

PN-ACC-839

**“Tell Me, I’ll Forget.**

**Show Me, I May Remember.**

**But Involve Me and I’ll Understand.”**

tRAIN-tHE-tRAINER cOURSE

“DISCOVERY LEARNING”

METHODOLOGY ON INTERACTIVE

TEACHING

EP3

Water Environment Federation

(WEF)

&

California Water Environment Association

(CWEA)

1997

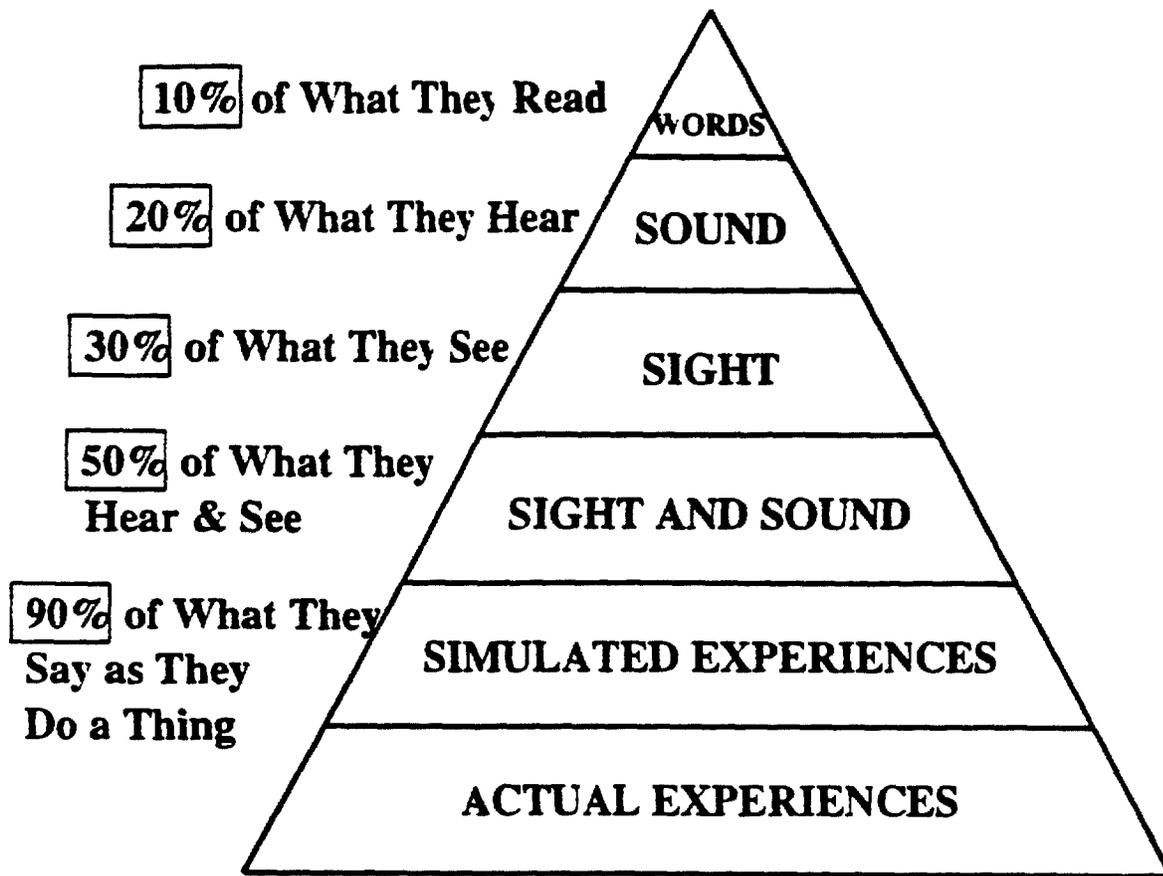
*Tell me, I'll forget.*

*Show me,  
I may remember.*

*But involve me,  
and I'll understand.*

# CONE OF EXPERIENCE

PEOPLE GENERALLY REMEMBER:



## **CHARACTERISTICS OF "DISCOVERY LEARNING"**

- ✓ **Active student is persuaded, not told**
- ✓ **Experience of student is valued and used**
- ✓ **Student evaluates self and trainer**
- ✓ **Material applies to student's life and work**
- ✓ **Content is discussed and discovered – not "hammered-in"**

## **THE ADULT TRAINING APPROACH**

- ✓ Emphasizes the skills of analysis and decision making thru cases
- ✓ Establishes a learning rather than a teaching approach
- ✓ Practical and job-based

## **CRITERIA FOR EFFECTIVE TRAINING**

- ✓ **Trainer is enthusiastic and well informed**
- ✓ **Information and opinions are welcome**
- ✓ **Group is involved in the process**
- ✓ **Atmosphere is comfortable and relaxed**
- ✓ **Course is well structured and designed**
- ✓ **Content tailored to group needs**
- ✓ **Content and design flexible**

# Methods and Media

 Lecture

 Demonstration

 Buzz Groups

 Role Play

## Methods and Media, cont...

### ☞ Lecture

- ☐ Most frequently used method of training
- ☐ Used alone, it is also one of the least effective ways to teach
- ☐ Used in conjunction with visual aids, and structured interaction with the class, it is a practical way to present "concepts", "knowledge" or "information"
- ☐ Motivate class to expand on topics
- ☐ Never say something in a lecture you could draw from the group itself
- ☐ Limit your material to 5 or 7 points
- ☐ Draw on examples that are familiar and relevant

## Methods and Media, cont...

### **Buzz Groups**

- Discussions in which the trainer does not participate
- The larger audience is divided into groups of 5 to 7 members
- Time is limited
- Each group is given a task or series of tasks
- Promotes nearly total participation
- Promotes team building

