Analytics and Evaluation: A Blueprint for How to Use Data More Effectively

Shawn Bergman, Ph.D.
Associate Director
Center for Analytics Research and Education
Appalachian State University

Chrissy Tillery, Ed.D.
Director of Evaluation
National Council for Community and Education Partnerships

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Welcome & Introductions

Agenda

1. Presentation Objectives
2. What is Analytics?
3. Data Analytics Methodology
4. Wrap-up and Questions

Presentation Objectives

1. Gain familiarity with analytic methodology
2. Understand that using analytics is a process
3. Overview of analytics processes and methodologies
4. Provide some implementation tips
5. Provide roadmap for how data and analytics you can use

An Introduction to Data Analytics

What is Analytics?

A process that involves the use of:

- statistical techniques
- information system software
- operations research methodologies

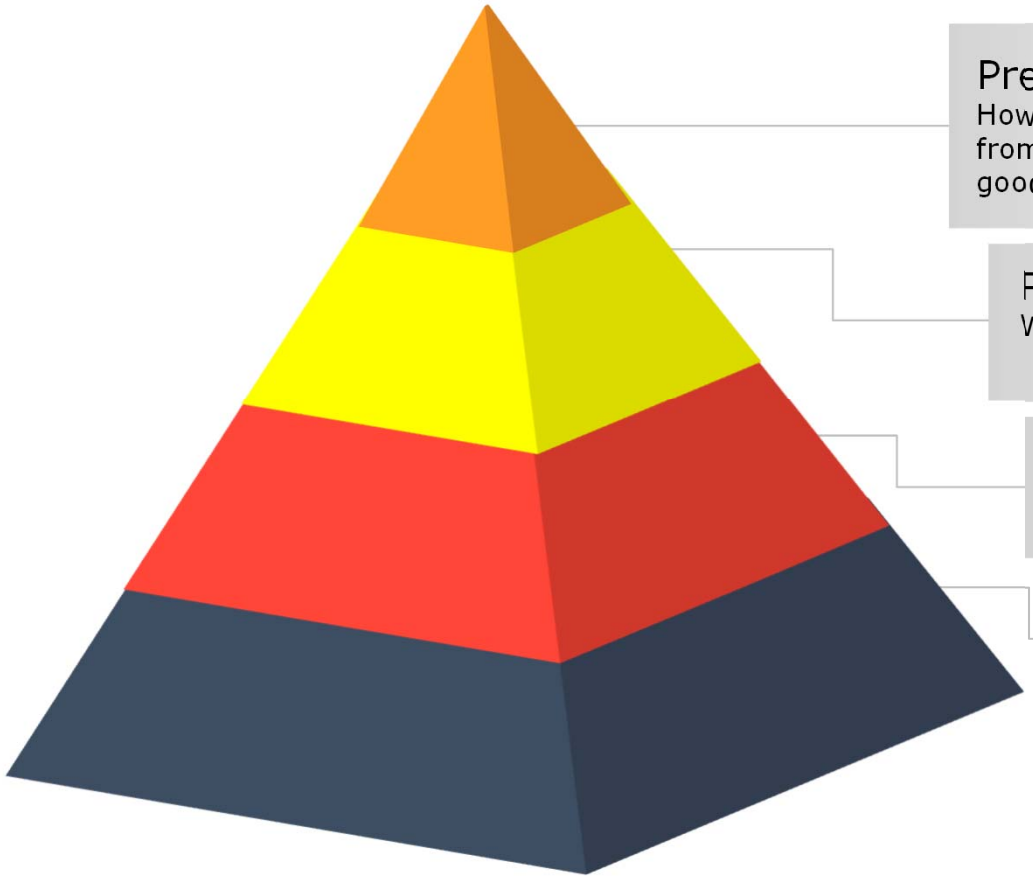
ANALYTICS

is defined as the scientific process of transforming data into insights for making better decisions

(INFORMS, 2012)

Used to explore, visualize, discover, and communicate patterns or trends in data
(Schneiderjans, Schneiderjans, & Starkey, 2015)

Four Analytic Applications



Prescriptive Analytics
How to prevent bad things from happening and ensure good things?

Predictive Analytics
What is going to happen?

Diagnostic Analytics
What are the relationships?

Descriptive Analytics
What's happened?

Future

Retrospective

Great!
What could possibly go wrong?

Reasons Analytic Initiatives Fail

Failure to Plan

- Using data analytics is no different than any other intervention, it takes planning to reap the benefits.

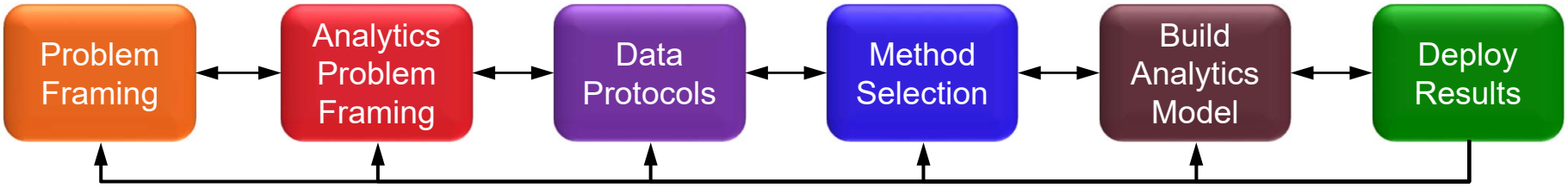
Lack of Communication

- Need to be able to share findings with users, clients, and everyone within an organization to benefit from it.

Inability to Prove Success

- Need to document and measure the impact of initiatives and show value.

