

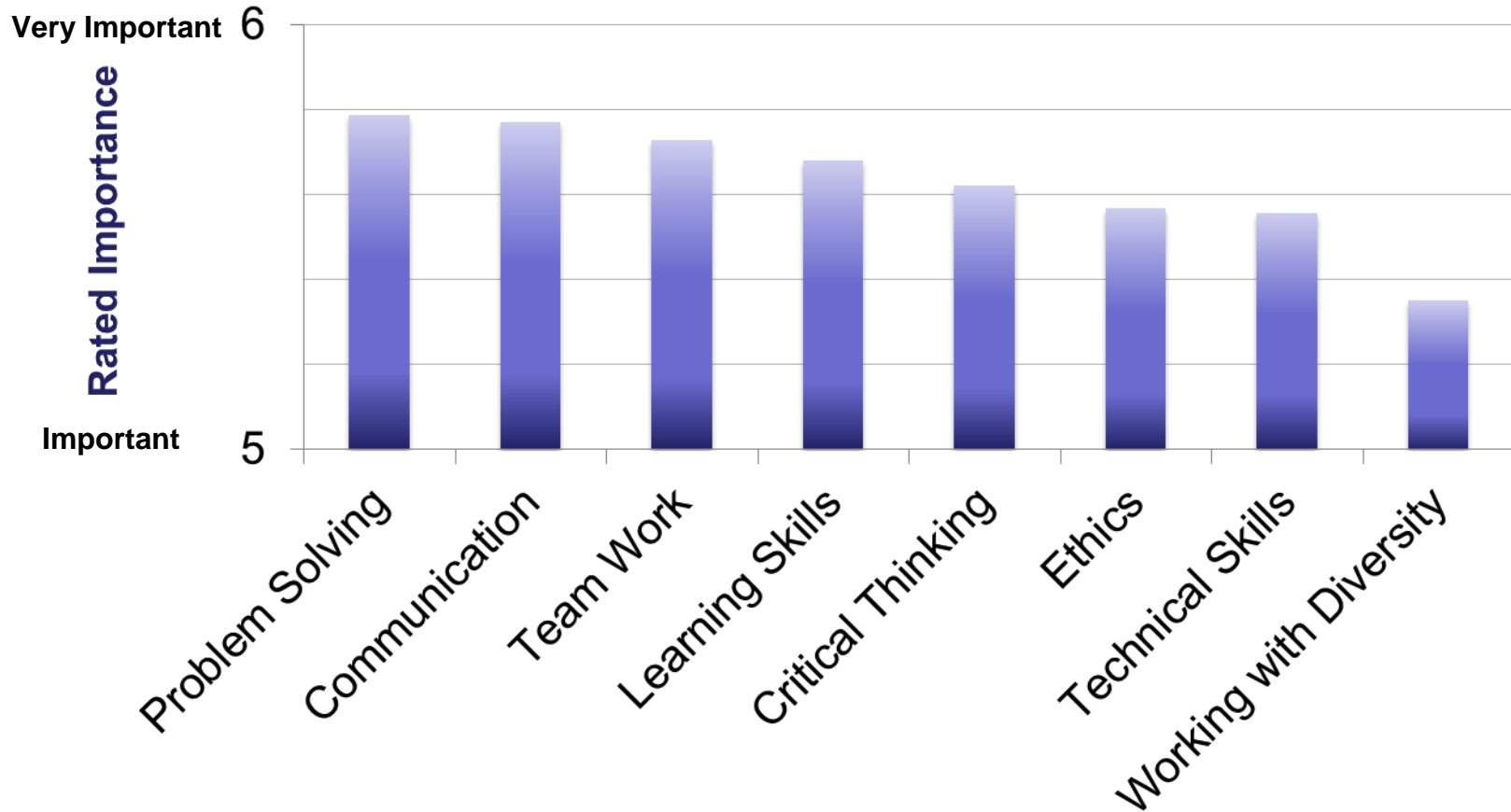
Lecture

Today's Lecture 9/6/16

Problem Solving Strategies—Why Bother??

