



# A Problem:

A disparity between where you are and where you want to be.–Knowledge is the key

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# What's in a word.....

## 'Deathtrap' on GM's naughty words list

- Instead of a "Problem," there is an "Issue, condition, matter."



By Peter Valdes-Dapena @peterdrives May 17, 2014: 7:31 AM ET





# Synonyms

- ▶ complication
- ▶ dilemma
- ▶ dispute
- ▶ issue
- ▶ obstacle
- ▶ question
- ▶ trouble
- ▶ disagreement
- ▶ doubt
- ▶ mess
- ▶ predicament
- ▶ quandary



# Pólya's Four Step Process

- ▶ Understand the problem
- ▶ Devise a plan
- ▶ Carry out the plan
- ▶ Look back

1945 George Pólya "How To Solve It"





# Questions and Disputes

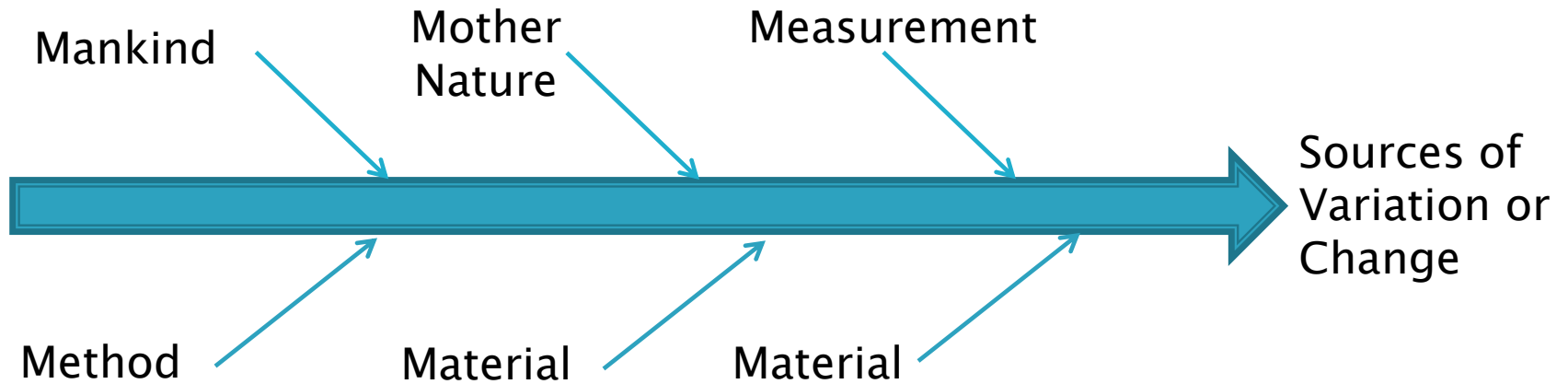
Provide Understanding

- ▶ Six Evidentiary Questions
  - Who
  - What
  - How
  - Where
  - When
  - Why
- ▶ Cicero- four different rhetorical constitutions (*constitutions*)
  - Dispute about fact
  - Dispute about definition
  - Dispute about nature of the act
  - Dispute about jurisdiction or procedure