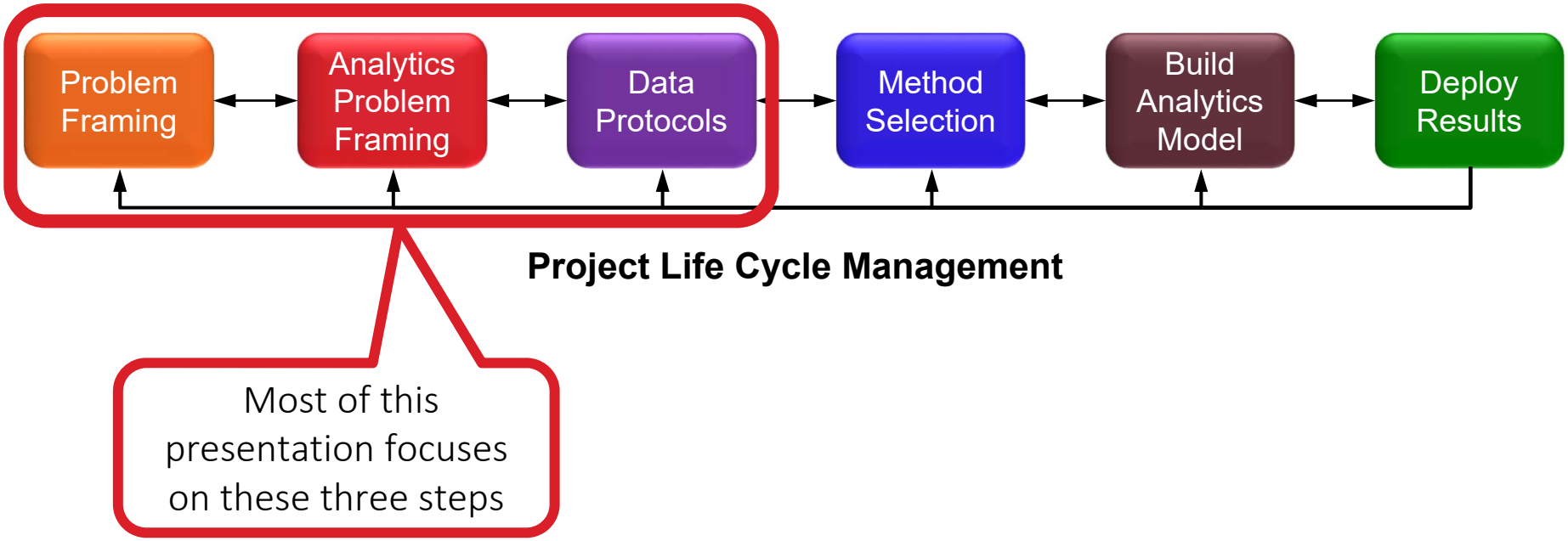
Data Analytics Methodology



Project Life Cycle Management

Source: Institute for Operations Research and the Management Sciences (INFORMS): 2012

Data Analytics Methodology



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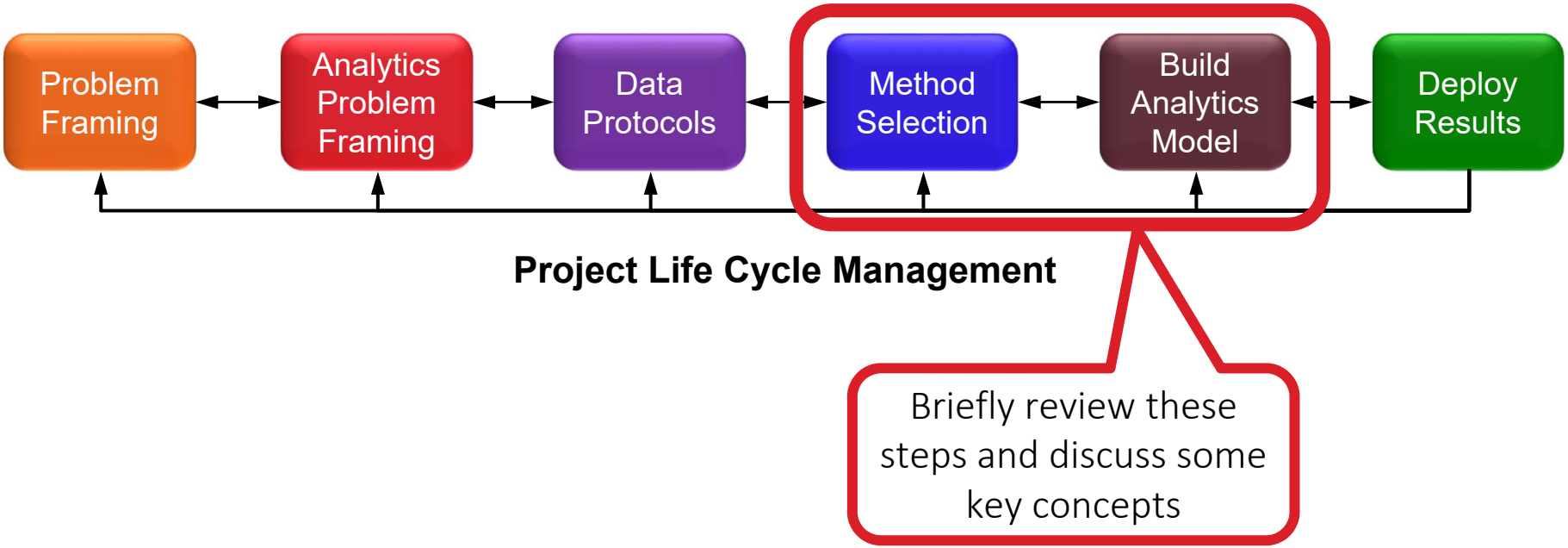

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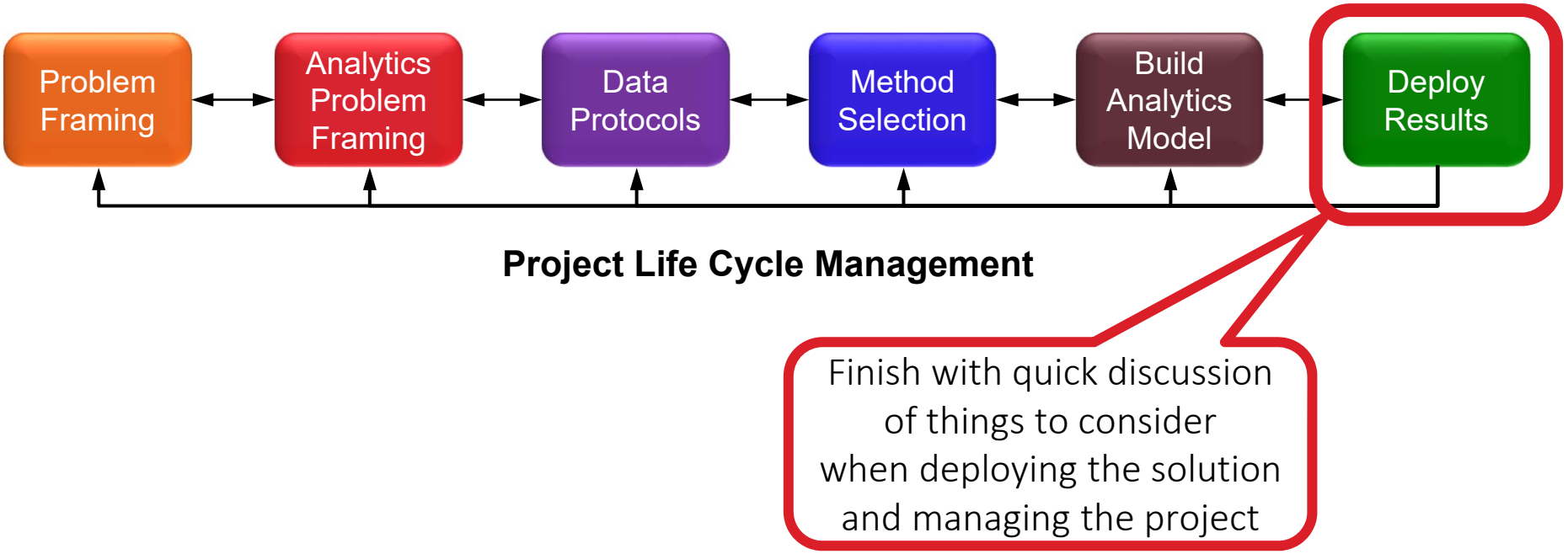