Introduction to the Course
Problem Solving Strategies, Why Bother?
Joel Barker: Discovering the Future

Relative Importance of Skills for Employers



National Science Foundation Grant

\$350,000 National Science Foundation Grant
to Research Problem Solving



1025

DATE mm/dd/yyyy

PAY TO THE ORDER OF H. Scott Fogler \$ 350,000

Three Hundred and Fifty Thousand DOLLARS

MEMO _____

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Security Features Included. Details on Back.

Contributing Companies

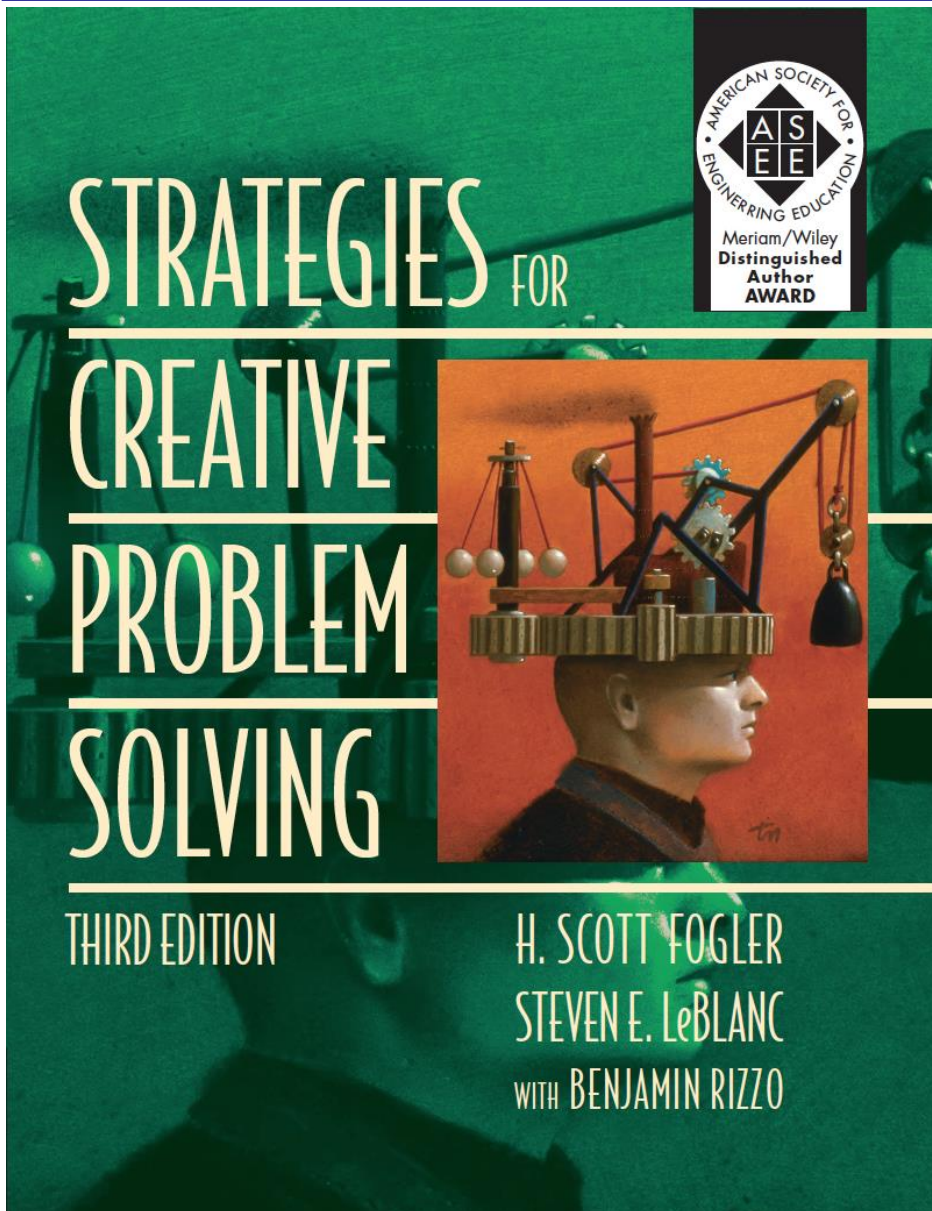


Typical Company Visit



Goal: To learn how engineers, scientists and managers went about solving problems and the techniques they used.