# Ishikawa Diagram

Fishbone Diagram, 6-M's







# Revision of Bloom's Taxonomy



## Higher-Order Skills

6. Create
5. Evaluate
4. Analyze
3. Apply
2. Understand
1. Remember

## Lower-Order Skills



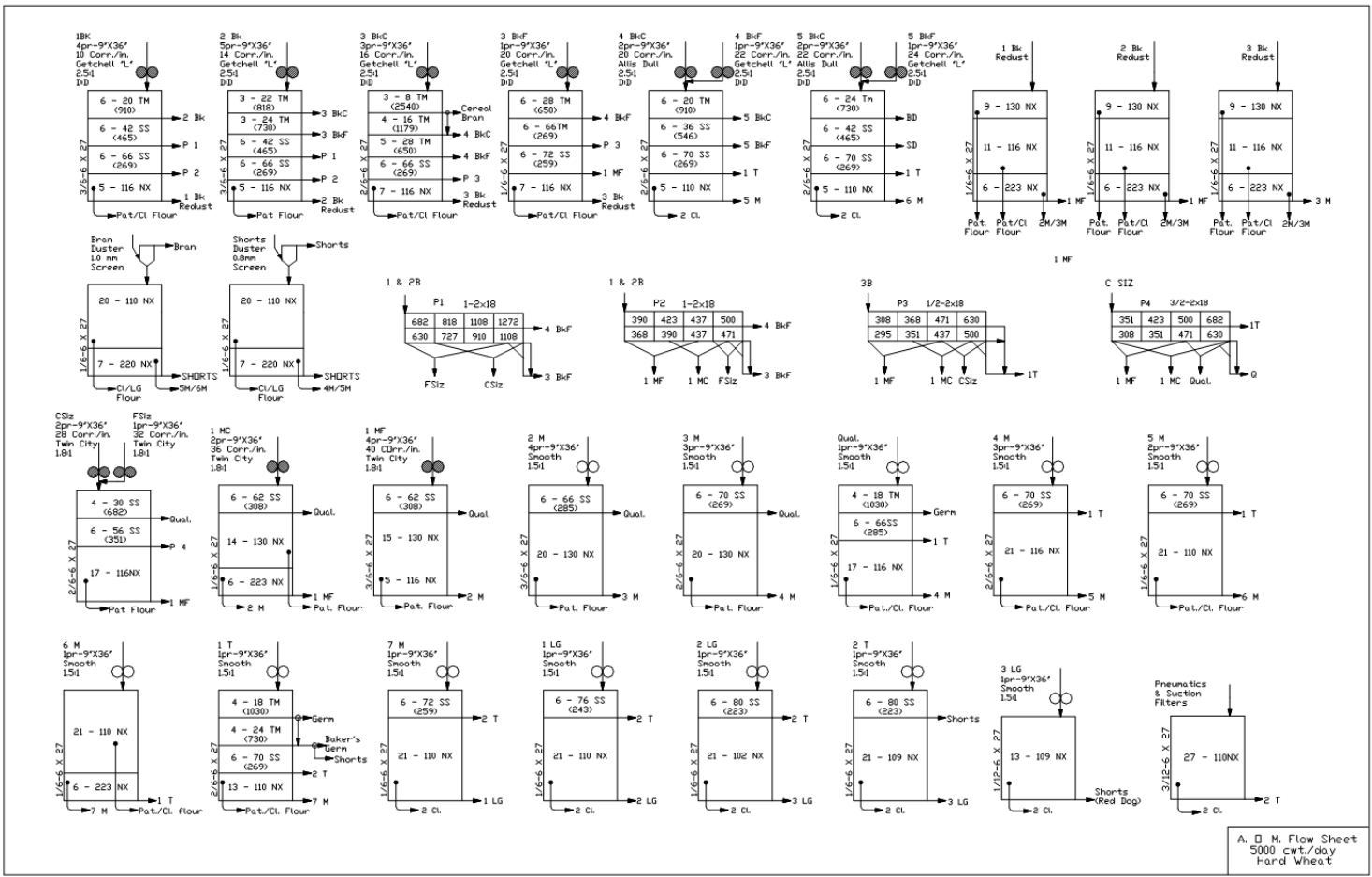
Source: Anderson, L.W., & Krathwohl, D.R. (Eds.) (2001).  
A taxonomy of learning, teaching, and assessment:  
A revision of Bloom's taxonomy of educational objectives. New York: Longman.





# An Up-To-Date Flow Sheet

## Not a Mimic Board or Computer Screen



A. D. M. Flow Sheet  
5000 cwt./day  
Hard Wheat







# Learning from Sizing's Stock

- ▶ Sizings Problem
  - Open grinding, good ash, low yield
  - Closed Grinding, high ash, good yield
  
- ▶ How it was addressed
  - Corrugations
  - Differential
  
- ▶ Cost
  - \$10,000 (1980 dollars)
  - 2-3 months



# Learning from Sizing's Stock

- ▶ What was really the problem
  - Incorrect screens in one of several input sifter boxes
  - Cost to fix approximately \$300
  
- ▶ What Did I Learn
  - Stock appearance can be misleading
  - Read the Flow Sheet
  - Verify input Quantity and Quality
  - Address the problem, not the symptom



# How Bran was Hidden?





# Filter Dust Stock– What is reasonable

- ▶ Filter Dust Stock
  - Collection and disposition changes over time
    - Good/Poor Suction → Suction
    - Separate Sifting Section → Combined with other stock
  
- ▶ A problem
  - Area around 4/5 Break with floury stock choke evidence
  - Sight Glass into 4/5 Break appeared to contain predominantly flour and middlings stock



# Can't see the forest because of the trees!!!



What it was, and what it should have been.....