Source: Institute for Operations Research and the Management Sciences (INFORMS): 2012

Analytics Methodology

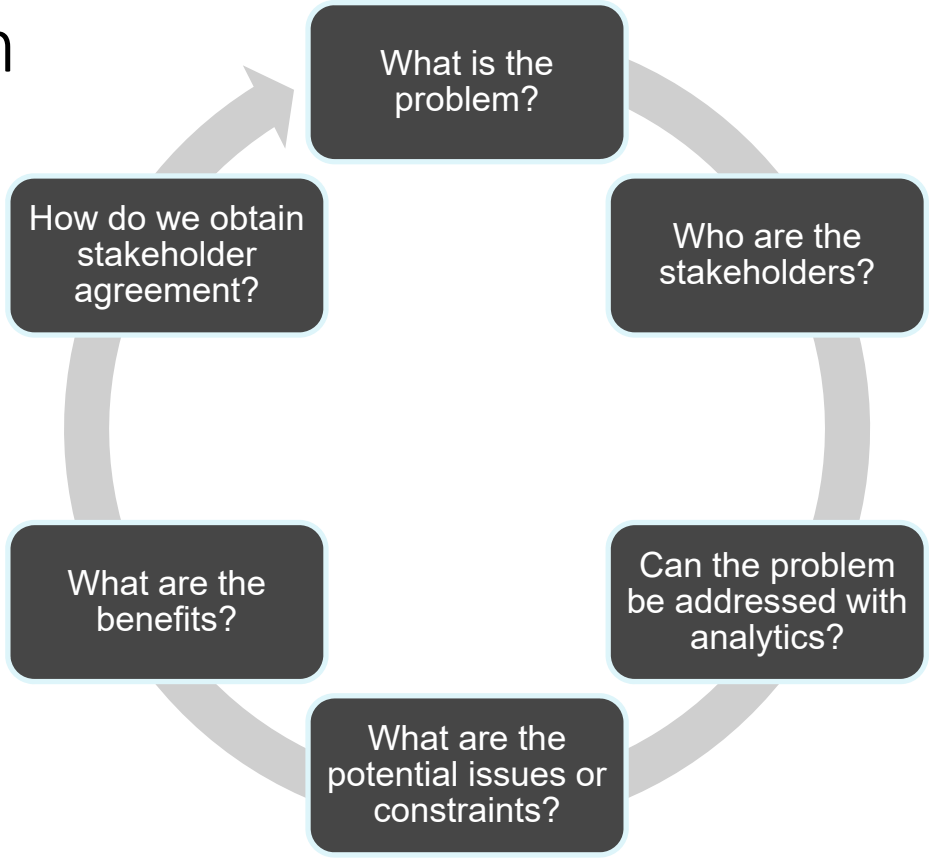
Step 1

- Problem Framing

Without planning:

- Analytics and the solutions can do more harm that good
- Leave out key staff or personnel
- Fail to identify how success will be measured

Problem Framing: Identify and refine the problem



Problem Framing

Problem Framing: Stakeholder Analysis

Consider interests of all stakeholders

- What issues could disrupt the project?
- Who should have access to information?
- Who should be involved and when?
- Establish communication strategies
- How do you get buy-in for robust evaluation?

Problem Framing

Problem Framing: Making the case

- Can our goals, methods, and measurable outcomes be explicitly stated in our organization's strategic plan and get support from key officials?
- What would it take to make this happen?
- Have we considered the unintended consequences that analytics may introduce?

Problem Framing

Problem Framing: Implementation Tip

This is an iterative process

- Step 1 helps set expectations and focus team's efforts

Analytics personnel should be involved

- Might be less involved than in later steps

If buying analytics talent

- Recommend that planning sessions happen before contracting
- Make sure you devoting resources that will solve a problem

Problem Framing

Step 2

- Frame Analytics Problem

Need to establish a dialogue:

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

Analytics Framing: Research Questions, Variables, and Hypotheses

Turn the problem or question into an analytics problem

- Reformulate problem statement into analytics problem
- Develop a proposed set of predictors and relationships to outputs
- Set the set of assumptions
- Define key metrics of success
- Obtain stakeholder agreement

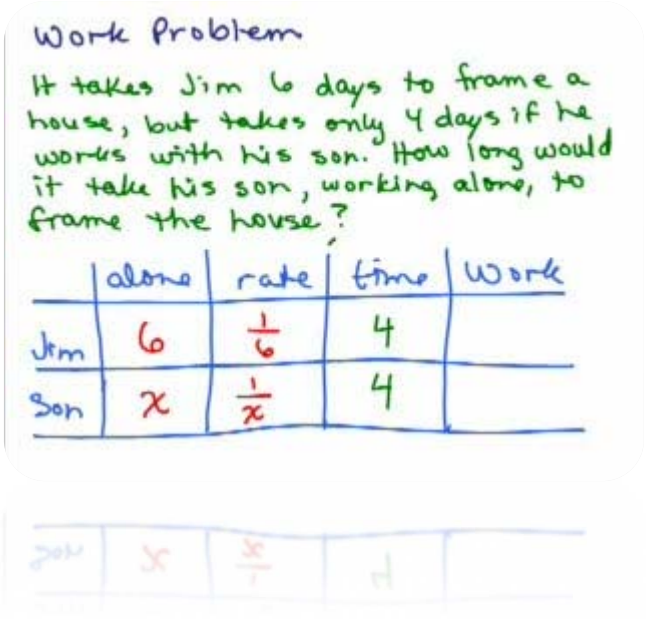
Analytics Problem Framing

Analytics Framing: Reformulate Ideas to Variables

Begin translating the "what" of the problem into the "how" of the analytics solution

- Conceptual or latent variable: the abstract concept or idea being examined

- Operational, measured, observed, or manifest variable: The specific way in which a concept is turned into a data element



Analytics Problem Framing

Analytics Framing: Stakeholder Conversations

Discuss input, output, and model assumptions

Make sure assumptions acknowledged

Agree on key metrics used to mark solution progress

What the final answer will look like?

