

## **Chapter 1**

# **CONTINUOUS IMPROVEMENT CONCEPTS**

***The Continuous Improvement (CI) process is built on the need for the organization to manage Key Results Areas:***

- ***Customer Satisfaction***
- ***Quality***
- ***People Growth***
- ***Organization Climate***
- ***Innovation***
- ***Productivity***
- ***Economics***

### ***DEFINING CI & QUALITY***

This chapter will familiarize you with the definitions of terms commonly used in Continuous Improvement (CI), and provide an understanding of the comprehensive nature of quality in a product or service. Integrating CI concepts with Key Result Areas (KRAs) provides a total quality environment in the organization.

Views of what Quality is are varied. Even experts do not agree on a common definition of Quality. Here are a few definitions.

Quality is:

- “Character with respect to excellence, fineness, etc., or grade of excellence; High grade, superior excellence.” – *Webster’s Dictionary*
- “Fitness to use.” – *Joseph Juran*
- “The efficient production of the quality the market expects.” – *W. Edwards Deming*
- “The total of features and characteristics of a product or service that bear on its ability to satisfy a given need.” – *The American Society for Quality Control & The American National Standards Institute*
- “Quality depends on understanding and revising the production processes on the basis of data about the processes themselves...”  
– *Joint Commission on Accreditation of Hospitals*

None of the above definitions are specific enough to work from. Each is inadequate because Quality is the total combination of many factors. The best way to think of Quality is as expressed in Figure 1.1. First we consider what Quality is to the Customer, then we look at whether we’re meeting standards of performance. Finally, we ask what can we do to continuously improve the level of Quality we’re producing.

**Figure 1.1**

***QUALITY DEFINITIONS***

*"I know it when I see it!"*

**Customer Satisfaction**

- Performance—Produce Right Results?
- Features—Provide Extras?
- Conformance—Meet Standards, Expectations?
- Serviceability—Speed, Courtesy, Easy Use?
- Aesthetic—Clean, Look, Impact On Senses?
- Perceived Quality—Reputation, Image?
- Reliability\*—Will It Work, Not Fail?
- Durability\*—How Long Will It Work?

**Standards Of Performance**

- World Class, Benchmark, NAO
- JCAHO Clinical Outcomes

**Continuous Improvement**

- No Upper Limits!
- On KRAs: Faster, Better, Cheaper More!

*\*These definitions apply to products, but may not be applicable to services.*

***RELATING CI TO KEY RESULT AREAS***

Before moving to more advanced levels of analytical tools for problem-solving, the primary operating aspects of each KRA must be in place. KRA CI means efforts of Continuous Improvement for each of the KRAs:

- Customer Satisfaction CI
- Quality CI
- People Growth CI
- Culture & Climate CI
- Innovation CI
- Productivity CI
- Economic CI

A common failing is the pursuit of Quality while neglecting the needs of Colleagues and Customers, or not dealing effectively with competition. KRA CI means that we are looking after the total needs of the organization?

There are specific strategies for powering up the problem-solving process and getting at Quality.

## QUALITY LEVELS & PRACTICES

Quality Levels & Practices provide the basis upon which Excellence and Continuous Improvement are built. Supporting the philosophy and operation of Continuous Improvement is the belief that everything can be improved. To guide your efforts for improvement, the following questions need to be answered:

- What is it that we should work to improve and by how much?
- How do we maintain that improvement?
- Is the improvement seen as desirable and a good value to the Customer?

There are two primary aspects of Quality:

1. Levels of Quality
2. Practices of Quality

These concepts, individually and jointly, are the basis of Continuous Improvement. Learning these concepts will give you a set of ideas to make your work more enjoyable and easier to do.

Figure 1.2

### QUALITY STRATEGIES

#### Levels

- A. Acceptable Quality Level
- B. Competitive Benchmarking
- C. Beyond Benchmarking

#### Practices

- √ Customer Is Quality Boss
  - *Their Agenda 1st, Then Ours*
  - *Zero Defections, Quality Function*
- √ KRA Continuous Improvement Process
  - *Zero Defects*
- √ Reduce Cycle Times
  - *Just-In-Time*
- √ Design In Quality
  - *Poka-Yoke*
  - *Robust Design*

## 1. LEVELS OF QUALITY

### A. ACCEPTABLE QUALITY LEVEL (AQL)

The Acceptable Quality Level is the minimum number of work steps, materials, or other elements needed to meet quality standards. The objective is to operate within the AQL. For example, at one point in time the auto industry had a job description for a “product test driver.” This person was responsible for test driving each car that came off the assembly line before shipping the car to a dealer. Many costs were Colleague with this step of the process, i.e., salary, benefits, test site, etc. If every Colleague had performed their job correctly, there would be no need for a “product test driver,” and still the AQL would be met. The point is, the “product test driver” costs could have been, and eventually were, eliminated. It was “stripped out” of the process, as were the costs Colleague with this work step. Strip out work elements that are not required for achieving an *acceptable quality level*.