# Filter Dust Stock– What is reasonable

- ▶ What was really the problem
  - Filter stock weigh-off was at a 10% level
    - 10% logically seemed high given the goal of a suction system
    - Mill loading research from 1960's suggested 2–3%
  - Purifier suction filter was major contributor
  - Purifiers observed to have flour build up on the deck
    - Incoming stock contained a high proportion of flour
  - Sifting efficiency needed to be addressed





# Filter Dust Stock– What is reasonable

## ▶ What Did I Learn

- Where the choke is may not be the source of the problem
- Value of information does not always diminish with age it may be basic or fundamental
- Sifting is important to good purifier operation as well as suction and break grinding operation



# Filter Dust Stock– What is reasonable

## ▶ What Did I Learn

- Where the choke is may not be the source of the problem
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# Stream splitting

## ▶ Observation

- Two identical sifter boxes making the same separation on identical stock produced differing quantities and qualities of scalp stock.
- Roller mill grinding adjustments just could not correct the problem.



# Stream Splitting

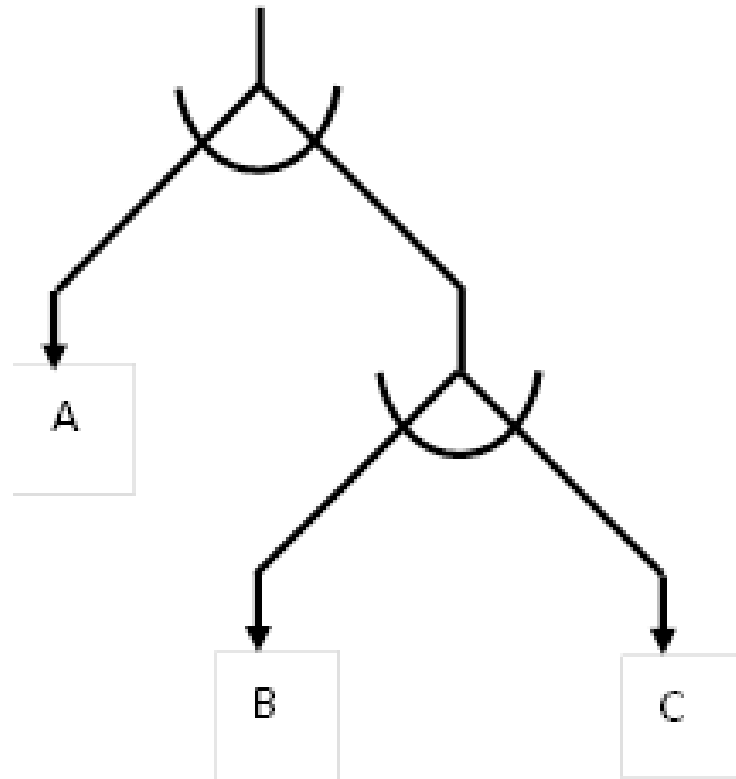
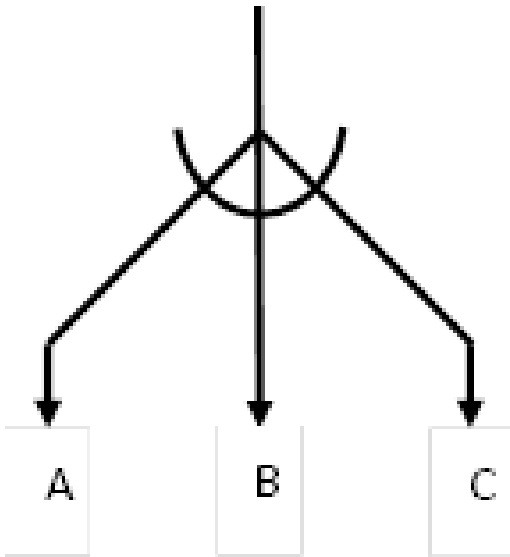
- ▶ **Problem Observation**  
Scalp from one of several sifter boxes appeared to be rich as a result of incomplete sifting
  
- ▶ **Studied the problem**
  - Used the flow sheet
  - Screen tested product under the rolls
  - Screen tested product into the sifter
  - Attempts to re-balance the load simply relocated the increase scalp
  
- ▶ **What was the conclusion**
  - The mechanical layout of the system would not permit equal distribution of what appeared to be uniform material into the two sifter boxes.