## Methods and Media, cont...

### **☞ Demonstration**

- A presentation that shows how to use a procedure or perform an act
- Often the most practical way to teach a particular task, procedure or skill
- Trainees are highly active and have a high interest level
- Provides practice, gives instant feedback
- Good for manual skills training, but expensive and time-consuming

## Methods and Media, cont...

### **Role Play**

- Several individuals or a small group act out a real-life situation
- One or more people are told to act out a character which creates a problem
- Helps understand human behavior and improve attitudes
- Allows players to explore solutions without dangers of on-the-job trial and error
- One of the most effective training methods
- Promotes team building

## PREPARING HANDOUT MATERIALS

Think about your material's purpose

- ▶ Remind the group what you have said
- ▶ Tantalize the audience with what you are about to say
- ▶ Give clear instructions about an exercise or case study
- ▶ Elaborate what they have already learned
- ▶ Give more details or reinforce them
- ▶ Reference materials
- ▶ Materials distributed by the participants

## PREPARING YOUR SPACE

Select the room to suit the course's need

Psychology of size

Breakout space

Refreshments

Arrange the seats to suit your purpose

Psychology of seating

Theater style

Classroom style

Discussion style

Meeting style

Workshop style

Informal discussion style

Orientation

"The front"

Projector's position

Distractions

Modify as necessary

Be sure to see the room beforehand that way you have an idea how to use it

## SPECIFY THE EQUIPMENT YOU WILL NEED

Flipchart

Blackboard

Markers

Paper/pens for the participants

Audio visual equipment

Tables

Podium or table for notes

Water

Name tags

Access to copying machines

Pointers

Tape

## USING VISUALS

“A picture is worth a thousand words”

20% of what one hears

30% of what one sees

50% of what one hears and sees

## THE ADVANTAGES OF VISUAL AIDS

### Flipchart

- flexible
- can be prepared ahead of time
- you can write notes
- you can go back to the previous page or hang it on the wall
- it can be used later
- low cost
- easily available

### Blackboard/whiteboard

- flexible
- corrections can be made easily

### Electronic boards

- the same as whiteboards but you can print from them

### Transparencies

- fast and inexpensive
- it can be done in high quality (but higher cost)
- the screen is clear even in a lit room
- the order of the visuals can be quickly changed
- the equipment is easily available

### 35mm slides

- you can use photography to add interest
- high quality available
- high originality available
- durable
- easily portable
- the slide projectors are smaller than those for transparencies

### Video

- available in vast theme categories
- portable
- the audience likes to see "films"

## **Improving Your Facilitation Skills** **(No Matter How Good They Are)**

-  Pay close attention to written evaluations
-  Invite a peer to critique you
-  Develop alternative examples and anecdotes
-  Watch yourself for signs of boredom
-  Use an audiotape for an hour
-  Make it your goal to reach every single participant
-  Watch a videotape of yourself
-  Redo your visual aids
-  Interview participants who may be honest with you
-  Set your own criteria and evaluate yourself

# **MAKING THE COURSE RELEVANT AND INTERESTING**

## **Before**

**Survey participants**  
**Plan for student needs**  
**Consider what they already know**  
**Assess their work situations**

## **After**

**Ask for feedback**  
**Find ways to work-in other's ideas**  
**Incorporate ideas from group**

## **KEEPING THE CLASS ON TRACK**

**Agenda On Flipchart Or Transparency**

**Regular Summary And Forecast**

**Frequent Reference To Agenda**

**Relate Comments To Overall Points**

**Know In Your Mind What's Next**

# **TRAINING TECHNIQUES FOR DELIVERING AN EFFECTIVE COURSE**

**Setting the tone**

**Facilitating participation**

**Varying approaches**

**Solving potential problems**

## The Art of Asking Questions

### The Five Great Powers of Questions

- 1 Questions demand answers
- 2 Questions put you in control
- 3 Questions provide information
- 4 Questions get people to take on and solve their own problems
- 5 Questions allow you to find out how people think

## The Art of Asking Questions

### Keys to Improving Questions Asked

- Realizing power of questions
  - motivation
  - optimizes learning process
- Learning how questions can get you past the barriers that block information
  - Are you really getting the information you need to meet others' needs?
  - Do you get the best information?
  - Are you really being understood?

## The Art of Asking Questions

### Getting Past the Information Barrier

- People don't volunteer information
- People talk in generalities
- People make wrong questions
- People perceive things differently

## The Art of Asking Questions

### Plan Your Questions

- Ask yourself - What do you want to accomplish with your question?
- Know the purpose behind every question you ask
- Listen to responses just as carefully

## The Art of Asking Questions

### A Question of Style

- Open ended/general questions
  - gets participants to open up
  - gets participants to divulge information
  - gets participant to reveal hidden resistance
- Closed ended/specific questions
  - gets agreement
  - gets commitment
  - gets short, factual answers

## The Art of Asking Questions

### A Question of Verbs

Different verbs stimulate different thinking process

#### Question

What can you do?

What will you do?

What should you do?

#### Answer

(imagined, current condition)

(plans, commitment)

(anticipatory, ideal situation)

# The Art of Asking Questions

## Putting Your Questions into Practice

- Needs analysis/Assessments
  - Probe and clarify
  - What is the real cause of a problem

## The Art of Asking Questions

Objective To find somebody's profession

Question #1      Where do you work?

Question #2      In a private company?

Question #3      What field are you in?

## The Art of Asking Questions

Objective To obtain report from subordinate

Question #1 Is the report ready?

Question #2 Where is the report?