### Assignment

1. Look at one work process that you routinely do in your job. List all of the tasks involved in the process. Identify the tasks which can be eliminated because they are not necessary to achieve the required standard of performance. If it cannot be removed altogether, can it be removed in part, simplified, or combined with another task?

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2. Review your assessment with your supervisor. Make changes to achieve AQL in that process.

Process Name:

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Steps in the process to be eliminated:

1. 

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2. 

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3. 

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4. 

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Changes to be made:

1. 

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2. 

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3. 

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4. 

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Supervisor's Approval:

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## B. COMPETITIVE BENCHMARKING

The next level to achieve is benchmarking. Benchmarking is the rating of an organizations' practices or products against the world's best. It can occur within your own industry or outside your industry. Are we as good as they are? If not, what can we learn and adapt from them?

For example, the Marriott Corp. has been a leader in the hospitality industry. What can we learn from the Marriott's housekeeping department? Their food service department? Their registration/admitting process? Many aspects of efficient and effective management can be translated to healthcare.

### Case Illustration

#### Benchmarking: Mazda Accounts Payable

This case illustrates a benchmarking practice.

**Define Problem:** Ford Motor Company, a leading auto manufacturing organization, employs 500 people in their Accounts Payable Department. Ford management tried to reduce A/P staffing, but the department was convinced they were working hard, and needed all 500 employees to get the work done.

**Outline Options:** Ford management asked their A/P department head to benchmark the Mazda Corporate A/P Department. Mazda Corporation, a leading auto manufacturing organization about one half the size of Ford Motor Company, employs 50 people in their A/P Department. Ford Motor staff did not believe that it was possible for Mazda staff to process the same type of work with such few employees, until they saw it with their own eyes. People have to come to grips and understand that things can be dramatically different and better.

**Implement Solutions:** When Ford staff visited Mazda operations, they saw a major difference in the way A/P was processed. It was a faster, more effective system. Ford A/P required a verification process on all bills. This process included a summarization of all charges onto a form. This means handling the same piece of paper two times, and duplicating the number of pieces of paper involved in the process. It slowed down payment to suppliers, thus making the supplier less cooperative and more unhappy.

Mazda required that the invoice be received with the goods, a requirement that they made of all suppliers. The invoice was endorsed at the time of receipt, and paid from there. The Mazda process required half the paperwork and half the amount of handling time. Suppliers were happier as they received their payment faster. Thus, they were willing to follow the billing process required by Mazda.

**Track Results:** Ford Motor, having seen the process with their own eyes, made substantial changes and reduced their A/P staffing by half.

**Case Illustration**  
**Benchmarking: Xerox Copies**  
**Competitors Costs**

This case illustrates how the benchmarking practice can be used to set goals as well as improve processes.

**Define Problem:** From 1975 to 1982 Xerox experienced a downturn. By 1981 fierce competition had reduced Xerox's 85% market share to 35%, its once high profitability to below industry average, and its once state-of-the-art product line to obsolescence.

**Outline Options:** In 1981, Xerox made its first visit to Japan. There, Xerox staff discovered why their company was failing, and used the following information as objectives for their improvement effort:

- Xerox's product costs were twice its competitors'
- Xerox had more than three times the number of managers per employee than did its competitors'
- Xerox's product design process was outdated

**Implement Solutions:** After discovering that its production costs were significantly higher than those of its competitors, Xerox discarded its standard budgeting process and adopted the lower competitor costs as its improvement target. Soon all units were instructed to adopt similar improvement targets.

Support units such as distribution, administration, etc., were initially stumped for a comparison source, but found that they could make internal comparisons to other units (e.g. worker productivity at different regional distribution centers).

*With permission from Health Care Advisory Board, Total Quality Management Volume II, 1992 and "How To Measure Yourself Against the Best," Harvard Business Review, Jan -Feb., 1987.*

### Assignment

1. *What organization will your department target to set new all time high benchmarking objectives?*

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2. *Benchmark one aspect of your department's performance. If someone has recently done this for your department, talk with them about their findings. What ideas did you learn from benchmarking that you can use for improvements in your department?*

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3. *How is your department using benchmarking to improve quality and performance?*

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### C. BEYOND BENCHMARKING

Benchmarking provides information on the present-day, state-of-the-art process. Adopting benchmarking practices may prove to be a great improvement for your organization. However, why not leap frog the competition? Go beyond what benchmarking research indicates as state-of-the-art. Be better than the best. Go beyond benchmarking.

For example, in the following Belgrade Hospital Case, each of the components of a clinical process were benchmarked. The best practices and costs were identified. Combining the best of each of the components, including the lowest cost factors, Belgrade Hospital designed a new clinical practice. Hence, what is called the *additive process theory* was employed: adding together the best of the best to arrive at a new, improved process.

