AQS 200
ROOT CAUSE INVESTIGATION

This material is based upon work supported by the National Science Foundation under Grant No. 1304474

LECTURE 12
TOOLS FOR
SOLUTION IMPLEMENTATION

- Tree Diagram
- Force Field Analysis

PROBLEM ????? → ROOT CAUSE

Problem/Issue Identified → Understand the Problem
Chapter 3

Investigate Potential Causes
Chapter 4 → Data Collection
Chapter 5

Data Analysis
Chapter 6 → Identify Root Cause
Chapter 7

Eliminate Problem
Chapter 8 → Implement Solution
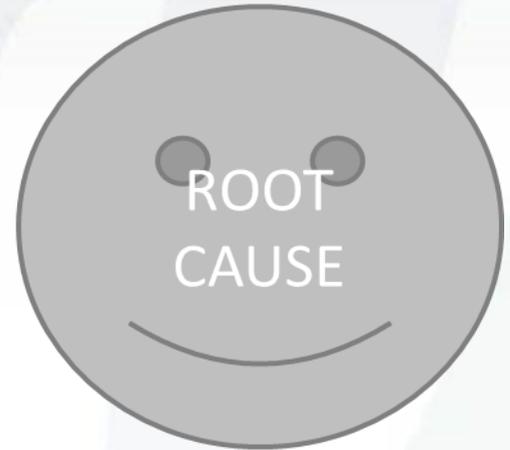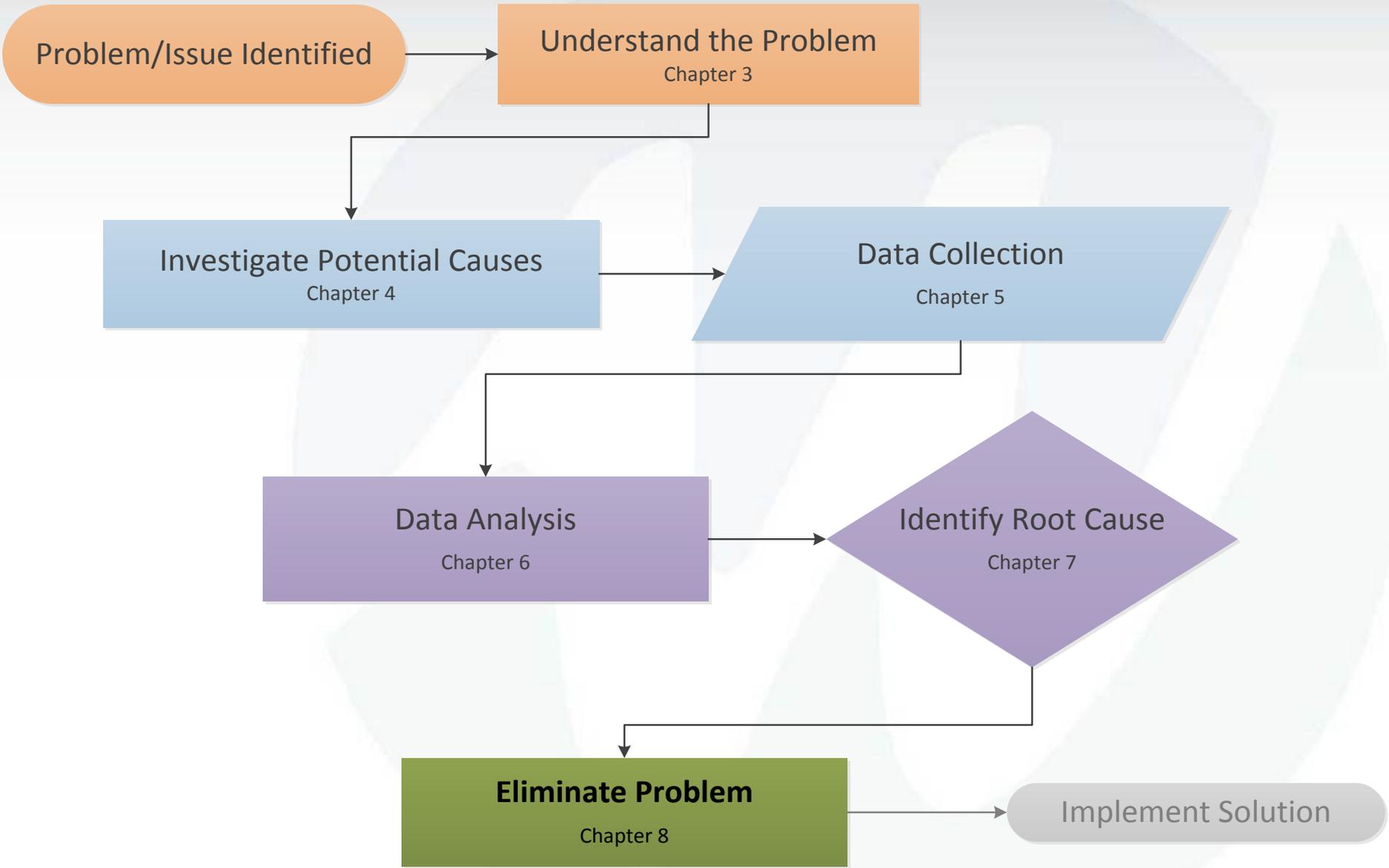
CAUSE INVESTIGATION