Analytics Problem Framing

Analytics Framing: Implementation Tip

This is an iterative process

- Analytics Framing helps to focus the analytics staff and team resources

Analytics personnel will start to be more involved

- Help layout what analysis will be done, data needed, and what results could look like

Analytics Problem Framing

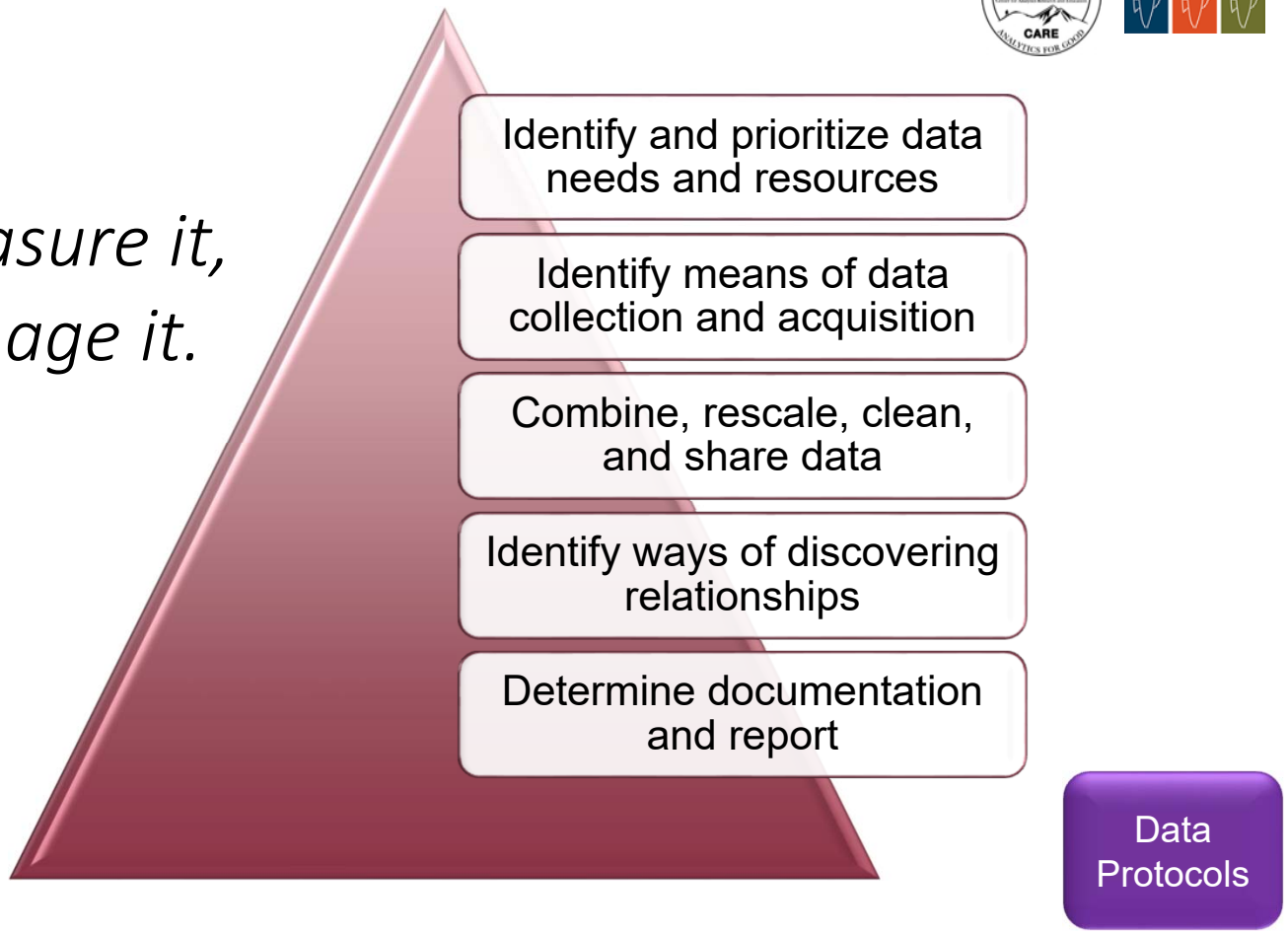
Step 3

- Data Protocols

Make sure data collection, management, and analysis support the question

Data Protocols

If you can't measure it, you can't manage it.



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?

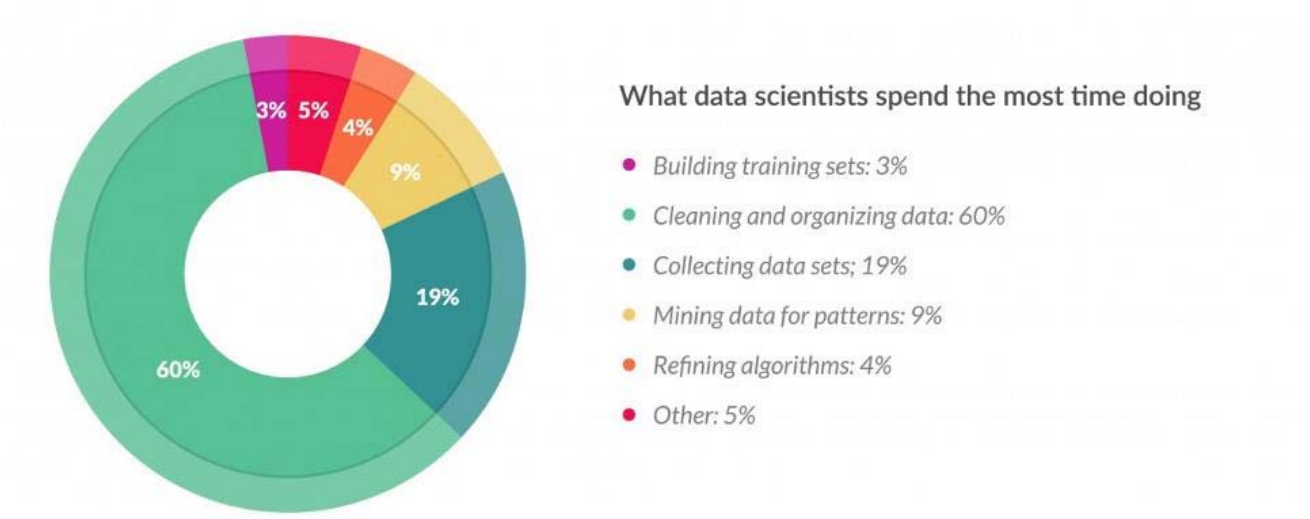
This examination should also loop back to problem

- What is the most important outcome?
- What is the best use of organizational resources?