A variation of this idea would be to benchmark the work processes in your organization against the most excellent performing organizations outside, and then arbitrarily set a goal of 5 - 10% improvement in costs, time, or other critical factors. So, either by additive process, or by leap frogging to a higher goal, you must go beyond benchmarking to improve current work processes.

### Case Illustration

#### Belgrade Hospital Additive Theory

**Define Problem:** Belgrade Hospital, a Canadian organization, needs to reduce the cost of the total hip replacement procedure while maintaining or improving clinical outcomes.

**Outline Options:** Belgrade Hospital tested the “additive” concept of Continuous Improvement. Using a comparative database of information from 6 hospitals and 32 patients who underwent total hip replacements, they determined that the average cost of performing the procedure was \$6,407. (See Figure 1.3)

Comparing the costs of components of care, e.g. lab tests, room, care, etc., the “best demonstrated cost” for the procedure was determined. Adding together each of the best demonstrated costs for each component of the procedure, the total best demonstrated cost was found to be \$4,077.

**Implement Solutions:** Based on the best demonstrated cost, Belgrade Hospital established a new cost standard of \$2,330 for this procedure. This is an example of the *additive process theory*, and “*beyond benchmarking*” concepts being used together.

**Track Results:** Belgrade Hospital is tracking results and making further improvements.

### Assignment:

1. *How can you use the additive process in your department to set new benchmarks?*

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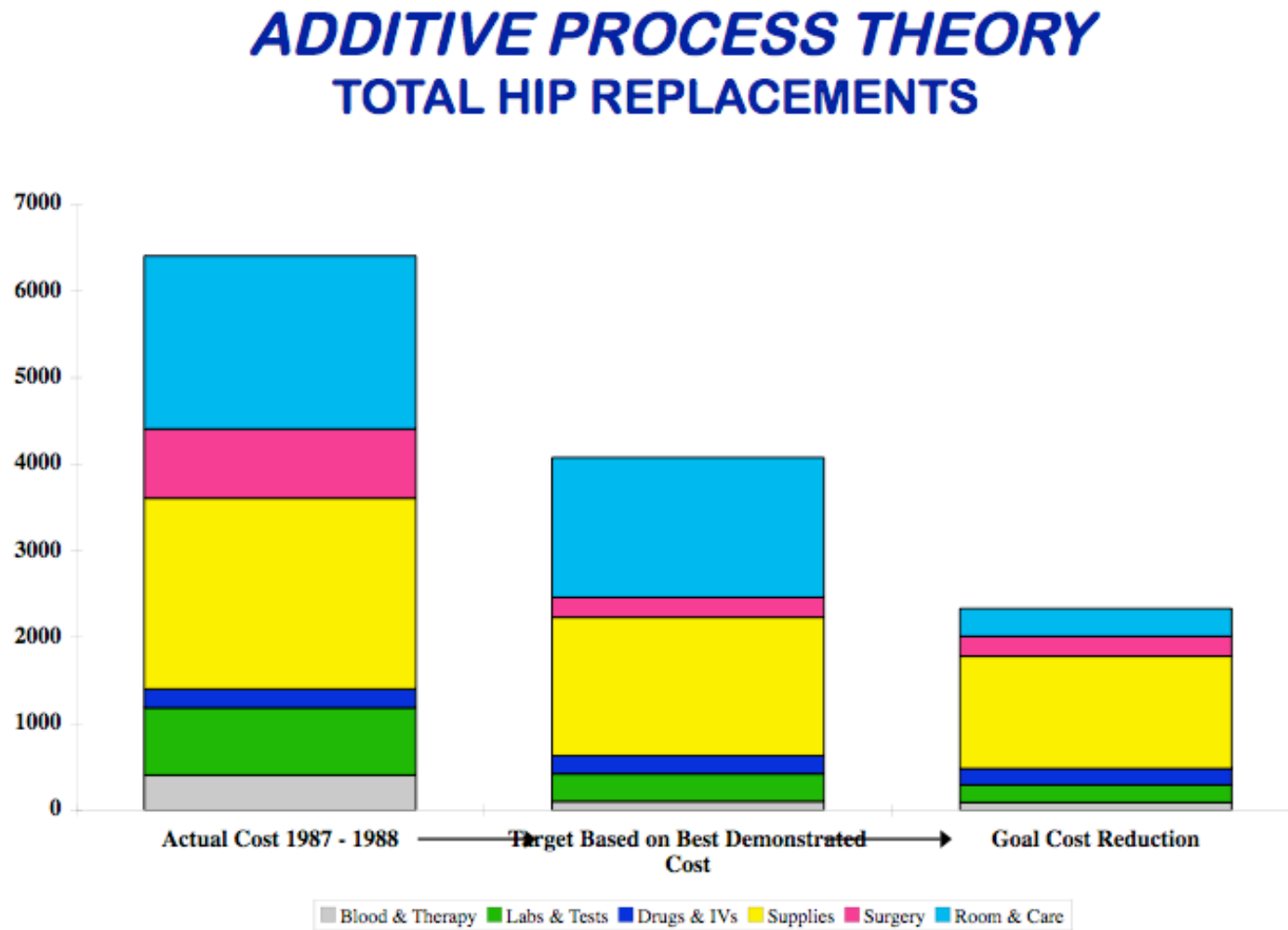
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2. *What problems should you be prepared to manage as you implement the additive process?*