Chapter 1



**H. Scott Fogler
Steven E. LeBlanc
with Benjamin Rizzo**

*Strategies for Creative
Problem Solving*
Prentice Hall

3rd Edition (2014)

The greatest hurdle companies faced in Problem Solving



The greatest hurdle they faced in Problem Solving

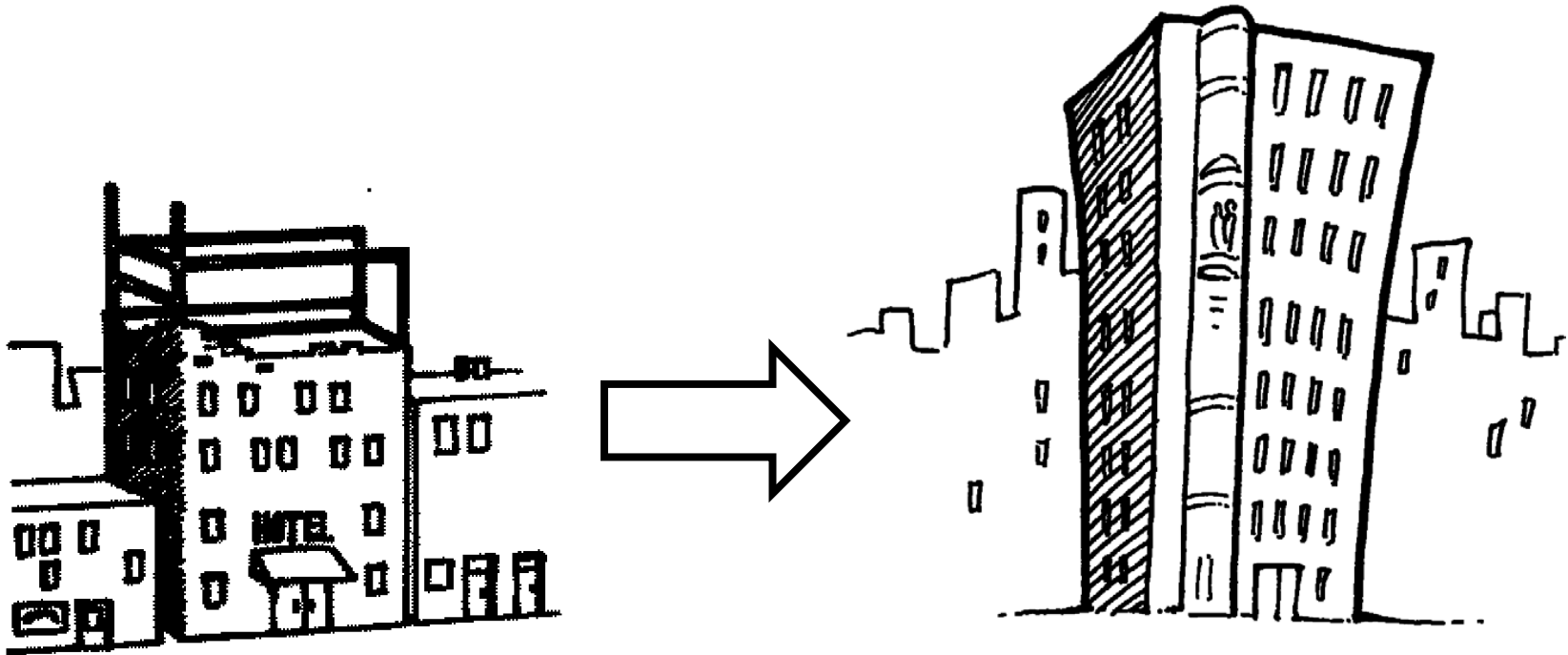


Defining the *Perceived Problem* Instead of the *Real Problem*

The Perceived Problem

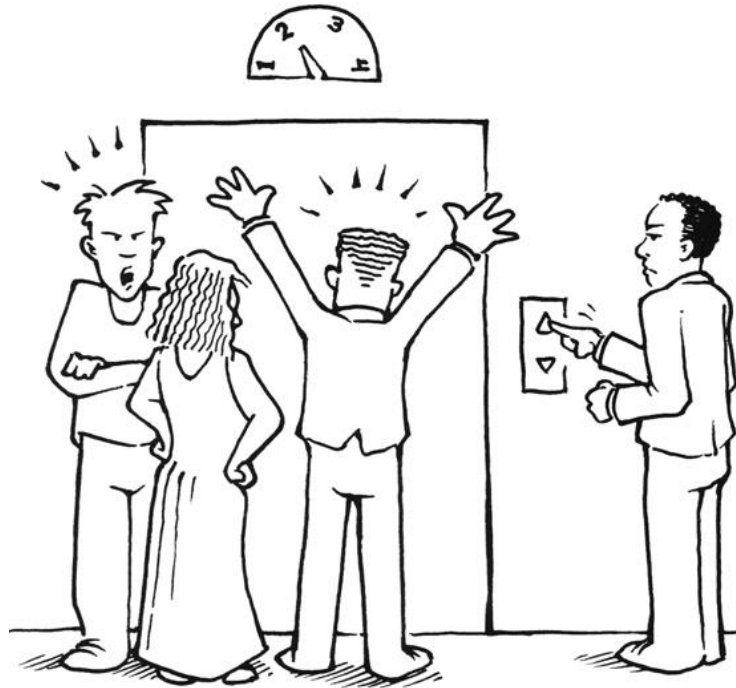


The Annoying Wait



Shortly after the upper floors of a hotel got renovated, guests started to complain that the elevators were too slow.

