

# ***The Challenge of Rapid Problem Solving***

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# *Traditional Approach to Problem Solving*

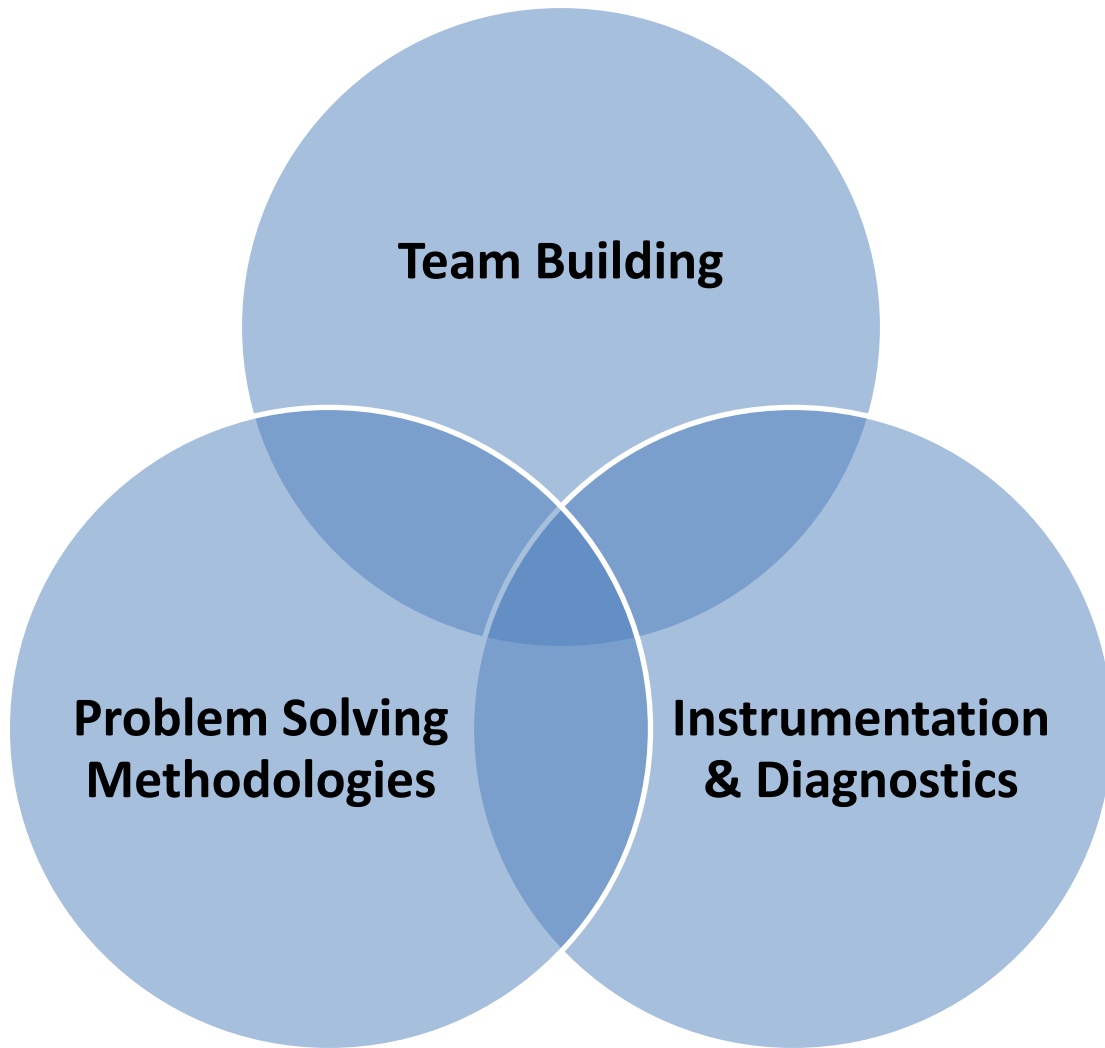


Excerpt from Saturday Night Live

# Rapid Problem Solving ... Critical Role to Success

- Challenge ... regions that do not have a long history in automotive.
- Manufacturing ... strong “Sense of Urgency.”
- Feedback ... no more important skill for a workforce to master.
- Applies ... ALL levels of the workforce.
- Increasing ... Problem Solving Capacity
- Integrate ... Project Based Training

# Enhancing Problem Solving



## **Coalition Partnership**

- Nissan & Suppliers
- Holmes Community College
- Mississippi State University (CAVS)

*Workshops Funded by the American Recovery and Reinvestment Act (ARRA)  
Department of Labor via the Mississippi Department of Employment Security*



Problem Solving Methodologies

Instrumentation & Diagnostics

# Problem Solving Methodologies

- Rapid Problem Solving
- Statistical Process Control I & II
- Ergonomics Essentials
- Introduction to Minitab
- Lean Certificate
- Fundamentals of Welding for Engineering
- Introduction to Gage Repeatability & Reproducibility
- Simulation Modeling
- Design of Experiments

# Instrumentation & Diagnosis

- Vehicle Communications & Diagnostics
- Fundamentals of Mechanical Drive Systems
- Vehicle Dynamics and Safety
- Testing and Instrumentation I & II
- Sound and Vibration Diagnostics



Holmes Community Colleges Involvement:  
Six Teambuilding Modules

1. Essential Skills of Leadership
2. Essential Skills of Communicating
  - a. Oral Communications (2)
  - b. Written Communications (2)
3. Coaching Job Skills

4. Resolving Conflict

5. Supporting Change

6. Developing Performance Goals and Standards

# Training Opportunities

- Career Training
- Communications Training
- Computer Training
- Foreign Language
- Health Related Training
- Leadership Training
- Maintenance & Manufacturing
- Online Training
- Society for Human Resource Management Training
- ASTD Modules

# The Problem Solving “Problem”

- Lots of possible factors could be causing the problem.
- Questions is how do we go about narrowing down to root causes.
- No Time for data ... “Nike” mentality ... “Just Fix it!”
- Too much time ... 6 weeks later we have established our baseline. ... “Analysis Paralysis”

- Need to combine “Sense of Urgency” with Data Driven Methodologies
- Sometimes our methodologies and tools are in the way.
  - Too technical (death by ANOVA)
  - Too much brainstorming (death by talking and meeting)
  - Too ...
- Illustrate a couple of quick and easy “tools”