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Figure 1.3



## 2. PRACTICES OF QUALITY

### A. CUSTOMER IS QUALITY BOSS

The Customer's agenda is primary, then ours. The goal is *zero defections*, no loss of Customers at any time. Where possible, give the Customer what they want!

Elimination of unwanted activities and functions and paying more attention to Customer desires is called *quality function deployment*. If the Customer doesn't want it, the question should be raised as to why we're doing it! For example, the Customer has no interest in our paperwork or meetings, which they see as a waste of time and effort. *Quality function deployment* would "redeploy" resources of time, talent, and money from paperwork and meetings to aspects of Quality viewed as more desirable by the Customer, such as less time waiting for service.

### Assignment

1. Review the work process in your department. What work or tasks are being done which the Customer does not see as valuable? If possible, delete these functions and redeploy the resources of time and money to value-added aspects.

List work/functions in your department that can be eliminated and resources that can be redeployed:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

What Customer service need could the resources be deployed to?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

Supervisor's Approval:

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## **B. KRA CONTINUOUS IMPROVEMENT PROCESS**

KRA CI is the process of searching unceasingly for ever higher levels of quality by isolating sources of defect in each step of the process, and in each KRA. The goal is *zero defects*. Arriving at a point of *zero defects*, is a gradual process. We cannot do it all at once. Our immediate goal is to improve a process, and work to keep improving it—continuously. Each end product must be as perfect as the first one. Drive defects out!

## **C. REDUCE CYCLE TIMES**

*Cycle time* is the period of time from your decision to start the process until the process is complete. To reduce cycle time means speeding up the process. One effective way of reducing cycle time is to reduce the amount of time spent waiting for supplies, waiting for people, waiting for equipment, etc. Begin using the *Just-in-time (JIT)* approach.

*Just-in-time* means that suppliers, whether external vendors or internal departments, deliver materials at the moment they are needed. The costs of carrying inventories and maintaining valuable storage space are eliminated. The quality of the material received must be excellent because there is no time on the receiving end to check it. Faulty material from suppliers will cause quality problems for the receiver. Suppliers are responsible for *zero defects* in what they bring to their Customers.

As more organizations use *JIT*, it will force those who cannot comply to quality standards out of business. It takes only a few incidents of poor *JIT* products to permanently destroy a Customer/supplier relationship and spread unkind news about the supplier. There are no second chances in the *JIT* environment.

### **Assignment**

1. *In your organization, list the types of materials that you would like to have arrive faster, be more timely, or have fewer quality problems with.*

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2. *What steps should you take with your vendor and within the system to prepare for JIT?*

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3. *Review this list with your supervisor and make arrangements to put just-in-time standards in place for your work.*

*Supervisor's Approval:*

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### **D. DESIGN IN QUALITY**

*Poka-yoke* is the idea of making the workplace mistake proof. For example, guide rails on a piece of equipment allow work to be done only one way, the correct way. This is *poka-yoke*.

*Robust design* builds in tolerances for problems that are known to be unavoidable. By building in tolerances, the Customer receives a product that will withstand normal abuse and continue to be pleasing to him. An example of *robust design* is the Volvo crushable cage passenger compartment. The crushable cage protects passengers from harm during a collision. The body of the car is designed to absorb the impact of collision, and collapse without penetration of the passenger compartment.

### **Assignment - Poka-yoke**

1. *Review the work process in your department. What tasks would you like to make foolproof?*

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2. *What changes can you make to develop your work environment into one that is mistake proof?*

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3. Review these recommendations with your supervisor and make a plan for implementation.  
*Note: Departments that have experienced workers' compensation injuries should set a priority to take action to improve the situation, thus avoiding future injuries of the same nature.*

Supervisor's Approval:

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### **Assignment - Robust Design**

1. In your department, identify some aspect of your service/product where the concept of robust design would improve the final product or service. Review your ideas for robust design with your supervisor.

<u>Product/Service</u>	<u>Robust Improvement</u>
<hr/>	<hr/>
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2. With your supervisor, design an action plan to incorporate one or more of the robust design ideas into your product or service. Include a specific time frame.

