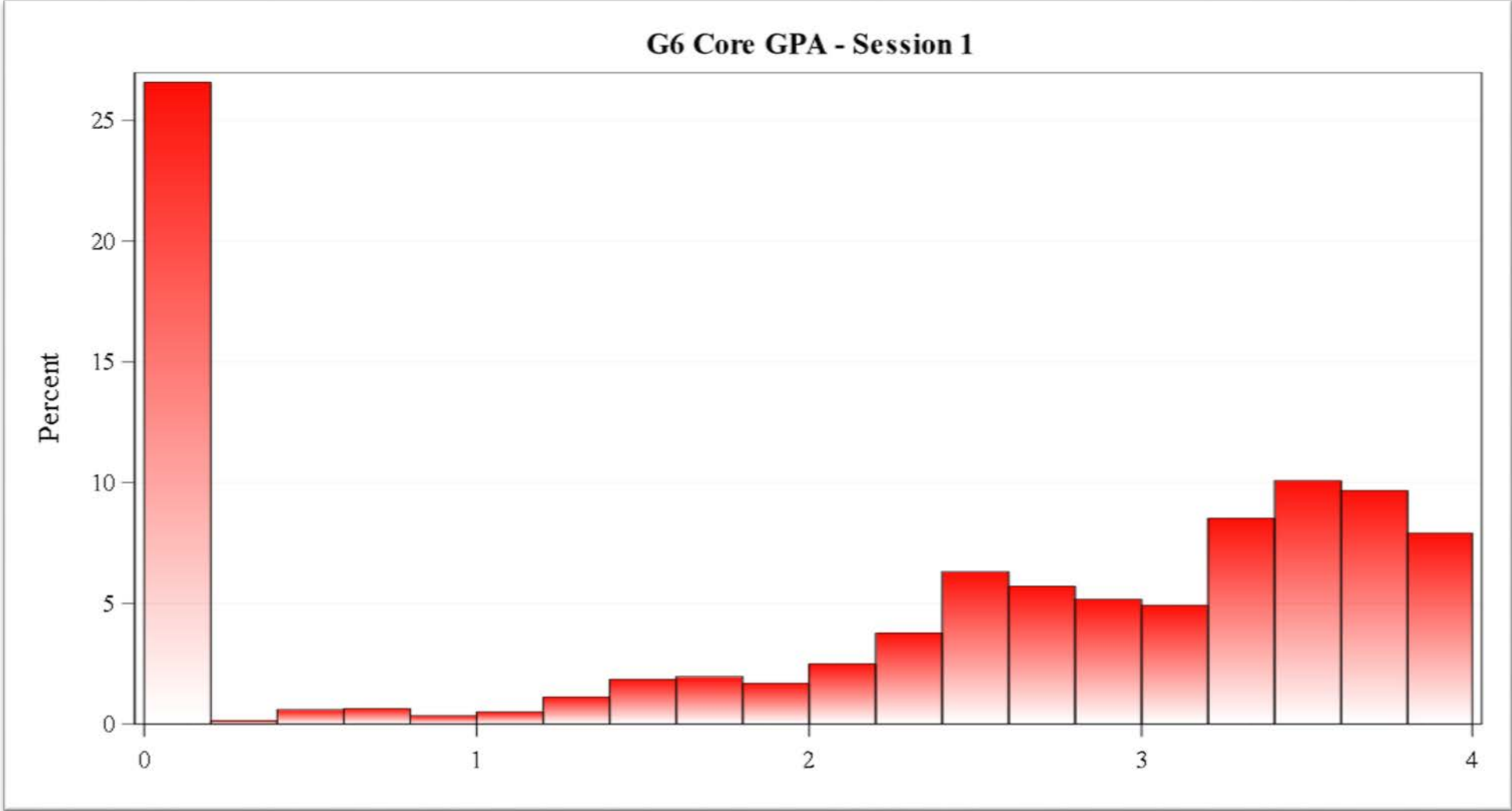
Data  
Protocols

# Data Protocols: *Determine Needs*

- Examining the analytics problems
  - Do you have the data (measured variables) needed?
  - Effort to pull those data elements together?
  - Is the data of sufficient quality to answer the question?
- This examination should also loop back to problem
  - What is the most important outcome?
  - What is the best use of organizational resources?



# Data Audit Example



# History Lesson:

## *Importance of Sampling*

- Who was the only president from the state of Missouri?