Question #3a Why haven't you submitted it to me?

Question #3b Is it ready to be submitted?

## The Art of Asking Questions

Objective To get helpful information during P2 assessment

Question #1 Why are there chemical spills everywhere?

Question #2 Where is the chemical storage area?

Question #3 How are chemicals transferred to the mixing unit?

## The Art of Asking Questions

Objective Getting management commitment for P2

Question #1 Why aren't you more concerned about the environmental impact of your company?

Question #2 Do you know how not doing \_\_\_\_\_ will effect your bottom line?

Question #3 Do you know how \_\_\_\_\_ will effect your company's bottom line?

## The Art of Asking Questions

### Training - Course Development

- ▶ Survey participants
  - Knowledge of the subject?
  - Educational and professional background?
  - Expectations?
  - Needs?
  
- ▶ Ask Yourself
  - Will materials tie into overall training goals
  - Does material enhance behavioral objectives
  - Is it interesting? Is it boring?
  - Does material provide new or supporting information?
  - How can I get participants to participate and share information?
  - How can I get participants to integrate this information?

## The Art of Asking Questions

**Objective** To ensure that participants understand course material

**Question #1** Do you understand?

**Question #2** What was the most important points of the last presentation?

**Question #3** How can you apply this information in your job?

# The Art of Asking Questions

## Putting Your Questions into Practice

### Training

- Course Development
- Conducting Course
- Evaluation

## The Art of Asking Questions

### Training - Conducting the Course

- ▶ Use Questions To
  - Incorporate ideas from others
  - Get instant feedback
  - Gain consensus
  - Perform on-going needs analysis
  
- ▶ How
  - Scheduled group debriefings
  - Exercises
  - One-on-one conversations
  - Establishing norms

## The Art of Asking Questions

Evaluate! -- Did the training work?

- Short term results - feedback for trainer
  - Was the trainer effective?
  - Was the material useful?
  - What methods were most interesting/informative?
  
- Long term results
  - How has the training benefited the participants or organization(s)?
  - What specific changes did people make as a result of the training?
  - Did you accomplish your objectives and those of the participants and managers?

## **The Art of Asking Questions**

**“Your ability to ask the right questions in the right way can mean the difference between a mediocre training program and a truly exciting effective learning experience**

**It’s one of the best tools you’ll ever use as a trainer**

**The art of asking smart questions takes concentration and practice but reaps big rewards!”**

**(Dorothy Leads, author of ‘The Art of Asking Questions’ Training & Development, January 1993, and founder and president of Organizational Technologies, New York, NY)**

## Preventing Audience Boredom

- ☛ Tailor information that you know is relevant
- ☛ Establish a reason to listen
- ☛ Provide examples and anecdotes
- ☛ Use participatory exercises
- ☛ Vary activities through the training period
- ☛ Note physical movement: yours and theirs
- ☛ Use and encourage diverse voices and opinions
- ☛ Use humor
- ☛ Allow for breaks
- ☛ Plan physical arrangement of the room
- ☛ Maintain your own interest

## Preventing Audience Boredom, cont...

### **☞ Establish a reason to listen**

- If you've done your homework, your audience will see immediately why they should listen to you
- They will know how the course is going to solve problems they face
- You need to win them over as early as possible

## Preventing Audience Boredom, cont..

### **☞ Provide examples and anecdotes**

- ❑ Nothing engages people as much as a good story
- ❑ It must be to the point and say exactly what you want it to
- ❑ Polish your examples and anecdotes so that your timing is as good as a comedian's
- ❑ Don't be afraid to talk about times when things went wrong
- ❑ People often remember anecdotes and tell them to others long after they have forgotten whatever was on the overhead
- ❑ Beware of confidential information

## Preventing Audience Boredom, cont...

### **☞ Use participatory exercises**

- ☐ Most people cannot lecture well enough to prevent boring an audience at times
- ☐ Adults don't respond well to being talked at
- ☐ Participatory exercises will perk things up
- ☐ Be flexible to the audience's reaction, whether its positive or negative
- ☐ Controversy always picks things up

## Preventing Audience Boredom, cont...

### ☞ **Vary activities through the training period**

- ☐ Look at your training design from the standpoint of varied activities
- ☐ Do not repeat activities
- ☐ Try to introduce different methods or different angles on the same questions

## Preventing Audience Boredom, cont...

### **☞ Tailor information that you know is relevant**

- Be sure that the material you are presenting is relevant to the audience's situation
- Use examples which are drawn on their experiences
- Throw out any material which would be off track before you start

## Preventing Audience Boredom. cont...

### **☞ Note physical movement: yours and theirs**

- Watch out if people's eyes begin wandering away
- Move closer to them
- Use more vigorous gestures
- Try moving around the room

## Preventing Audience Boredom, cont...

### ☞ Plan physical arrangement of the room

- ☐ Classic classroom arrangement is a killer
- ☐ Many facilitators prefer the open U, which allows you a lot of contact with people
- ☐ Try different arrangements, depending on the exercises

***Maintain your own interest.  
If you are bored, they will be too!***

## Preventing Audience Boredom, cont...

### ☞ **Diverse voices and opinions**

- ☐ Simply hearing different vocal tones prevents boredom
- ☐ Ask for input -- has the benefit of varying what participants are hearing and seeing
- ☐ Different opinions also stimulate people and make them want to listen more closely
- ☐ Make people feel that the field is open and that they will be allowed to contribute

## Preventing Audience Boredom, cont...

### **Use humor**

- Can make an enormous difference in maintaining interest
- Must always be tasteful
- Must always relate in some way to your subject