Supervisor's Approval:

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## **SELECTING KRA PROJECTS**

Continuous Improvement requires an investment of time, finance, and people resources. In order to reap a reward for this investment, proper project selection is required. Regardless of the amount of executive leadership, training, and commitment, there will be no significant KRA improvement seen unless significant projects are selected. This doesn't mean that small problems should not be dealt with, but that our focus should be such that we are getting the best use of time, energy, and dollars.

Choose projects that address opportunities for significant KRA achievements:

- Competitive Improvement
- Financial Improvement
- Clinical Outcome Improvement

These are generally projects involving services with:

- High Unit Cost
- High Degree Of Frequency Of Utilization
- High Degree Of Variation In Outcomes Or Results

**Notes:**

## **Chapter 2**

# **UNDERSTANDING THE SYSTEM CONCEPT**

***Every team member must understand the process of work which transforms input into output, and how their work contributes to Quality and Added Value.***

This chapter explains how tasks, processes, and systems relate to one another. There are specific, sequential steps that have to be taken in order to improve work processes. Knowledge of system components and typical system errors will equip you to analyze and improve systems more easily.

### **DEFINING THE SYSTEM PROCESS**

What is a process? A *process* is a set of related work activities that are based on a set of *inputs* and result in a set of *outputs* that have *added value*. Between the time you receive the input, and the time you finish the work and “send it on down the line,” you should have done something to add value to the process. See Figure 2.1.

For example, when a pharmacist receives a prescription for allergy pills, s/he goes to the drug supply, counts out the proper amount, prepares a label, and seals the bottle. If the second step of the process is to include informative literature on the drug in order to educate the Customer, then each step has added value to the

process. However, if the second step of the process is to recount the number of pills in the bottle, then the second step does not add value to the process, and should be discontinued.

All work requires *inputs*. The president of a corporation requires *input* from production workers, Colleagues, marketing representatives, and financial experts. A physician treating a patient requires *input* from test results, observations by the nursing staff, and advice from other experts, before making patient care decisions. No occupation or work can be done without the benefit of *inputs*.

The work process involves one or more of the 7Ms:

- 1 Manpower
2. Money
3. Minutes
4. Mission
5. Methods
6. Materials
7. Machinery

When *inputs* are received and work is done, *outputs* result, and a *process* has occurred. Feedback about the *outputs* of the system become a source of new *inputs* to the *process*. This is called *process feedback*: statistics for measuring the work itself, or Customer feedback indicating what the Customer thinks.