# Dictionary Game

- Illustrate how we can rapidly “parse” a large solution space by using a focused search technique.
- Dictionaries ~ 70,000 words ... We can find any in word 20 questions or less.
- Get a “Volunteer” from the audience to select a word (make sure you know how to spell 😊)

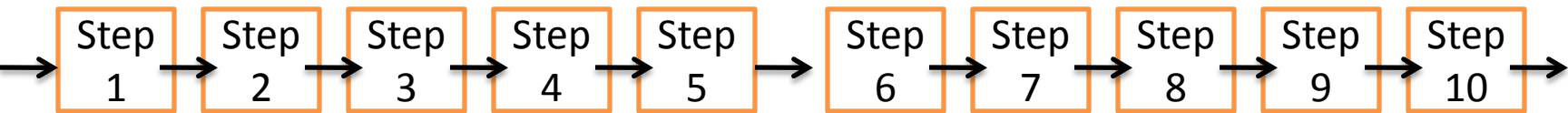
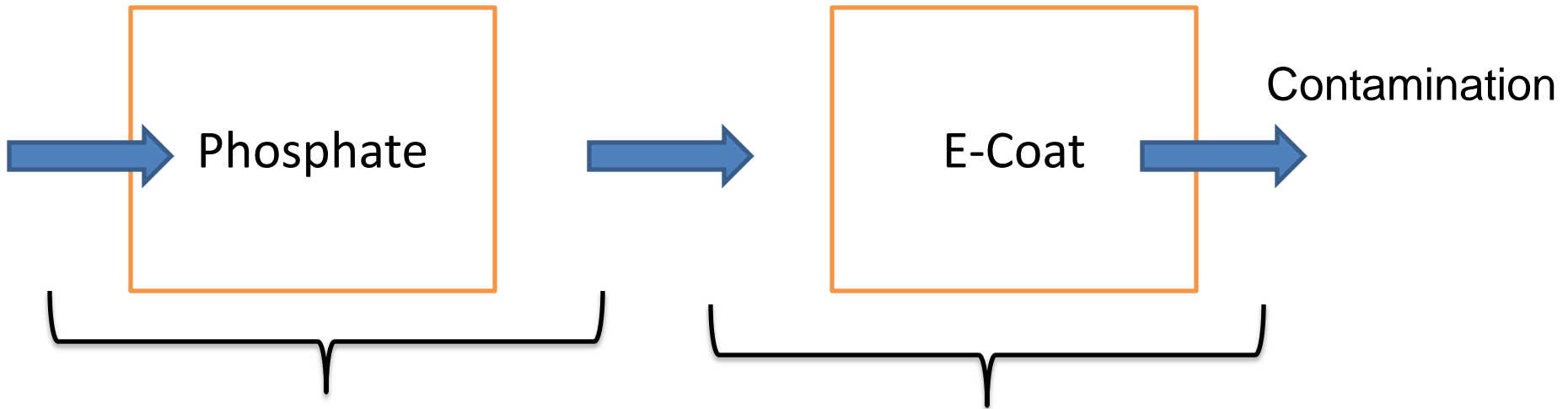
# Dictionary Game

A B C D E F G H I J K L M

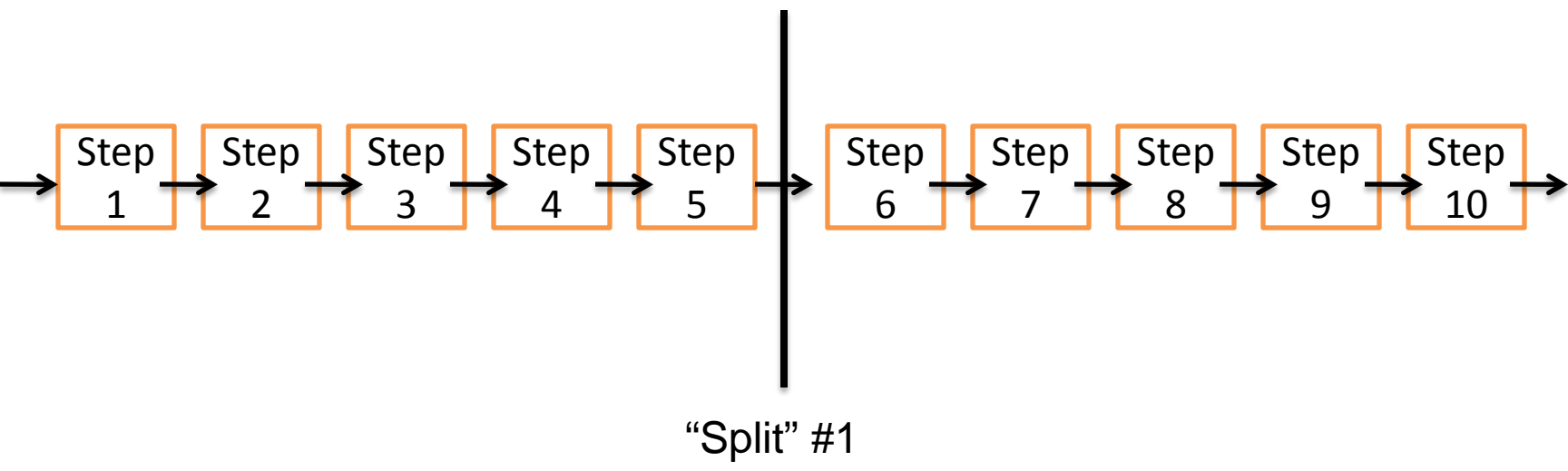
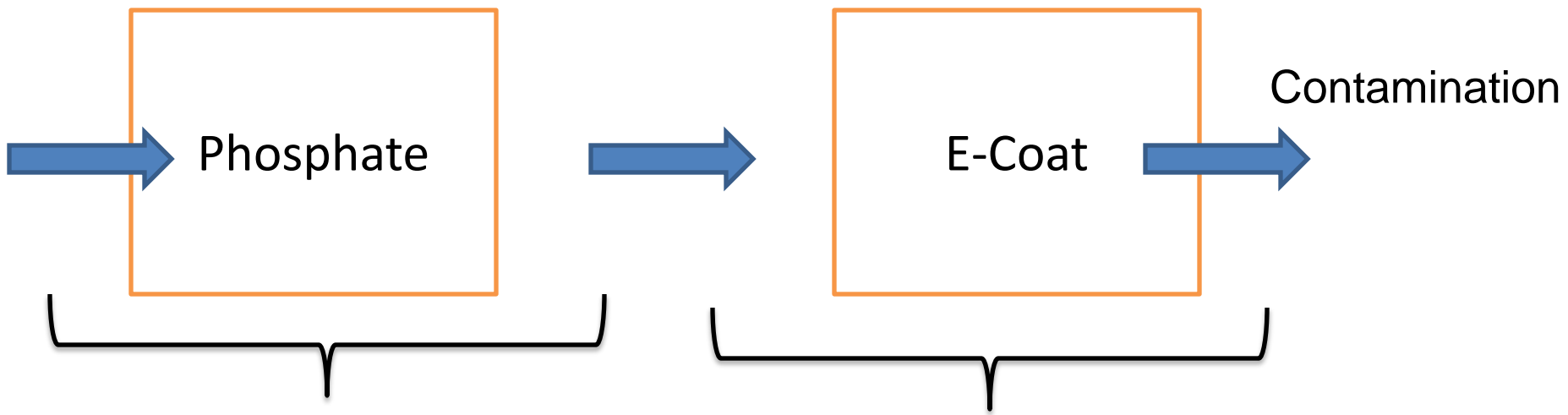
N O P Q R S T U V W X Y Z