The Annoying Wait



The manager's instructions to solve the perceived problem:
"Find a way to speed up the elevators."

Next, the manager's directions were:
"Find a location and design a shaft to install another elevator."

Problem Solved



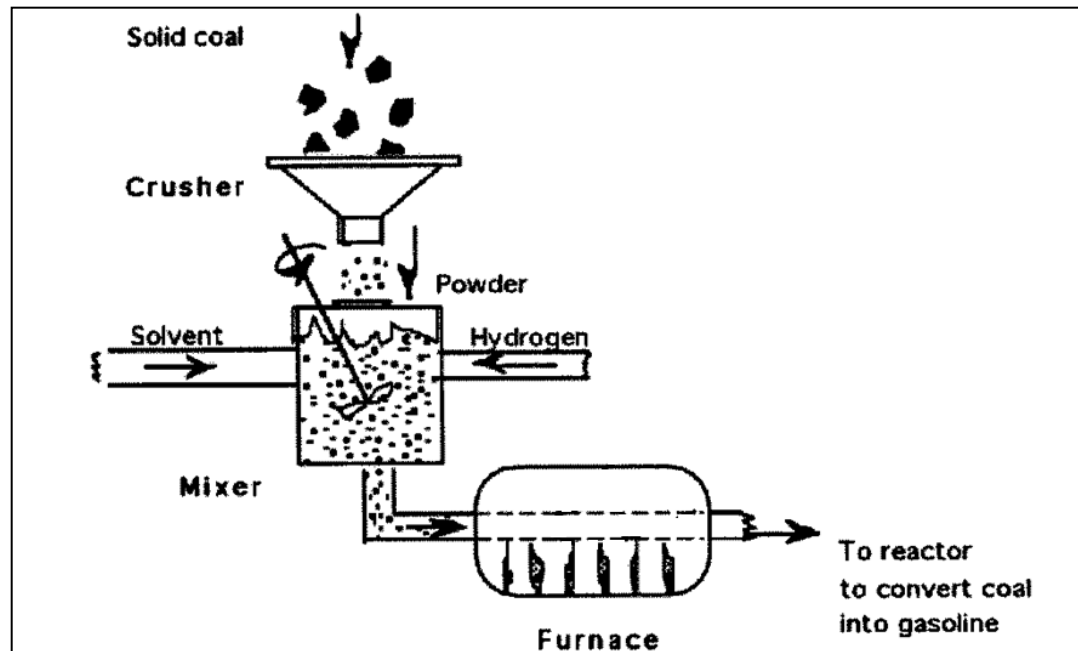
Find a Better Solvent



A few years ago a major oil company was developing a process for the Department of Energy to produce liquid petroleum products from coal in order to reduce the U.S. dependence on foreign oil.