### **Plan for Breaks**

- Refreshes participants and facilitators
- Divides themes or activities
- Allows for individual questions
- Promotes networking
- Allows facilitator to "check-in" with individual participants

# How to Prevent Participant Hostility

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Participants view trainer as

Negative: Authority to exert control

Positive: Expert to develop their skills

# How to Prevent Participant Hostility

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Trainer needs:

- To be liked
- To be in control
- To be effective

# How to Prevent Participant Hostility

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Hostility expressed as:

- Hostile Withdrawal
- Hostile Diversion
- Hostile Attack

# How to Prevent Participant Hostility

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- 1) Personalize session
  - Give ownership
  - Involve participants
    - Group Leaders
    - Presentation
  - Personalize meeting space

# How to Prevent Participant Hostility

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## 2) Personalize your presence

- Easier to attack “stranger”
- The more they know you, the less likely to attack
- Build allies
  - Reluctant to attack a peer of their peers

# How to Prevent Participant Hostility

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## 3) Purge anger

- Make sympathetic statement
- Make humorous statement
- Make attack statement
  - Having invited protest, commit time to listen, legitimize and accept it

# How to Prevent Participant Hostility

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## 4) Bridge building

- Identify participants leading protest
- Initiate positive social interaction
- Give opportunity for you to know them and them to know you

# How to Prevent Participant Hostility

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## 5) Table complaint

- Use when you do not want to stop to deal with problem at that moment
- Table complaint for later consideration
- Write it down on flip chart
- Be sure to address at “better” time

# Responding to Hostility

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## Option 1 - Avoidance

- Ignore and it will go away
- Solicit peers influence
- Indirect response
  - Interpret concern and address in a general way

# Responding to Hostility

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## Option 2 - Acceptance

- Find purpose of protest
- Accept their resistance
- allow some change in program to increase their sense of ownership (unless only intent is to disrupt)

# Responding to Hostility

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## Option 3 - Adapt

- Manipulative strategy
- Switch sides
  - “That’s a good point” diffuses resistance
- Make an argument on “their side” to take back control
- Turn discussion back to your point -- if needed

# Responding to Hostility

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## Option 4 - Stand fast

- Very simple
  - Takes a lot of energy
- Let resistance express itself but do not change your program

# Responding to Hostility

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## Option 5 - Push Back

- Needs highest energy level
- Hope to overcome resistance by persuading them to back off
- You may create a fight
  - If you lose
    - you may reduce your respect
  - If you win
    - may gain respect
    - may create “equality to loser”
- Big, a gamble – “win or lose”

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# How to Prevent Participant Hostility

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## How to reduce trainers' fears.

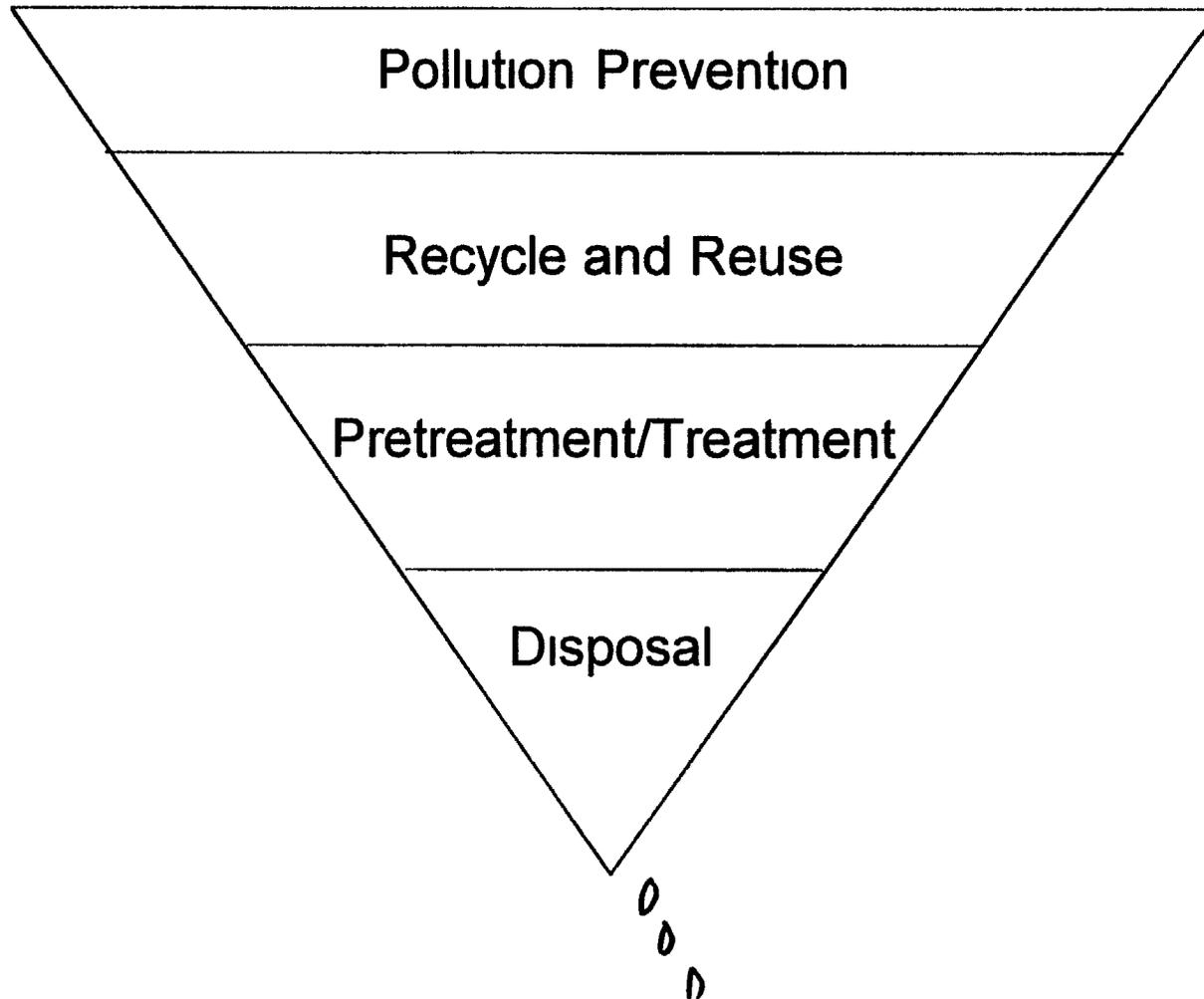
- Physically move closer
- Make direct eye contact
- Solicit information about their protest
- Talk to them in a positive and supportive way about their concerns
- Rewards
  - Time
  - Food
  - Tobacco, alcohol, medicine