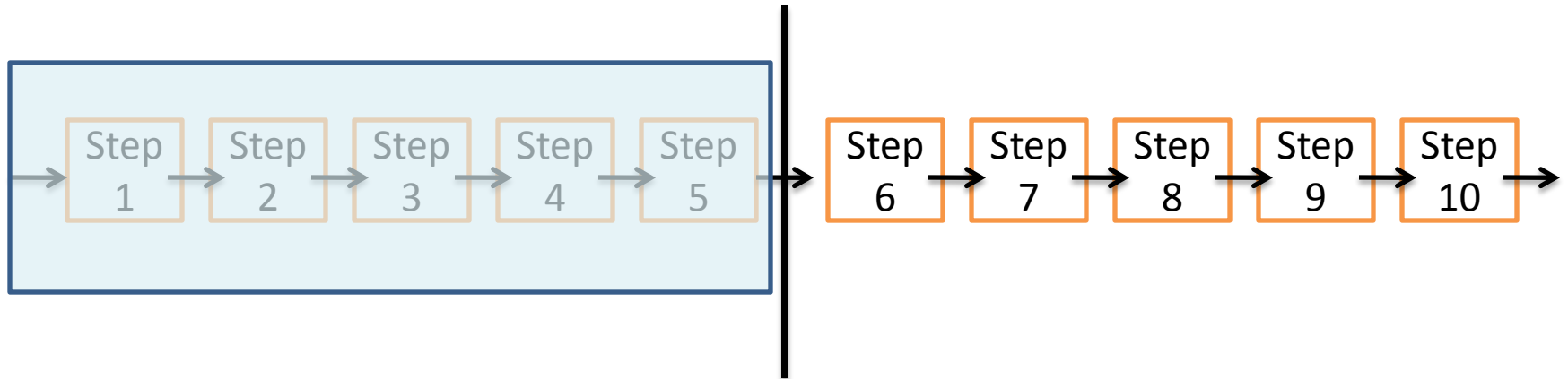
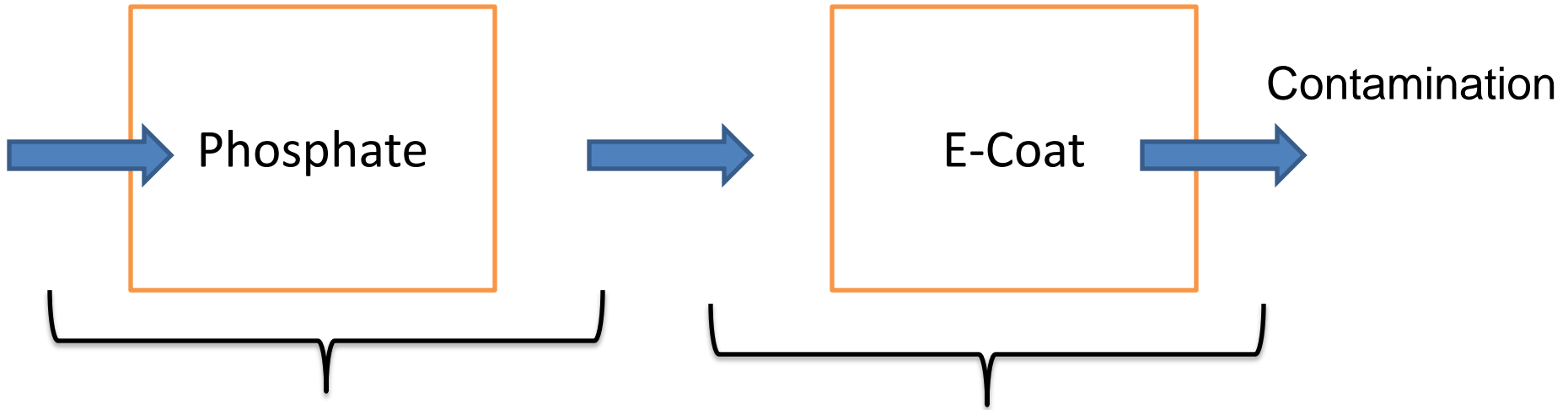
# Application of the Dictionary Game to Rapid Problem Solving

- Exhaustive Search – start at each word “Aardvark”; or ask if the word begins with “A”, then “B”, ...
- By splitting the problem space in half each time we can gain lots of speed without giving up anything.