The Better Solvent

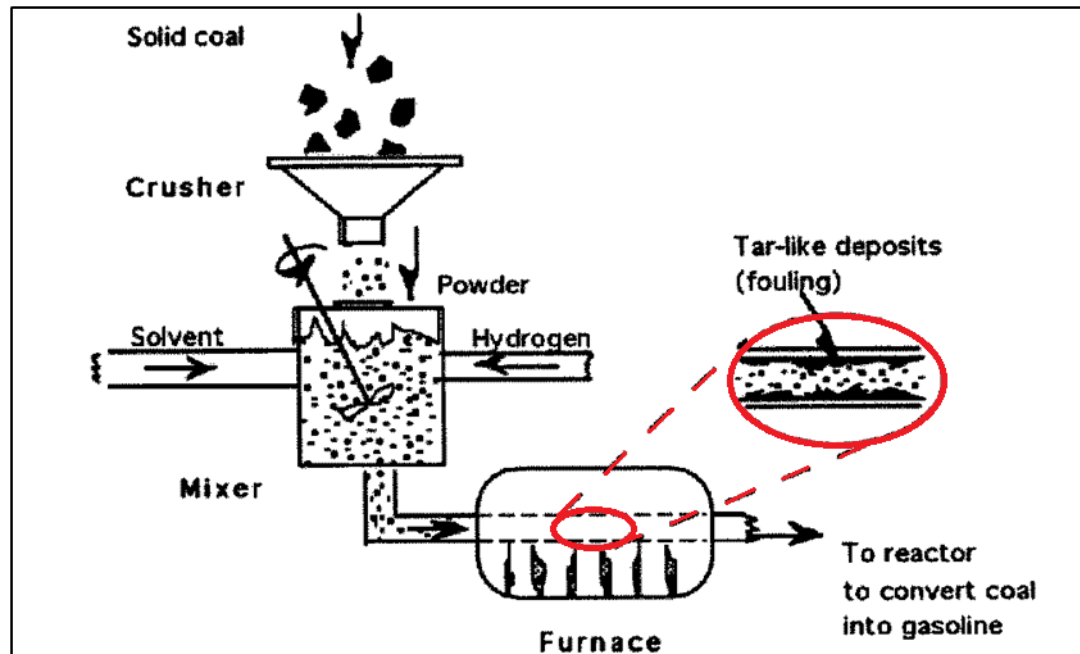
In this process, solid coal particles were ground up, mixed with solvent and hydrogen, then passed through a furnace heater to a reactor that would convert the coal to gasoline.



The Better Solvent

Sometime after installation excessive amounts of a tar-like material were being deposited on the pipes in the furnace, causing fouling and plugging. Management told its engineers

“Find a better solvent”

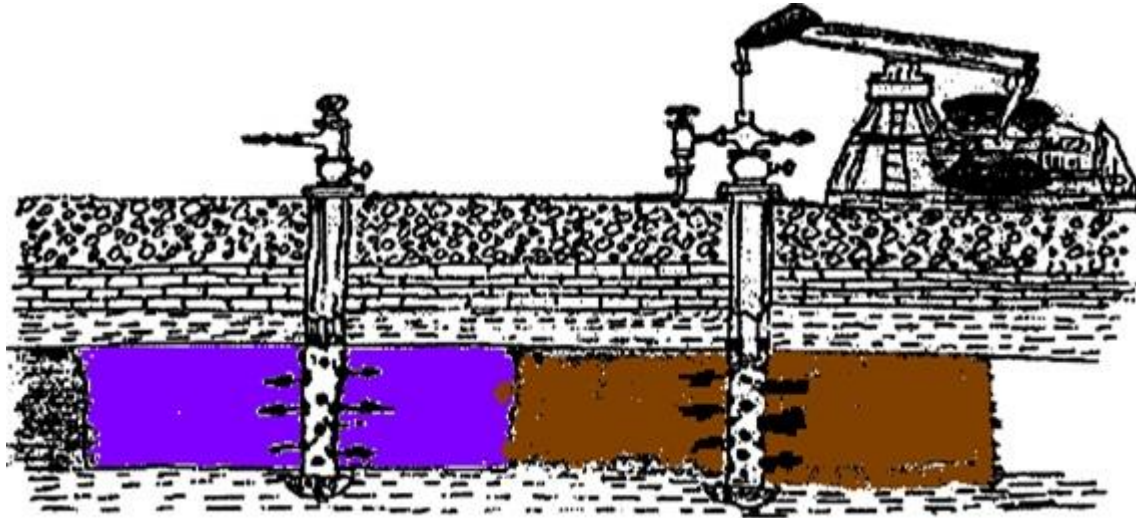


The Better Solvent

- Why is the Deposit Forming?
- Brainstorm and List all the Possible Causes.