# Stream Splitting

## How Even is Even?

### ► Options/Training





# Sifter Loading Expectations

Load To Sifter	Scalp Load	Potential Through Stock in Scalp	Flour Load	Flour in Over tail of Flour Cloth	Flour Ash	Flour Particle Size Dist.
↑	↑	↑	↑	↑	↓	↓
↓	↓	↓	↓	↓	↓	↑





# Break Release

- ▶ **Problem**
  - Could not open the roll up enough to achieve target release
  
- ▶ **The real problem**
  - The incoming stock was already smaller than “expected”.
  
- ▶ **Solution**
  - Read the flow sheet
  - Check the stock
  - Replace the incorrect sieves



# Break Grinding Extremes



Grinding too open?



Grinding too close?



Grinding just right?



# Checking Purifiers

## ▶ Problem

- Adjusting P-7 purifier to solve another “problem/issue” and observed large pieces of bran similar to shorts stock coming off the purifier at a significant rate.

## ▶ Why was it a problem?

- P-7, what type of material do you really expect? There was a disparity between where we were “expectation” and where we wanted to be “observation”.



# Checking Purifiers

- ▶ How do we examine the problem?
  - Get out the flow sheet
  - Identify source location and material size
  - Collect samples, evaluate
    - Visual examination
    - Sifting test results
  
- ▶ The solution
  - Fix the gapping hole in one of the sifter sections feeding P-7





# A new machine or process? Analysis in 14 Points

1. Material and Processing Objectives
2. Equipment Physical Dimensions
3. Construction Materials
4. Drives
5. General Equipment Adjustments
6. Material (Stock) Flow
7. Sanitation
8. Safety

# A new machine or process? Analysis in 14 Points

9. Maintenance
10. Special External Inputs Needed For Designed Function
11. Dependency on other Equipment and Systems
12. Operational Skill
13. Environment
14. Performance Measures







# General Milling Process Guide

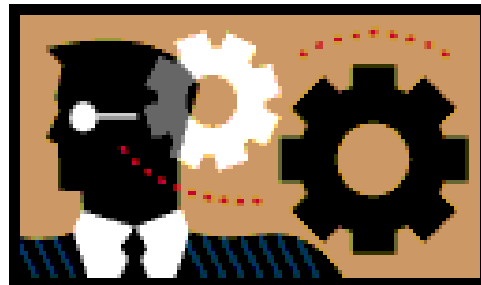
- ▶ Incoming materials
  - Uniformity of Quantity, Quality, Rate
- ▶ Ancillary input(s)
  - Uniformity of Quantity, Quality, Rate
- ▶ Process objective(s)
  - Reduce, separate
- ▶ Expected outcome
  - Uniformity, performance measures, fractions, interaction





# Knowledge, the Key to Critical Thinking

- ▶ **Experiential**
  - Aided with proper guidance
- ▶ **Knowledge**
  - Milling–Aided with proper guidance
  - Problem Solving Skills/System
  - Basics including–Physics, Chemistry, Mathematics, Statistics





# What is A Problem Solver

- ▶ Examines problem setting to understand critical issues, assumptions, limitations, and solution requirements
- ▶ Considers all relevant perspectives, solution models, and alternative solution paths
- ▶ Selects models for obtaining solutions consistent with problem type, assumptions, and solution quality
- ▶ Applies selected models, methods, and data to produce desired solution
- ▶ Validates results and interprets the solution to the needs and assumptions made



# Becoming a Problem Solver

- ▶ Listen, observe with all your senses
- ▶ Avoid the experience trap
- ▶ Sharpening your skills and understanding
- ▶ Be a life-long learner

