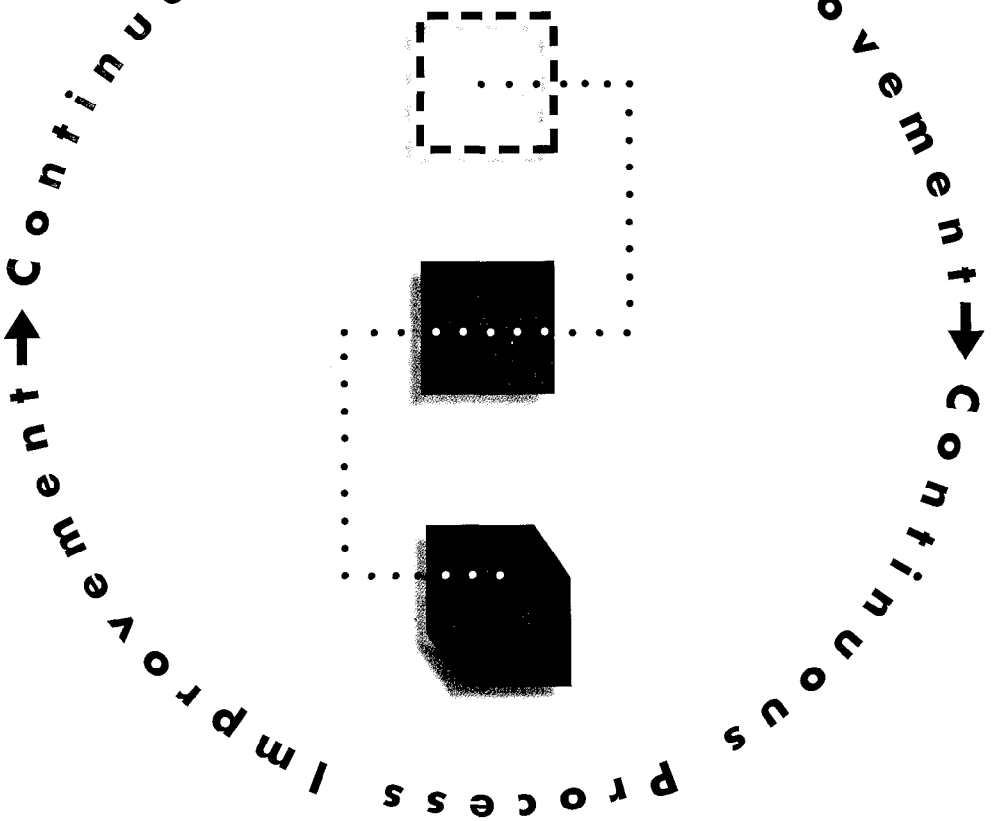
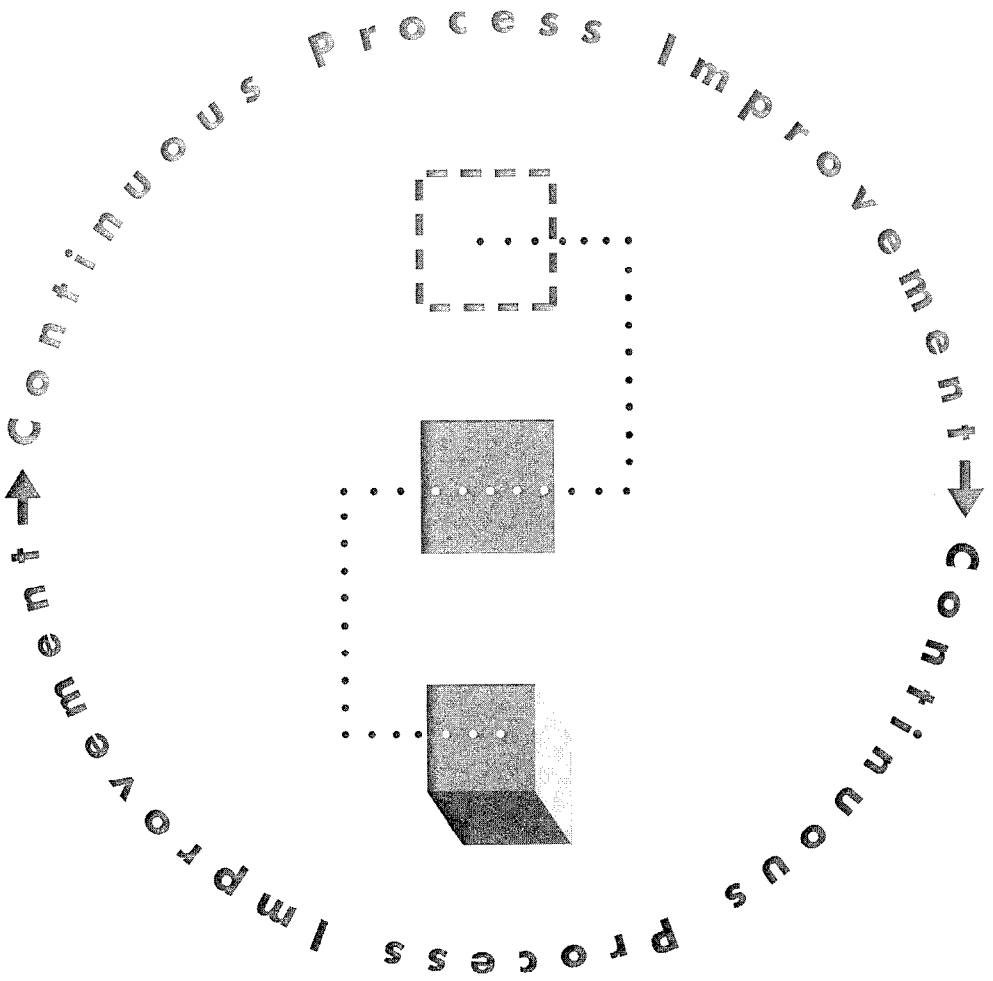
TOOLS AND TECHNIQUES FOR PRACTITIONERS

Continuous Process Improvement



JULY 2001

U.S. Department of Transportation
Federal Highway Administration



TOOLS AND TECHNIQUES
FOR PRACTITIONERS

Preceding Page Blank

Contents

Preface to the Second Edition

In 1997, when the material that eventually became the Continuous Process Improvement course and this accompanying handbook was pulled together, a Second Edition was never envisioned. However, it was never envisioned that a group of trainers who would take the material, make it their own, and teach it in all parts of the country. They became zealots, deeply believing in the philosophy and practice of continuous process improvement. Without their commitment and drive, this Second Edition would not have materialized. The Introduction to the First Edition ended with the statement that "this handbook is a work in progress" and indeed it has turned out to be just that. Over the course of a year and a half of well over 50 sessions we have all learned a lot about the material—what works and what doesn't work. Fortunately, most of it works.

What this Second Edition tries to do is to retain what works, clarify and simplify misleading terminology, and add what now appears useful in the light of all of our experience. The following are the major changes:

Chapter 1: Now includes three categories of an organization's processes, key business processes, key support processes, and supplier and partnering processes.

Chapter 2: Now includes the attributes of a key business process and a worksheet for defining the process.

Chapter 5: Now clarifies that the biggest difference between a Team Charter and a Work Plan is the planned approach and includes a comparison of the two documents.

Chapter 6: Now adds some steps that the CPI Team should take to produce an As-Is Process Map.

Chapter 7: Now includes most of what was in Chapters 7 and 8. The three steps when using trained observers has been added to that section and sampling is now included.

Chapter 8: Now is all about interviewing, including guidelines for developing questions.

Chapter 9: Now is about improving the process and includes which chapters of this handbook are related to the *FADE Problem Solving Model and a section on the Pareto Diagram.

Chapter 10: Now is about idea generation with a clarification of when and how to use an Ideal Process Map.

Chapters 11, 12, 13, and 14 have been renumbered and some redundancies have been removed. Chapter 12 now includes a worksheet for selling your ideas.

Chapter 15: Now is all about follow-up and measurement of process outputs. Added to this chapter is material on Quantitative Thinking and the four general levels of measurement.

Baltimore, July 2001

* Focus, Analyze, Develop, Execute (FADE)

Introduction

Meet someone for the first time and they will invariably ask a variation of the question: "What do you do?" We answer that we are engineers, accountants, secretaries, computer specialists, planners, environmentalists, or any other myriad professions and specializations. Among other things, Americans identify themselves by what they do. Implicit in our answer is that we are "successful" engineers, accountants, et cetera. Success may be defined in many ways but one universal component of the definition is continuous improvement. Whatever we do, we want to get better doing it. That is the fundamental quality in human nature that **Continuous Process Improvement** addresses.

For many years, the Federal Highway Administration (FHWA) has had a program called *Process Review and Product Evaluation* (PR/PE) (the concomitant training course was called *The Role and Use of Process Review Techniques in Program Monitoring*). The PR/PE Program had two primary purposes: 1) validating processes and procedures; and 2) analyzing and solving problem areas, if identified through product examination. It is a program that has been characterized as "compliance based," and has served the needs of the Agency at the time. As the role of FHWA changed because of legislation, the leadership of the organization sought ways to make PR/PE more relevant to daily operations. While Agency personnel have not been relieved of their "program oversight responsibilities," they take on that task with a new emphasis that includes the "level of federal interest, technical complexity, local circumstances, risk management, and statutory requirements." Federal employees are more than regulatory "police"; they must add value to the process. To do this, employees would need tools and techniques that help them and the Agency's partners improve what they do.

While this fundamental change in emphasis was occurring, the organization embarked on a "Quality Journey." The guiding principles for

this journey are the seven *Presidential Quality Award Criteria,* which have been called the "Quality Cornerstones." One of these criteria/cornerstones is Process Management, which examines how "key processes are designed, effectively managed, and *improved to achieve better performance* (emphasis added)." To do this, employees would need tools and techniques to continually improve what and how they do what they do.

The operational goals of "Stewardship Oversight" and the "Quality Journey" seemed to meet on a need for tools and techniques to help practitioners achieve **continuous process improvement.** This handbook (and its accompanying course) is intended to meet that need.

The handbook has 15 chapters covering a variety of tools and techniques that practitioners of **continuous process improvement,** whether individuals or teams, may find useful. There is no one way to do a continuous process improvement study, so individuals or teams will have to devise the best way to use these tools and techniques to meet their needs. Unlike Process Reviews, **continuous process improvement** should not be considered an "event." Rather, practitioners should consider it an integral part of their work.

The 15 chapters of this notebook are organized along several themes. Chapters 1 and 2 gives the basic concepts around which **continuous process improvement** is built. The two chapters consider what is basic to a process, the criteria used to define a process, the minimum criteria one should use to determine whether the process is of high priority, and the premise for **continuous process improvement.**

Chapters 3 and 4 deal with teams. Every employee should use the tools and techniques of **continuous process improvement** every day to get better at what he or she does. However, the reality is that, at least initially, we will continue to make **continuous process improvement** an "event" and we will continue to appoint teams to do a study of a process. The dynamics of a team are complex. Chapter 3 looks at the organization of a team in terms of the roles individuals may be

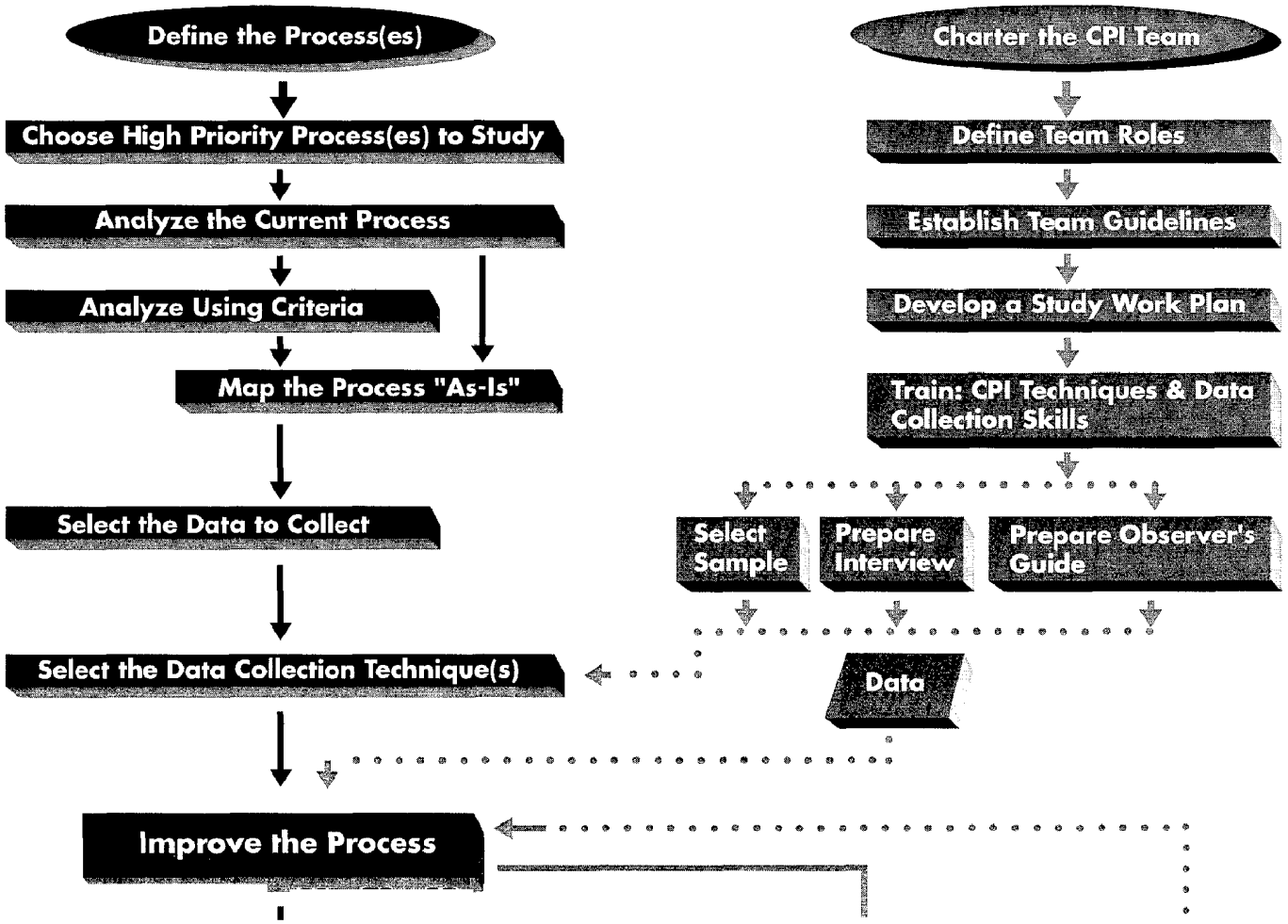
asked to play on the team, and the guidance given to the team by the sponsor in the form of a team charter. Chapter 4 considers the internal people behaviors that help or hinder the team from being a high performing team and suggest ways to handle interpersonal issues. Chapter 5 gives a suggested outline for a Work Plan for the team to carry-out the continuous process improvement study.