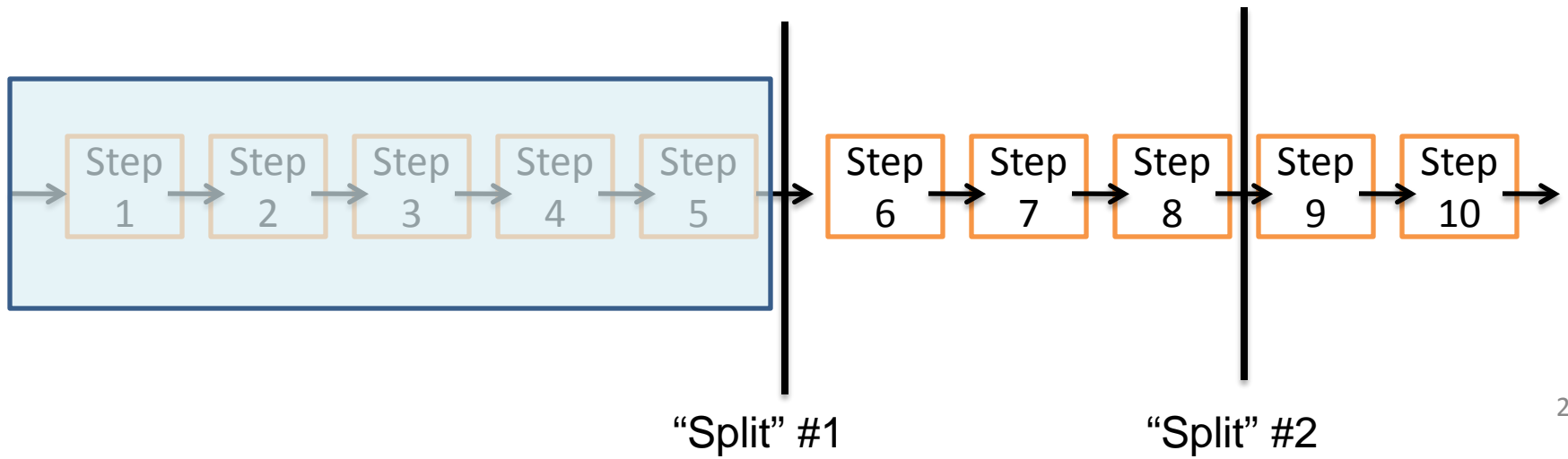
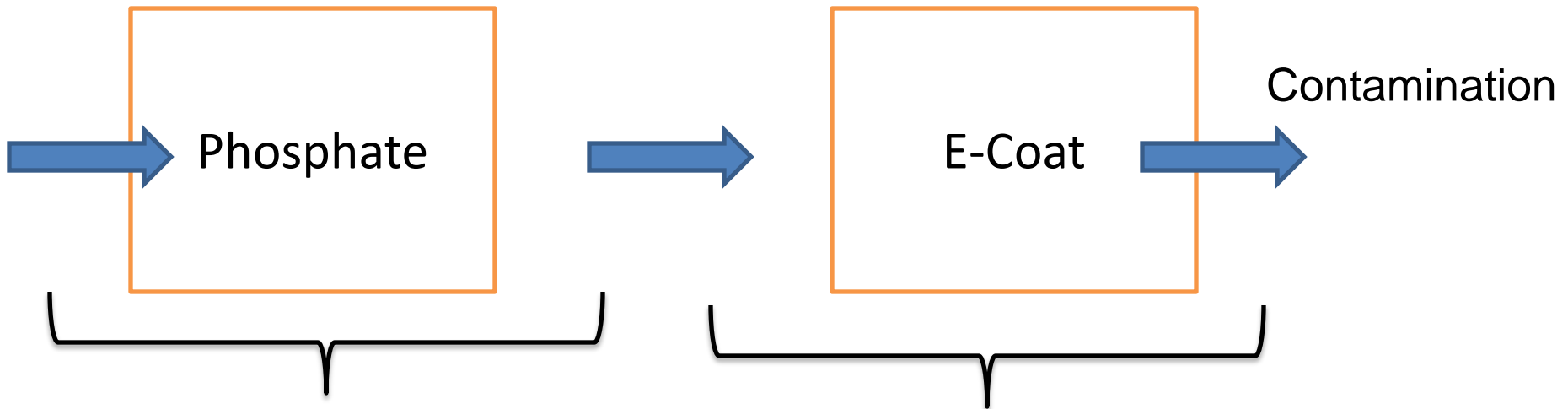