# History Lesson: Importance of Sampling



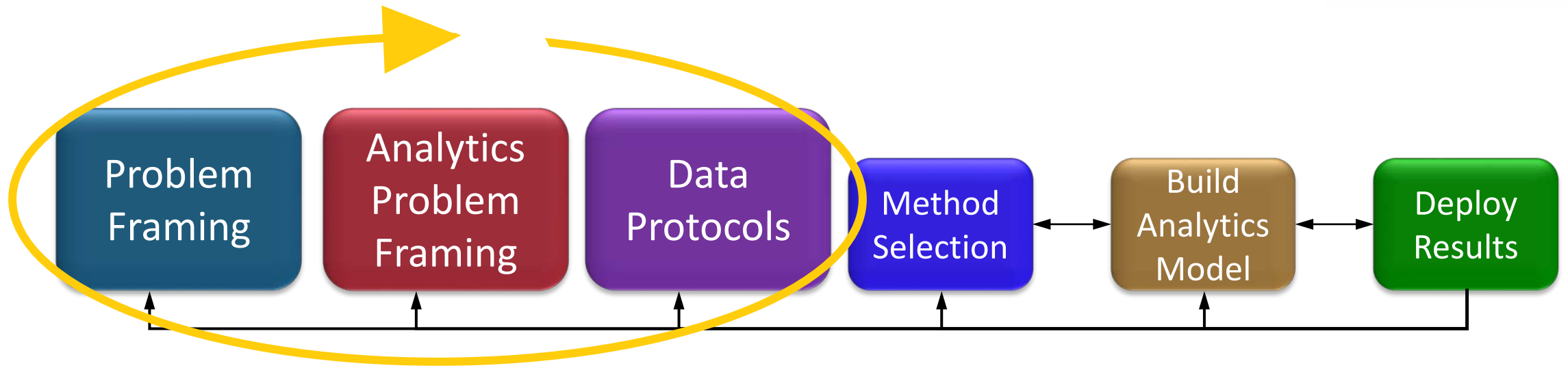
## Activity 4: DATA!!!

- For analytic-model in Activity 2: determine data needs and data quality  
*5 minutes*
- Discuss comments and feedback regarding the ease and/or difficulty of getting good data  
*10 minutes*

# Got Data?

- Name of outcome or driver variable
- Source or potential source of data
- Do you currently have access to the data for this variable?
- Is the data for this variable representative of target population?
- Data issues with this variable (e.g., missing or incomplete data, have the right level of data)?

# Steps 1, 2, & 3



## Project Life Cycle Management

- Continual interplay between the data you have, the data you can collect, and the questions you want to answer.

# Steps 4 & 5



## Project Life Cycle Management

- Steps are typically completed by analytics personnel
- Communication still needed, but to a lesser extent