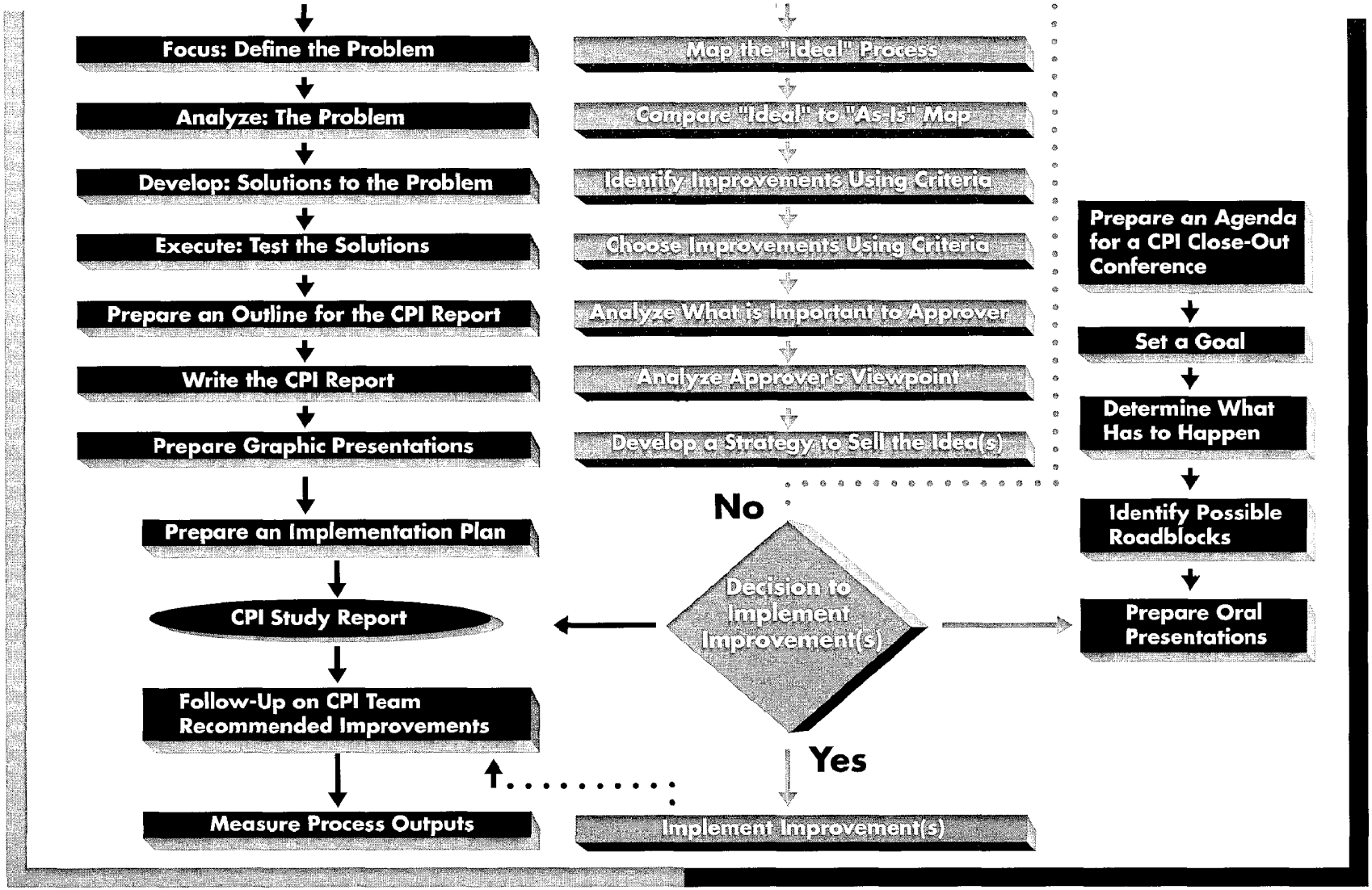
Chapter 6 provides techniques for analyzing the current process using verbal cues and picture cues in the form of a process map. An illustration of a process map, also called a flowchart, is provided after this introduction, and shows the process of **continuous process improvement**. Chapter 7 provides guidance on selecting the kinds of data to collect, the seven commonly accepted data collection techniques and their protocols, and gives guidance on sampling and provides statistical tables to develop a scientific sample. All of Chapter 8 is given over to the art of interviewing, with guidance on how to prepare for an information gathering interview, and how to prepare the questions to be asked.

Chapters 9 and 10 deal with improving the process. Chapter 9 offers the FADE problem solving model as one possible and useful method for focusing the team's attention on solving root causes of any problems discovered. Directions for using the Cause and Effect Diagram are also provided. Chapter 10 offers the nine rules of Brainstorming and ways to reach consensus, including the Nominal Group Technique and the Affinity Diagram.

Chapters 11, 12, 13, and 14 are concerned primarily with presenting the team's findings and recommendations. Chapter 11 provides things to consider when writing the team report and offers a suggested format. Chapter 12 offers ideas on how to market the team's recommendations. Chapter 13 gives guidance on planning a close-out conference. Chapter 14 gives some guidance for making engaging, successful oral presentations. Chapter 15 provides ideas to use in following up on the team's recommendations for improvements, and how to measure the outputs of the process.

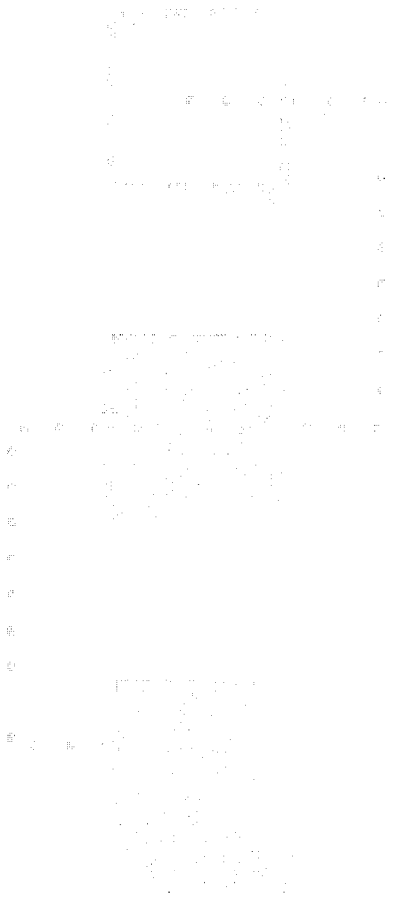
Continuous Process Improvement Flowchart




Focus: Define the Problem
Analyze: The Problem
Develop: Solutions to the Problem
Execute: Test the Solutions
Prepare an Outline for the CPI Report
Write the CPI Report
Prepare Graphic Presentations
Prepare an Implementation Plan
CPI Study Report
Follow-Up on CPI Team Recommended Improvements
Measure Process Outputs
Map the "Ideal" Process
Compare "Ideal" to "As-Is" Map
Identify Improvements Using Criteria
Choose Improvements Using Criteria
Analyze What is Important to Approver
Analyze Approver's Viewpoint
Develop a Strategy to Sell the Idea(s)
No
Decision to Implement Improvement(s)
Yes
Implement Improvement(s)
Prepare an Agenda for a CPI Close-Out Conference
Set a Goal
Determine What Has to Happen
Identify Possible Roadblocks
Prepare Oral Presentations

Owing to the number of subjects covered and the natural brevity of the handbook format, most of the topics are covered only superficially. All of the topics could be subjects for complete courses of their own, and some, like report writing, are the subject of semester long courses in colleges and universities. We hope that the information provided here will lead practitioners to further study and reflection. To that end, some reference material is contained at the end of each chapter.

This handbook is a work in progress, as everything we do is a subject for **continuous process improvement**. The handbook is not the last word on the subject, but is rather the first word of a story to which all practitioners will contribute.



CHAPTER 1

THE DEFINITION OF A PROCESS AND THE CONCEPT OF CONTINUOUS PROCESS IMPROVEMENT

WHAT IS A PROCESS?

For the purposes of Continuous Process Improvement we will define a process as: a sequence of steps, tasks, or activities that converts inputs to outputs. A process adds value to the inputs by changing them or using them to produce something new.

A process may be defined more simply as a continuing series of activities dedicated to some end.

Generally, every organization has at least three categories of process:

1. **Key Business Processes:** Those critical processes within an organization that permit it to accomplish its mission. Key Business Processes produce the business results that the organization intended by its strategic plan.

2. **Key Support Processes:** Those ancillary processes upon which the organization depends. A failure of key support processes may be initially evident only to those inside the organization and not by external customers.

3. **Supplier and Partnering Processes:** Those supplier and partner processes that provide products and services to individual units of the parent organization. The use of these products and services may occur at any stage in the production, design, delivery, and use of the parent organization's primary products and services.

What is Continuous Process Improvement?

Continuous Process Improvement (CPI) is as much philosophy as it is practice. It is driven by the desire of every employee to improve products or services to the customer. It requires a vigilant focus on the customer and a constant examination of the value that customers receive from every step in a process.

A CPI philosophy looks at the process rather than the people as a starting point for improvement. It comes from a belief that people are driven to improve and that improvement itself lends meaning to work.

Continuous Process Improvement in practice is dedicated to advance the effectiveness and capability of work processes. The effectiveness of the process refers to how well it transfers inputs into outputs by eliminating waste, non-value adding steps, and by doing work right the first time. Advancing the capability of the process refers to producing outputs that have greater value to the customer.

As we improve processes, we work toward providing flawless products and services to our customers so that better and better performance promises can be made. Continuous Process Improvement is not an "event:" it ought to be thought of as a integral part of work by everyone.

Chapter 2

How to Define a Process and Choosing Key and High Priority Processes

The six elements of a process definition are: **boundaries; customers; suppliers; inputs; outputs; owners.** A Worksheet to do this is reproduced at the end of this chapter.

1. A **boundary** is "something that indicates or fixes a limit or extent." For our purposes, we want to know where the process begins and ends.

   a. **What typically starts a process in our organizations?**

   - Someone (e.g. customer, partner, etc.) asks for, demands, requires, or needs something from us;
   - Something bureaucratic (e.g. federal or state law, rule, regulation, policy, procedure, or past practice) requires that under certain circumstances certain things will be done;
   - Professional standards, ethics, or practices require us to do something in a particular way.

   b. **What typically ends a process in our organizations?**

   - It may be very specific, e.g. a new highway, bridge, approved EIS, etc.; or very general, e.g. results, customer satisfaction, etc. It is enough that you understand that the end of a process is a **product** or **service.**

2. All **customers**, for the purposes of defining a process, will be defined using the following definitions of the terms:

   a. **External Customers**—the people who distribute or use our product or service. They are the reason the organization exists.

b. **Internal Customers**—the people who are involved in accepting items and/or information, adding value to it, and passing it on as suppliers to another internal customer or an external customer.

3. **Suppliers** are the people who provide items, information, and/or services for use in a process.

4. **Inputs** are the items and information that are required to perform the tasks of a process.

5. **Outputs** are the products, services, or information that are the end result of a process.

6. The **owners** of the process are those individuals, "from the supplier to the individual adding-value who (are) charged with providing the best possible product or service to (the) customers." Owners contribute to the process, add value, and accept responsibility for the process and its output.

How do we identify our Key Business Processes?

The organization we work for has many processes, but only a vital few are essential to the organization accomplishing its mission. Some experts advise that the vital few Key Business Processes of an organization constitute no more that five to eight of all of the processes in which we are engaged. A process that is essential to our accomplishing the organization's mission would have the following attributes:

1. It would be driven by customer and/or partner needs.

2. It would provide the vital products and services of the organization to meet the customer/partner needs.

3. It would satisfy any federal legal requirement.

4. It would lead to the accomplishment of the organization's goals.

How do we choose the high-priority processes?

Continuous Process Improvement advances the effectiveness of what we do by helping us produce products and services that have a greater value to the customer, so every process is susceptible to continuous improvement. In an environment where resources in terms of time, money, and people are becoming less and less, we need to maximize the impact of CPI by concentrating on those high-priority processes where we can get the "most bang for the buck." These criteria, as a minimum, should be used to identify the high-priority processes:

1. What are the customer's needs and expectations?

2. What is significant about the output of the process to customers?

3. Are there legal requirements for the process? If so, do they impede CPI?

4. Are there any other "driving forces" for the output of the process?

5. Are there any perceived problems in the process?

WORKSHEET: DEFINING THE PROCESS

A process is a sequence of steps, tasks, or activities that converts inputs to outputs. A process adds value to the inputs by changing them or using them to produce something new. To help you define a process, answer the following questions:

1. What typically starts the process?

2. What typically ends the process?

3. Who are the external and internal customers?

4. Who are the suppliers?

5. What are the inputs to the process?

6. What are the outputs, the products and services, of the process?

7. Who are the owners of the process?

Chapter 3

TEAM ROLES AND TEAM CHARTER

WHAT ARE THE ROLES PEOPLE PLAY ON TEAMS?

During our lives, whether we are aware of it or not, we play many roles. The parts we play are varied: wife, mother, husband, father, supervisor, leader, and professional, e.g. engineer, doctor, lawyer, clergy, etc. We all have roles that we like to play and roles we do not like to play. On every sports team there are role players and our CPI Teams are no exception. The description of some of these roles follows.

TEAM SPONSOR: The **Team Sponsor** is the individual who forms the team. The team sponsor:

1. Chooses a team leader.
2. Helps the team leader choose a facilitator.
3. Helps the team leader choose team members.
4. Clearly defines the problem, issue, or opportunity for the team.
5. Meets, as needed, with the team leader to discuss progress and problems of the team.
6. Provides timely and accurate guidance to the team and team leader concerning the definition of the problem, issue, or opportunity.
7. Ensures that the team is rewarded and recognized.
8. Serves as team enabler, removing barriers which keep the team from succeeding.

TEAM LEADER: The **Team Leader** is, typically, someone who works directly for the team sponsor. The leader should have good communication and leadership skills. The team leader:

1. Chooses a team facilitator.
2. Chooses team members.
3. Plans and finalizes all pre- and post-meeting agendas with the facilitator.

4. Participates as an active voting member of the team.
5. Works with the team to establish ground rules.
6. Sets an example by following those rules and models appropriate behavior.
7. Keeps the team focused on tasks.

TEAM FACILITATOR: The **Facilitator** may or may not work for the team sponsor. The facilitator should have had training as a facilitator and should be proficient in handling group dynamics, conflict resolution, and various problem solving techniques. The facilitator must have excellent communication skills. The facilitator:

1. Ensures that all team members share all relevant information.
2. Ensures that decisions made by the team are based on free and informed choice.
3. Helps team members to make an internal commitment to the choice.
4. Helps establish a climate of trust, openness, and cooperation.
5. Uses the ground rules to monitor group behavior.
6. Identifies problematic behaviors and intervenes appropriately.
7. Encourages all team members to participate in team activities.
8. Focuses the team on the common task.
9. Raises undiscussable issues.
10. Helps the team identify and solve problems.
11. Instructs the members in team dynamics, and problem solving techniques.
12. Works with the team leader to develop the pre- and post-meeting agenda.
13. Helps the team evaluate itself; conducts team critiques.
14. Provides feedback to the team and team leader to enable team growth.
15. Is not a team member; does not vote or perform team activities.

TEAM MEMBERS: Typically, **Team Members** are chosen or volunteer for membership on the team. Team members bring four important attitudes to team activities: commitment; cooperation; communication; and contribution. Team members:

1. Are COMMITTED to the team mission and goals; they show their commitment through full participation in team activities.
2. Are COOPERATIVE; they share a sense of purpose and performance.
3. Are willing to COMMUNICATE fully with all team members; they are willing to engage honestly, openly, and with respect for opposing views, even those which are controversial or divisive.
4. Consider CONTRIBUTION their reason for being on the team; there are no free rides, and they don't want one.
5. Attend all meetings and activities.
6. Come prepared to all meetings or other activities.
7. Help establish and abide by the ground rules.
8. Respect fellow team members and treat all members equally.
9. Listen and respond appropriately.
10. Ensure that all meeting comments and decisions are recorded accurately.
11. Serve as a role model for other team members.
12. Promote and participate in the decisionmaking process agreed to by the team.
13. Participate in presentation activities.
14. Share responsibility for logistics, recording, minute taking, and other administrative tasks.

TEAM RECORDER AND TEAM MINUTE TAKER: The **Team Recorder** and **Team Minute Taker** are duties that may be performed by one or two team members depending on how structured the team needs to be. These duties can be rotated among team members. The role of team recorder is not necessarily the duty of the facilitator or team leader. In fact, the team leader should not assume this responsibility so that she/he can devote full attention to team discussions. The role of team minute taker is not recommended for the facilitator or team leader. The facilitator or team leader should encourage team members to assume the roles

of team recorder and team minute taker because these duties encourage commitment and accountability to team actions.

TEAM RECORDER

1. Records ideas on flip chart, overhead projector, or chalkboard; ensures that the information is retained in some form for later activities.
2. Writes legibly for all to see.
3. Captures ideas, comments, and decisions as presented; paraphrasing and editing should be done only with the speaker's approval.
4. Seeks clarification of ideas, acronyms, and words to ensure a common understanding by the team.
5. Recognizes that the power of the pen can be abused.

TEAM MINUTE TAKER

1. Prepares minutes of team meeting, agreements, decisions, etc.
2. Ensures that minutes are reviewed and distributed in accordance with team operating procedures.
3. Ensures the accuracy of the minutes.