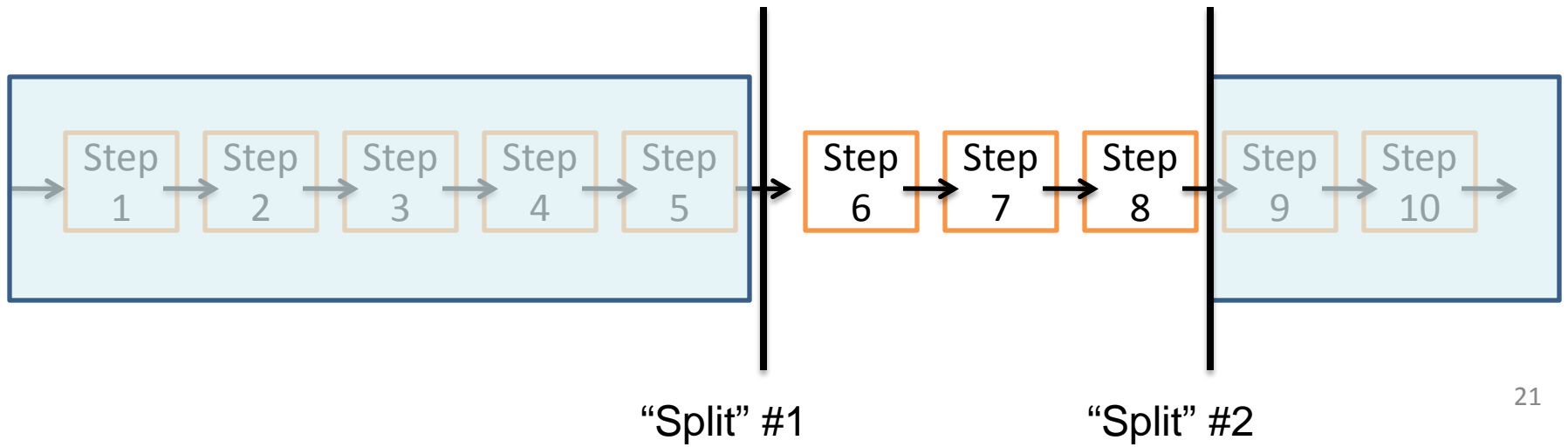
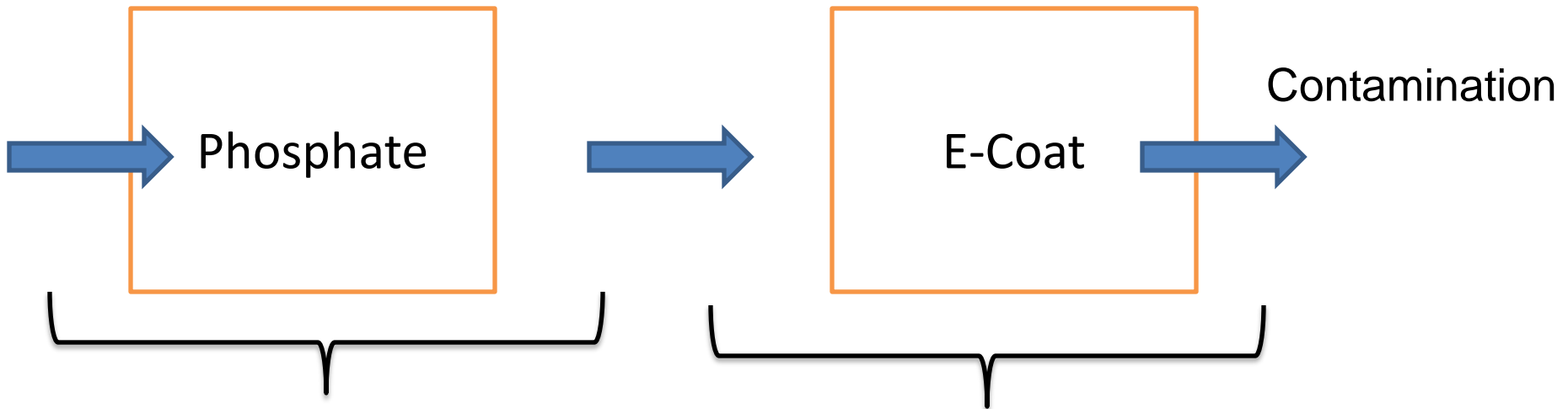
***Where do we start with our data collection?***

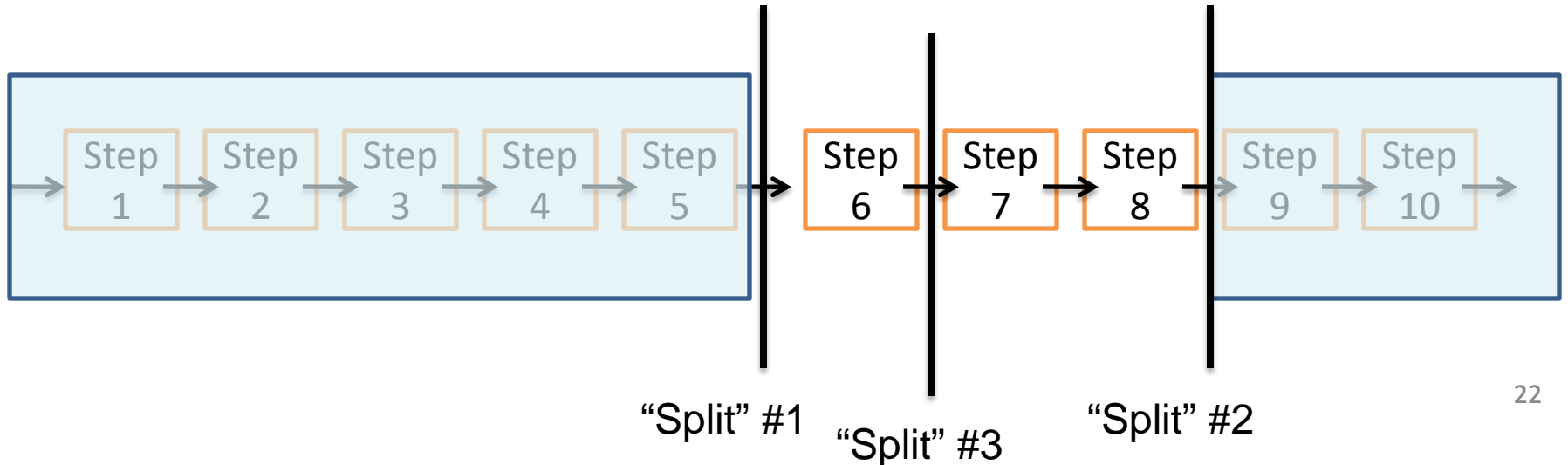
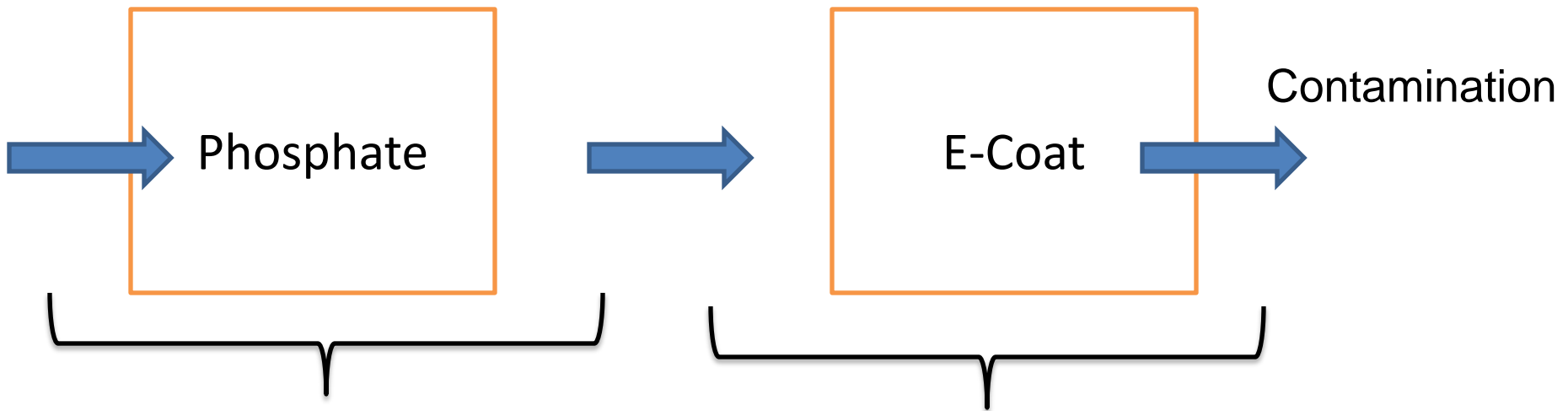