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# POLLUTION MANAGEMENT HIERARCHY

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# P2 Hierarchy -- SOURCE REDUCTION

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- Product Change
- Process Change
- Input Materials Change
- Good Housekeeping/Operations Practices

# P2 Hierarchy -- RECYCLE and REUSE

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- Direct Reuse
- Separate and Recycle On-Site
- Reclaim Off-Site
- Resource Recovery

# P2 Hierarchy -- Pre-Treatment/Treatment

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- Hazard/Toxicity Reduction
- Volume/Quantity Reduction



# P2 Hierarchy -- DISPOSAL

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- Air Discharge
- Water Discharge
- Stabilization
- Land Disposal

# INCENTIVES FOR POLLUTION PREVENTION IN THE UNITED STATES

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- Minimize legal risks
- Improve public image
- Reduce energy consumption and waste of raw materials
- Increase the community's confidence toward the industry
- Enhance the industry's credibility
- Improve employee's safety
- Increase employee's efficiency
- Reduce the costs of treatment
- Meet legal and regulatory requirements

# INSTITUTIONAL BARRIERS

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- Inertia/ fear of change
- Belief that current processes have optimal efficiency
- Hierarchical management structure does not encourage individual responsibility for waste reduction
- There is no one responsible for environmental policy
- Only the environmental department is responsible for environmental policy

# Institutional Barriers cont.

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- There is no real knowledge of actual wastes created and waste sources
- There is no system in place to quantify the costs of wastes generated
- There is no incentive or reward for reducing waste at the source

# IMPLEMENTING P2--

## Overcoming Aspects of Organization

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- Its culture
  - » generally train, reward, and punish employees to reinforce organization's beliefs
- Its ability to process information
  - » generally understand details of current production process; rather than look for new technical possibilities
- Its politics
  - » unwilling or unable to offer suggestions outside of management hierarchy

# IMPLEMENTING P2

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A major part of waste minimization methodology is not based on technology, but on an organization and its management

It is necessary to substitute classical management of residuals and emissions with pollution prevention

# REASONS TO PREVENT POLLUTION

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- ENVIRONMENT
- QUALITY
- COSTS

# ENVIRONMENTAL ISSUES

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- Less need for costly pollution prevention control equipment
- “Getting ahead” of environmental regulations
- Reduced reporting and permitting requirements
- Less operation and maintenance of pollution prevention control equipment

# IMPROVING THE BOTTOM LINE -- COST

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- Can save on raw materials
- Can save on labor costs
- Disposal costs can be reduced or eliminated
- Can save on waste handling/treatment costs
- Can reduce future liability costs through decreased amounts of toxic materials used, handled, and transported

# IMPROVING PRODUCT QUALITY - TQM/TQEM

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- P2 assessment requires facility to examine production process in-depth
- TQM/TQEM
  - » Customer Focus
  - » Continuous Improvement
  - » Teamwork
  - » Strong Management commitment

# Customer Focus

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## ● TQM

- » External Customers
  - end-user
  - consumer
- » Internal Customers
  - next person on production line
  - other employees

## ● TQEM

- » External Customers
- » Internal Customers
- » People and environments affected by the production process waste
  - neighbors
  - receiving waters
  - etc

# Continuous Improvement

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## ● TQM

- » Quality can only be built into, not inspected into a product
- » Continuously identify and eliminate root cause
- » Zero defects

## ● TQEM

- » Quality can only be built into, not inspected into a product
- » Continuously identify and eliminate root cause
- » Zero defects
- » Waste generation brought to a minimum  
Zero waste

# Teamwork

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## ● TQM

- » Includes various perspectives - cross disciplinary
- » Empowers employees

## ● TQEM

- » Includes various perspectives - cross disciplinary
- » Empowers employees
- » Identifies ways to reduce and prevent pollution throughout process not after it is generated

# Strong Management Commitment

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## ● TQM

» Will not succeed  
without strong  
management  
commitment

## ● TQEM

» Will not succeed  
without strong  
management  
commitment

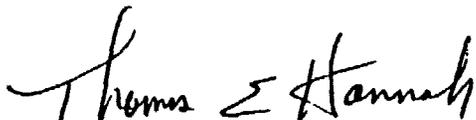
# OPTIONS TO PROMOTE SOURCE REDUCTION

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- Adopt, as an explicit policy, the pollution prevention hierarchy
- Have the plant manager, not only the manager of environmental issues, responsible for adapting P2
- Create employee training and programs for their participation
- Establish accounting systems for materials
- Establish accounting systems to determine the cost of wastes
- Reward good P2 ideas and results