# Data Analysis: *Analytics Models*



## Method Selection

Identify available problem-solving approaches

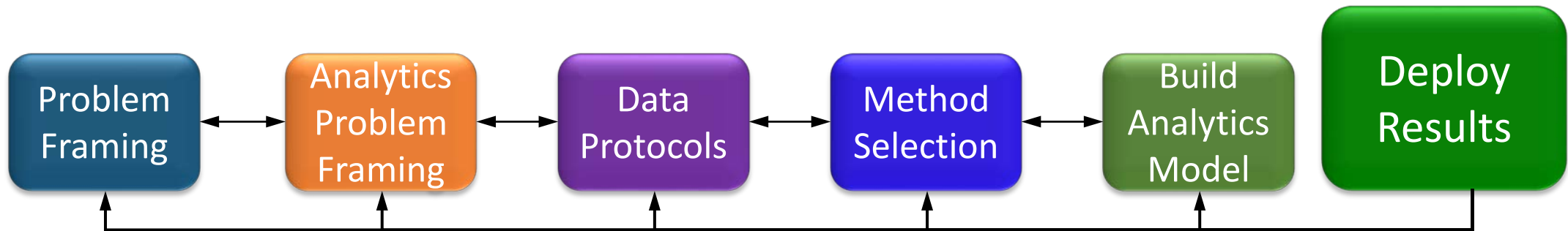
Select model testing approaches

## Build Analytics Model

Test relationships among predictors and outcomes

Examine and evaluate model fit

# Step 6

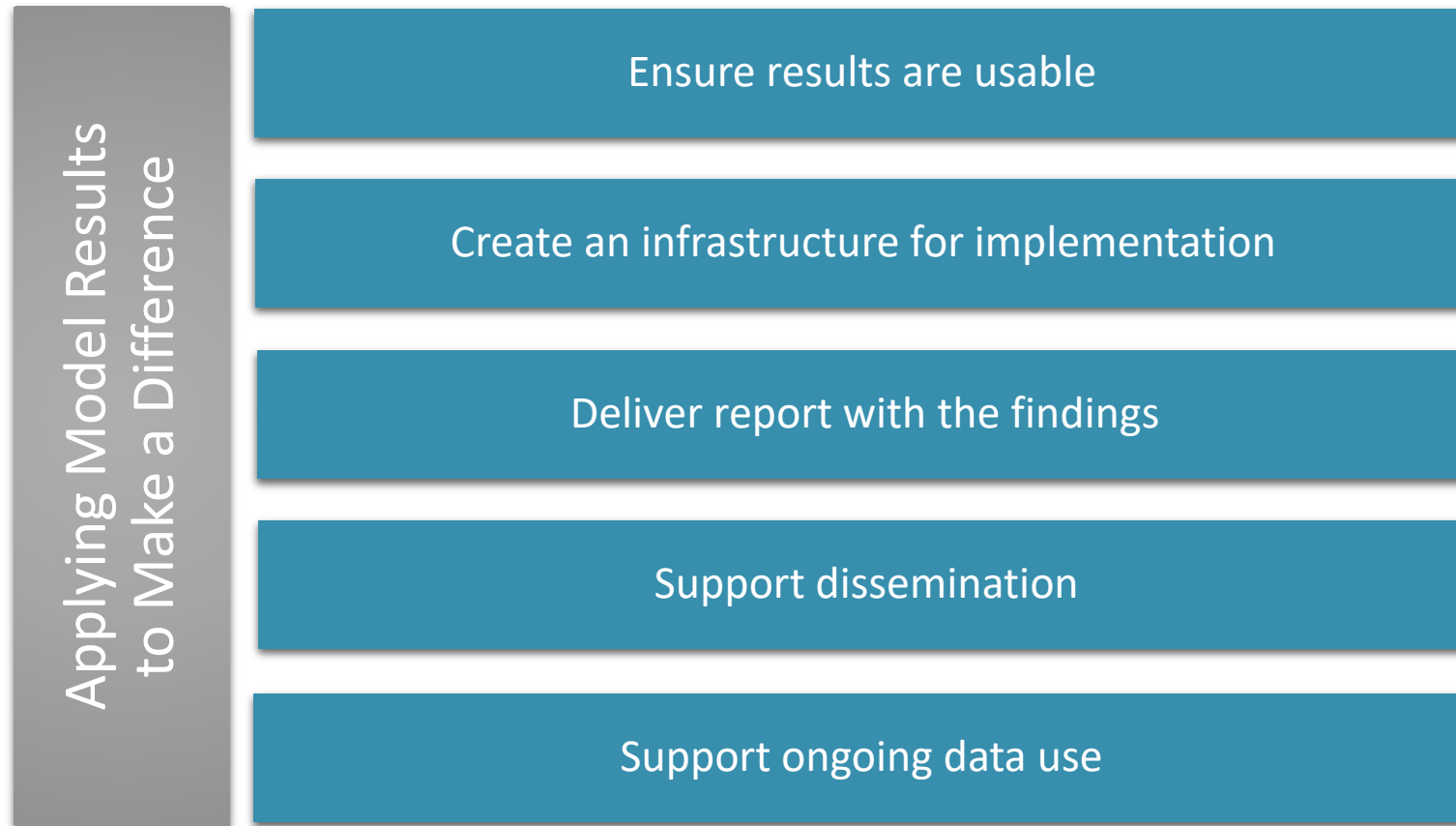


## Project Life Cycle Management

- Deploying the model involves interacting with the partners and users who will use the model directly or the results of the model
- Requires careful planning so everyone knows their roles and how to apply results