WHAT ARE THE ELEMENTS OF A TEAM CHARTER?

A chartered team is one that has a specific task to achieve, usually a task that reflects the priorities of the organization. The Charter helps the CPI Team to understand the parameters of the task, the resources available, and any barriers to achieving the task. The elements of a Team Charter are:

1. The **name** of the process the CPI Team is to study.
2. The **definition** of the process (including all of the criteria identified in Chapter 2).
3. The **goal** or **objective** of the CPI Team; this must be clear and unambiguous; it must not be open to interpretation by the Team.
4. The **parameters** of the study; e.g., Are there any issues that are "off limits" or undiscussable?

5. The **members** of the CPI Team and any pre-arranged roles; e.g., Who is to be the Team Leader?
6. The **resources** the CPI Team will have, including time, money, and access.
7. The **time frame** for the study.
8. The **authority** and **responsibility** of the CPI Team; e.g., Will they only make recommendations? Will they be able to test their recommendations? Will they be authorized to implement proposed changes?
9. Any potential **restraining forces** that can be anticipated at this time.
10. When and how the team will be asked to **follow-up** on the recommendations and implementation of changes.

REFERENCES:

Making Teams Work, Burlington, MA: Organizational Dynamics, Inc, 1993.

Fisher, K., *Leading Self-Directed Work Teams,* New York, NY: McGraw-Hill, 1993.

Scholtes, P., Joiner, B., and Streibel, B., *The Team Handbook,* Madison, WI: Joiner Associates, Inc., 1996.

Fisher, B., and Thomas, B., *Real Dream Teams,* Delray Beach, FL: St Lucie Press, 1996.

Lynch, R., and Werner, T., *Continuous Improvement Teams & Tools,* Atlanta, GA: QualTeam, Inc., 1992.

Chapter 4

TEAM BUILDING — TEAM CHARACTERISTICS AND TEAM GUIDELINES

WHAT ARE THE CHARACTERISTICS OF A TEAM?

The characteristics of a team include the following:

1. Teams have an agreed upon goal, mission, vision, or purpose.
2. Team members work together to achieve this goal.
3. Teams have some structure that defines roles, responsibilities, procedures, and guidelines for group behavior.
4. Teams usually have a leader formally designated either by the team or by the team sponsor.
5. Team members learn how to solve problems, achieve goals, and work together in a cooperative manner.
6. Team members develop close interpersonal relations where a high level of communication and trust exists. "I, me, and mine" are replaced with "we, us, and ours."
7. Teams are complex social units or communities that are recognizable.

WHAT ARE TEAM GUIDELINES?

Guidelines are expectations about how people should or should not behave that all or many team members share. Guidelines are important because they help integrate members into the team by helping them predict how others will act in a given situation and by providing a guide for members' behavior.

Agreeing to team guidelines explicitly is an important first step in developing a team climate. This occurs when members talk about their expectations. It ensures that members are aware of the guidelines and enables them to determine how much they can support the guidelines.

Guidelines can be very simple. For example:

1. Focus on the topic; avoid side conversations.
2. Allow one person to talk at a time.
3. Honor the established time limits for breaks.
4. Participate in discussions and contribute ideas, experiences, and opinions.
5. Provide feedback to members in a constructive manner.

Or more comprehensive as in the following example:

1. Attendance: members should place a high priority on meetings.
2. Promptness: meetings should start and end on time.
3. Meeting place and time: specify a regular meeting time and place.
4. Monthly meetings with the team sponsor: discuss the purpose of such meetings.
5. Participation: everyone's viewpoint is valuable; speaking freely and listening attentively is important.
6. Basic conversational courtesies: do not interrupt; one conversation at a time; no side conversations, etc.
7. Assignments: When members are assigned responsibilities, it is important that they complete their tasks on time.
8. Smoking and breaks: decide whether and under what circumstances for both.
9. Interruptions: decide when interruptions (e.g. telephone calls) will be tolerated.
10. Rotation of routine chores: decide who will be responsible for setting up the room and other housekeeping chores.
11. Agenda, minutes, and records: Who is going to do what.

Chapter 5

The Work Plan

WHAT SHOULD BE THE ELEMENTS OF A USEFUL WORK PLAN?

The CPI Team's Work Plan should provide all the information that would be needed to go to work on the study. Some of the information may already have been developed in the Team Charter, Definition of the Process, identifying the process as high-priority, and other places. Other information may need to be developed more fully to serve the purpose of the CPI Team, like the **approach** which is only developed in a work plan. The elements of a Work Plan include:

1. The **purpose** or **objective(s)** of the study, i.e. what the study is intended to achieve. The generic purpose is to continuously improve the process in order to improve products and services.
2. The **scope** should include the area of coverage and depth of the study; the parameters or boundaries.
3. The **background** of the study or process, e.g. prior reviews, problem areas, references.
4. The **responsibilities** of each of the team members: all roles should have been clarified and agreed to in advance.
5. The **approach**, i.e. how the study will be carried out and the data analyzed.
6. The **resources** that will be needed, primarily people (if the requirements go beyond the team members, particularly if computer modeling is needed) and money.
7. The **time frames** or **milestones** for individual actions or activities involved in the study. This should be flexible enough to accommodate individual schedules while meeting the time frame in the Team Charter.

Comparison of elements of the Work Plan and Team Charters

Team Charter	Work Plan
Team name	X
Definition of process	X
Goal or objective	Purpose or objective
Parameters of CPI study	Scope of work
X	Background
Team members	Responsibility of each team member
X	Approach of study
Resources	Resources
Time frame	Time frames or milestones
Authority and responsibility of team	X
Restraining forces	X
Follow-up	X

Chapter 6

Analyzing the Current Process — Criteria and Process Mapping

What are the criteria the Team should use to analyze a process?

Some people believe that the one way to analyze a process is to develop a flowchart or process map. While process mapping is a good way to get a picture of the process, it is not the only way to analyze the process. A CPI Team may choose an analysis of the current process criteria to make their decisions to improve the process. There are several criteria that the team needs to identify in order to analyze the current process. These include:

1. The **past history** of the process;
2. The **basic steps** or **activities** that will produce the output;
3. What is **unique** about the process;
4. The **patterns** in the process;
5. The **perceived problems** with the process;
6. The **parallel processes** if any;
7. The **cycle time**; i.e., the total amount of time required to complete the process from boundary to boundary.

What is flowcharting or process mapping?

Once you have started the analysis of the current process, it is often useful to get a "picture" of the process. To do this, we use a tool that is sometimes called "flowcharting," but we will call PROCESS MAPPING or developing an As-Is Diagram.

A Process Map is a graphic representation of a process, showing the sequence of activities using standard flowcharting symbols.

Typically, Process Maps use the following five symbols:

1. **Ovals** are used to describe the boundaries of the process.
2. **Rectangles** are used to show each step, task, or activity of the process.
3. **Parallelograms** are used to show inputs of the process, and are linked to the step where they are used. They are also used to show interim outputs.
4. **Diamonds** are used to show decision points in the process.
5. **Arrows** show the direction of the steps, tasks, or activities.

The CPI Team should follow these steps to produce an **As-Is Process Map**:

STEP 1: Using some form of brainstorming, the team should list all of the activities of the process as they are—not as they should be; don't worry about sequence.

STEP 2: Then sort the activities into those that must occur; those that sometimes occur; those that occur in parallel; and the sequence in which the activities occur.

STEP 3: Select a format for the As-Is Map, either horizontal or vertical.

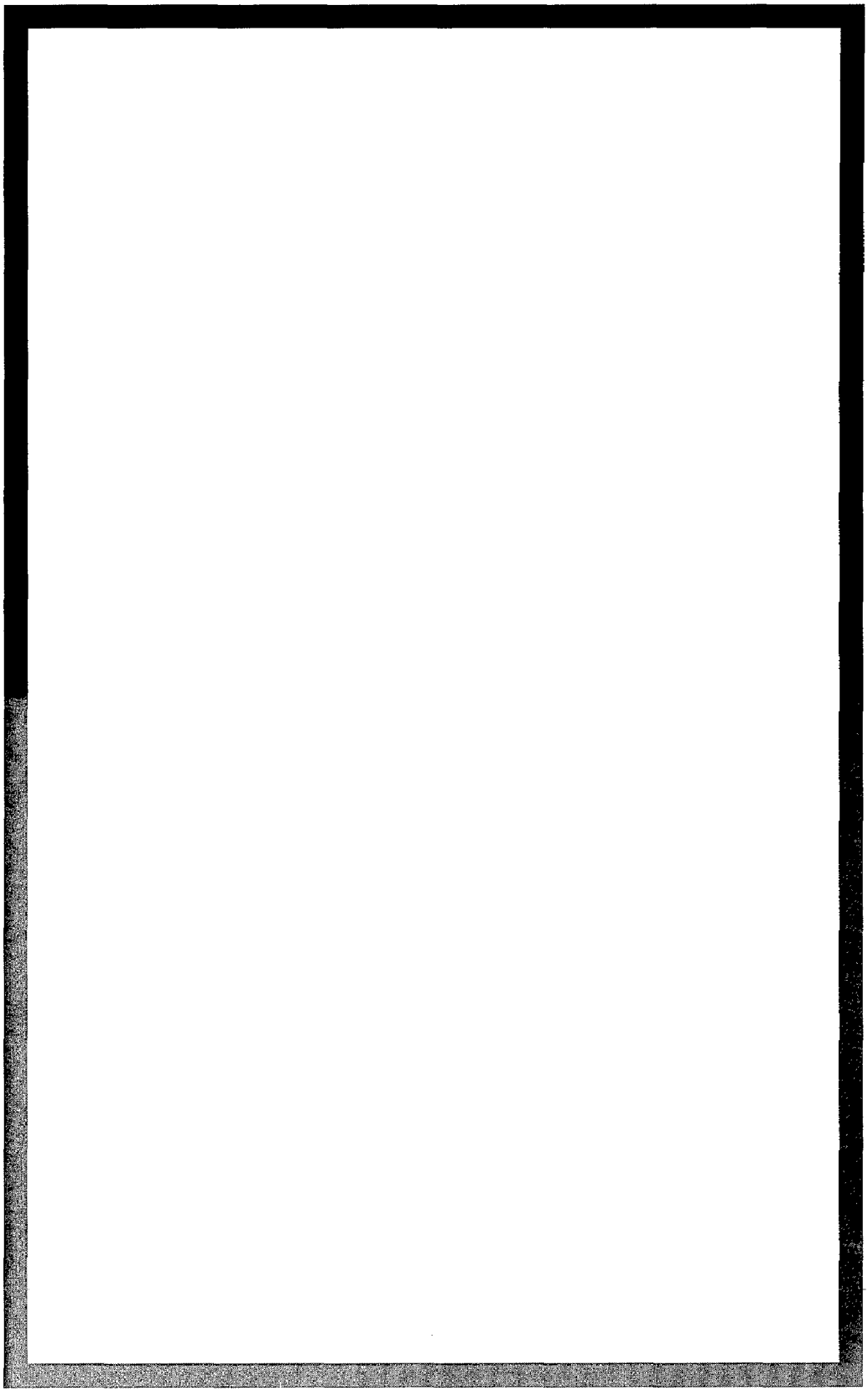
STEP 4: Prepare the process map by posting the sorted activities on large pieces of paper in the sequence in which they occur beginning with the boundaries; connect the activities, inputs, decision points, and outputs with lines and arrows. Activities that must occur and/or are parallel should be posted to the left in vertical format, or top in horizontal format; activities that sometimes occur should be posted correspondingly to the right or the bottom.

STEP 5: Then check the As-Is Process Map to see where the gaps are in the information; What doesn't the CPI Team know about the process? This will help the team to better understand the data collection it will have to do.

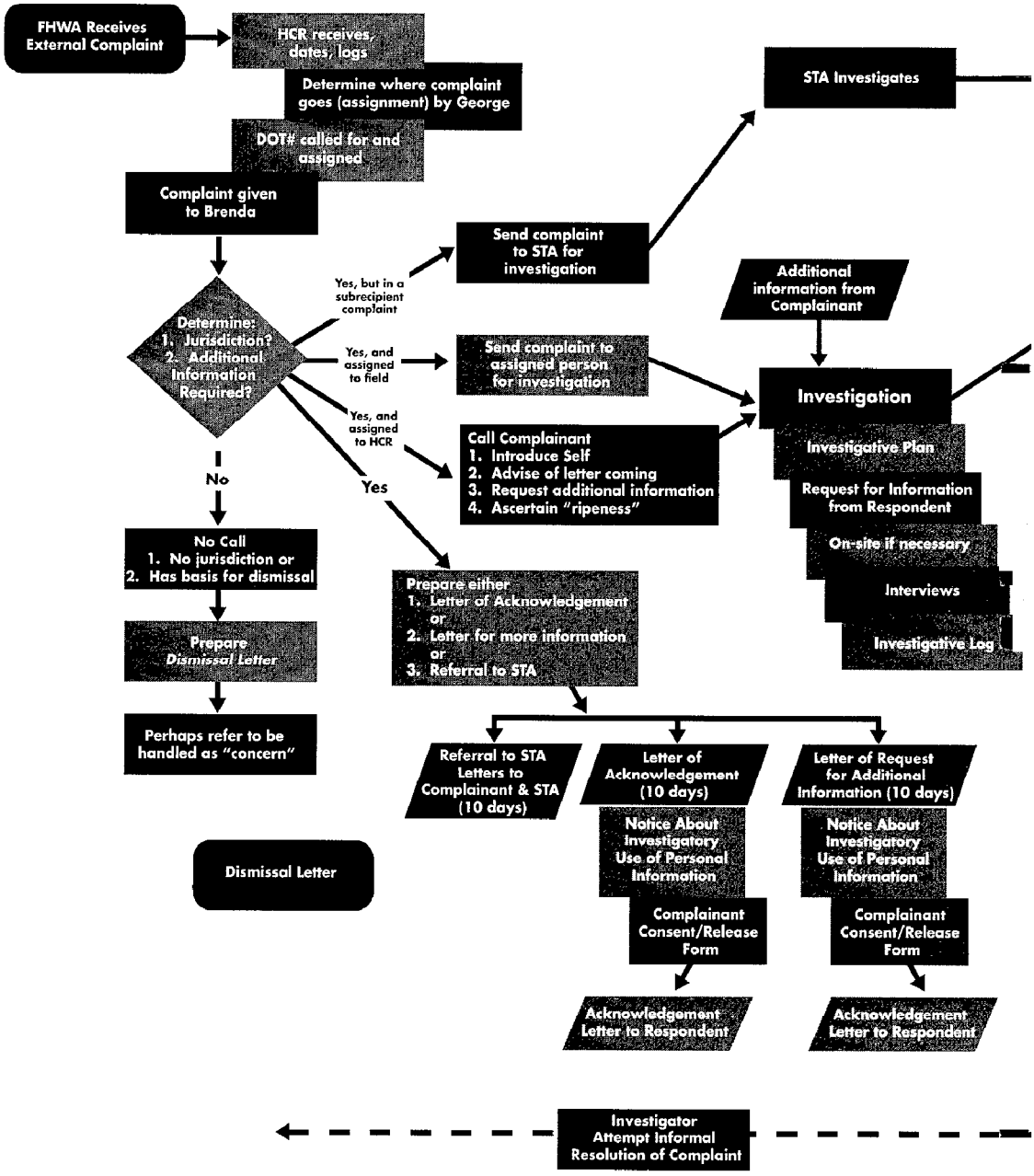
The map you create will represent the process as it is now, with all its flaws and inefficiencies. It will be a working document, so don't have an impressive document as your objective. You will want a document to change, mark up, and revise often. An example of an As-Is Process Map follows this chapter.