- Root Cause – The fundamental (true) reason a product or process nonconformance occurred.

Symptoms
Not actual causes – instead signs of existing problems

PROBLEM

First Level
Causes that lead directly to the problem
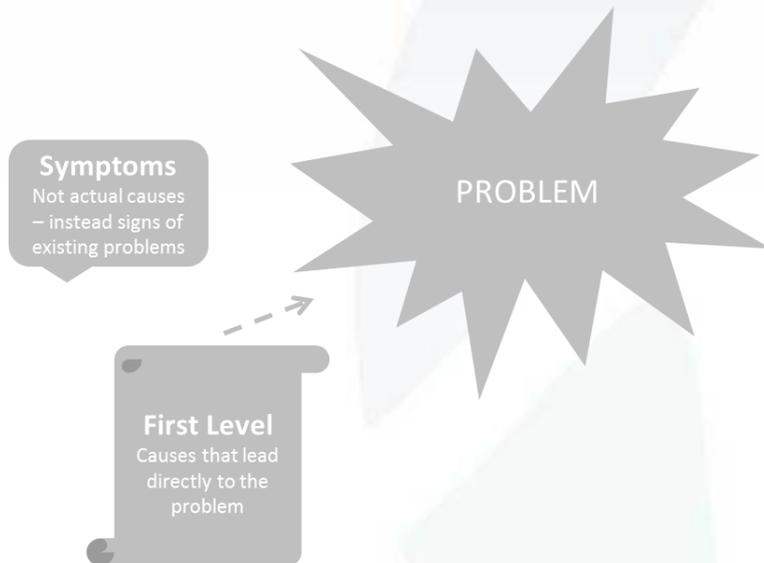
➢ Define the issue
➢ Understand scope of investigation
➢ Generate ideas and reach agreement for potential causes
➢ Data collection - verify ideas and gather new information
➢ Data analysis – evaluate results
➢ Identify Root Cause
➢ Find Solutions – eliminate RC