## Environmental Creed

- We will operate our facilities in compliance with all applicable laws and regulations
- We will instruct our employees about their environmental responsibilities and our commitment to sound environmental practices
- We will minimize the volume of waste through source reduction and recycling
- We will address community concerns which might arise in the course of our operations and actively participate in the development of responsible environmental laws and regulations
- We will ensure that environmental impact is an important consideration in all research and development activities, purchasing and marketing evaluations and shipping and warehousing decisions



Thomas E Hannah

President and Chief Executive Officer

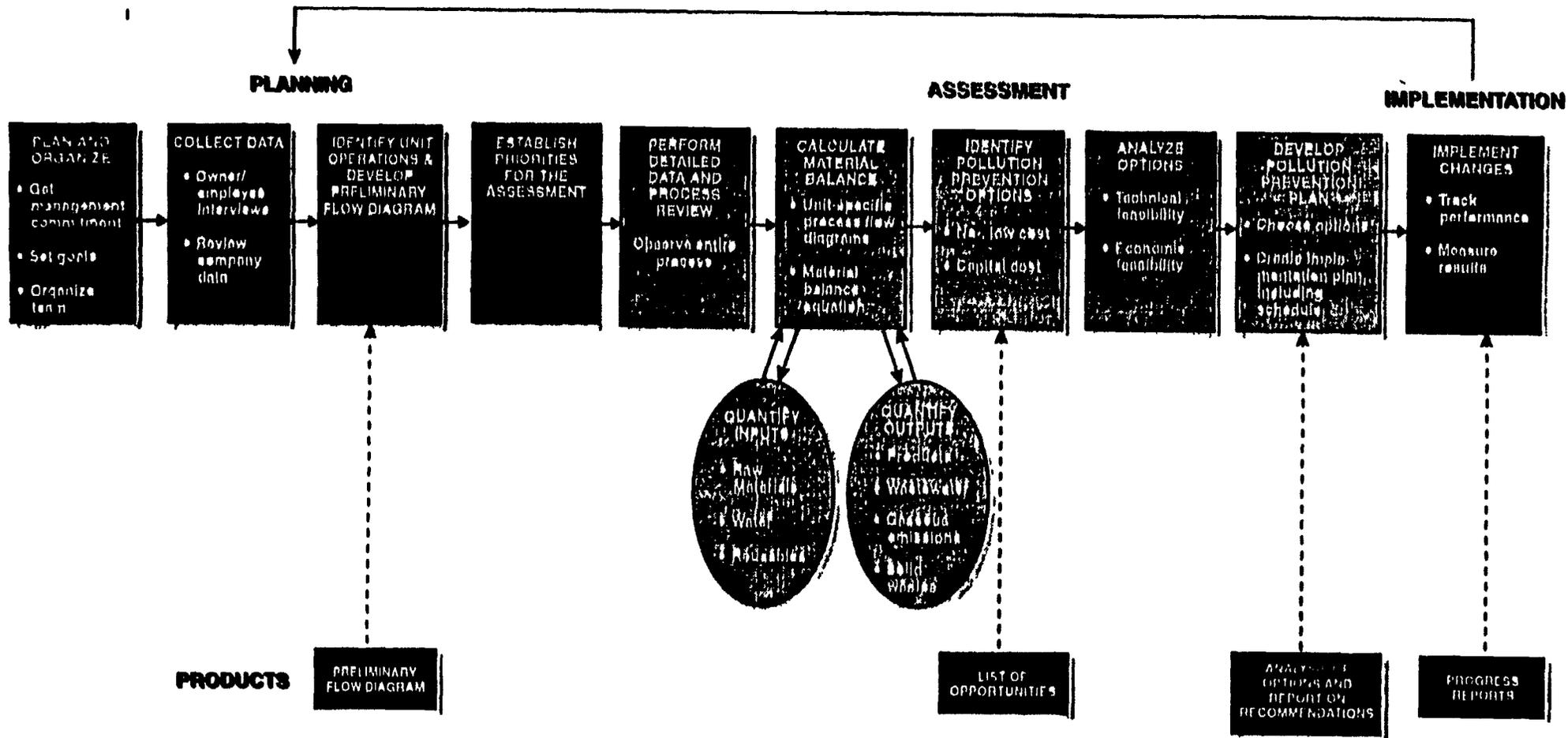
**POLLUTION PREVENTION POLICY**  
for  
**Capsule Equipment Company**

Capsule Equipment Company is committed to excellence and leadership in protecting the environment. In keeping with this policy, our objective is to work towards the elimination of hazardous wastes and emissions by modifying our products and processes. We strive to set a standard for excellence in pollution prevention. By successfully preventing pollution at its source, we can achieve cost savings, increase operational efficiencies, improve the quality of our products and services, and maintain a safe and healthy work place for our employees.

Capsule Equipment Company's environmental guidelines include the following:

- Environmental protection is everyone's responsibility. Capsule is committed to being a good neighbor and to operate in complete compliance with federal, state, and local environmental laws. Meeting this commitment requires the continued efforts of all employees.
- Preventing pollution by reducing and eliminating the generation of waste and emissions at the source is a prime consideration in plant operations. Capsule is committed to identifying and implementing pollution prevention opportunities through encouragement and involvement of all employees.
- Technologies and methods which substitute nonhazardous materials and utilize other source reduction approaches will be given top priority in addressing all environmental issues.