Data Protocols

Data Protocols: Data Management

Data analysts spend most of their time collecting and cleaning data required for analysis. Answering questions like "*Where do you collect the data*?", "*How do you collect the data*?", and "*How should you clean the data*?", require much more time than the actual analysis itself.



Data Protocols

Press (2016). Cleaning Big Data: Most Time-Consuming, Least Enjoyable Data Science Task, Survey Says. [online] *Forbes.*

Data Protocols: Implementation Tip

This step helps determine the extent to which analytics be used

This step is mostly in the hands of data and analytics personnel

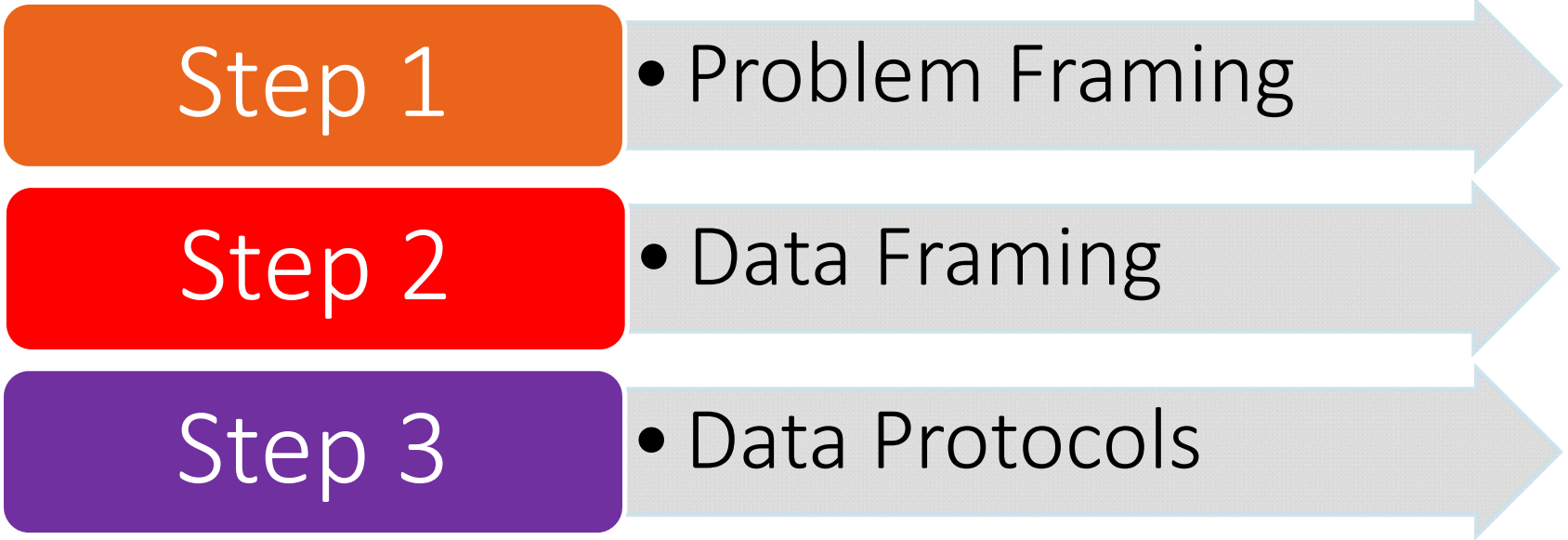
- Coordination with data gatekeepers and analysts
- Continued collaborations help make sense of results and patterns found

This step can be time intensive depending on how the data is collected and stored

If buying or contracting with analytics talent

- First have “data audit” or “stop light” report

Data Protocols



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

Exercise:
What do you want to answer using data?

- Write down one or two questions you want to answer using data/analytics
  - Who needs to be involved in formulating the question?

- Do you have the data to answer those questions?
  - What is the quality of that data?
  - How should you collect that data to give you the best answer?