REFERENCES:

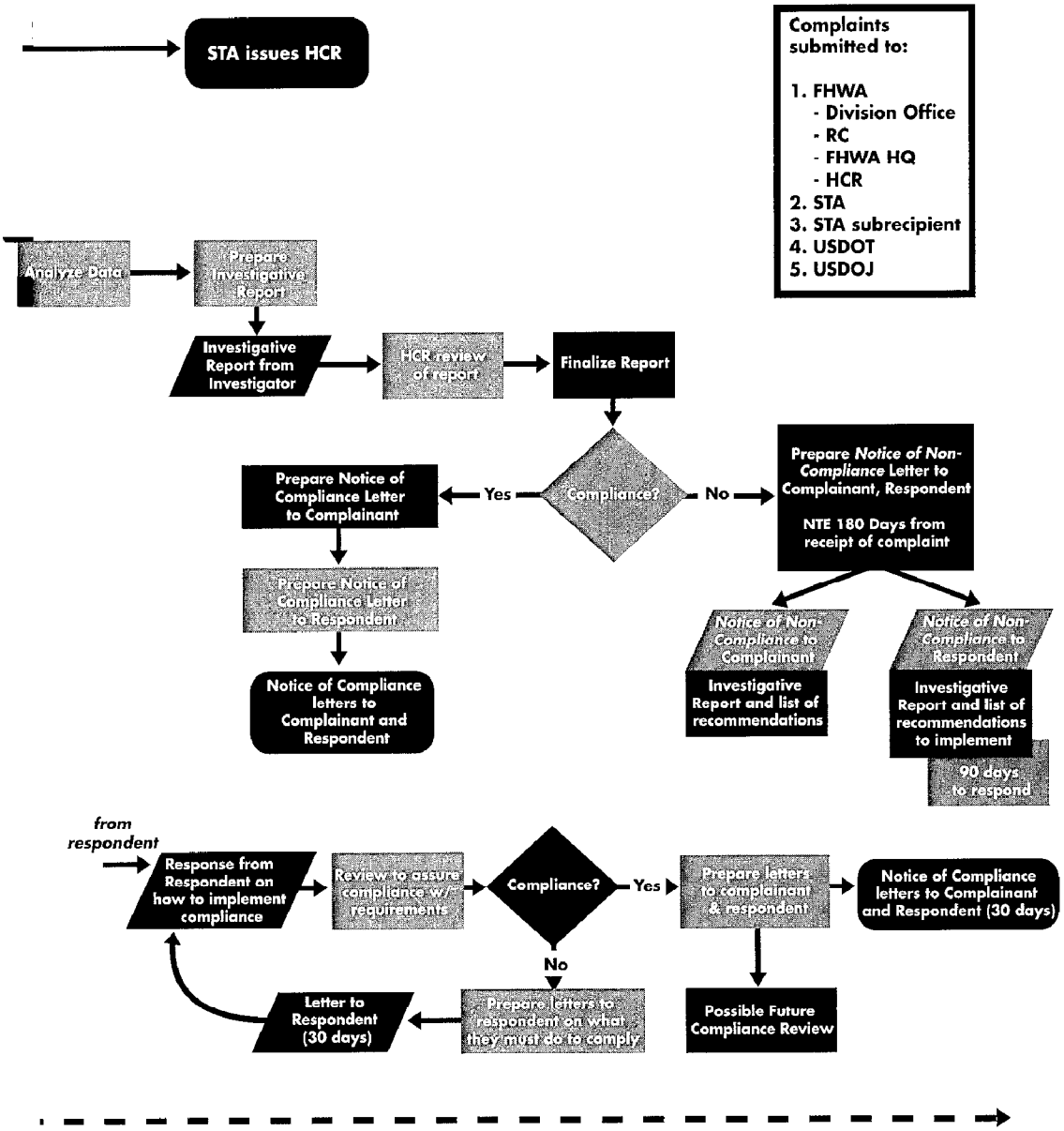
Galloway, D., *Mapping Work Processes,* Milwaukee, WI: ASQ Quality Press, 1994.



Environmental Justice Allegations and FHWA's



External Complaint Processing Procedures



Chapter 7

Data Selection, Collection Techniques, and Sampling

How should the team select the data to be collected?

There are several important questions that should be answered before collecting the data:

1. What data should be collected?
2. Who should collect the data?
3. When should the data be collected?
4. How should the data be collected?
5. What does the team expect to do with the data?

What to collect?

The first issue is whether the data to be collected should be:

1. **Quantitative data**, which are observations that lend themselves readily to numerical representations, or
2. **Qualitative data**, which are observations that tend to be less easily summarized in numerical form.

The dividing line between the two types of data is fuzzy: qualitative data may be transformed into quantitative data through content analysis, while quantitative data may be treated as qualitative data by disregarding the numerical values.

Another consideration when deciding what to collect is whether the CPI Team needs data relative to:

1. An **input** characteristic which is material, equipment, information, people, money, or environmental conditions needed to carry out the process, or

2. An **output** characteristic which is the product or service that is created by the process; that which is handed-off to the customer, or
3. A **process** characteristic which is a sequence of steps, tasks, or activities that adds value to inputs by changing them or using them to produce something new.

In the final analysis, the data the CPI Team will need will be that data that fills in the gaps in their knowledge about the process that they are trying to improve. At some point, over-collecting will overload the collection resources and cause significant difficulties in analysis of data. In their planning, the team should make sure that each data element they include has a specific purpose and is likely to provide useful evaluative information.

WHO COLLECTS THE DATA AND WHEN IS IT COLLECTED?

Some of the things you should consider include:

1. The members of the CPI Team are the primary collectors of the data, unless a data collection technique is used that requires other individuals;
2. Data must be collected when it is needed;
3. It should be collected at the convenience of the individuals providing the data.

HOW SHOULD THE DATA BE COLLECTED?

There are seven (7) Data Collection Techniques with commonly accepted protocols:

1. **Collecting Data from Agency Records** refers to data that are obtained by observing secondary sources, and not from original data collection efforts such as survey information and trained observer ratings. Agency records will be the source of much important data in many, if not most, CPI studies. Inevitably, CPI Team members will find less than perfect data from Agency records. Team members need to be assured that they know the definitions and content of the various data elements being

collected. Obtaining data from Agency records will present unexpected difficulties. The challenge is to make needed adjustments that do not compromise the overall quality of the study.

2. **Field Data Collection** involves conducting site visits to collect systematic information through surveys, participant observation, focus groups, or structured interviews. Fieldwork is conducted to describe what is happening at the particular level being examined, and to explain why the situations are as they are. Too often, fieldwork is approached in an informal or haphazard manner that results in massive amounts of notes that cannot easily be analyzed. The CPI Team should pay careful attention to developing fieldwork procedures, designing fieldwork data collection instruments, and preparing plans for managing and analyzing the information collected.

3. A **Systematic Survey** is a set of questions for obtaining statistically useful or personal information from individuals which can be accomplished by mail, telephone, or in-person interviews. Surveys have a number of important qualities: they offer anonymity to respondents; they structure answers to questions so that the point of view, characteristics, or use patterns of the respondents can be summarized with little confusion; they provide responses from a representative cross-section of the population—not just the most impassioned, the least busy, or the most vigorous.

4. **Trained Observers** are persons who make ratings of conditions or events by comparing their perceptions of the conditions to a pre-specified rating scale. The rating scales should incorporate detailed written definitions and/or photographic benchmarks that enable the observers to assign precise grades to the conditions they see. Because of the inherently subjective nature of trained observer ratings, adequate control of inter-rater reliability, repeatability, and accuracy with respect to the written and visual rating standards is critical to ensuring the validity and credibility of the results. The following three steps are the minimum when using trained observers:

STEP 1: Identify the specific features and conditions that will be rated. The characteristics selected should be readily observable and sensed by the rater.

STEP 2: Develop a rating scale with no more than four or five major rating levels. Define the conditions constituting each level.

STEP 3: Develop a convenient form for recording results.

5. **Expert Judgement** uses tacit and explicit knowledge of experts to make reliable judgements about a process. Reliability means that other experts looking at the same information would come to approximately the same judgements. Judgements can be made individually and aggregated, or they can be reached collectively. Most studies by experts follow an informed dialogue procedure where a group of experts is brought together for informed, face-to-face exchanges of views. The behavior of the experts is controlled, in principle, by the norms of science, engineering, or other professional practice.

6. **Focus Group** is an informal, small-group discussion designed to obtain in-depth qualitative information. Participants usually have something in common. They are encouraged by a moderator to talk with each other about their experiences, preferences, needs, observations, or perceptions. Focus groups typically involve small, non-randomly selected samples. They offer a way to explore a topic in-depth with participants drawn from an often narrowly defined target population.

7. **Role Playing** is a methodology for directly assessing the overall quality of a process in which individuals pose as requesters in order to document service or treatment of and by the process directly. Because role playing involves direct human observation, the results produced are particularly powerful. They provide the power of narrative through anecdotal evidence of individual experiences.

WHAT ARE SAMPLING TECHNIQUES THE CPI TEAM WILL NEED?

Any of the data collection techniques may require the CPI Team to sample. **Sampling** is all about deciding how to get **some** respondents to represent **all** possible respondents in the target population. To select a valid sample, the team needs to follow three steps:

STEP 1: Make a **list of all possible participants** who fit the target population. When the team considers this first sampling issue they need to carefully evaluate:

a. The scope and objectives of the data collection, and

b. The characteristics of the process being studied. Collecting data that goes beyond the scope and objectives of the study and that include characteristics that are not essential to the process is costly, confusing, and unnecessary.

STEP 2: Then a **method for selecting participant respondents** must be chosen that simulates a lottery in which respondents are picked approximately at random. There are two ways of determining a sample:

a. Nonscientific sampling includes any kind of sampling procedure that does not follow strict mathematical principles. Non-scientific sampling may either be 1) judgmental where items are chosen by one or more individuals to best represent the target population, in their judgement, or 2) quasi-scientific where items are chosen using objective procedures, but the sample size is based on conjecture

b. Scientific sampling selects the sample following mathematical principles called "probability theory." Scientific sampling involves determining the following:

   1) **Expected Error Rate:** The percentage of error the team believes will be found as the result of the test or survey, ordinarily expressed as a percentage.

2) **Confidence Level:** The probability that the value obtained by a sample will not differ from the true value by more than a stated amount (precision), ordinarily expressed as a percentage. For example, a confidence level of 90% means that there are 90 chances in 100 that the sample is representative and 10 chances that it is not.

3) **Range of Precision:** A range within which the true answer concerning the target population should fall at a specified confidence level, ordinarily expressed as plus or minus a given number of percentage points. For example, if the expected error rate for a target population is 5%, +/- 2%, means that the error rate in the target population may be as low as 3% or as high as 7%; +/- 4% means that the error rate may be as low as 1% or as high as 9%.

Fortunately, there are various tables that are available that determine the scientific sample based on various population sizes, maximum expected error rates, degrees of confidence, and levels of precision. Copies of four of these tables are reproduced at the end of this chapter. To select the sample size for a specific test or survey, the team selects the table that corresponds to the maximum expected error rate and the selected confidence level. Then locate the precision percentage desired and follow the column downward to the line that most nearly corresponds to the target population size. The number at the intersection of the target population size and the range of precision selected is the sample size to be used. If the exact target population size does not appear in the table, use the next higher population shown, or interpolate.

STEP 3: Finally, an **approximation of random selection of participants**, e.g., taking every Nth person, is the touchstone of good sampling design. There are four ways to do this:

a. **Simple random sample**, where individuals or items are selected completely at random from the entire target or universe.

b. **Systematic sample**, where selection is made such that there is a uniform interval between each sample individual or item.

c. **Stratified sample**, where individuals or items are first segregated into two or more classes called strata. Items that are generally comparable in the characteristic being measured will fall within the same stratum. Then each strata is sampled independently and the results are weighted.

d. **Cluster sample**, where individuals or items are first formed into groups or "clusters," then the clusters are randomly selected, and the items within the selected clusters may be further sampled.

REFERENCES:

Wholey, J., Hatry, H., and Newcomer, K. editors "Practical Data Collection Procedures," p. 233-385, *Handbook of Practical Program Evaluation.* San Francisco: Jossey-Bass Publishers, 1994. [This work contains numerous other references that the practitioner will find useful in the areas of data collection techniques.]

Rossi, P. and Freeman, H. *Evaluation: A Systematic Approach.* Beverly Hills: SAGE Publications, 1985.

TABLE 1
SAMPLE SIZES FOR ATTRIBUTES SAMPLING
EXPECTED ERROR RATE NOT OVER 2%
CONFIDENCE LEVEL 90%

Population Size	Sample Size for Precision Percentage of Plus or Minus						
	0.50	0.75	1.00	1.25	1.50	1.75	2.00
50	48	47	45	43	41	38	36
100	95	90	84	77	70	63	57
150	140	129	116	104	91	80	70
200	182	165	145	125	108	92	79
250	223	197	169	143	121	102	86
300	262	227	191	159	132	109	91
350	300	255	210	172	140	115	96
400	336	280	228	183	148	120	99
450	371	304	243	193	154	125	102
500	404	326	257	202	160	128	104
550	436	347	270	209	165	131	106
600	467	366	281	216	169	134	108
650	497	384	292	222	172	136	110
700	526	401	301	228	176	138	111
750	554	417	310	233	179	140	112
800	580	432	318	238	182	142	113
850	606	447	326	242	184	143	114
900	631	460	333	246	186	145	115
950	656	473	340	250	188	146	116
1000	679	485	246	253	190	147	117
1100	724	507	357	259	194	149	118
1200	766	528	367	264	197	151	119
1300	806	546	376	269	199	152	120
1400	843	563	384	273	201	154	121
1500	878	578	391	276	203	155	121
1600	912	593	398	280	205	156	122
1700	943	606	404	282	207	157	123
1800	973	618	409	285	208	157	123
1900	1002	630	414	287	209	158	123
2000	1029	640	419	290	210	159	124

Source: Lockheed-Georgia Company, Math Analysis Group

TABLE 2
SAMPLE SIZES FOR ATTRIBUTES SAMPLING
EXPECTED ERROR RATE NOT OVER 2%
CONFIDENCE LEVEL 95%

Population Size	Sample Size for Precision Percentage of Plus or Minus						
	0.50	0.75	1.00	1.25	1.50	1.75	2.00
50	49	48	46	45	43	41	39
100	96	93	88	82	76	71	65
150	142	134	125	114	103	93	83
200	187	174	158	141	125	110	96
250	230	210	187	164	143	123	107
300	272	245	214	184	158	135	115
350	313	277	238	202	171	144	122
400	353	307	261	218	182	152	128
450	391	336	281	232	191	158	132
500	428	364	300	245	200	164	136
550	465	389	317	256	208	169	140
600	500	414	333	267	214	174	143
650	534	437	348	276	220	178	145
700	567	459	362	285	226	181	148
750	600	480	375	293	231	185	150
800	632	500	387	300	235	188	152
850	662	519	399	307	240	190	154
900	692	538	409	313	243	193	155
950	722	555	420	319	247	195	157
1000	750	572	429	325	250	197	158
1100	805	603	446	335	256	200	160
1200	858	632	462	343	261	204	162
1300	908	659	476	351	266	206	164
1400	955	684	489	358	270	209	165
1500	1001	707	501	364	273	211	167
1600	1044	728	512	370	276	213	168
1700	1086	748	521	375	279	214	169
1800	1126	767	530	380	282	216	170
1900	1165	785	539	384	284	217	171
2000	1201	801	547	388	286	218	172

Source: See first page of Table 1

TABLE 3
SAMPLE SIZES FOR ATTRIBUTES SAMPLING
EXPECTED ERROR RATE NOT OVER 5%
CONFIDENCE LEVEL 90%

Population Size	Sample Size for Precision Percentage of Plus or Minus						
	1.00	1.50	2.00	2.50	3.00	3.50	4.00
50	48	45	43	40	37	33	30
100	92	85	76	67	58	51	44
150	134	118	102	86	73	61	52
200	173	148	123	101	83	68	57
250	209	173	140	112	90	73	60
300	243	196	155	122	96	77	63
350	275	217	167	129	101	80	65
400	305	235	178	135	105	83	66
450	333	251	187	141	108	85	68
500	359	266	195	145	111	86	69
550	385	280	202	149	113	88	70
600	409	292	209	153	115	89	70
650	431	304	215	156	117	90	71
700	453	314	220	158	118	91	72
750	473	324	224	161	119	92	72
800	493	333	229	163	121	92	73
850	511	341	233	165	122	93	73
900	529	349	236	167	123	93	73
950	546	356	240	169	124	94	74
1000	562	363	243	170	124	94	74
1100	592	376	248	173	126	95	74
1200	620	387	253	175	127	96	75
1300	646	396	257	177	128	97	75
1400	670	405	261	179	129	97	75
1500	692	413	264	180	130	98	76
1600	712	420	267	182	131	98	76
1700	731	427	270	183	131	98	76
1800	749	433	272	184	132	99	76
1900	766	439	274	185	132	99	77
2000	782	444	276	186	133	99	77