Implement Solutions

Solution Implementation

Process for moving forward

Solution Implementation

Process for moving forward

1. Organize
2. Develop the plan
3. Create acceptance of changes (includes favorable climate)
4. Executing the plan

REVIEW - CAPA SYSTEM
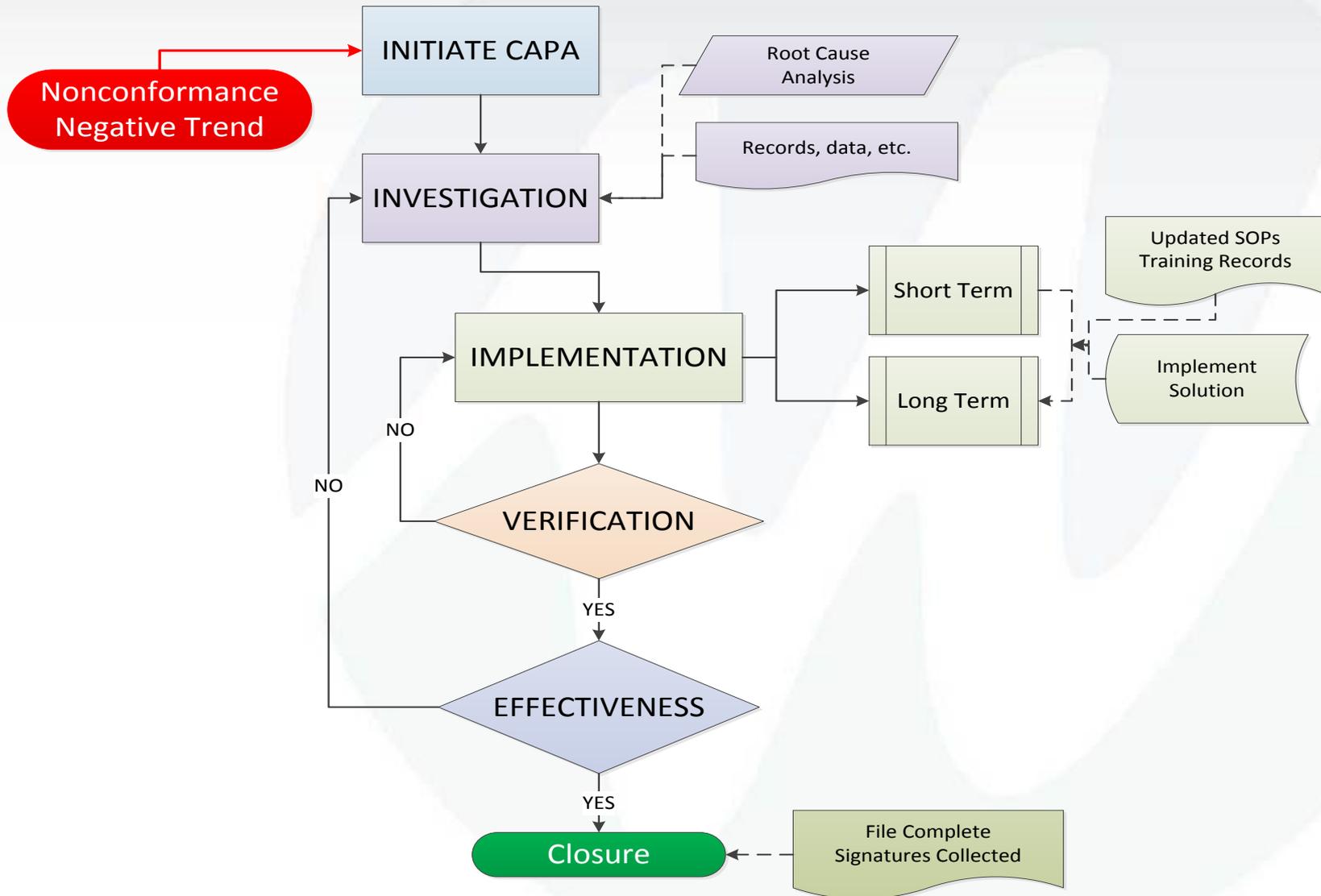
Solution Implementation

1. Organize
   - Utilize the team conducting the investigation
   - Hand-off / include decision makers
   - Hand-off / include process owners

2. Develop the plan
   - Required activities
   - Sequence for implementation
   - Responsibilities
     - Implementation AND monitoring
   - Schedule
   - Costs

   NOTE: Target Setting -- ambitious but attainable
   - ➢ Too ambitious = frustration
   - ➢ Low ambition = untapped potential

Solution Implementation

- Tools
  - Tree Diagram
    - Breaks down larger tasks into management activities
  - Project planning tools
    - Gannt charts
    - PERT charts (program evaluation review)

TREE DIAGRAMS

- Break down larger tasks into manageable activities
  - Provides structure/organization
- Structure complex tasks into activities
- Plan implementation process