Step 3

- Method Selection

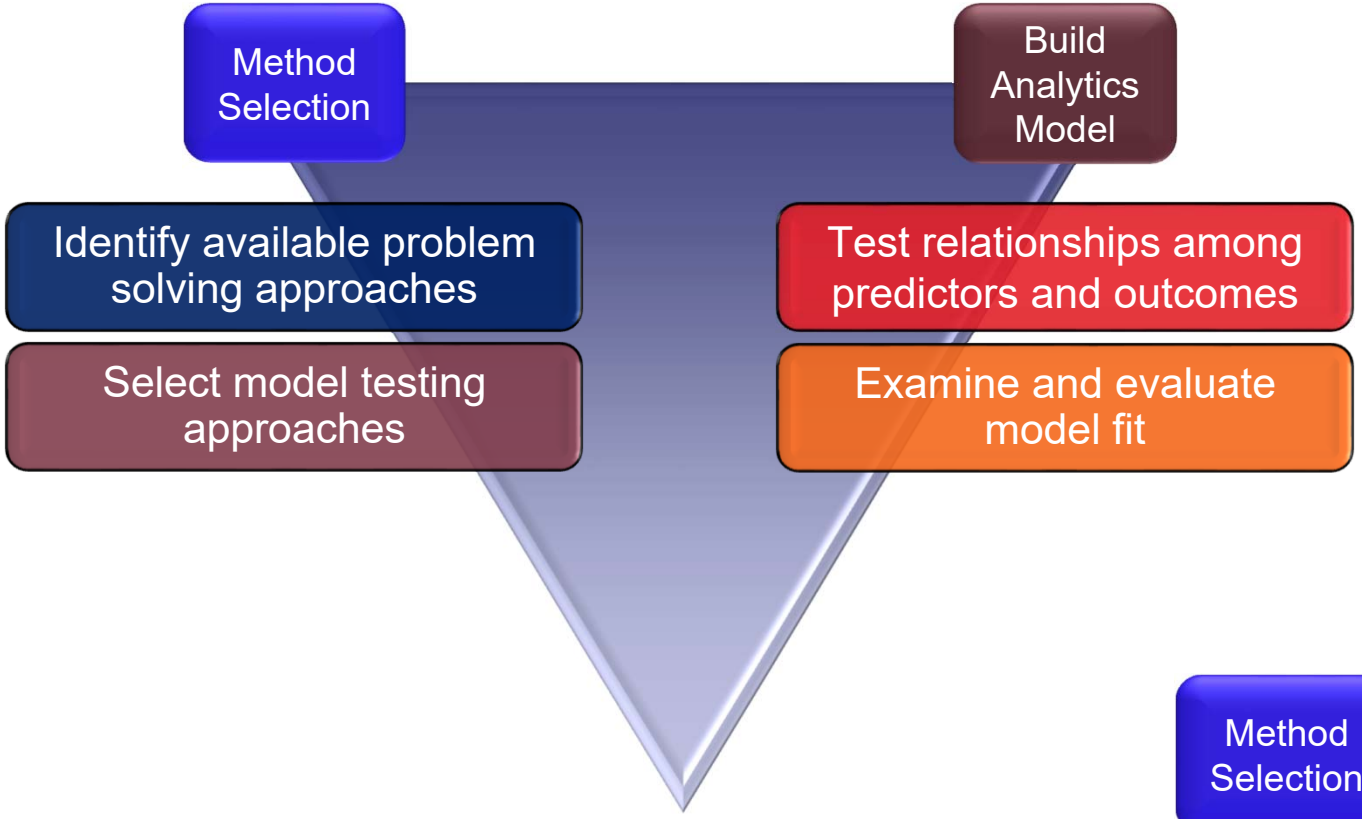
Step 4

- Build Analytics Model

Data Analysis

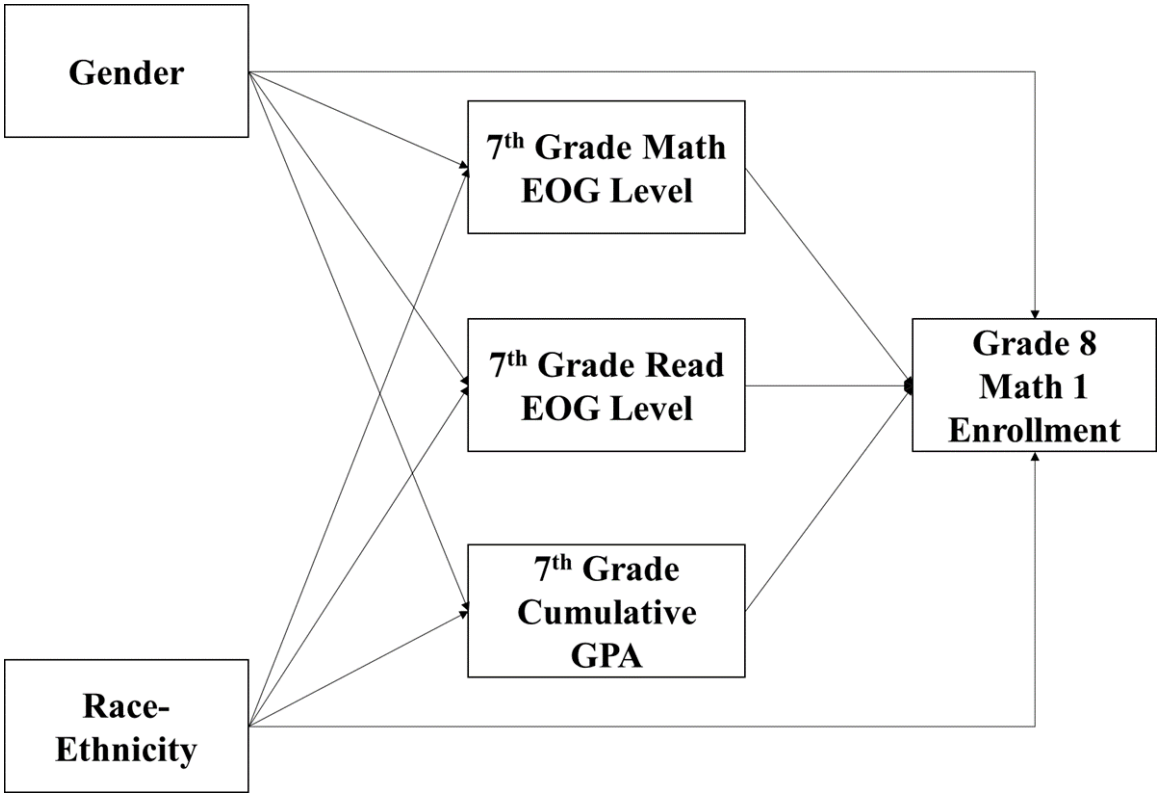
- Steps are typically completed by analytics personnel
- Communication still needed, but to a lesser extent

Data Analysis: Analtyics Models



Method Selection
Build Analytics Model

Data Analysis: Check Bias in Models



Method Selection

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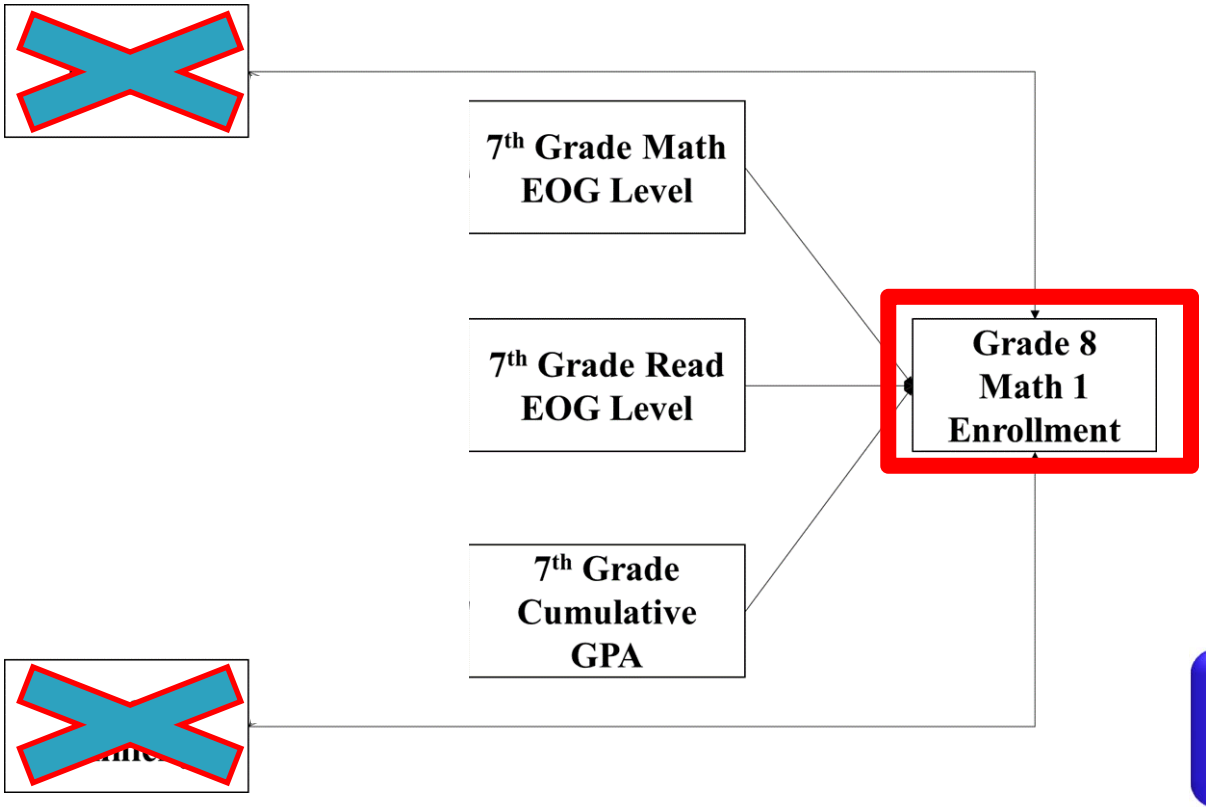