Source: See first page of Table 1

TABLE 4
SAMPLE SIZES FOR ATTRIBUTES SAMPLING
EXPECTED ERROR RATE NOT OVER 5%
CONFIDENCE LEVEL 95%

Population Size	Sample Size for Precision Percentage of Plus or Minus						
	1.00	1.50	2.00	2.50	3.00	3.50	4.00
50	48	47	45	42	40	37	34
100	94	89	82	74	66	59	53
150	138	126	112	99	86	74	64
200	180	160	139	118	100	85	72
250	219	191	161	134	111	93	78
300	257	218	180	147	120	99	82
350	293	244	198	159	128	104	86
400	328	267	213	168	134	108	88
450	360	289	226	177	139	111	90
500	392	309	238	184	144	114	92
550	422	327	249	190	148	117	94
600	451	344	259	196	151	119	95
650	479	360	268	201	154	121	97
700	505	375	276	206	157	122	98
750	531	389	283	210	159	124	98
800	556	402	290	213	161	125	99
850	579	415	296	217	163	126	100
900	602	426	302	220	165	127	101
950	624	437	308	223	167	128	101
1000	645	447	313	225	168	129	102
1100	686	466	322	230	171	131	103
1200	723	483	330	234	173	132	104
1300	759	499	337	238	175	133	104
1400	592	513	344	241	177	134	105
1500	823	526	349	244	178	135	105
1600	852	538	354	246	179	136	106
1700	880	549	359	249	181	136	106
1800	906	559	363	251	182	137	107
1900	930	568	367	253	183	138	107
2000	954	577	371	254	184	138	107

Source: See first page of Table 1

Chapter 8

Planning Interviews and Developing Questions

Interviews are the most common form of purposeful, planned communication. Each day people engage in sales, informational, job, counseling, health care, survey, appraisal, and recruiting interviews, to name only a few. Because we are involved in interviews so frequently, we assume that the process is simple and that the skill comes naturally. **The biggest problem with human communication is the assumption that it happens.** There are two fundamental approaches to all interviews:

a. Directive, where the interviewer establishes the purpose of the interview and controls the pacing; and

b. Non-directive, where the interviewee has more control over subject-matter, purpose, and pacing.

There are three parts to any interview: **opening, body, and closing.**

a. The **opening's** primary function is to motivate both parties to participate freely and communicate accurately. It is the most important period of the interview because it sets the tone and often determines if you get successful interaction between the parties. The opening is a two step process:

   STEP 1: **Establish rapport** (i.e. creating good will and trust).

   STEP 2: **Orientation.** The interviewer, in most instances, will want to provide all of the following information: the purpose, length, and nature of the interview; the organization responsible; how the information will be used; why the interviewee was selected.

b. Preparing the **body** of the interview is also a two step process:

STEP 1: Write down an **interview guide.** The guide is an outline that helps the interviewer develop areas of inquiry, remember areas of information, determine which questions to ask, and helps organize the answers.

Guides are developed as structural sequences. Some of the possible sequences are:

(1) Topical sequence; the most common sequence consisting of first the major areas of information needed, and then possible sub-topics under each major area;
(2) Time sequence, e.g. stage 1, stage 2, etc.
(3) Space sequence, e.g. different locations;
(4) Cause and effect sequence, usually listing the effect first; and
(5) Problem-solution sequence.

STEP 2: Once you have an interview guide then you write out the **interview schedule,** which is the outline of questions that the interviewer will take to the interview.

Sometimes interviews are *non-scheduled.* This is appropriate when: the information area is extremely broad; the interviewees and their information levels differ significantly; interviewees are reluctant or have poor memories; the interviewer has little preparation time.

At the very least, interviews should be *moderately scheduled.* This would contain the major questions to be asked along with some possible probing questions.

There are *highly scheduled interviews* which contain all of the questions to be asked and the exact wording to be used.

And finally, there is the *highly scheduled standardized interview* where all question and answer options are stated in identical lan-

guage to each interviewee who then picks an answer from those provided. This is the essence of a survey interview.

c. The **closing** is usually brief but should never be abrupt because the interviewer does not want to undo the rapport and trust that was established during the interview. Some closing techniques might include:

(1) Offer to answer questions;
(2) Use "clearinghouse" questions, e.g., "Anything else before I leave?"
(3) Declaring the completion of the purpose or task;
(4) Make personal inquiries;
(5) Signal that time is up;
(6) Explain the reason for closing;
(7) Express appreciation or satisfaction;
(8) Exhibit concern;
(9) Plan for the next meeting; and
(10) Summarize the interview.

Everyone preparing for an interview should use the following **Checklist** for the interview:

a. PURPOSE: For any type of interview, the interviewer must be clear about the purpose of the interview.

b. RESEARCH: Interviewers will want to be thoroughly briefed on the interview topic(s) so that they can go beyond basic, obvious information that is readily available. They should become mini-experts on the topic so that they will be familiar with unique terminology and technical concepts.

c. STRUCTURE: The traditional journalistic interview guide may be the best way to approach the interview guide; i.e. what happened; when it happened; where it happened; how it happened; why it happened; who was involved.

d. SELECT INTERVIEWEE(S): Does the interviewee have the information desired? Is the interviewee available? Is the interviewee

willing to give the information needed? Is the interviewee able to transmit information freely and accurately?

e. PHRASE THE QUESTIONS: Generally, questions should be clearly worded, relevant to the topic, appropriate to the interviewee's level of knowledge, not too complex, and socially and psychologically accessible.

f. SELECT AND TRAIN THE INTERVIEWERS: Determine how many will be needed; what special qualifications, if any, are needed; and what personal characteristics are optimal. Interviewers should be keen observers and listeners; patient, persistent, flexible, adaptive, courteous, tactful, non-argumentative; skillful at asking follow-up questions; and able to write a coherent, organized report of the interview after asking dozens of questions. Training is especially necessary for survey interviewers to ensure consistency of data.

g. NOTE TAKING AND PRE-TESTING SURVEY INTERVIEWS: Survey interviews should be pre-tested because the best plans on paper may not work out in actual practice. Conduct complete interviews with individuals from the target population, trying out the opening and closing, asking all questions, and recording answers. Then, analyze the pre-test results and make necessary alterations in procedure and questions.

h. PREPARING THE INTERVIEW REPORT: The technical steps of report preparation (whether a narrative based on a probing interview or the coding, tabulating, and analysis associated with Survey interviews) is beyond the scope of this training. But there are some precautions: remember what information is "off the record;" assert that a statement was made, not that it's true; be careful of assumptions; and strive for accuracy in every fact and interpretation.

GUIDELINES FOR DEVELOPING QUESTIONS

Questions are the tools of the trade in most interviews. A question is defined as any statement that invites an answer; it need not be an interrogative utterance followed by a question mark. Each question has three

characteristics: (1) it is open-ended, closed-ended, or bipolar; (2) it has either a primary or a secondary function; and (3) it either leads the respondent to an answer or it is neutral with regard to the response.

a. An **open-ended question** allows the respondent freedom to determine the amount and kind of information to give. Open-ended questions are either *highly-opened* or *moderately-opened.*

   Highly-opened questions have virtually no restrictions, for example:

   Tell me about yourself.
   What do you know about FHWA?
   How do you think this city can be improved?

   Moderately-opened questions have some restrictions, for example:

   Tell me about your hobbies.
   What do you know about the Planning operations of FHWA?
   How do you think the highways in this city can be improved?

b. A **closed-ended question** restricts the respondent's possible answers. Closed-ended questions are either *highly-closed* or *moderately-closed.*

Highly-closed allow the respondent to select an appropriate answer from a list, for example:

____ *some high school*	____ *high school graduate*
____ *some college*	____ *college graduate*

Rate the following brands of coffee based on a scale where 5 means you strongly like and 1 means you strongly dislike.

Folgers	*1*	*2*	*3*	*4*	*5*
Maxwell House	*1*	*2*	*3*	*4*	*5*
Sanka	*1*	*2*	*3*	*4*	*5*
Nescafe	*1*	*2*	*3*	*4*	*5*

c. A **bipolar question** limits the respondent to one or two choices. Bipolar questions assume that there are only two possible answers and that they are the antithesis of one another: like/dislike, approve/disapprove, high/low, yes/no, for example:

Do you usually purchase colas with or without caffeine?
Do you live in a rural or urban area?
Do you agree or disagree with the new tax proposal?
Do you smoke?

d. A **primary question** introduces a topic or a new area within a topic and to make sense out of context. All examples of open-ended and closed-ended questions are primary questions. The following are other examples:

Where were you when the storm hit?
What is you favorite hobby?
Tell me about your last engineering position?

e. A **secondary question** attempts to get further information following a primary or other secondary question. Secondary questions are often called probing or follow-up questions and are useful when the respondent does not respond or the answers seem incomplete, superficial, vague, suggestible, irrelevant, or inaccurate. There are many types of secondary questions. The following are illustrative of some of these:

I see. Go on. And then? Yes? What happened next?
What have I not asked about that might be of importance?
Tell me more about ....What happened after ....
I'm not sure I understand your point.
Please define "tentative" for me.
Why do you feel that way?
How do you feel about that?
You mean 2001, don't you?
Then, you are going to support this recommendation?
You think, then, that you can meet the new deadline?

The use of secondary questions separates skilled from unskilled interviewers. The skilled interviewer listens carefully to each response to determine if the answer is adequate. If the answer is inadequate, the interviewer determines the probable cause within seconds and phrases an appropriate follow-up question to get more accurate and complete information.

f. A **leading question** suggests implicitly or explicitly the answer expected or desired. A **neutral question** allows the respondent to decide upon an answer without direction or pressure. The varying degrees of direction and the distinction between leading and neutral questions are illustrated by the following:

Leading Question	Neutral Question
You like close detail work, don't you?	*Do you like close detail work?*
You're going with us, aren't you?	*Are you going with us?*
Do you oppose the union like most workers I've talked to?	*What are your attitudes toward the union?*
Wouldn't you rather have a Buick?	*How does this Buick compare to other cars in this price range?*
How do you feel about these asinine government rules?	*How do you feel about these government rules?*
When was the last time you got drunk?	*Tell me about your drinking habits.*
Have you stopped cheating on exams?	*Did you cheat on your last exam?*
Would you classify yourself as politically conservative or radical?	*How would you classify yourself politically?*
Do you think tax reform is unfair to farmers?	*How do you feel about tax reform?*

Phrasing questions is not a simple task. As you develop your **interview schedule** of questions you should be guided by the following factors:

a. **Language**; be aware of the limitations of the language

- Avoid jargon and slang; use common words; e.g.,

  "going to college" vs. *"matriculating"*
  "drunk" vs. *"inebriated"*
  "interviewing" vs. *"dyad"*
  "liar" vs. *"prevaricator"*

- Be aware of the variety of meaning; e.g.,
  - *"Moved by a gesture:" do you mean physically or emotionally?*
  - *The word "game" can mean "Monopoly, football, basketball, tennis, bridge, baseball, deer, pheasant, sport, fun, cards, wild animal, and willingness to try something."*

- Never assume that the following words are synonymous;
  "could, should, ought, and *would"*

- Be aware of similar sounding words; e.g.,

  "very" vs. *"fairly"*
  "steal" vs. *"steel"*
  "bull" vs. *"bowl"*
  "cereal" vs. *"serial"*
  "weather" vs. *"whether"*

- Be on guard against phrasing that may alter results; e.g.,
  In a survey, one group of respondents was asked:
  "Is it okay to smoke while praying?"
  Another group was asked:
  "Is it okay to pray while smoking?"
  An overwhelming number said "No" to the first question and "Yes" to the second question.

b. **Relevance**; respondents must be able to see the relevance of each question in order to communicate freely and accurately.

c. **Information level**; respondents must have knowledge that enables them to respond intelligently. Questions above the respondent's knowledge level may cause embarrassment or resentment. Questions below the respondent's knowledge level may insult his/her intelligence. Finally, do not assume that respondents will have the information you need.

d. **Complexity**; questions should contain a simple, clear request for a limited amount of information. Avoid complex questions that defy a person to answer.

e. **Accessibility**; this refers to the respondent's ability to answer questions because of social, psychological, or situational constraints.

Sequencing questions is the final thing an interviewer should consider when developing an **interview schedule.** There are two common ways to sequence questions: **funnel** and **inverted funnel:**

a. A **funnel sequence** begins with a broad open-ended question and proceeds with ever more restricted questions. For example:

What are your reactions to the employee retraining program?
What kinds or retraining are most workers likely to take part in?
Which one is most likely to be most helpful?
What is the cost per employee?
Is the program worth it?

b. The **inverted funnel sequence** begins with a closed-ended question and gradually proceeds toward open-ended questions. For example:

Is your employee retraining program worth the cost?
What is the program's cost per employee?
Which type of retraining is likely to be most effective?
What kinds of retraining are included?
What are your reactions to the retraining program?

Chapter 9

Improving the Process — Problem Solving Models and Techniques

How should a CPI Team define a problem?

CPI Teams frequently discover "problems" with the operation of the process, or opportunities being missed to add value for our customers. A "problem" is defined generically as:

A situation or condition considered to be undesirable.

In order to continually improve processes, the "problem," whether it is waste, or variation, or gaps, or inefficiency, etc.; must be removed. To do this effectively requires that the "problem" be named with considerable specificity, but as concisely as possible. (A Worksheet to do this is reproduced at end of this chapter.)

The very minimum the Team will need for a clear concise definition includes:

1. **What** is the problem?
2. **Where** is the problem?
3. **When** is it a problem?
4. For **whom** is it a problem?
5. **What is likely to happen** if something isn't done about the problem?

Defining or Naming the Problem is usually the first step in any **Problem Solving Model**. CPI Teams should always have a systematic way of handling "problems," and adopting one of the many Problem Solving Models available is the best way to do this. No one Model is best: the one that works for the CPI Team is the one that is best.

For training purposes, the following Problem Solving Model has been chosen:

FADE Model:

STEP 1: **Focus** - In addition to defining the problem(s), the Team recognizes at this step that, faced with multiple problems, they will have to select the problem or problems that are important and capable of being fixed. (Chapters 2, 6, and 7 of this book help the team focus on the problem.)

STEP 2: **Analyze** - In this step the Team decides what is known, unknown, and needs to be known; collects data, if needed; searches for consequences and causes; and determines the influential factors. (Chapters 7, 9, and 10 of this book help the team analyze the problem.)

STEP 3: **Develop** - In the third step, the CPI Team generates promising solutions; maps an ideal process; tests the solutions when appropriate; selects a solution(s); and develops a plan for implementation. (Chapter 11 of this book will help the team develop improvements.)

STEP 4: **Execute** - In the last step the CPI Team gains commitment, executes the plan; and monitors the impact. (Chapters 12, 13, 14, and 15 will help the team to execute their improvements.)

When using any Model, the CPI Team should follow all of the steps of the Model to ensure success. If the CPI Team decides to change Models in the middle of the study because the Model they are using is not adequate, they should start using the new Model from its beginning.

WHAT ARE THE WAYS IN WHICH A CPI TEAM CAN ANALYZE A PROBLEM?

There are two issues to consider when analyzing a problem: the **consequences**, i.e., something that is the effect or result of a problem, and **causes**, i.e., the producer of an effect, result, or problem.

Analyzing a problem first involves (1) creating a list of "what created the problem;" (2) identifying the most significant consequences and/or causes; and (3) choosing the cause or causes that you will attack. To do this, the team will need to be familiar with two tools that help them analyze the problem, causes and consequences.

a. The first tool is the **Pareto Diagram**. The Pareto Diagram helps the team focus their efforts on the problem, consequence, or cause that offers the greatest potential for improvement—on the right things to succeed. It is a bar chart, a visual guide, used to separate the "vital few" from the "trivial many." It is based on the idea that the team will be faced with lots of problems, consequences, or causes, and should work first on those things that have the greatest opportunity for improvement.