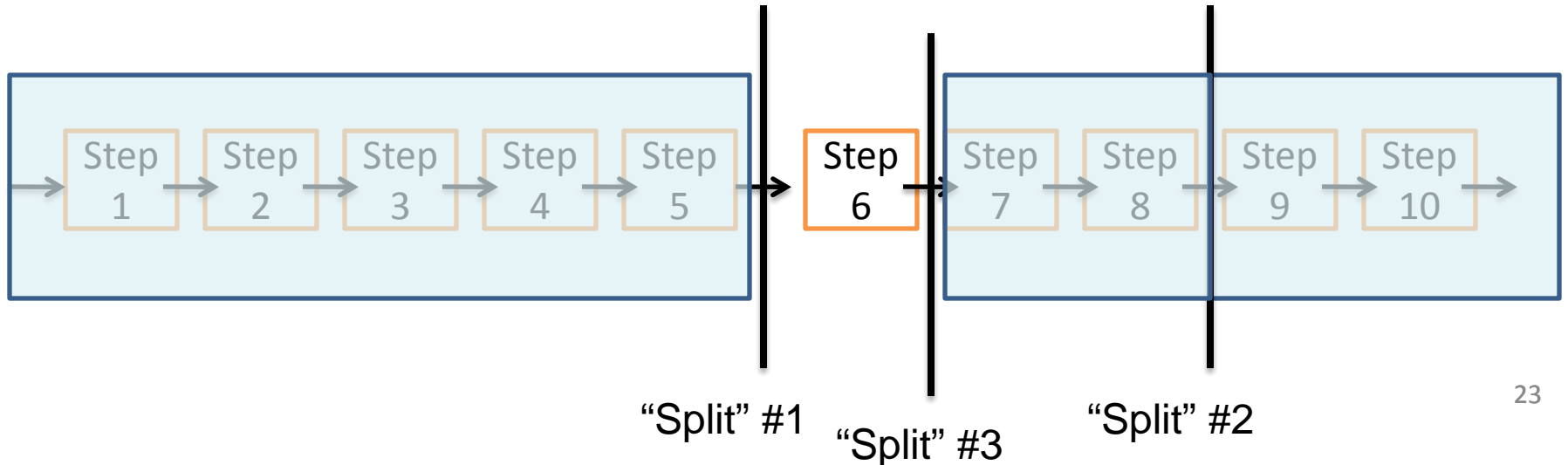
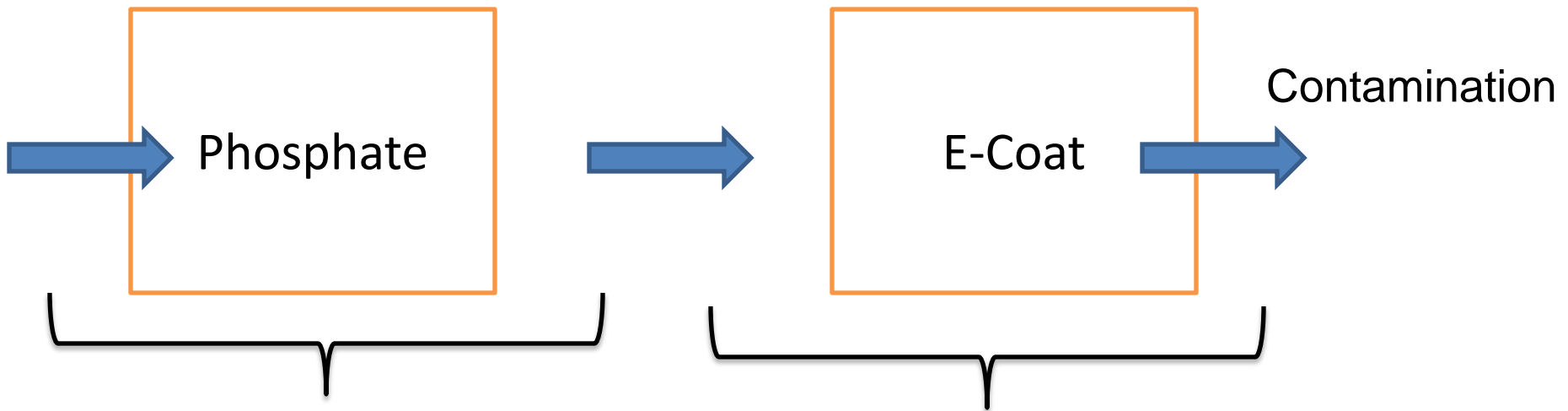