Method Selection

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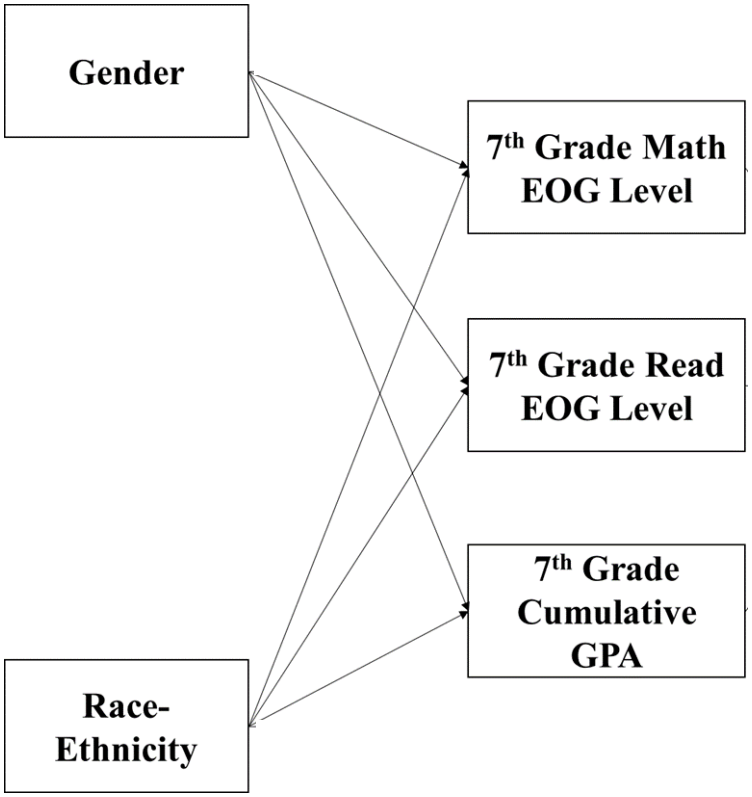

Method Selection

Build Analytics Model

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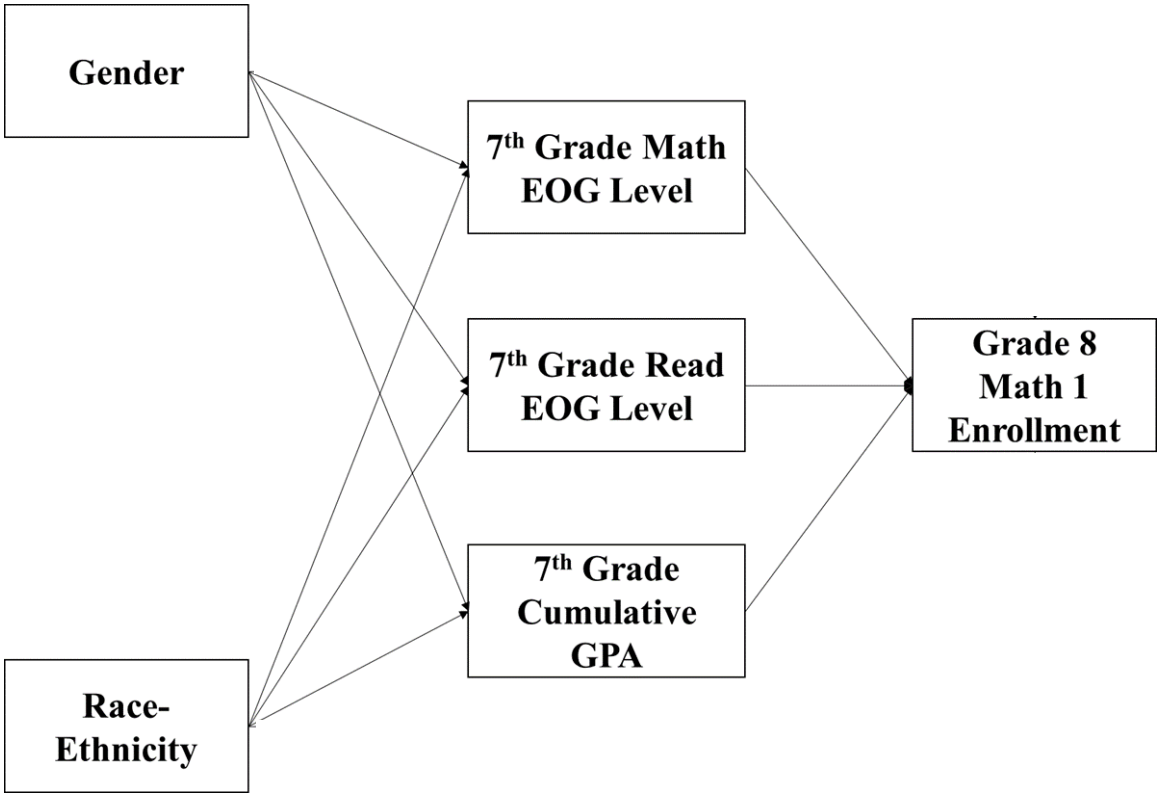


Method Selection

Build Analytics Model

Data Analysis: Implementation Tip

Continued collaborations help make sense of results

- Analytics staff often need a “sounding board”
- Make sure models solve analytic problem and meet business needs

Method Selection and Building Analytics Models can also be time intensive

- Depending on model complexity and quality of data
- Data exploration continues and could change the analytic problem

Step 6

- Deploy Results

Deploying the answer involves requires careful planning

- All personnel involved know their roles
- Know what to do with results once they get them