Improving Oil Recovery

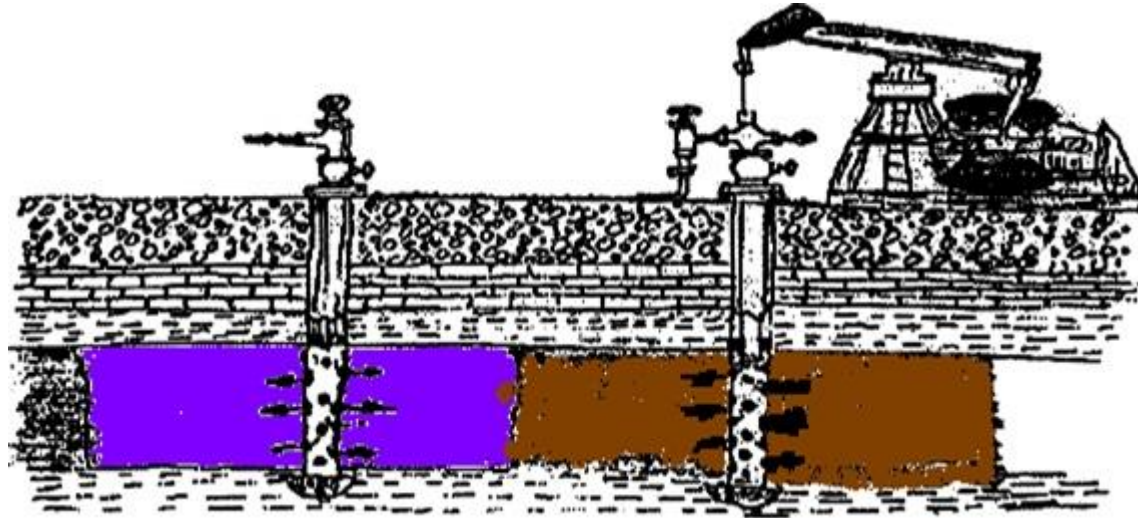


Perceived Problem Statement:
“Find ways to improve oil recovery”

Proposed Solution to Solve the Perceived Problem

Inject Better Surfactants and Viscosifiers

Improving Oil Recovery



Perceived Problem Statement:

“Find ways to improve oil recovery”

Real Problem Statement

“Learn why the well is not producing as expected”

New Bills Smeared



Perceived Problem Statement:
“Find a Better Printing Ink”

New Bills Smearred: Find a Better Printing Ink



Better Problem Statement.

- **Brainstorm and List all the things that could cause the ink to smear.**

Murray River Dams

Right Problem Definition

BUT

Wrong Solution

Grow agriculture crops in arid land



Grow Agriculture Crops in Arid Land

The following solution was chosen by the Australian government:

“Design and build a dam to divert the river water inland to irrigate the land.”



Murray River Flows From the Mountains to the Sea



Build Dams along the Murrumbidgee River



Dam the Torpedo or Torpedo the Dam?

The following solution was chosen by the Australian government:

“Design and build a dam to divert the river water inland to irrigate the land.”

Unfortunately, no new vegetation grew.