Tree Diagrams - Example
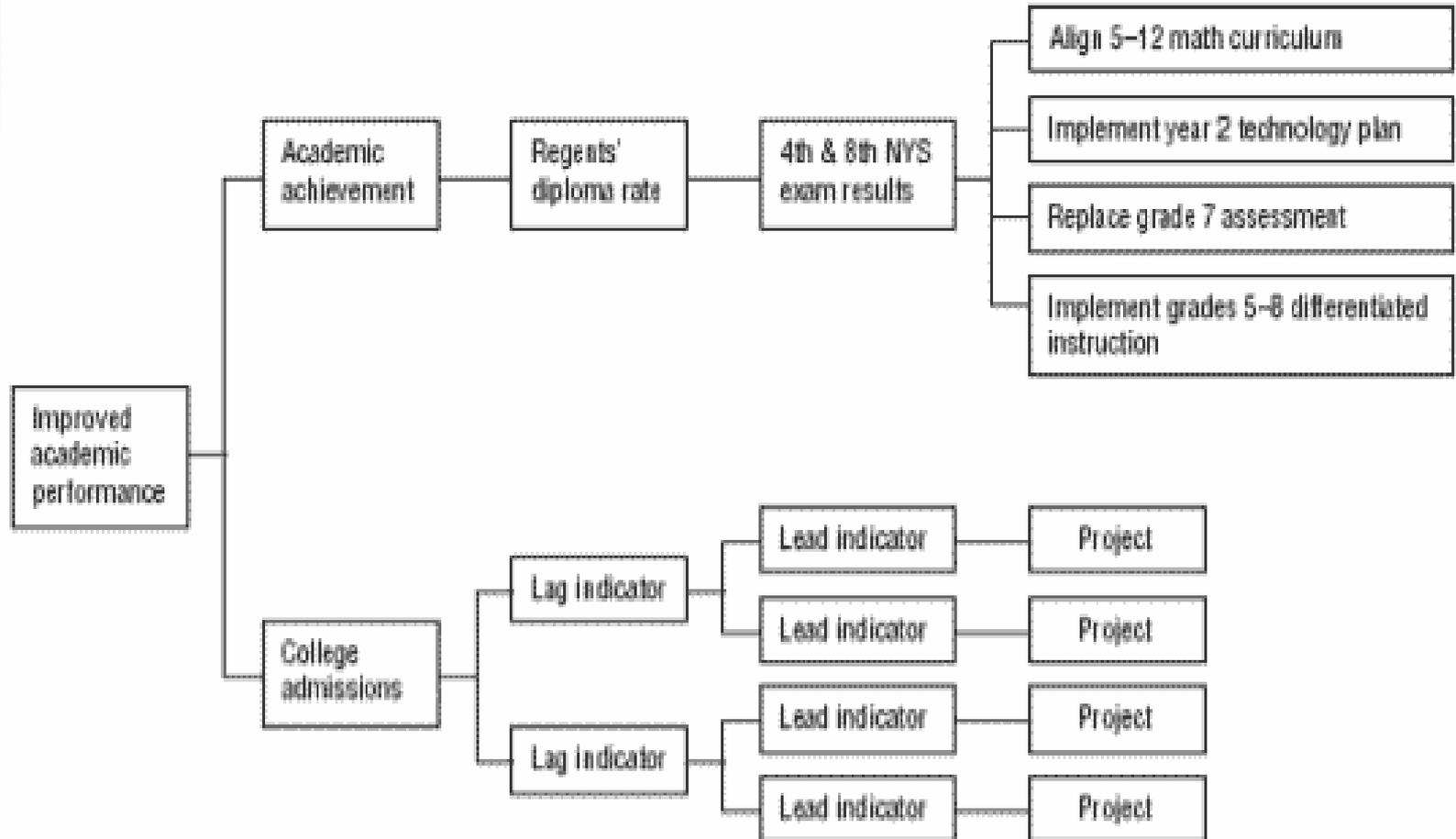
Pearl River NY School District

Tree Diagrams - Example
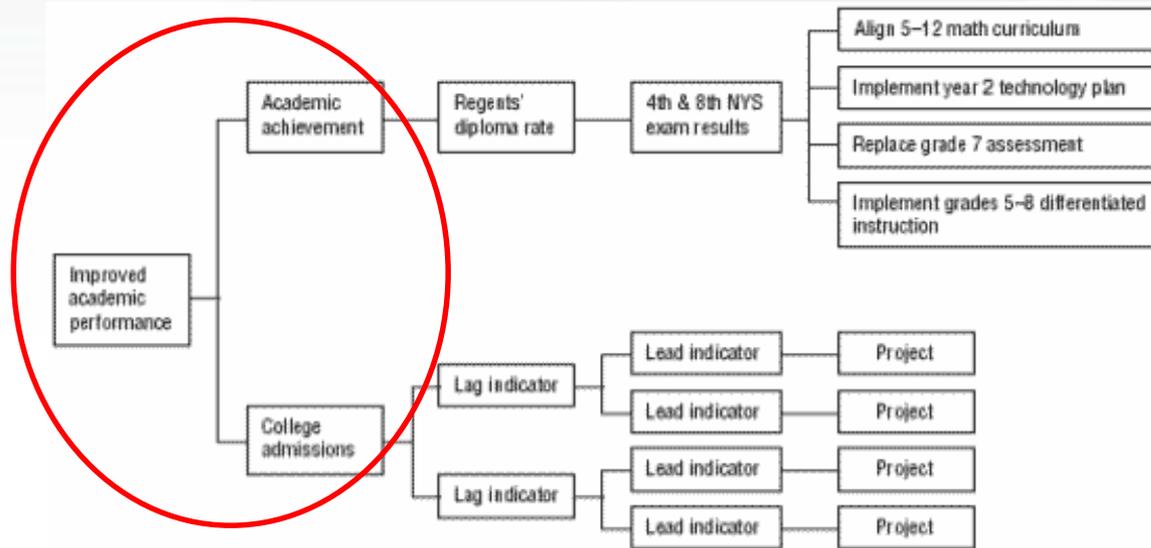
Primary goal: Improved academic performance