# POLLUTION PREVENTION PROGRAM DEVELOPMENT

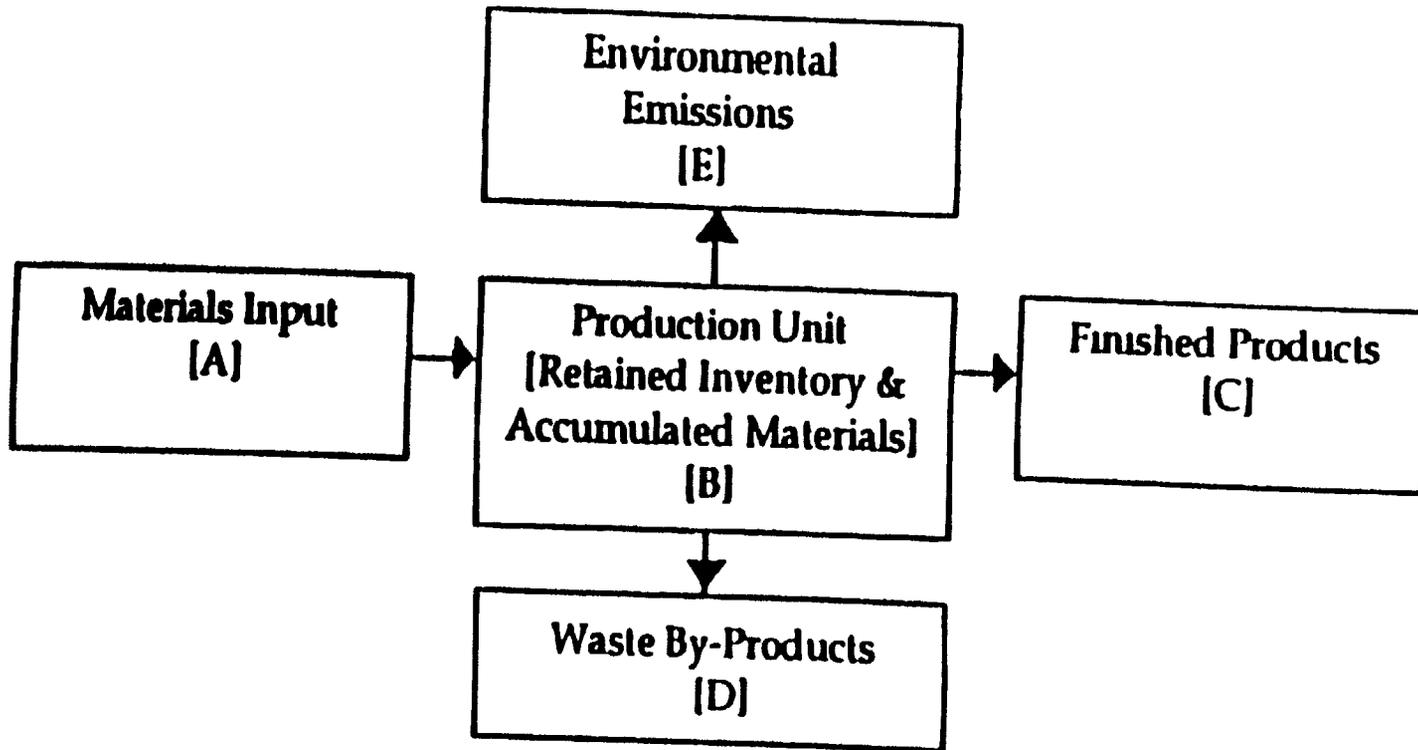


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## **Tools for Pre-Assessment**

- Policy statement
- Flow diagram
- Materials balance

**Materials In = Materials Out + Materials Accumulated**



$$A = B + C + D + E$$

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## Hint

Another way to think about this is where would you find information about:

- ☞ Materials purchased
- ☞ Materials in inventory or storage
- ☞ Materials used in the manufacturing process
- ☞ Materials used in the maintenance of equipment
- ☞ Materials as products
- ☞ Materials as by-products
- ☞ Materials reused
- ☞ Materials wasted, spilled, contaminated, rejected
- ☞ Materials disposed
- ☞ Materials lost through fugitive emissions
- ☞ Energy consumed
- ☞ Water used
- ☞ Water wasted

## **Possible Resources for Materials Accounting**

### **Materials Procurement**

- raw material purchase records
- transfer records
- vendor invoices
- receiving dock records

### **Materials as Inventory**

- end-of-year inventory records
- storage records

### **Materials Use**

- operations log
- samples, analysis, and flow measurements
- batch make-up records
- product specifications
- production line job sheets

### **Materials as Product**

- product shipment records
- loading dock records
- product specifications
- invoices to customers

### **Materials as By-products**

- waste transport manifests
- waste transport invoices
- invoices to scrap buyers and recyclers
- sewer (POTW) discharge records
- Toxics Release Inventory Form R
- DEP air source registration records

### **Materials Reuse**

- recycling records
- reclaim records

**ASK EMPLOYEES, AT ALL LEVELS, FOR THEIR INPUT!**

# **OPTION ASSESSMENT PHASE**

- **Screening: Narrow down set of options**
- **Check feasibility based on social, technical and economic impacts**
- **Reevaluate effectiveness of each option**
- **Compare and prioritize options**

# SCREENING

- Use common sense for the obvious
- Construct facility specific criteria:
  - Main benefits
  - TUR potential
  - Condition of existing equipment
  - Fit with company goals
  - Chance of success

## **TECHNICAL FEASIBILITY**

- **Availability**
- **Applicability**
- **Effect on product quality**
- **Sustainability**

## **ECONOMIC ASSESSMENT**

- **Direct costs or savings**
- **Hidden costs or savings**
- **Liability**
- **Intangibles**
- **New revenue sources**

# **SOCIAL IMPACT ASSESSMENT**

- **Environmental effects**
- **Public health**
- **Worker health and safety**
- **Management acceptance**
- **Employee acceptance**
- **Public image**
- **Community good will**