London Underground

Right Problem Definition

BUT

Wrong Solution

Jubilee Line



Jubilee Line



Jubilee Line



Jubilee Line



Always Carry Out a Potential Problem Analysis

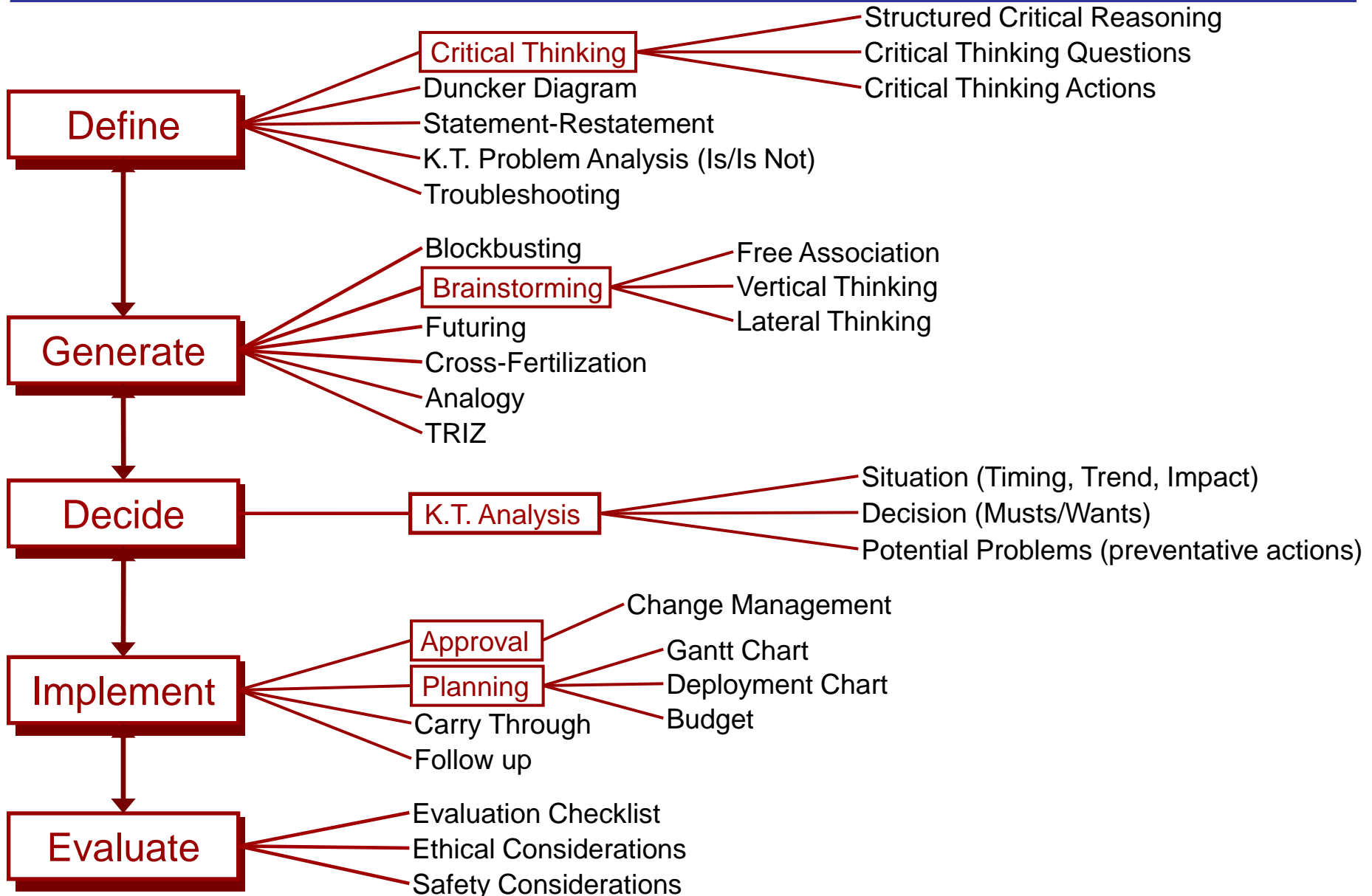


What Could Go Wrong?