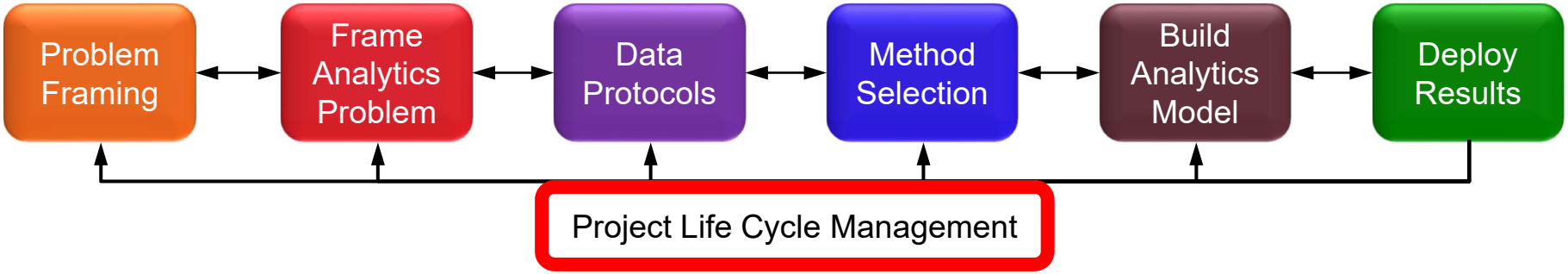
Deploy Results

Applying Model Results to Make a Difference

- Ensure results are usable
- Create an infrastructure for implementation
- Deliver report with the findings
- Support dissemination
- Support ongoing data use

Deploy Results

Step 7: Project Life Cycle Management

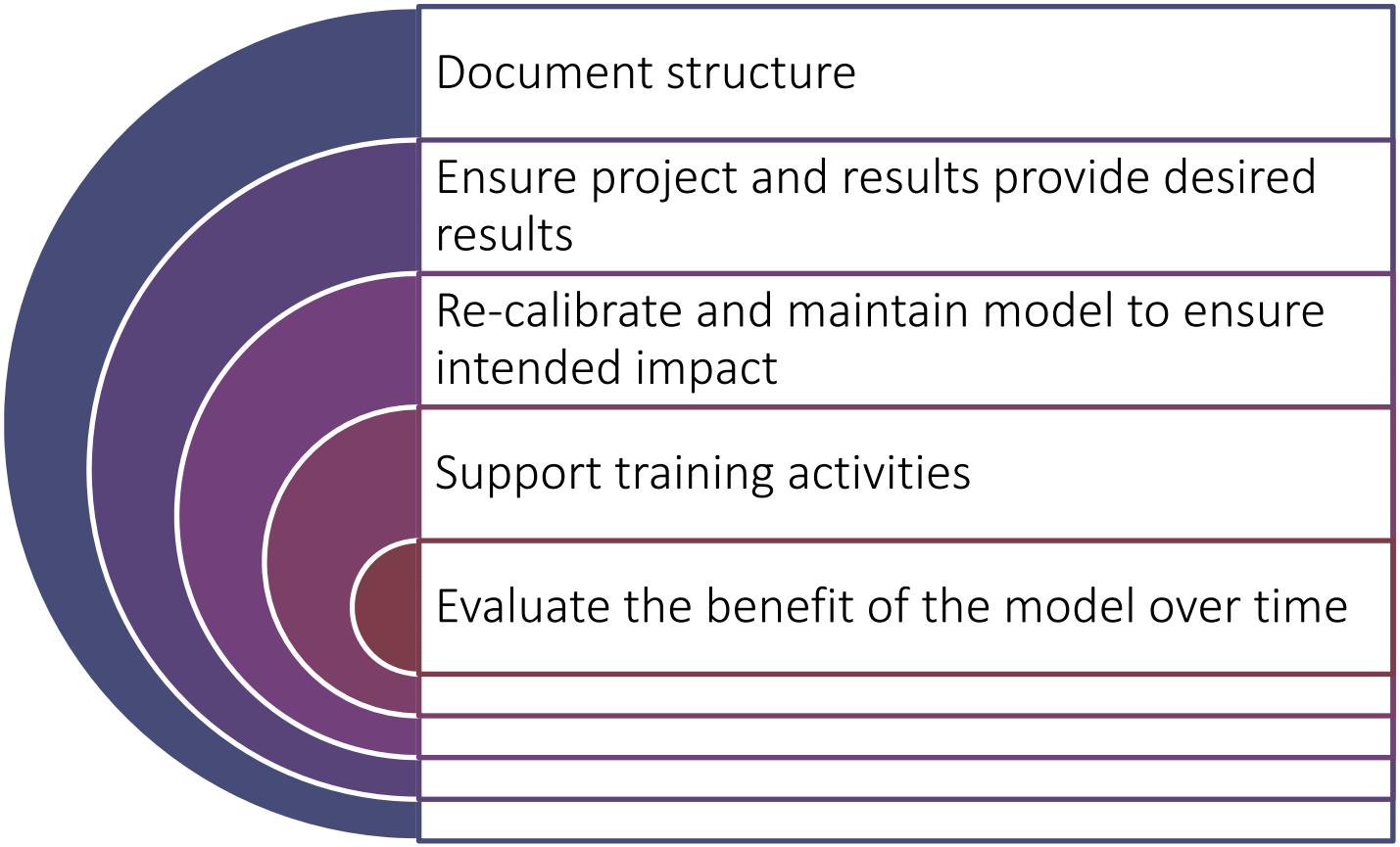


Think of the end at the beginning

A good lifecycle process helps to keep this process orderly

- Allows you to replicate the process
- Repeat and/or expand the analyses

Project Life Cycle Management



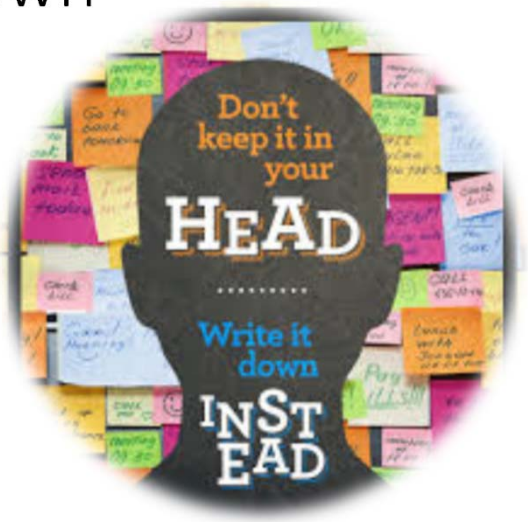
Project Life Cycle Management

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



Project Life Cycle Management

Session Wrap-Up

Shawn Bergman, Ph.D.
Associate Director
Center for Analytics Research
and Education (CARE)
Appalachian State University
222 Joyce Lawrence Lane, Box 32109
Boone, NC 28607
bergmans@appstate.edu
(828) 278-9608
IOHRM.appstate.edu

Chrissy Tillery, Ed.D.
Director of Evaluation
National Council for Community and
Education Partnerships
1400 20th Street NW, Suite G-1
Washington, DC 20036
Chrissy_Tilery@edpartnerships.org
202.530.1135, extension 108
www.edpartnerships.org