- **Identify Options**
- **Assess Effectiveness and Impact of Options**
- **Compare Options to Each Other and Existing Conditions**

# DECISION-MAKING METHODS

- ▶ Ranking
- ▶ Rating
- ▶ Prioritizing

# RANKING

- ▶ Best
- ▶ Most Workable
- ▶ Reliability
- ▶ Most Tested and Proven
- ▶ Least Risky
- ▶ Staff Ability to Make It Work
- ▶ Chance for Success

# **RATING**

**Individuals on Team Rate Each  
Item and Tabulate Ratings**

- 5. Top Preference**
- 4. High Preference**
- 3. OK**
- 2. Maybe**
- 1. Slim Chance**
- 0. No Way**

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# **PRIORTIZING WITH BUBBLE-UP/ BUBBLE-DOWN**

- ▶ **Designed to Select an Alternative For Implementation**
- ▶ **Forced-Pair Comparison**
- ▶ **Allows Extensive Team Interaction**
- ▶ **Additional Information May Be Required**

# BEGINNING

Take First Two Alternatives on the List  
From the Brainwriting Exercises

Decide Which is Better Taking Into Account  
Effectiveness, Implementability and Cost

If the Second Wins, It Moves to the Top of  
the List, Otherwise Leave Them As Is

Move to the Next Distinct Pair

Alternatives May be Combined  
During the Ranking

**END**

**Forced-Pair Prioritizing  
Comparison is Finished When  
There is Agreement on the  
Relative Position of  
Every Alternative on the List  
in Relation to Every Other  
Alternative on the List**

# CRITERIA MATRIX

- ▶ Use For Top Rated Alternatives
- ▶ Forces Examination Of Issues To Be Addressed During Implementation
- ▶ Much Less Interaction Between Team Members
- ▶ Not Enough Differentiation In Scores for Initial Prioritizing

# **EFFECTIVENESS**

- ▶ **Potential For Minimization/Elimination**
- ▶ **Potential Recovery Of Valuable By-Products**
- ▶ **Compliance With Current And Future Regulations**
- ▶ **Reduction In Hazardous Properties**
- ▶ **Benefiting Safety Of Employees**
- ▶ **Diminish Materials Use**

# IMPLEMENTABILITY

- ▶ Well-Documented Cases Available
- ▶ Variety Of Vendors Already Available
- ▶ Risk Of Media Transfer Is Low
- ▶ Quality Of References Provided
- ▶ Management/Employee Support
- ▶ Engineering Sophistication Of Project

# **COSTS**

- ▶ **Cost Savings  
(Direct and Indirect)**
- ▶ **Potential Environmental  
And Safety Liability**
- ▶ **Availability Of Internal  
Funding Or Outside Assistance**
- ▶ **Expedient Payback Potential**

**Table 4**  
**CRITERIA MATRIX**

Alternative Solution Chosen	Effective- ness	Cost	Imple- menta- bility	Total Rating
Use displacers to reduce bath ratios	4	4	3	11
Reuse of dyebath, final rinsewater from dyeing for dye bath makeup, mercerizing or bleach wastewater for scouring or desizing, and scouring rinses for desizing	4	4	3	11
Apply countercurrent washing	5	4	5	14
Use appropriate holding tanks to implement beach bath reuse	3	4	5	12
Implement chemical handling procedures to employees for dispensing systems, weighing systems, and handling systems	3	3	5	12
Use flow control valves and flow restrictors on washers and cooling water	3	4	4	11
Use horizontal or inclined washers	5	5	4	14
Use low volume, high velocity nozzles for machine and facility cleaning	3	4	4	11
Install moveable water meters to document water use and evaluate improvement	3	3	4	10
Install computerized preventive maintenance package and integrated dyehouse control system	5	3	3	11
Renovate water for reuse by implementing ultrafiltration technology	5	5	5	15
Use automatic shutoff valves and hoses	5	4	4	13
Implement pad batch dyeing	5	4	5	14
Select dyes which exhaust with minimum salt	4	4	2	10
Optimize salt use individually for each dyeing	5	3	3	11

# Preliminary Organization

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- ▶ **Obtain Management Comittment**
- ▶ **Gather General Company Information**
  - > **Identify key personnel**
  - > **Obtain general production / waste data**
- ▶ **Establish general goals / objectives**
- ▶ **Identify /organize team**

# Gather General Company Information

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- ▶ **Identify Key Personnel**
  - > **Management**
  - > **Production Supervisors**
  - > **Accounting personnel**
- ▶ **Obtain Production / Waste Data**
  - > **Raw Materials Used**
  - > **Products Produced**
  - > **Air**
  - > **Water**
  - > **Solids**
  - > **Energy**

# Establish Goals / Objectives

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- ▶ **Specific Processes**
- ▶ **Specific Media (Air, Water, Solids)**
- ▶ **Specific Pollutants**

# Identify and Organize Team

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- ▶ **Team Leader**
- ▶ **Industry Specialist**
- ▶ **Define Time Requirements**
- ▶ **Schedule Assessment**

# IMPLEMENTING P2 -- Decision Making Stages

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- Identifying pollution prevention opportunities
- Finding solutions appropriate to opportunities
  - » substitution of one or two production steps
  - » changes in relationships between production steps
- Implementing solutions

# IMPLEMENTATION

- ▶ Action Plan
- ▶ Standard Operating Procedure
- ▶ Contingency Planning
- ▶ Measurement / Monitoring
- ▶ Overcoming Resistance to Change

# ACTION PLAN FORM

Date

Overall Target

Action	Responsible Person	Performance Standard	Monitoring Technique	Completion Deadline	Resources Needed
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					