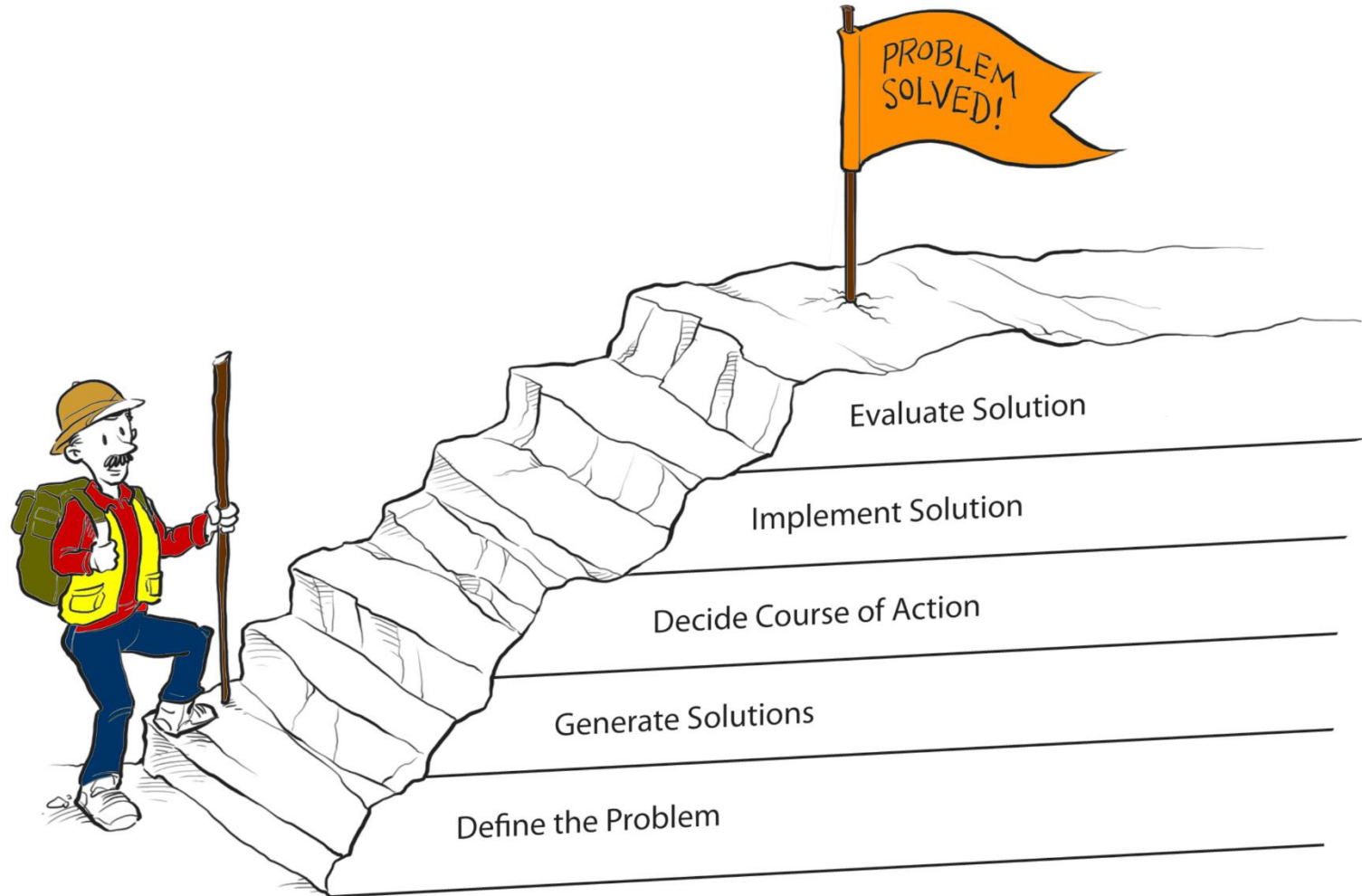
K.T. Potential Problem Analysis

1. Brainstorming a list of all the potential problems
2. For each problem identified, brainstorm all the possible causes to that problem
3. For each cause, brainstorm a list of preventive actions.
4. For each problem, brainstorm a list of contingency actions if your preventive actions fail to prevent the problem from occurring.

Components of the Heuristic



The Five Steps of the Heuristic



Advice from Previous Classes

Top 5 Consensus Comments

- Start work on the project early
 - Mention that you've taken a problem solving class in any interviews you have and you'd be surprised how impressed people are when you can explain a KT decision analysis.
 - Pay attention to lecture. At first I thought his class was going to be a joke, I was dead wrong. I believe it helped me tremendously.
 - What you put into the class is proportional to what you will get out of it
 - Outside of class, think about situations or other classes you could apply the material: you'll surprise yourself.
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