Strategic Objectives: Academic Achievement, College Admissions

Tree Diagrams - Example
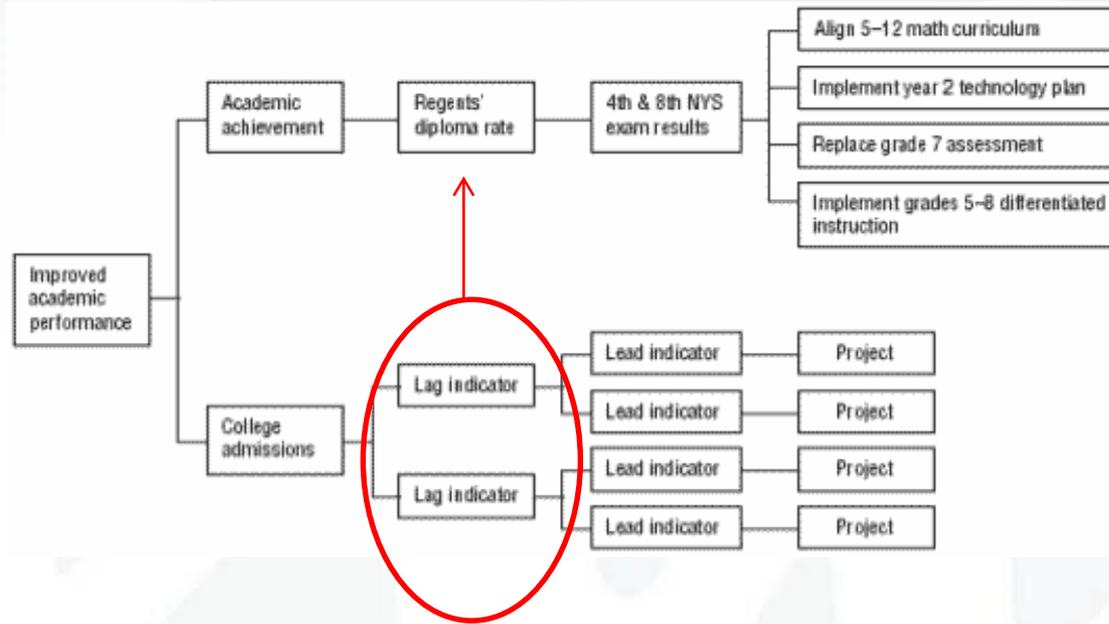
Lag Indicators

- Long term, results oriented
  - Regents diploma rate
  - % students passing eight Regents exams