Figure 2.1

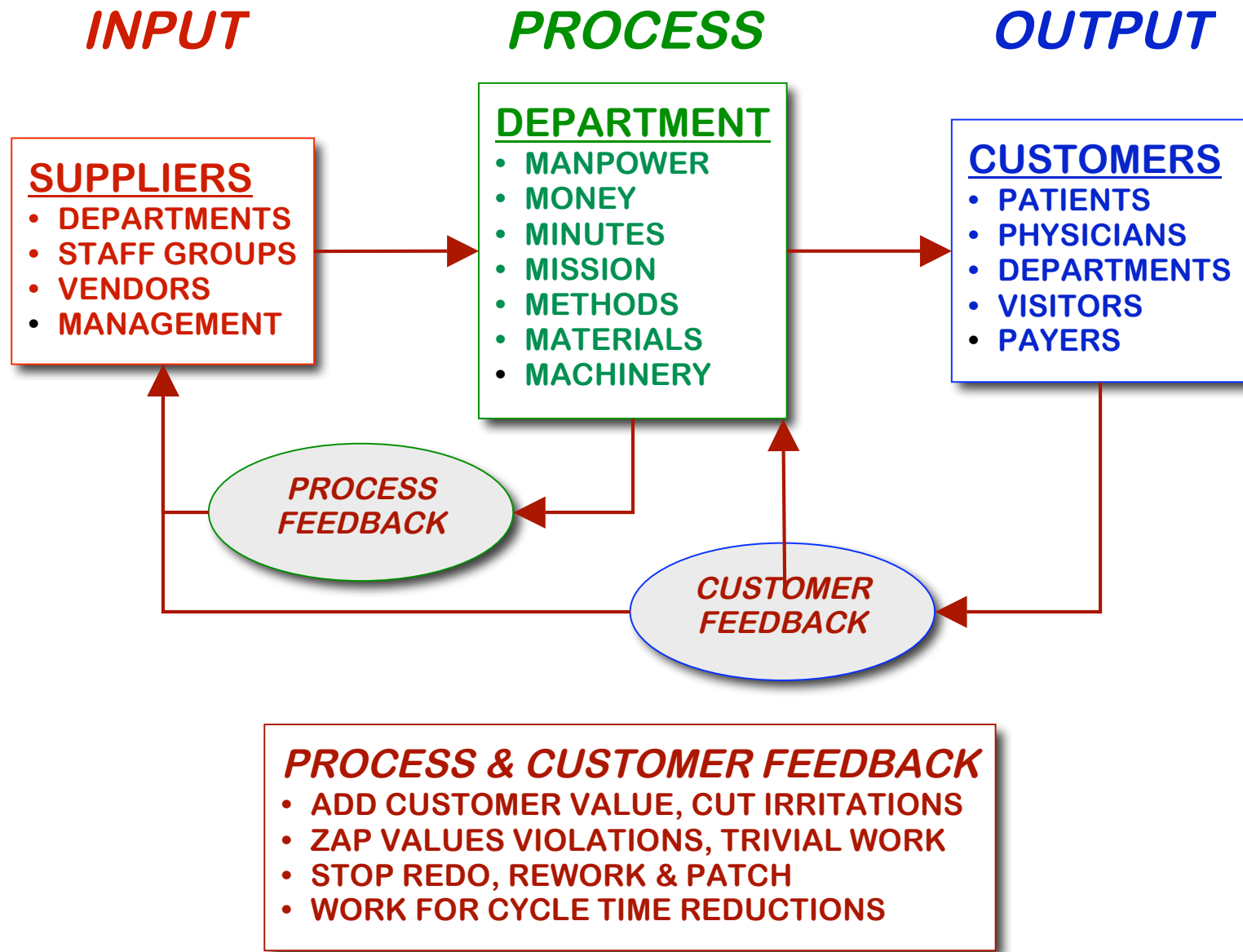
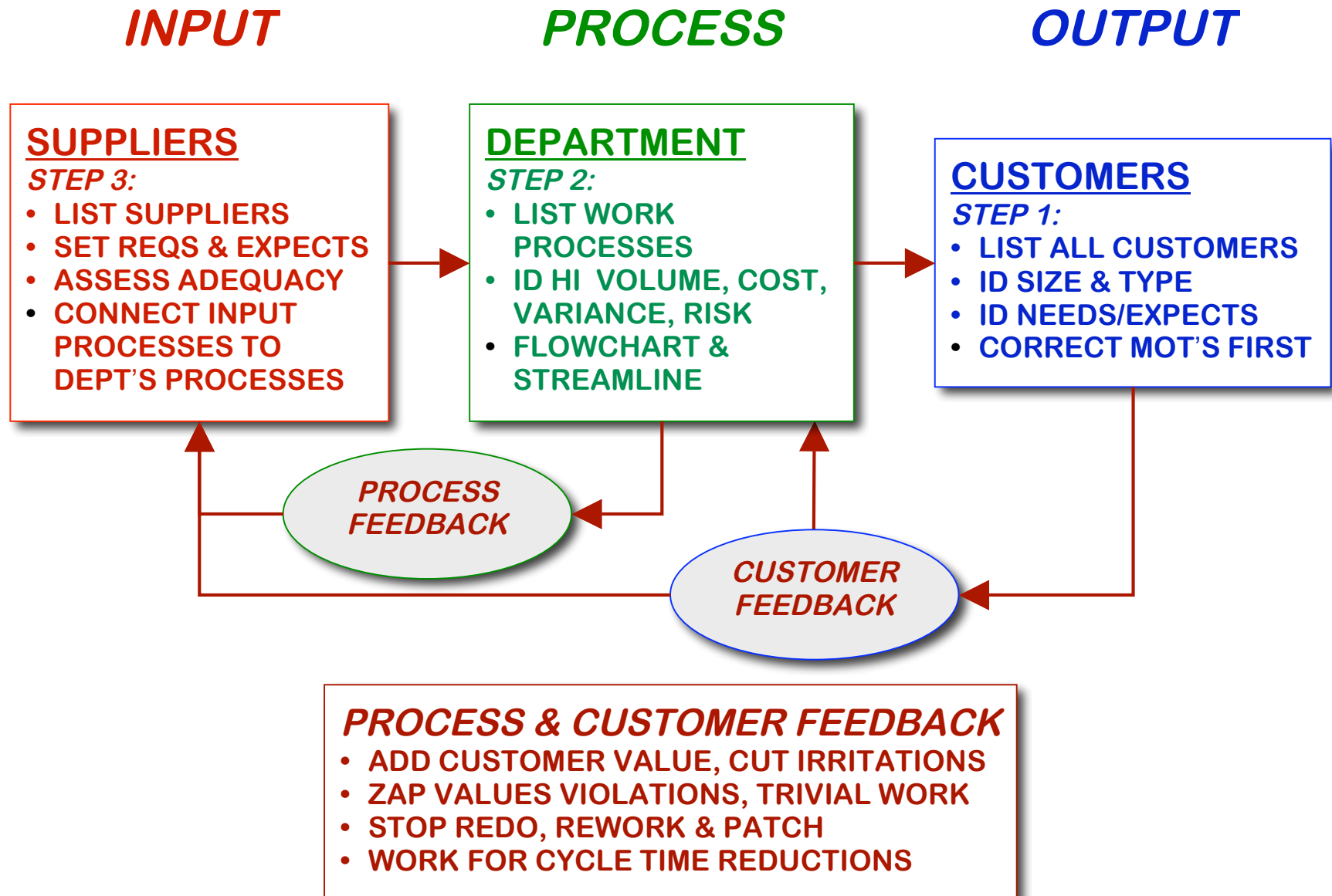