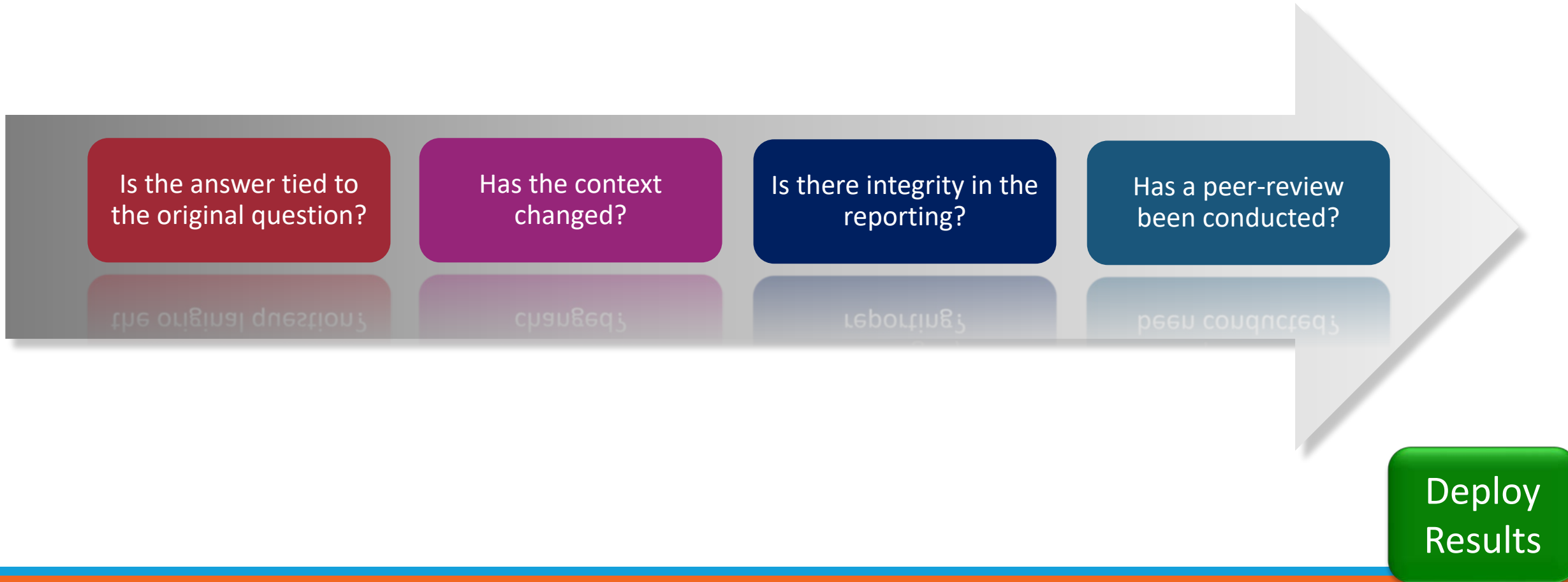


# Deploy Results



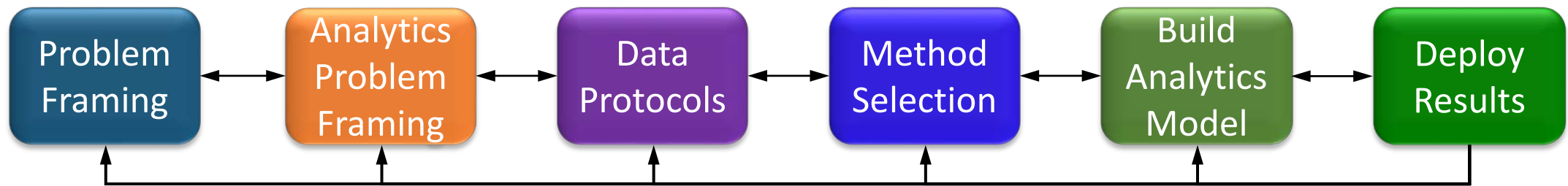
Deploy Results

# Double Check Solution



Deploy Results

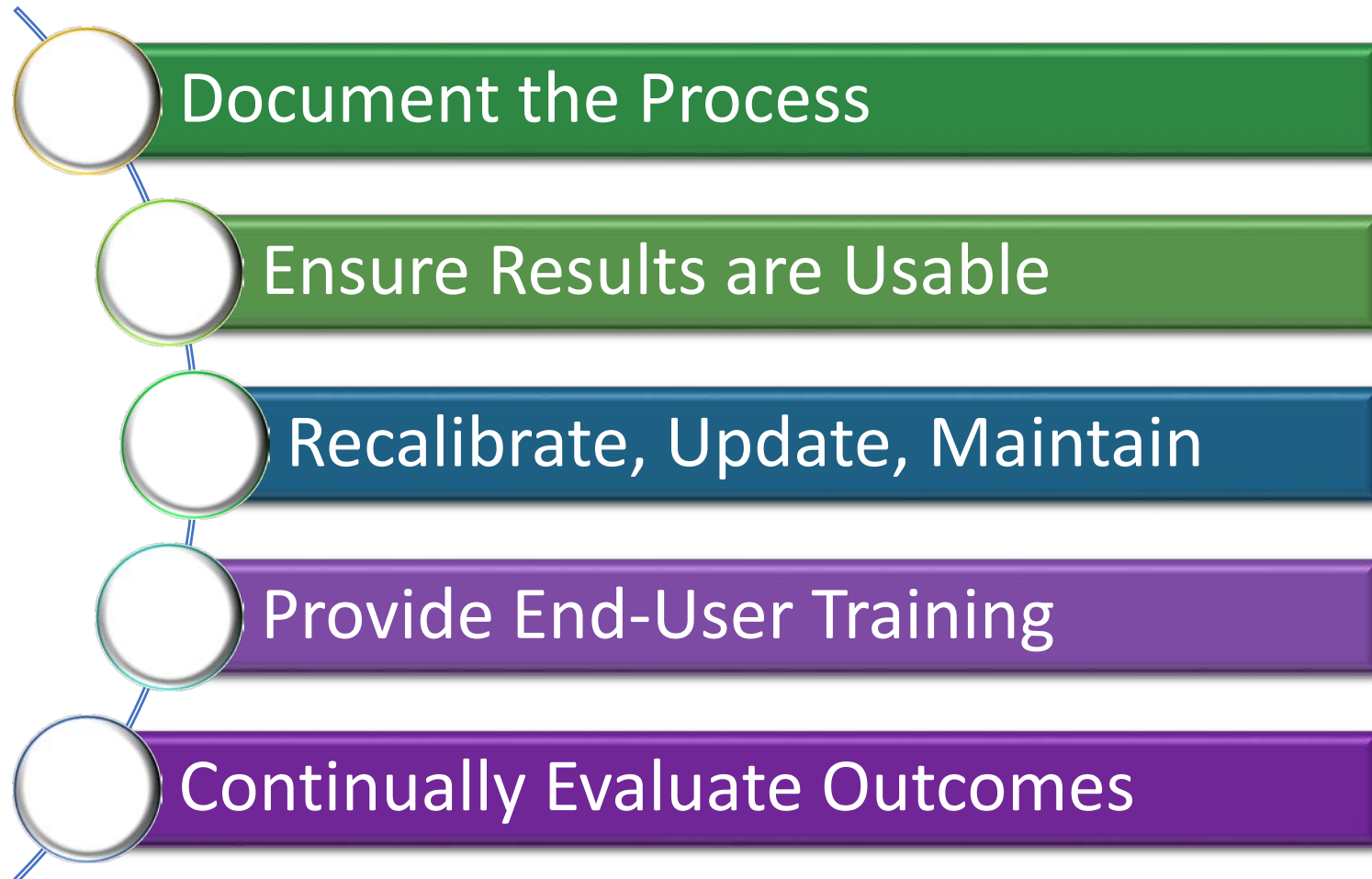
# Step 7



## Project Life Cycle Management

- Analytical models will go through a lifecycle from conception and justification through the model building and deployment
- A good lifecycle process helps to keep this process orderly, minimizes the cost and efforts, and provides the users with clear roles within the lifecycle

# Project Life Cycle Management



# Project Life Cycle Management: *Write it Down*

- For the model to be trusted it has to be repeatable
- Document:
  - Key assumptions made about the organizational context
  - Assumptions about the analytics problem
  - Data sources and data schema
  - Methods used to clean and harmonize the data
  - Model approach and selection choices
  - Documentation for any software code written
  - Recommendations for future improvements to the model



# Follow-Up on Solutions



- Communication should occur throughout the project lifecycle (before, during, and after) to evaluate:
  - Progress toward objectives
  - Changes to objectives and business
  - Value of findings
  - Updates to the data, model, or deployment

# Session Objectives

1

Differentiate between metrics and analytics

2

Examine relationship between data analytics problem-solving

3

Look at analytics as a resource to improve decision-making

4

Identify key concepts or data needed to deliver actionable results

A detailed architectural blueprint is shown on the left side of the slide, featuring various lines, dimensions, and symbols on a blue background. The blueprint includes structural elements like walls, doors, and windows, along with numerical measurements and circular callouts.

# Session Wrap-Up

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