   Here's how to do a Pareto Diagram (see Exhibit 9-1 at the end of the chapter):

   STEP 1: Choose the problem, consequence(s), and/or cause(s) the team wants to know more about: e.g. fatalities (consequences) and their causes; not wearing seat belts (problem) and the reasons for not wearing (causes); not doing value engineering (problem) and the consequences.

   STEP 2: Choose the sources or components of the problem, consequences, or causes that are to be monitored. These items may be the result of data already available or through brainstorming.

   STEP 3: Choose the most meaningful units of measurement such as frequency, cost, time, or other measure.

   STEP 4: Choose the time period that is long enough to represent the situation. This period may be an hour, day, month, or year.

   STEP 5: Gather the data on each component either by "real time" collection (see Chapter 7) or reviewing historical data. Compare the frequency or quantity of each item and arrange in descending order.

STEP 6: Construct a bar graph with the measure on the vertical (Y) axis and the consequences, causes, or categories on the horizontal (X) axis with the most frequent to the left. Items which occur infrequently can be lumped in an "other" category to the far right. If cumulative percentages will add understanding to the diagram, add them as a second vertical (Y) axis.

b. The second tool is the **Cause and Effect** Diagram. The Cause and Effect Diagram, sometimes called a "fishbone" diagram, helps a CPI Team identify, explore, and graphically display, in increasing detail, all of the possible causes related to a problem or condition to discover its root cause(s).

Here's how to do a Cause and Effect Diagram (see Exhibit 9-2 at the end of the chapter):

STEP 1: Specify the effect to be analyzed; it can be positive (an objective or an opportunity) or negative (a problem or consequence). Write the effect (problem) in a box on the right side of the diagram.

STEP 2: Select the most appropriate Cause and Effect format. There are two major formats:

(1) **Major Cause Categories:** this is the most common format. Major cause categories are usually used to organize the causes in a way that makes the most sense for the specific situation. The most common major cause categories are: the "4 M's" - Methods, Machines, Materials, and Manpower (or sometimes Personnel, then it's "3 M's & a P"); the "4 P's" - Place, Procedure, People, Policies; and the "4 S's" - Surroundings, Suppliers, Systems, Skills.

(2) **Major Steps in the Process:** which organizes possible causes around activities, decisions, inputs, etc.; of the process.

Write the major cause categories or major steps in the process in boxes that connect to a horizontal line (the backbone of the "fish-bone") to the left of the box containing the effect or problem statement.

STEP 3: Generate the lists of potential causes for the effect or problem. One of the best way for doing this is **Brainstorm** without previous preparation. In Brainstorming, possible causes can be placed in a major cause category as each is generated, or only after the entire list has been created. Either works well, but Brainstorming a whole list first maintains the creative flow of ideas without being constrained by the major cause categories or where the cause fits on each "bone."

As the Team categorizes the causes, they should continually ask this question: **Why does this cause happen?** This question should be repeated for each level of detail until the team runs out of causes.

Keep in mind that the location of a cause on the diagram is not an indicator of its importance. A sub-cause may be the root cause to all of the process problems. The Team may also decide to collect more data on a cause that had not been previously identified.

STEP 4: Interpret or test for root cause(s) by one or more of the following:

(1) Look for causes that appear repeatedly within or across major cause categories; this is an indication of a *most likely cause(s).*

(2) Select through an unstructured consensus process or one that is structured, e.g., Nominal Group Technique, the *most probable cause(s).*

WORKSHEET: DEFINING THE PROBLEM

A problem is a situation or condition considered to be undesirable. To help you define a possible problem, answer the following questions:

1. What is happening now?

2. What are the symptoms of the problem?

3. When does the problem occur?

4. Where does the problem occur?

5. For whom is it a problem?

6. What are the negative impacts of the problem?

7. Now, write out a statement of the problem.

REFERENCES:

The FADE Model is taken from: *Making Teams Work.* Burlington, MA: Organizational Dynamics, Inc. (ODI), 1993.

The following are other useful problem solving models:

"Five Stage Plan for Process Improvement," taken from: Scholtes, P., Joiner, B, and Streibel, B., *The Team Handbook,* Madison, WI: Joiner Associates, Inc. 1996.

"10-Step Creative Problem Solving Process," taken from: Barra, R., *Tips and Techniques for Team Effectiveness,* New Oxford, PA: Barra International, 1989.

"Problem Solving Model," taken from : Schwarz, R., *The Skilled Facilitator,* San Francisco, CA: Jossey-Bass Publishers, 1994.

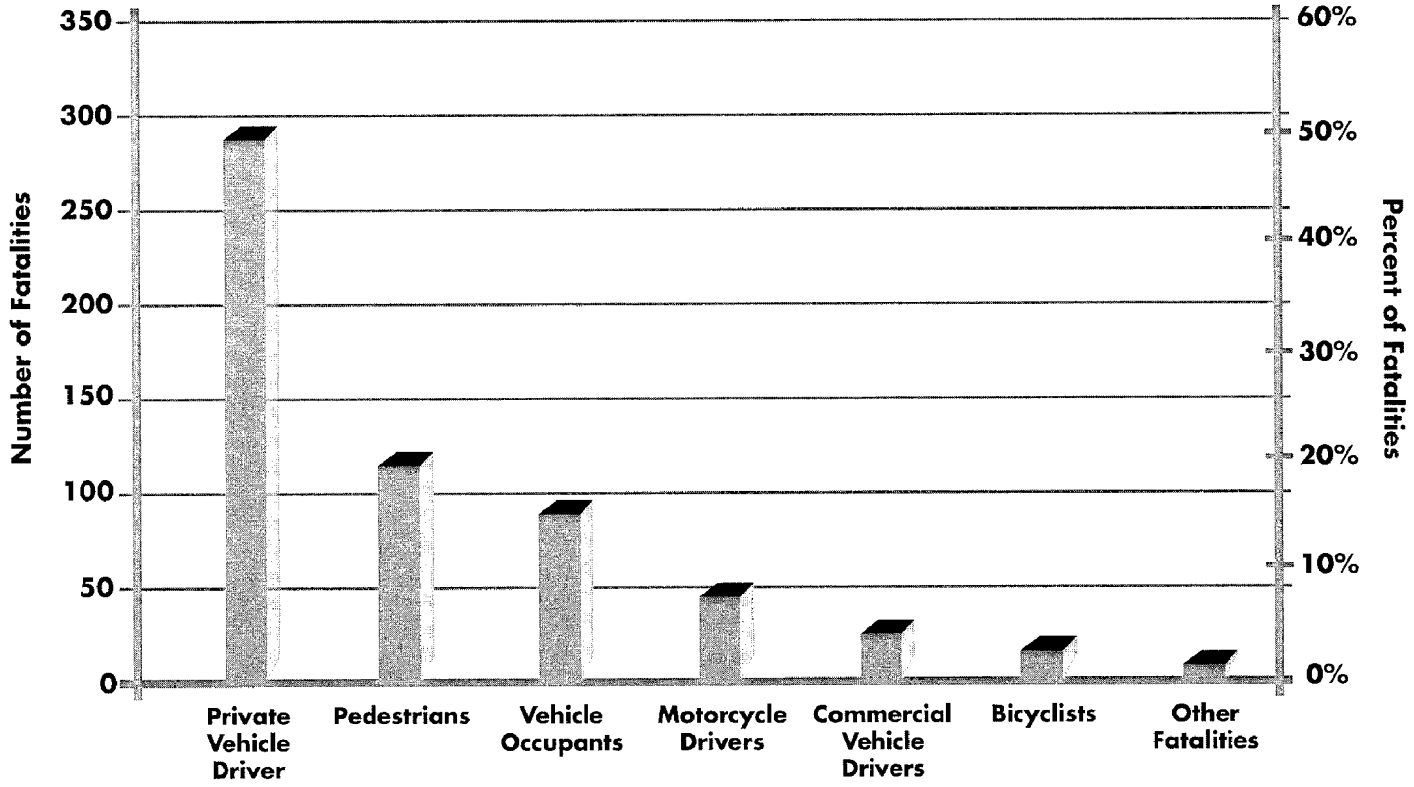
"Compact & Comprehensive problem-Solving Model," taken from: Hart, L., *Faultless Facilitation,* Amherst, MA: HRD Press, Inc. 1996.

References for Cause and Effect Diagrams are fairly common. Two of the most widely used are:

Brassard, M., and Ritter, D., *The Memory Jogger: A Pocket Guide of Tools for Continuous Improvement,* Methuen, MA: Goal/QPC, 1988. An updated version published in 1994 is called *The Memory Jogger II: A Pocket Guide of Tools for Continuous Improvement and Effective Planning.*

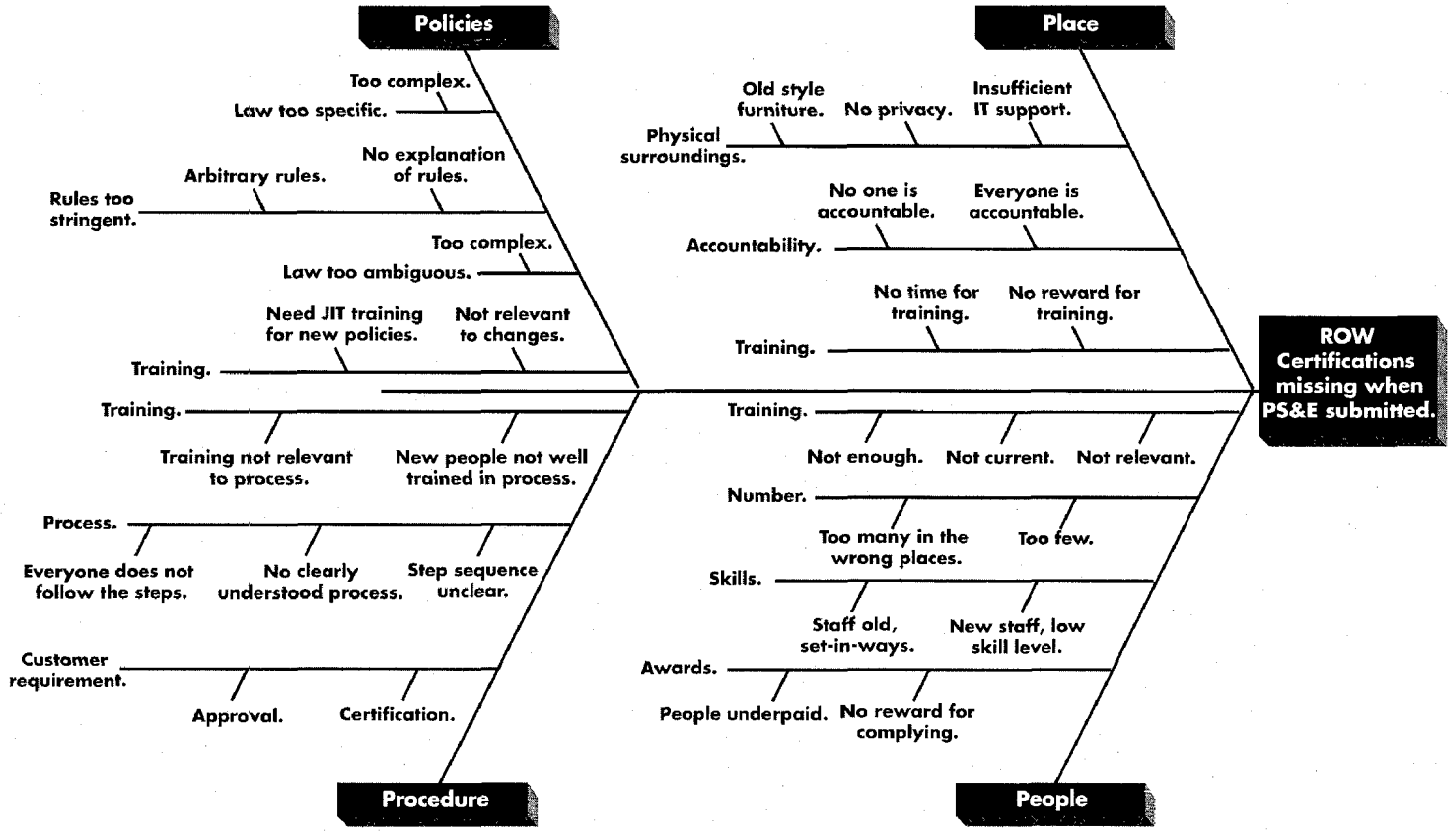
Hornor, L., King, C., and Dethier, B., *Waste Chasers: A Pocket Companion to Quality and Productivity,* Nashua, NH: Conway Quality, Inc. 1992.

Pareto Diagram: traffic fatalities on State & Local Highways



ACCURATE DOCUMENTATION CAUSE & EFFECT DIAGRAM

ISHIKAWA OR "FISHBONE" DIAGRAM



Chapter 10

Idea Generation — Brainstorming; Consensus; Ideal Flow Charting

Finding the 'root' cause(s) of a problem or effect is merely the beginning of Continuous Process Improvement. Generating ideas and identifying opportunities for improvement is crucial to successful implementation of CPI. Brainstorming is the technique used most to generate ideas.

What are the rules of Brainstorming?

Rule 1: Make sure that the central Brainstorming question is stated, understood, agreed upon, and written down for everyone to see.
Rule 2: Evaluation and/or criticism is not allowed and must be enforced by everyone.
Rule 3: Focus on a large quantity of ideas, the more the better.
Rule 4: Record all ideas accurately; don't edit what is said.
Rule 5: No idea is too exaggerated; Team members should be uninhibited so that they come up with wild and outrageous ideas which may end up as the most desirable.
Rule 6: "Piggyback," "hitchhike," and build on the ideas of others.
Rule 7: Team members should give ideas one at a time in turn, or may pass at any time.
Rule 8: Keep the process moving and relatively short—5 to 20 minutes works well, depending on the complexity of the topic.
Rule 9: Once the Team has exhausted their listing of ideas, review each idea for understanding and clarification, and combine where appropriate.

There are two major methods of Brainstorming:

1. **Structured** - where Team members are given a few minutes to silently generate ideas, then every member gives one idea as their turn arises in the rotation or passes until the next round.

2. **Unstructured** - any Team member gives his/her idea(s) as they come to mind.

There are numerous variations in Brainstorming including:

1. The **5-3-5 Method** where each member has 5 minutes to write down three ideas, then the sheet is passed to the next member who has five minutes to add three more ideas that build on the first three ideas; repeat the process as many times as there are team or group members.

2. **Visual brainstorming** occurs when members (or the team) produce a picture of how they see the situation or problem.

3. **Analogies** stimulate the imagination by providing detailed background information on some analogous situation and then invite our minds to make specific creative associations. The team can identify analogies through thoughtful preselection (direct analogies), on-the-spot selection (forced analogies), imagining other places (excursions), or imagining other people (be someone else).

4. **Free-word Association**, the team selects a random noun and uses the image it conjures up in the mind as a starting point for mental movement. The more distant sounding the word seems to the Team at first, the better for creative stimulation.

5. **Brain Writing Pool** where Team members generate ideas silently, then they put their ideas into a pile in the center of a table, where someone else will later read them aloud to the whole Team. It may also be similar to the 5-3-5 method, where members write a few ideas on a piece of paper and place the sheet in the center of the table; each member randomly picks one of the sheets and adds an idea of their own, repeating the process until all ideas are out or you run out of time.

6. **Idea generation** allows for discussion of each idea as it is proposed with a goal of creating quality ideas not necessarily quantity.

7. **Imagineering** is visualizing how things would be if everything were perfect—no problems, no complexities, no errors, no troubles of any kind. No one expects perfection, so asking what perfection would look like is a non-threatening way of opening people's minds to the possibilities of improvement.

8. In **Is/Is Not,** describe the issue; then on one flip-chart list the facts that are part of the issue; on another chart, list the facts that are not part of the issue.

9. **Mind-mapping** is essentially an unstructured brainstorming technique where all of the members are simultaneously recorders. State the issue, problem, or situation in a box in the center of the "map;" each member should use a marker to add their ideas as they get them without waiting for the recorder or their turn.