Figure 2.2



Many *processes* together form a *system*. For example, the *process* of checking vital signs is different from the *process* of administering medication. Both of these *processes* are different from the *process* of charting. All three *processes*, put together, are part of a patient care *system*.

Each *system* is unique unto itself, and yet each *system* may provide an *input* to another *system*. For example, the patient care *system* feeds into the medical records *system*, and the QA *system*. One *system* can become an *input* to another *system*.

### **Assignment**

1. *Identify who the Customers of your department are and list them.*

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2. *Identify who your suppliers are. Are there any defects or problems coming from suppliers that need to be improved?*

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3. *Identify 5 tasks you do routinely and what process(es) they become part of. Note if any of these processes are also a part of one or more systems.*

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4. *What feedback have you received about your departments' work process, or what Customer feedback have you received that suggests a need to improve your work processes?*

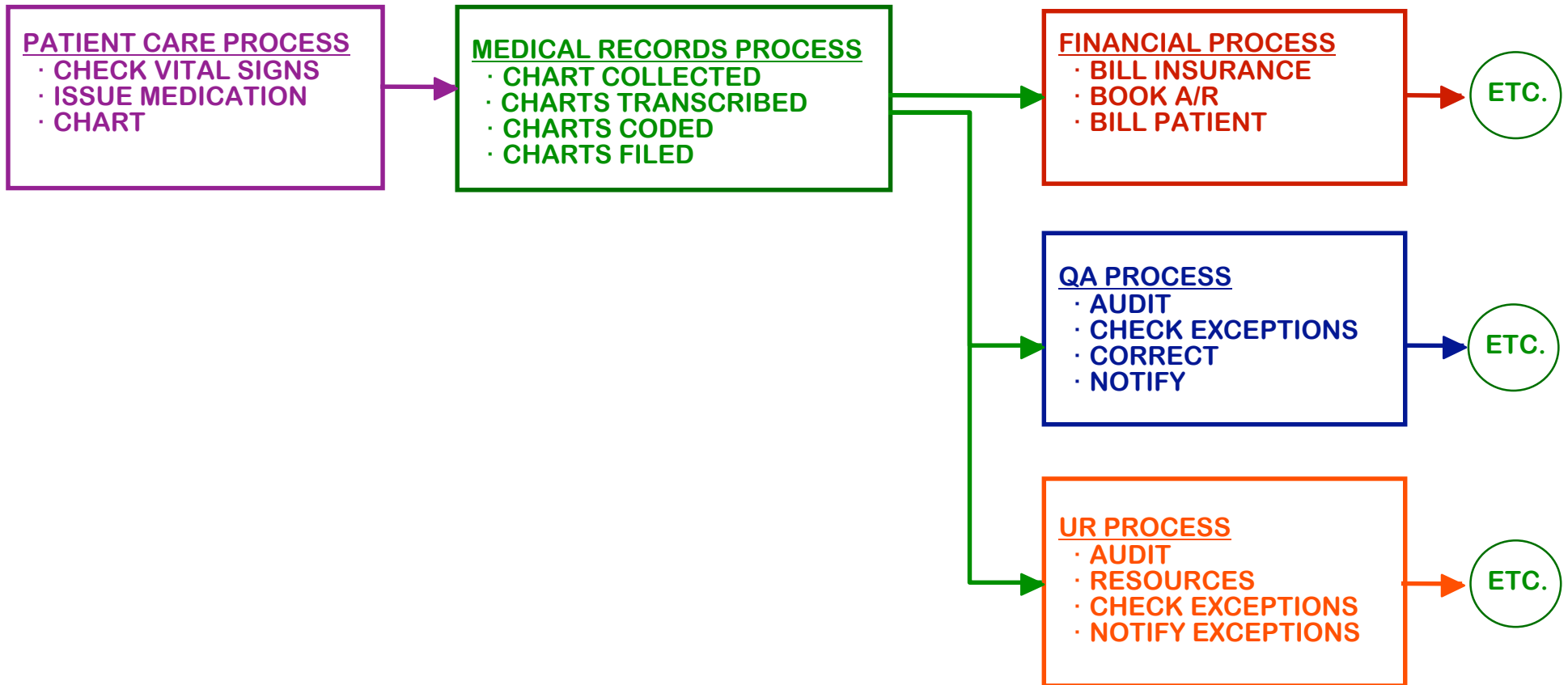
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Figure 2.3

## SYSTEM = MANY PROCESSES



## ***STEPS TO PROCESS IMPROVEMENT***

The best way to improve a work process is to follow the sequence shown in Figure 2.4. This approach has been found to be both efficient and effective. Learning to solve problems in this step-by-step way is what makes Continuous Improvement techniques so powerful.