Tree Diagrams - Example
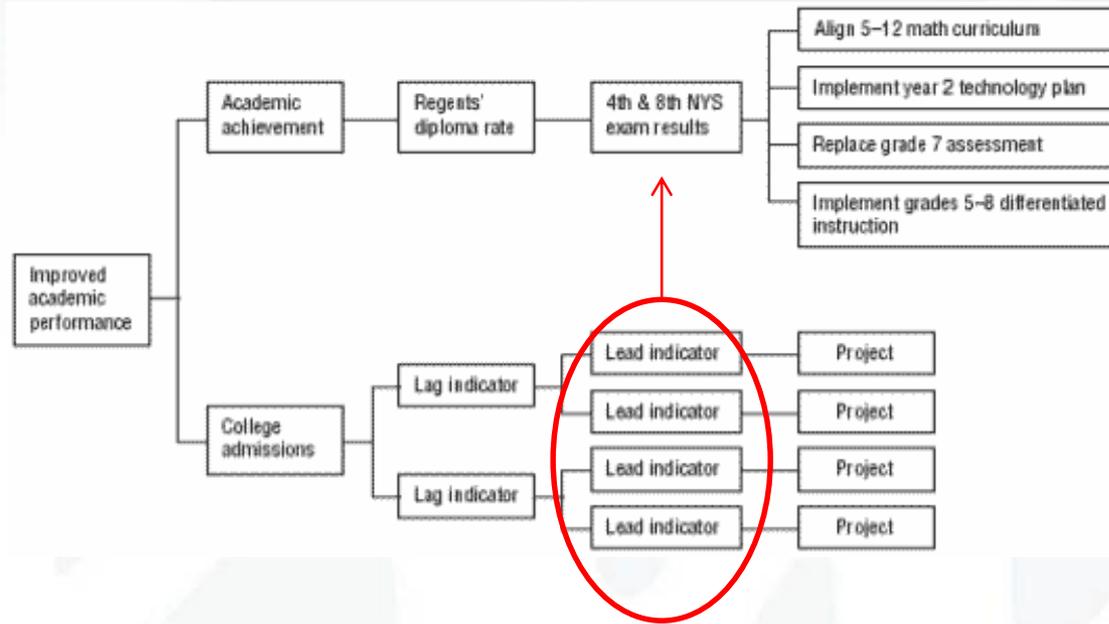
Lead Indicators

- Short term, process oriented
    - Performance on 4th and 8th grade state tests

Tree Diagrams - Example
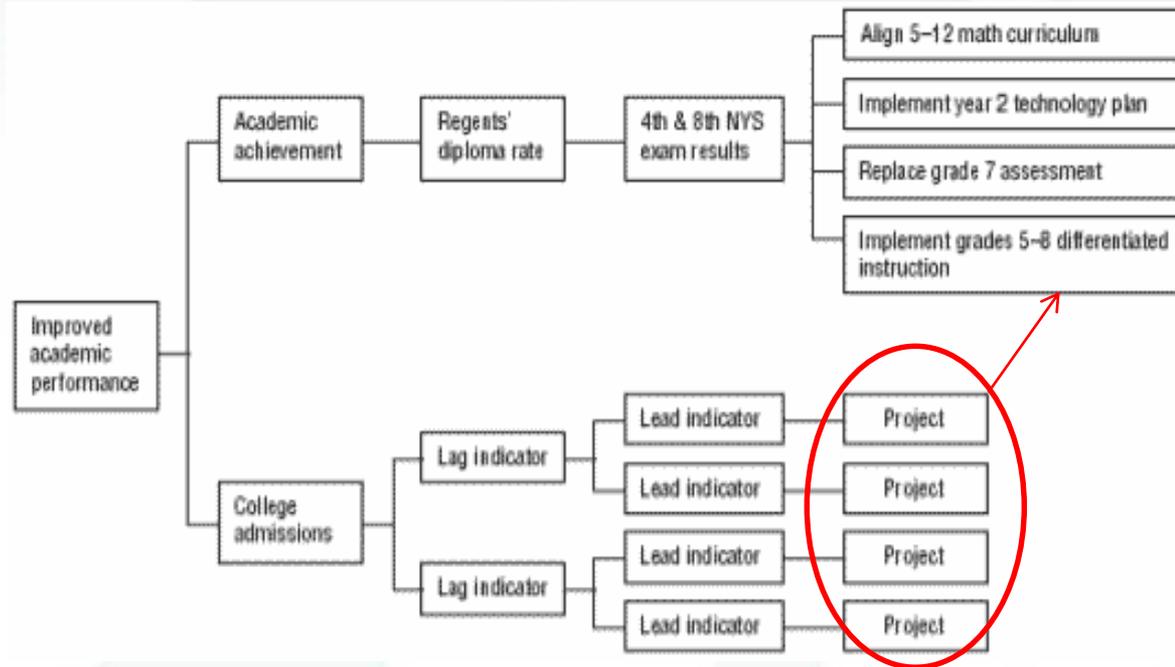
Annual Projects

- Defined using Cause/Effect diagram – improved performance

# Tree Diagrams – How To

1. Generate a list of activities that must be performed to implement the solution.

2. Write down each activity, in the form of a verb followed by a noun, on adhesive notes.

3. Arrange the activities in logical subgroups of activities that must be performed in sequence.

4. Arrange the subgroups into an overall sequence to illustrate the entire plan of the tree diagram.

EXERCISE

Solution Implementation

1. Organize

2. Develop the plan

3. Create acceptance of changes
   - Provide information to those who will be affected
   - Favorable climate for change
     - WIIFM (what's – in- it – for -me)