10. In **The Six Hats**, there are six imaginary thinking hats, each hat having a different color. Each of the six hats represents a different type of thinking. When you put on one of the hats, you operate exclusively in that mode of thinking. When you change from one hat to another, you change from the thinking mode indicated by the first hat to the thinking mode indicated by the next hat.

After generating ideas for some period of time, the CPI Team will have generated a lot of ideas that could possibly solve the problem or improve the process. Next, the CPI Team will need to decide on the **best idea**(s) or alternative(s). There are a wide variety of techniques that can be used to help a team decide on which are the best ideas. As the team makes decisions, it is always good to review the Team Guidelines to remind members on how they agreed to make decisions. The most common decision making process we have today is **consensus**. There are two ways to reach consensus:

1. **Unstructured Consensus:** is a group process that requires all team members to talk, to voice their opinions, concerns, beliefs, and understandings. Consensus does NOT require total agreement; but every member's position and interest has been heard. Therefore, this type of consensus requires time. Voting, or a

majority, or "going along" so that the team can move on is NOT consensus. The team members must continue to talk until each individual can make the internal commitment to the choice by saying, "I can live with this decision."

2. **Structured consensus**, for example the Nominal Group Technique (NGT), is outlined below:

   STEP 1: Brainstorm ideas, list the ideas, and clarify and combine.

   STEP 2: Choose and Rank, which is itself a two step process.

   a. **CHOOSE:** distribute a number of 3x5 cards or Post-it notes that equal the number of choices the team wants to make, e.g. they want the top three ideas, or top five ideas, etc. Then, select and write out one idea per card, from the total list. The idea(s) selected are those the individual team member considers the best. At this point, each member should have a certain number of cards spread out in front of them with one different idea per card.

   b. **RANK:** considering only those cards and ideas in front of them, each member should rank the ideas with the "least best" getting a "1" and the "best" getting a number based on the number of choices the team wants to make (e.g., three or five). The remaining numbers are distributed to the remaining ideas. Collect all of the cards and tally the numbers. The ideas with the highest numerical totals are the ones the team believes are the best.

3. Another structured consensus technique is the **Affinity Diagram**. Sometimes in arriving at consensus some ideas will be lost. In an Affinity Diagram, all of the ideas will be there somewhere. An Affinity Diagram helps a team to creatively organize and summarize a large number of ideas into natural groupings, to better understand the essence of the possible solutions and to find breakthrough solutions.

The steps in the Affinity Diagram are as follows:

STEP 1: Brainstorm and record the ideas on 3x5 cards or Post-it Notes, one idea per card. This works best using large bold print to make it visible 4 to 6 feet away. At a minimum, use a noun and a verb. Then spread out all of the cards/ideas on a flat surface.

STEP 2: **SILENTLY** sort the cards/ideas into groups looking for **relationships.** Team members should do this simultaneously. (Avoid pushing and shoving!) Sometimes, ideas can belong in more than one relationship grouping—so don't ask; move the card/idea or make a duplicate card. The SILENT part is very important because it encourages free thinking and discourages arguments over placement of the cards/ideas. Sorting will stop when each team member feels sufficiently comfortable with the relationship groupings. It is okay for some ideas to stand alone.

STEP 3: Develop "header cards" or "theme cards" for each relationship grouping that captures the relationship or theme everyone saw. Make them clear and concise; noun-verb combinations work best. Outline the "header cards" with bold lines to distinguish them from the idea cards. Team members can talk during this stage. Spend the extra time needed to do solid header cards. Strive to capture the essence of all of the ideas in each grouping. Shortcuts here can greatly reduce the effectiveness of the final Affinity Diagram.

STEP 4: In order to see additional relationships, groups that are similar should be placed next to each other. If groups are very similar, the team can combine two or more groups to create larger groups under a new header. The team should decide what to do next with the idea(s).

Any improvement idea should meet the following criteria: Is the improvement—

1. **Conceivable?** Can process owners understand the idea? On the other hand, do not eliminate an improvement idea just because you think management will not "get it" or "buy into it."

2. **Achievable?** Are there any known constraints such as budget, personnel, laws, and regulations?

3. **Valuable?** Do the improvements actually add value to the process for customers? What's the biggest impact?

4. **Manageable?** Are the improvements doable? What other resources will be needed? What is the return on investment? What is the time-frame needed to make the improvements?

5. **Growth Facilitating?** Will the improvements help the organization continue to grow and get better?

6. **Testable?** It is always preferable to test the recommended improvements on a small scale first. What are the milestones and measures?

The CPI Team should compare the idea(s) to the **Criteria Analysis** or **As-Is Process Map**, and ask and answer the questions for process improvement in the following order:

1. **Eliminate?** From the Criteria Analysis or As-Is Flow Chart look for steps that can be eliminated: e.g., inspections, approvals, delays, reporting, filing, etc.

2. **Change?** Change the way the process is done, the way the steps are done, the scheduling, and/or the technology.

3. **Combine?** Combine some parts of the process in order to improve it; combine with other processes in other organizations.

4. **Rearrange?** Rearrange steps in the process to make it simpler, to eliminate waste.

5. **Simplify?** Make sure you have eliminated all possible steps. Then, simplify what is left and recognize immediate fixes that prevent problems from reaching customers.

Once the CPI Team has tested its idea(s) for improving the process, they should construct an **Ideal Process Map**. An Ideal Process Map is constructed in the same way as an As-Is Process Map, only activities are listed and sequenced as they **should be**—not as they are. Ideal Process Mapping is really re-engineering the process: What is the best way to produce the product or service irrespective of the As-Is Process? An example of an Ideal Process Map follows this chapter.

REFERENCES:

Plesk, P., *Creativity, Innovation, and Quality,* Milwaukee, WI: ASQ Quality Press, 1997.

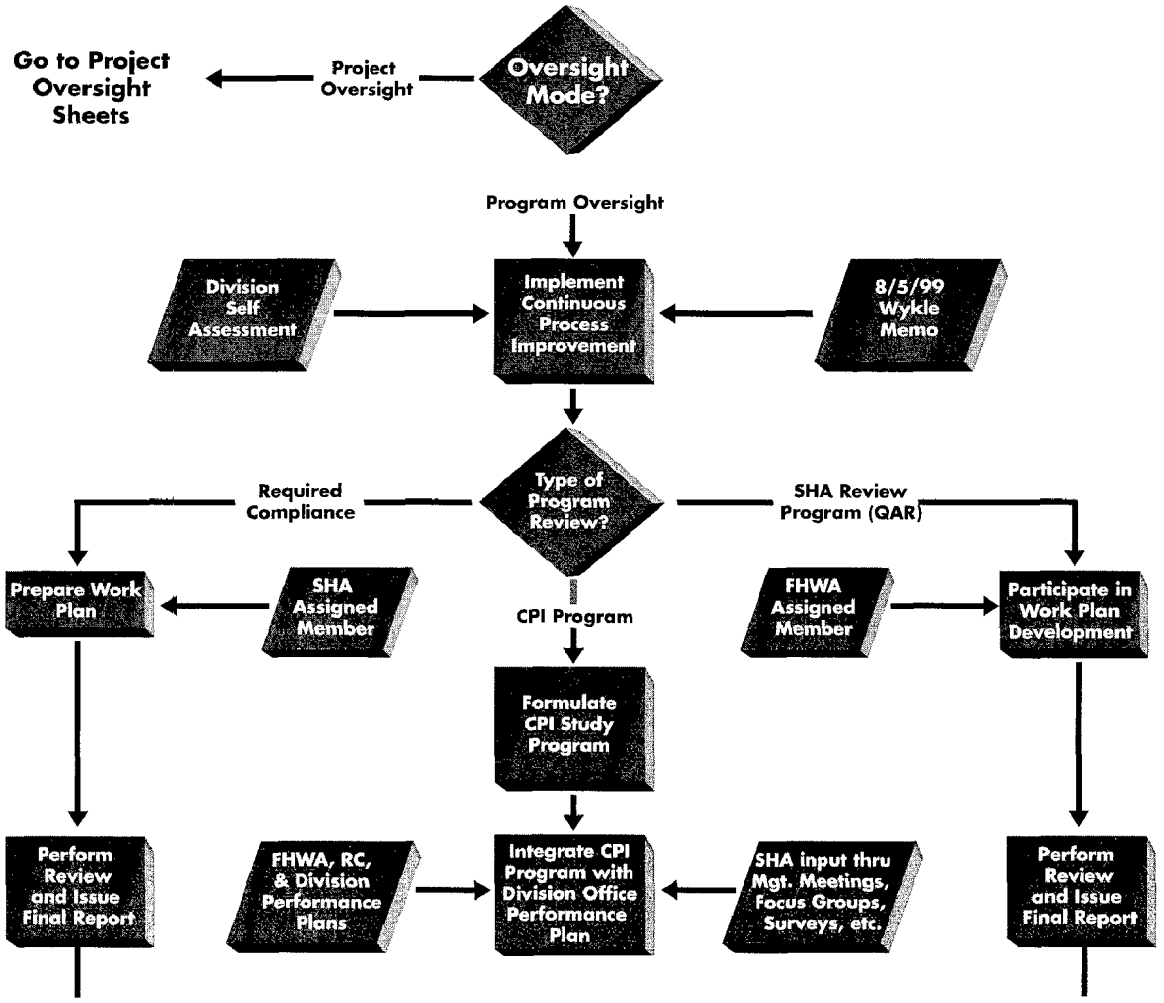
VanGundy, A., *Idea Power: Techniques & Resources to Unleash the Creativity in Your Organization,* New York, NY: AMACOM, 1992.

Brassard, M. And Ritter, D., *The Memory Jogger: A Pocket Guide for Continuous Improvement,* Methuen, MA: GOAL/QPC, 1988.

The Memory Jogger II: A Pocket Guide of Tools for Continuous Improvement and Effective Planning, Methuen, MA: GOAL/QPC, 1994.

Hornor, L., King, C., and Dethier, B., *Waste Chasers: A Pocket Companion to Quality and Productivity,* Nashua, NH: Conway Quality, Inc, 1992.

IDEAL PROCESS MAP



SHA Assigned Member
SHA & HWA Mgt. Input
Assemble CPI Multidisciplinary Teams
Perform Review and Issue Final Report
Negotiate Consensus Recommendations to be Implemented @ Closeout Mtg.
Document Agreement for Implementation
Incorporate all Implementation Items into a Tracking System
Conduct Regular Implementation Status Meetings with SHA Mgt.
CPIS Methodology

Chapter 11

Writing the Report

The report is the essential document of the business and professional world. It is used to:

1. Inform and instruct colleagues and customers;
2. Furnish data on which people can make decisions; and
3. Sell ideas for improving processes.

Reports are about facts; what the team has observed, investigated, experienced, or read about. Reports are NOT what people feel, fear, or hope.

In either written or oral communication there are **Seven C's** that ought to guide the writer or speaker:

1. **Completeness:** Say all that must be said.
2. **Clearness:** Say it clearly so there is no mistaking your meaning.
3. **Concreteness:** Be specific and choose your words carefully.
4. **Correctness:** Know your facts and use proper grammar.
5. **Conciseness:** Be brief.
6. **Courtesy:** Be polite, treating your reader as you would like to be treated.
7. **Character:** Let you personality show in a natural, unstilted style.

The qualities of powerful writing are:

1. **Sense of the audience:** Anticipate the reader's needs.
2. **Right tone:** The tone should be even tempered.
3. **Informative content:** Ensure that the report has substance; it should say something.
4. **Movement:** Give the report direction and sense of order.

5. **Helpful format**: The report should look good on the page and be easy to read.
6. **Detail**: Use concrete, selective, precise words.
7. **Voice**: Give the report the strong, credible imprint of the writer.
8. **Originality**: The report should say something new, or something old in a new way.
9. **Rhythm**: The report should sound natural and be easy to understand.
10. **Good Mechanics**: The report should observe the conventions of spelling, punctuation, and usage.

When it comes to writing the report, the authors must identify the **intended audience** as precisely as possible. To do this the authors need to decide:

1. What does the audience want to get from reading this report?
2. What is the level of expertise of the audience?
3. How much specialized vocabulary can be used?
4. How many will read the report?
5. How much influence does the audience have?
6. How long will this influence last?
7. What actions might be taken on the basis of the report's contents?

There is a good deal of disagreement about what is appropriate **language** and **style** in business reports. One specialist suggests that the **language** of the report should be objective in tone, which puts distance between the reader and the writer. Another specialist suggests that reports in which the team is making suggestions, proposals, or recommendations concerning routine matters, most readers prefer a more conversational approach. The ultimate goal as a report writer is to communicate the report message as quickly, easily, and precisely as language will permit.

The basic format of a CPI Report includes the following:

1. A **Title Page**, which contains the Title, the name of the preparer, and for whom the report was prepared.

2. A **Letter of Transmittal**, which briefly mentions the purpose of the report and may refer to special features or problems encountered during the study. An expression of appreciation for assistance is sometimes included.

3. A **Table of Contents**, which can be prepared from the basic outline of the report.

4. A **List of Illustrations**, which contains all of the graphs, charts, and process maps that the team used.

5. A **Synopsis**, **Abstract**, or **Executive Summary**, which is a brief summary of the report body presenting all of the major facts, analyses, and conclusions. This makes up about 1/5th to 1/10th the length of the entire report.

6. An **Introduction**, which should contain at a minimum the purpose of the report and a description of the method used.

7. The **Body of the Report** which usually contains at a minimum:

   a. A detailed description of procedures carried out,
   b. A report of findings,
   c. A summary of results,
   d. Conclusions, and
   e. Recommendations.

8. A **List of References**, which lists sources of primary and secondary information.

9. An **Appendix**, if included, contains supplementary material that supports the findings.

With the information collected and in preliminary workable order, the CPI Team is ready to make an **outline** for the report. Outlining is the process of dividing. The outline is simply the plan to be used in the writing task which follows. Although the outline may be either written or mental, the CPI Team will want to put it in written form for all except very short reports. In longer reports where a **Table of Contents** is needed, the outline forms the basis of this table. Also, in most long reports— and even in some short ones— the outline topics serve as guides to the reader as captions (headings) to the paragraphs they cover.

As the team begins the task of outlining, they will need to decide which writing *pattern* to use in the report. There are two basic patterns:

1. **Indirect**—findings appear in *inductive order*, moving from the known to the unknown. This pattern typically has an: a) introductory section; b) report body; and c) a summary, conclusions, or recommendations section.

2. **Direct**—findings appear in *deductive order*. This pattern typically has a: a) summary, conclusion, or recommendation section; and a b) findings and analysis section.

In the outline of the body of the report, the team will be dividing the whole of the information they have gathered and interpreted. They should begin by looking for some logical way of dividing the information into equal and comparable parts. The general basis for these divisions are:

1. **Time:** the divisions of the whole are periods of time;
2. **Place:** the divisions are based on similar characteristics occurring in different geographic locations;
3. **Quantity**: the divisions are based on quantitative values;
4. **Other Factors**: the divisions are based on varying information areas.
5. **Combination**: the divisions are based on some combination of the previous divisions.

In writing the outline, the CPI Team has a choice of two general forms for wording the outline:

1. **Topic Captions**: one or two words which do nothing more than identify the topic of discussion, or

2. **Talking Captions**: which identify the subject matter covered, but also indicate what is said about the subject.

As a general rule, captions at each level of the outline should be in the same grammatical form. Talking captions should be the shortest possible word arrangement that also meets the talking requirement.

In the outline, as in all writing, the team should take care not to overwork any words and expressions.

Graphic Aids are an essential part of many reports. Their role is supplementary, assisting the words to communicate the report content. Graphic Aids may serve to present minor supporting details not covered in the words, but they must never replace written discussion. They help to give emphasis to the key points of coverage. If the team is to use Graphic Aids effectively, they must plan them with care. Plan each Graphic Aid for a specific communication reason and include it because it is needed.

Graphic Aids should be placed within the report and near the text they will illustrate. Fortunately, modern computer programs make this easier. If the aid is small and takes up only a portion of the page, it should be placed so that it is surrounded by the writing that covers it. If it requires a full page, place it immediately following the page on which it is discussed. When the discussion covers several pages, the full illustration is best placed on the page following the first reference to its content. Putting all Graphic Aids in the Appendix is NOT convenient for the reader, who must flip through the pages each time he/she wishes to see the graphic presentation of a part of the text. Only those Graphic Aids that do not tell a specific part of the report's story should be placed in the Appendix.