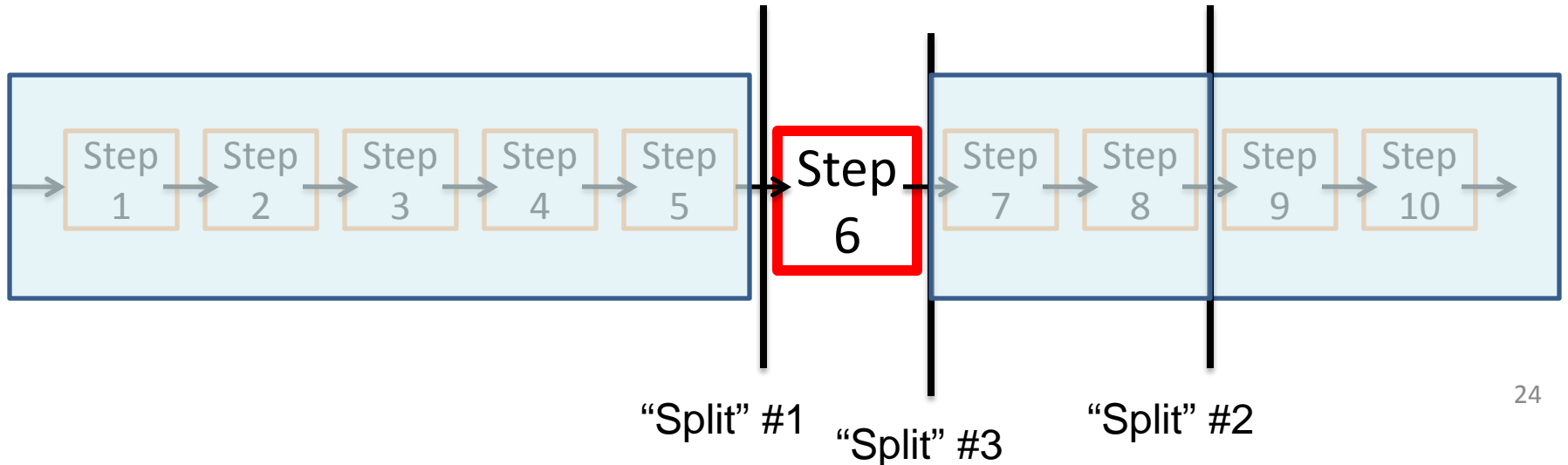
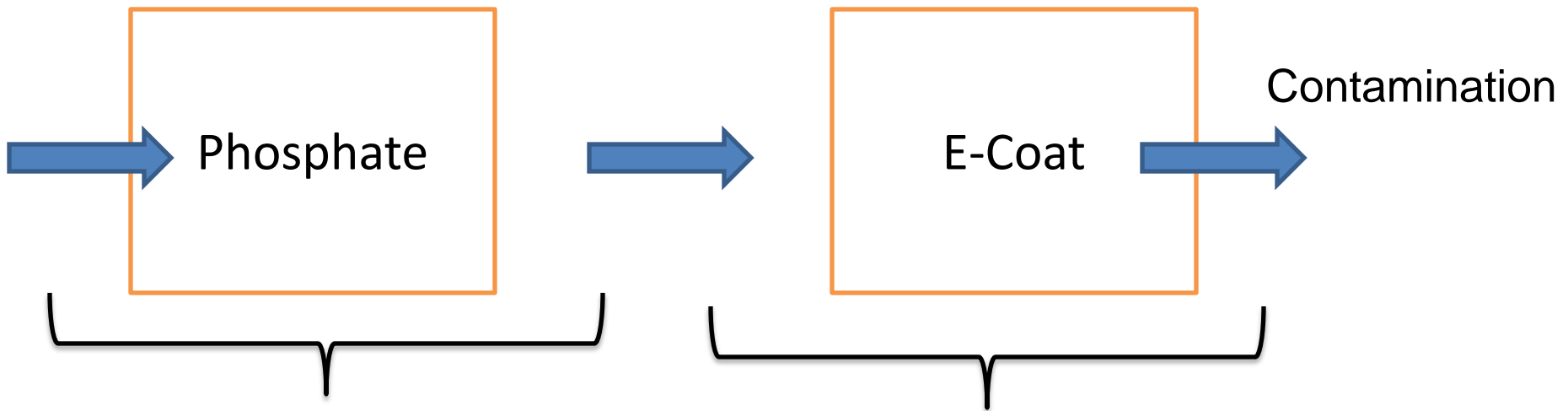
"Split" #1











- After only 3 Splits (1-2 days?)
- Not weeks of data collection



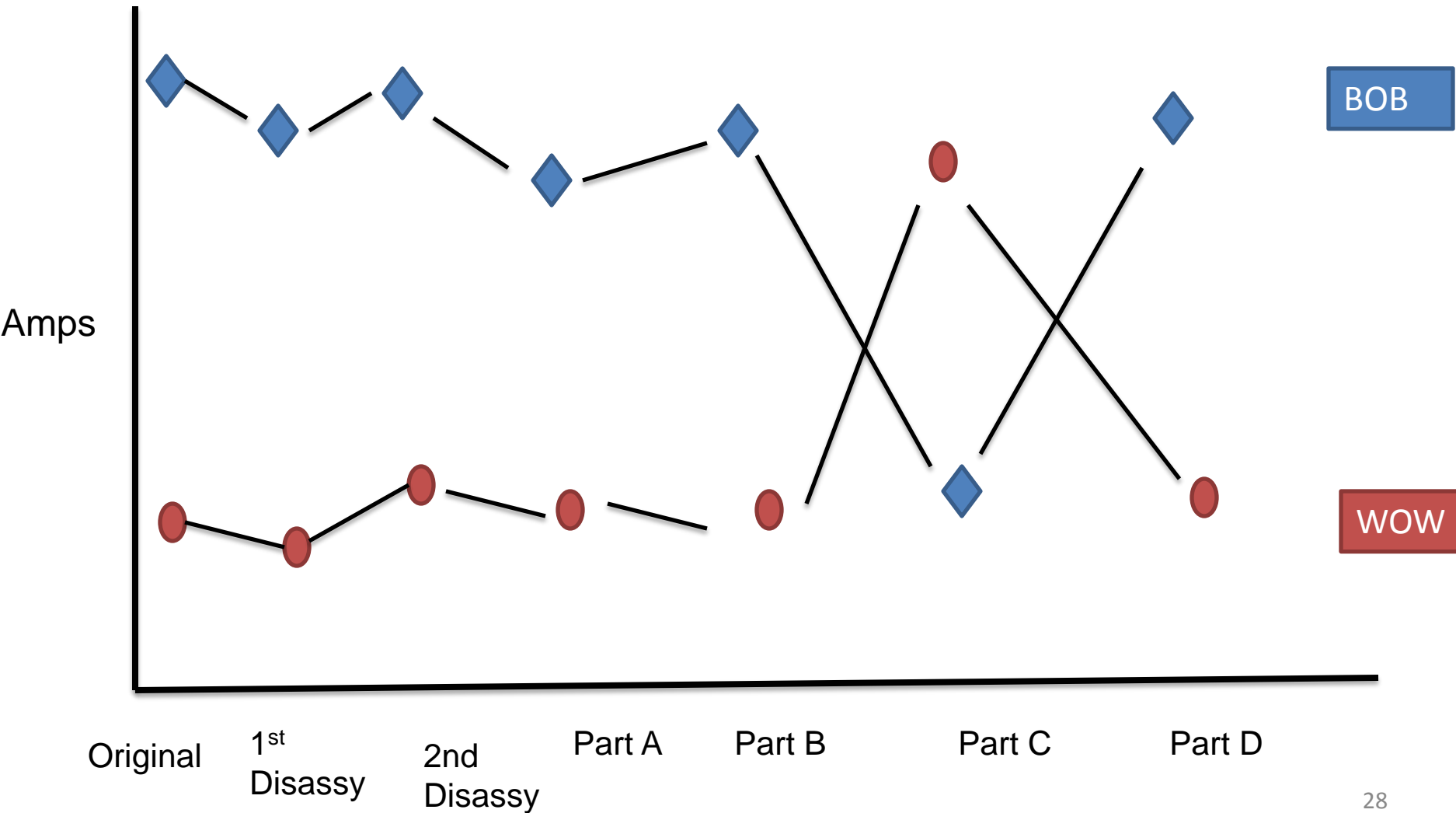
- “Deep Dive” into Station #6
- Implement Counter Measures based on most likely causes.