Those affected by change
Top Management
Process Personnel
Input Personnel
Output Personnel

Solution Implementation

1. Organize
2. Develop the plan
3. Create acceptance of changes

Those affected by change

Top Management

Authority to decide implementation & assign resources

Process Personnel

Motivate for change (WIIFM)
Involved in Solution / Implementation

Input Personnel ⎤ Are they affected?
Output Personnel ⎦ Assist implementation

Gatekeepers

Additional impacts (i.e. financial, marketing, etc.)

Helpful tool - Force Field Analysis

Force-Field Analysis

- Create overview and possible actions
- Used to plan effective implementation
- Based on the assumption that forces *for* and *against* the current state are in equilibrium
  - An *increase* or *decrease* in the strength of forces will induce a change

Force-Field Analysis – How To

1. Define clearly what change is desired
   - implementation plan
   - improvement objectives

2. Brainstorm all possible forces (pro's / con's) regarding the change

3. Assess the strength of each of the forces and plot them on a force-field diagram.
   - length of each arrow expresses the strength of the force it represents.

4. Starting with stronger forces, define actions that could increase the forces for the change or reduce those against it

EXAMPLE FORCE FIELD ANALYSIS

Pro	Con

Less risk of supplement-related complications

Recruitment based on language skills seen as unfair

Better working conditions for interviewers

Patients reluctant to discuss supplement use

Fewer language barriers

Interview process and questions clearer

Interviewers uncomfortable in pressing for answers

EXAMPLE FORCE FIELD ANALYSIS

Pro	Con
Less risk of supplement-related complications	Recruitment based on language skills seen as unfair
Better working conditions for interviewers	Patients reluctant to discuss supplement use
Fewer language barriers	
Interview process and questions clearer	Interviewers uncomfortable in pressing for answers

Developed as part of NSF ATE Grant #1304474

Office based surgery center needed to uncover patients use of herbal supplements and instruct them to cease use sometime before surgery

Identified as most serious obstacle – interviewers need to be persistant

EXERCISE

Solution Implementation

1. Organize
2. Develop the plan
3. Create acceptance of changes
4. Executing the plan

EXECUTING IMPLEMENTATION

Sense of false security

Vs

Sense of Crisis

EXECUTING IMPLEMENTATION

Sense of false security

vs

Sense of Crisis

*Sense of crisis can be useful
for successful implementation*

EXECUTING IMPLEMENTATION

A false sense of security might be caused by:

- Absence of a large & visible crisis
- Too many visible resources
- Low performance requirements
- Organizational structures that direct the employees' attention to narrow-minded functional objectives
- Internal measurement systems focused on the wrong issues
- Lack of feedback from external sources about performance levels & development
- A culture of smoothing out conflicts
- Too much "nice" feedback from management

EXECUTING IMPLEMENTATION

Ways to increase the sense of crisis:

- Allow financial losses, reveal weaknesses compared to competitors, or letting errors be corrected at the very last second.
- Eliminate obvious sources of waste or luxury.
- Set targets for revenues, profits, or customer satisfaction so high that they cannot be achieved by doing things the same old way.
- Make customer satisfaction and performance data widely available.
- Insist that employees regularly talk to dissatisfied customers or suppliers.
- Bombard people with information about future opportunities and the benefits achievable through pursuing them.

EXECUTING IMPLEMENTATION

- Involve everyone responsible for results

- Try to elicit involvement and inspiration from those involved in the project.

- Follow a clearly communicated plan.

EXECUTING IMPLEMENTATION

- Keep the affected persons constantly informed about progress and achieved results.

- Emphasize the importance of patience – changes do not happen overnight.

- Put the process under pressure – delays are common.

- Pick low-hanging fruit and celebrate wins.

Implementation - SUMMARY

- Develop the plan (tree analysis)

- Implement the plan (force field analysis)
    - Organize implementation
    - Generate Acceptance
    - Execute the Plan