Graphic Aids must be labeled concisely and accurately. Introduce them by referring to them and their roles in the text, or by a brief introductory paragraph immediately preceding the illustration.

Graphic Aids are divided into two groups:

1. **Tables:** any systematic arrangement of quantitative information in rows and columns. Table titles are placed above them and numbered consecutively using Roman numerals.

2. **Figures:** a miscellaneous group of any illustration type that is NOT a table, e.g., pie, line, and bar charts; diagrams, maps, and pictures. Titles of figures are placed below them and are numbered consecutively and consistently with either Roman or Arabic numbers.

Chapter 12

Selling Your Ideas

What can the Team do to improve the chances of getting their ideas approved?

The best way to gain support for an idea is to be able to show how the idea will help the approver (sponsor) meet some of his or her needs. In order to do this effectively, it is necessary to know what is important to the approver.

An approver in an organization usually wants answers to these four questions:

1. Are the results worth achieving?
2. Is there a high probability that this idea will achieve the results?
3. Are the resources available, i.e., time, money, people, etc?
4. What might go wrong?

The approver in an organization will most likely support the plan or idea if:

1. It will help solve a problem that he/she cares about;
2. It will achieve one of his/her goals;
3. It will help him/her satisfy their personal values, e.g., an increase in status, increased recognition, or an improvement in results.

To help them understand the approver's viewpoint, the CPI Team should answer the following questions:

1. What are the approver's top priorities?
2. What are the approver's current projects and work objectives?
3. What problems would the approver like solved?
4. What are the approver's long-term goals, values, or wants?

Once the CPI Team has some understanding of what is important to the approver, they should formulate their idea(s) or plan using the following test as a guideline:

1. What is the idea(s)? Is the idea(s) specific? What is the action? Where? When? How?
2. What are the benefits of this idea(s)? Are there benefits to the approver? Are there benefits to the organization?
3. What concerns or objections might the approver have about this idea(s)? The team needs to identify potential problems and find ways to protect the idea(s) from potential objections. What contingency plans are there for these objections?
4. What is the next step? If the idea(s) is approved, the team should be prepared to finalize the details. They will need to identify and confirm who will perform each task by a specified date.

WORKSHEET: SELLING YOUR IDEAS

The best way to gain support for an idea is to be able to show how the idea will help the approver meet some of his or her goals. To help you formulate your idea in such a way that it meets what's important to the approver, answer the following questions:

1. What is the specific idea(s)? What is the action? Where? When? How?

2. What are the benefits of this idea(s)? To the approver? To the organization?

3. What concerns or objections might there be to this idea(s)? What contingency plans do you have to meet these concerns or objections?

4. What are the next steps? Who will do what by when?

Chapter 13

THE CLOSE-OUT CONFERENCE

The fundamental qualities of every good meeting include:

1. A **purpose** all participants understand;
2. An **agenda** organized to achieve that purpose;
3. A **leader** who insures that the agenda is adhered to;
4. **People** there who need to be there;
5. **Visual presentations** to help the group assimilate masses of data;
6. **Prepared participants** who make contributions;
7. Concludes with a **summary** by the leader of what has been accomplished;
8. Has an organized **post-meeting follow-up**.

Most formal meetings generally fall into one of four basic types: problem-solving; decisionmaking; creative (or development); and the report meeting.

Our concern here is with the last type, the report meeting. Many regular staff meetings are information sharing or reporting sessions, which are often misused. Listening to someone give a report is almost always a waste of time, since most people can read a report far faster and with greater retention than hearing it at a meeting.

THE MEETING AGENDA

Many specialists believe that Report Meetings should be run in an authoritarian manner because the purpose is to pass along information as concisely and as efficiently as possible. If this methodology is to be followed, the leader should control the agenda and ensure that participants will adhere strictly to the agenda.

There are four distinct roles performed by an agenda:

1. It is a tool to help the CPI Team prepare for the meeting.

2. It communicates to participants what is to be considered and what is expected of them.

3. It is a standard by which the success or failure of the meeting can be measured.

4. It is a mechanism for order and control of the meeting by keeping the group mind focused.

The agenda should be **written** and circulated before the meeting (preferably 1 or 2 days). This exercise of drawing up the agenda is itself critical to creating the shape of the meeting. The meeting will have to proceed in a particular order to ensure that its objectives are met. To do this, the team first needs to consider its strategy for the meeting by answering these questions:

1. *Should there be a close-out (report) meeting at all?* After carefully determining that no alternative exists and that a meeting is the most effective method of achieving what is needed, call a meeting. Do not assume that just because the team has a report that you should conduct a Report Meeting.

2. *What is the goal of this meeting?* This question was answered when it was determined to have the meeting, but it is only final when the team writes a single sentence in which the goal is stated. That sentence becomes the opening statement of the meeting agenda.

3. *What must take place to achieve this goal?* In most cases, to achieve any goal, information must be passed or exchanged, an understanding of the issues must be reached by all participants, and perhaps several smaller decisions addressed before the final decision can be made.

4. *Who or what might be a roadblock in achieving this goal?* Identifying and understanding who and/or what might block the achievement of the goal is important in the strategy of the Team's presentation of the report. It is also important to understand the viewpoint of people who do the blocking.

As a general rule, an agenda should meet the following guidelines for a Report Meeting:

1. It should concentrate on a *few related major points or issues.*

2. It should be *well organized* and tightly focused.

3. It should be *distributed in advance* to those who need to be at the meeting.

4. It should say *who will attend,* as well as *the date, time, and place.*

5. It should be a *positive document.*

6. It should be specific about *starting and ending times,* and include the time allotted for each presentation, question period, discussion, etc.

REFERENCES:

Millar. R., and Pincus, M., *Running a Meeting That Works,* Hauppauge, NY: Barron's Educational Series, Inc. 1991.

Hart, L., *Faultless Facilitation,* Amherst, MA: HRD Press, Inc. 1996.

Chapter 14

ORAL PRESENTATIONS

There are five ingredients of a successful presentation:

1. The poise and confidence of the presenter;
2. A sense of the audience and the occasion;
3. The selection of material;
4. A sense of purpose for the presentation;
5. The presenter's delivery.

The primary aim of the Team's presentation is not to motivate but simply to *explain* and *inform*. To that end, the Team should be careful to:

1. Make sure that all information is accurate;
2. Strive for clarity by using precise words and defining unfamiliar terms;
3. Avoid complicated explanations and a mass of statistics;
4. Present in such a way that the audience will *listen, understand,* and *remember;*
5. Use examples to illustrate a point;
6. Be brief;
7. Determine the point you want to make;
8. Tailor your material to build to a conclusion;
9. Avoid digressions or irrelevancies.

WHAT ARE THE THINGS A PRESENTER DOES THAT MAKE THEM SEEM POISED, CONFIDENT, AND COMPELLING TO YOU?

According to the experts, nobody is totally immune to "stage fright." Nervousness is a universal phenomenon. It prevents the presenter from seeming to be poised and confident, and it affects their delivery. There are some things presenters can do to control their nervousness:

1. *Know your subject thoroughly.* Do all the research necessary to make you confident that you know what you are talking about.

2. *Know your audience.* Determine whether your audience supports your ideas; are they against your ideas, merely neutral, or can they be persuaded? These attitudes will affect your approach and manner.

3. *Organize your material.* A good presentation is a purposeful entity; it should have an introduction, body, and conclusion; it should have a purpose the audience clearly understands.

4. *Practice the presentation.* Prepare an outline (3 x 5 cards work well for some people) and deliver the talk out loud both in private and to other team members.

5. *Make a conscious effort to relax.* Take deep breaths. Listen closely to the speaker who precedes you—you may become so interested that you forget your uneasiness. If you expect to be nervous, try reading the first words of your presentation. You will relieve pressure from the most nervous time of all; the beginning. Then, move quickly away from reading—preferably to visual aids.

6. *Establish eye contact.* Look at the audience before you speak. This will draw its attention to you. Do not scan the audience every time you look up from your notes; pick one person—preferably an ally—and deliver several words or phrases to him/her.

7. *Be enthusiastic.* Usually the most important element in any successful presentation is the speaker's enthusiasm, a quality that reflects other desirable qualities like believability and sincerity.

8. *Be brief.* A good speaker knows when to quit. Be aware of your time limit and stick to it.

9. *Don't be too critical of yourself after the event.* There are three speeches involved in any presentation: the one you thought you

were going to give; the one you actually gave; and the one you delivered so brilliantly to yourself on the way home!

The following model can be helpful in organizing a presentation. It is a very obvious organization—and most busy listeners prefer obviousness to subtlety:

1. *Announce the topic.* Say what you're going to talk about. You want clean, simple, efficient starts; e.g., "My purpose is to tell you ...;" "I'm here to talk about the ...;" "This afternoon I'm going to propose ..."

2. *Define unfamiliar terms in you topic.* Sometimes the topic isn't so straightforward. There may be a necessary term that is unfamiliar to your audience. Right after you announce the topic, define any unfamiliar terms in plain English, and follow the definition by a quick example.

3. *State you bottom line.* Get to the point. Briefly state the conclusion, recommendation, or request. Sometimes a presentation does not have a bottom line, so be sure your audience is not expecting one.

4. *Give a blueprint for the body of the presentation.* The blueprint outlines the points in the body of your presentation. This technique helps the audience follow along. Make sure the blueprint precedes your first point or section in the body of the presentation.

5. *Use strong transitions.* Your organization may not be effective if listeners cannot figure out when you have moved from one section of your presentation to the next. There are three techniques for transitions:

   a. Announce the transition explicitly;

   b. Use visual aids;

   c. Use body movements.

6. In the body of the presentation repeat the following steps for each section or point in the presentation:

   a. *Announce the topic for this section;*

   b. *State the bottom line for this section;*

   c. *Present the details.* In presenting the details, the use of examples and visual aids can help the audience understand better the point the presenter is trying to make. Be careful not to make your examples or visual aids too wordy. Your audience can read the report.

7. When you have finished the body of your presentation:

   a. *Conclude with a strong transition;*

   b. *Restate your main point* (unless that would seem unnecessarily repetitious);

   c. *Ask for questions* (unless you have structured the meeting to handle questions at another time).

It is generally accepted that there are **Eight Steps to Credibility**:

1. Be honest with your audience.
2. Know both sides of the argument.
3. Make sure your audience knows you are the expert.
4. Raise questions.
5. Prove your points with facts.
6. Create your own survey.
7. Cite authorities that are accepted by your audience.
8. Invite questions from the audience.

REFERENCES:

Baily, E., *A Practical Guide for Business Speaking,* New York, NY: Oxford University Press, 1992.

Hoff, R., *A Fearless Guide to Making Great Presentations,* Kansas City, MO: Andrews and McMeel, 1988.

Chapter 15

Follow-up and Measurement of Process Outputs

Follow-up

The dictionary provides the following definitions for **follow-up**:

"to pursue closely and tenaciously (steadily)"
"to increase (strengthen) the effect by further action"
"to pursue to solution or conclusion"
"to follow (an act or achievement) with a similar or related act."

Everyone wants to have a follow-up strategy that insures that processes are improved. Here are some guidelines to use in developing your follow-up strategy:

1. Do not delegate follow-up assessment. This should be the responsibility of the CPI Study Team, as stated in the Team Charter.

2. Invite all of the workforce (i.e., all of the owners) to participate, all of the time.

3. Communicate, communicate, communicate! The biggest problem with human communication is the assumption that it happens.

4. Continuous process improvement is not a quality event—it must become a way of life in the workplace.

5. Avoid the not-invented-here syndrome. Overcome the tendency to reject any idea "not invented here." What is important is that the owners provide the time and patience to give any recommendation a chance to work.

6. Make this a learning experience. Process owners need to know as much about CPI as the team.

7. Do not expect a magic bullet. Follow-up, like everything in CPI, requires continuous work and attention. It takes time, energy, and intelligence.

8. JUST DO IT! The main idea is that the process is starting all over again. It is continuously improving what we do.

Implementation Plan

In Chapter 1 we learned that CPI is both a philosophy and a practice. Implicit in these concepts is that the "owners" of the process are committed to continually improving the process. The assumption is that CPI Teams would NOT be sponsored unless owners were prepared to implement the changes recommended.

In the final analysis, however, a CPI Team cannot force the implementation of even the most obvious improvements unless the owners are inclined to change. However, there are some things that a CPI Team can do to facilitate implementation. It may be beneficial to include an implementation plan or strategy in the final report.

At a minimum, an implementation plan should include:

1. A description of the actions necessary for implementation;

2. Identification of the responsible office and/or owner of the process;

3. The date by which each action should be completed; and

4. The measures of successful implementation.

Measurement of Process Outputs

The only true way to measure the success of recommended improvements is through measuring the performance of the process. There is a vast difference between measuring the outputs of processes and measuring results or outcomes. Individual outputs are not the outcomes. Nor are they the final measure of success. Rather, they are components of a whole. Output measures provide a metering of the individual activities that advance the achievement of outcomes. Outcome measures provide information on the achievement of larger goals and objectives. Outcomes are produced indirectly, and are the result of outputs.

A perfectly executed process is a waste of time and money if it fails to achieve the outcomes desired. However, the outcomes desired by any given program or organization are often very difficult to measure because the outcome: will not become evident for a long time; or it may be difficult to determine a causal relationship between outputs and outcomes; or the output may be easier to measure.

Regardless of whether we are considering outcome or output measures, a good measure needs to meet the following criteria:

Meaningful:	It has wide scope, has meaning to employees, and reflects the needs of customers and stakeholders.
Economical:	It allows for cost-effective data collection.
Apparent:	It is simple, understandable, unambiguously defined.
Sensitive:	It is capable of indicating changes in performance.
Useful:	It shows how well goals and objectives are being met.
Reliable:	It is quantifiable, realistic, and data driven.

The CPI Team should use **Quantitative Thinking** to develop performance measures. There are four basic steps in Quantitative Thinking:

STEP 1: Write a **measurable goal** for the process output.

STEP 2: **Visualize** situations in which the output to be measured is successful.

STEP 3: Identify the **observable characteristics** that distinguish achieving the goal: i.e. How will you know that what you have visualized has been achieved? Use brainstorming to identify as many observable characteristics as you can think of to describe achievement of the goal.

STEP 4: Determine if and how you can **quantify** the observable characteristics.

Output measures are set out as **performance indicators**, which are defined as "particular values or characteristics used to measure output." Some categories of performance measures may include:

1. *Process measures:* e.g., time, number of documents, number of reviews and approvals, marginal social costs, etc.

2. *Attribute measures:* e.g., timeliness, accuracy, customer satisfaction, etc.

3. *Efficiency measures:* e.g., how much each product or service costs; the marginal social costs, cost of doing business, etc.

4. *Effectiveness measures:* e.g., how worthwhile is our investment in the process; marginal social benefit, benefit-based cost allocation, cost-occasioned benefit, etc.

There are four general levels of measurement:

1. *Nominal level* where numbers are assigned to categories merely as labels, e.g., Non-deficient Bridges and Deficient Bridges.

2. *Ordinal level* where there is a rank ordering from the highest to the lowest, e.g., ranking of bridge condition from 1 to 100.

3. *Interval level* where numbers are assigned by using pre-determined rating scales, e.g., a Likert-type scale, i.e., rating deficient bridges on a scale of 1 to 5.

4. *Ratio level* where a relationship is expressed between two similar magnitudes in respect to the number of times the first contains the second, e.g., this year spending on bridge maintenance is twice what it was last year

The criteria described calls for "simple, understandable, unambiguously defined" measures. Operational definitions of the measures helps everyone to use the measures to drive appropriate action.

A typical operational definition of a measure includes:

1. A specific goal or objective of the performance measure.

2. Data requirements, including:

   a. The population the metric will include,

   b. The frequency of measurement, and

   c The data source.

3. Calculation methodology, including:

   a. Required equations, and

   b. Precise definition of key terms

4. Reports in which the data will appear and the graphic presentation that will be used to display the data.

5. Any other relevant rationale for the measure.

REFERENCES:

Teischler, W., *Understanding and Applying Value-Added Assessment,* Milwaukee, WI: ASQ Quality Press, 1996.

Index