# Component Search

- Start with two units ... BOB (Best of the Best) and WOW (Worst of the Worst)
- Question: What makes the good unit good and the bad unit bad?

# Component Search

- Step 1 ... Make sure measurements are repeatable by taking multiple measurements.
- Step 2 ... Disassemble and Reassemble both BOB and WOW make sure that the assembly process does not impact response.
- Step 3 ... Break unit into components. Rank each sub-component in order of importance.
- Step 4 ... Swap out components between the BOB and WOW units starting with the highest ranked component first.
- Step 5 ... Continue swapping . Stop when a complete reversal occurs. The associated sub-component “houses “ the root cause.
- Step 6 ... If no complete change occurs then note components associated with “partial” changes. Swap at one time all units associated with partial change. If complete change occurs then root cause is an interaction.



BOB

WOW

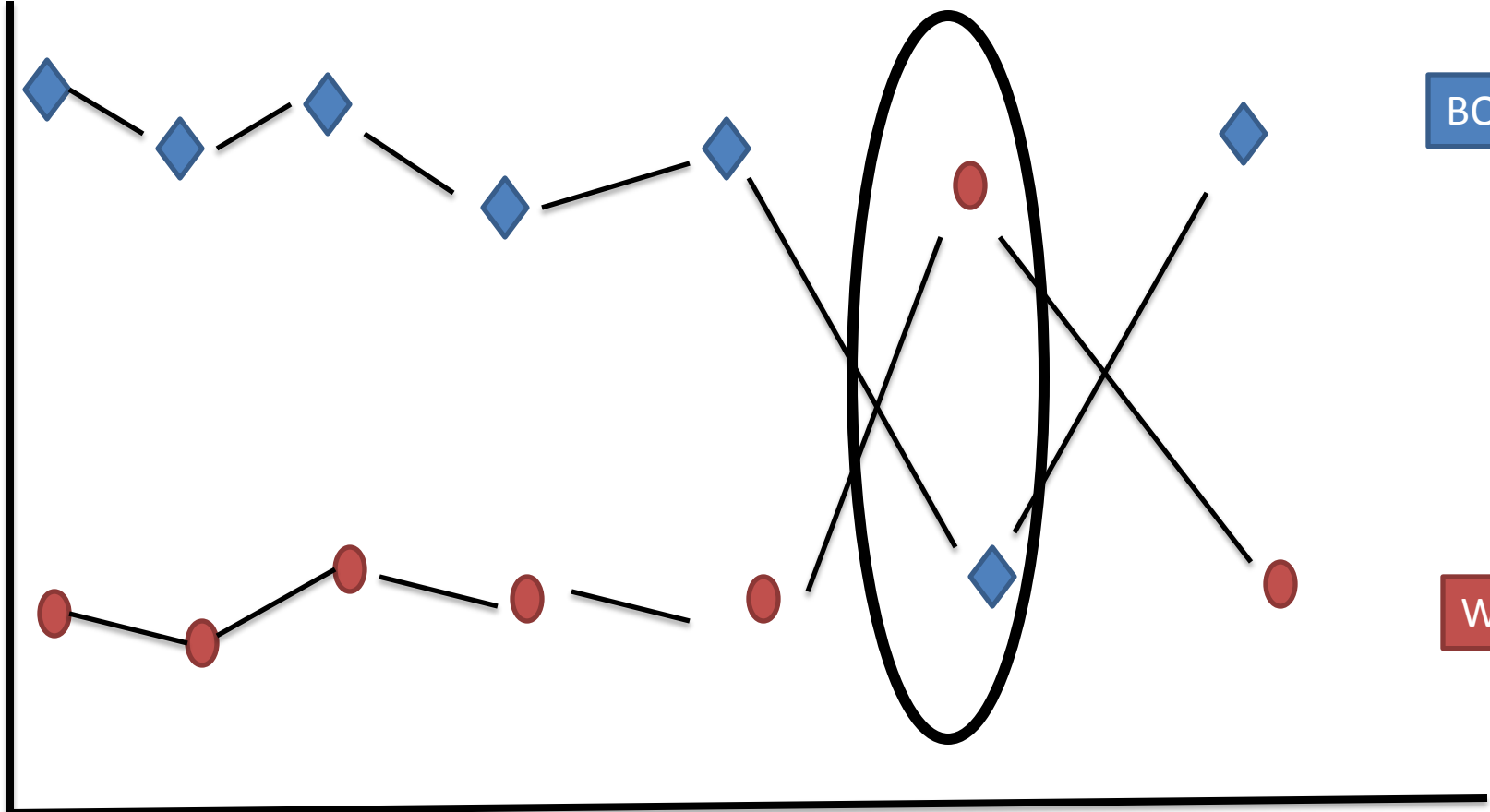
“Part C” contains the  
Root Cause

BOB

WOW

Amps

Original    1<sup>st</sup> Disassy    2<sup>nd</sup> Disassy    Part A    Part B    Part C    Part D



# Common “Theme” Underlying Rapid Problem solving

- Break-down into families of possible causes.
  - Part to part; time to time;
  - Line to line; machine to machine;
  - Product to product; batch to batch
- Systematically eliminate families (not individual causes).
- Use a strategic method of elimination to find the family of causes that “contains” the root cause.
- Deep dive on the family which contains the root cause.