### **Notes**

**Figure 2.4**

### ***STEPS TO PROCESS IMPROVEMENT***

1. Define Output Requirements — Customer First
2. Define Input Requirements With Suppliers
3. Define Unit Value-Added Process Changes
4. Flowchart Current Activities/Steps
5. Analyze Variance & Design Solutions
  - Quality Function Deployment
  - Analyze Cycle Times To Reduce Waste
6. Conform To Values, SOPs, & Principles
7. Design & Implement New Process
8. Continuously Improve, If Sensible

## ***Chapter 3***

### ***DO-IT PROBLEM-SOLVING***

***The importance of having a problem-solving model is that it provides a common framework within which the team practices Continuous Improvement.***

This chapter provides an understanding of the value of a consistent problem-solving process known as DO-IT. The four step DO-IT method is a comprehensive approach to solving problems, and is supported by a number of analytical tools. DO-IT stands for:

- Define Problem
- Organize Options
- Implement Solutions
- Track Results

#### ***VALUE OF THE FOUR STEP PROBLEM-SOLVING MODEL***

There is a natural order of things, and work processes, that leads to progress. A chef uses a sequential order in blending ingredients to create a meal. Beautiful music is the orderly arrangement of notes and the coordinated efforts of an orchestra. In human affairs there is an orderly way in which we must live. This order, or directed way of doing things, allows us to make change more effectively. DO-IT is an easy problem-solving method that has been found to be best for teams of people. Using it makes it easier to solve problems more quickly and efficiently.

Once the team has selected a problem to work on, the next step is to apply the problem-solving method. Often we make problem-solving more difficult than it needs to be. As Figure 3.1 shows, the DO-IT method is simple and direct.

Figure 3.1

# PROBLEM SOLVING WITH DO-IT

## DEFINE PROBLEM

1. ONE SENTENCE PROBLEM STATEMENT—SPECIFIC, EXACT
2. USE DATA & MEASURES
  - SYSTEM/CUSTOMER FEEDBACK—INPUT, PROCESS, OUTPUT
  - GRAPH MEASURES— **RUN & PARETO CHARTS, HISTOGRAM**
  - IDENTIFY STANDARD VARIANCES— **CONTROL CHART**
3. SELECT THE WORK TEAM

## OUTLINE OPTIONS

1. ANALYZE PROBLEM/DATA—BEGIN WITH **BRAINSTORMING**
  - PINPOINT POSSIBLE PROBLEM CAUSES— **FISH-BONE**
2. IDENTIFY ROOT CAUSES & PUSH CONSENSUS
  - FIGURE WHY PROBLEM OCCURRED— **VARIANCE ANALYSIS**
  - DOCUMENT CURRENT PROCESS— **FLOWCHART**
3. CREATE POSSIBLE SOLUTIONS— **VARIANCE SOLUTION**
  - TEST CONCEPT, PILOT & CHOOSE BEST ANSWER

## IMPLEMENT SOLUTIONS

1. CREATE ACTION PLAN & IMPLEMENTATION SCHEDULE— **GANTT CHART**
2. SELL PROPOSAL— **MANSYS GUIDELINES**
3. IMPLEMENT & ADDRESS CHANGE RESISTANCE

## TRACK RESULTS

1. GET FEEDBACK ON HOW IT'S DOING— **TRACKING CHECKLIST**
2. DEAL WITH BUMPS IN THE ROAD
3. REFINING—HEART OF CI

**Assignment**

**Notes**

1. Review the DO-IT problem-solving model with your supervisor. Discuss the merits of this approach to problem-solving.
2. Post the problem-solving model on the wall for ease of use.
3. Problem-solve one of the following situations:
  - Ways in which a supplier problem can be solved
  - Ways in which a Customer problem can be handled
  - Ways your team can make team meetings more effective.

Supervisor's Approval:

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### Case Illustration

#### Tirane Medical Center

#### Cuts Service Calls By 50 %

The Tirane Medical Center case illustrates the tools used and actions taken in each of the problem-solving steps of DO-IT. Note that several tools, such as *flow charting*, were used multiple times within one step.

**Define Problem:** The Radiology Department needs to reduce rework caused by billing discrepancies from imaging equipment vendors, and to reduce repair costs.

**Outline Options:** The group engaged in the following steps to outline their options.

- The hospital formed a DO-IT Group (task group) including representatives from the imaging company.
- The DIG *flow charted* the process, then used *brainstorming* to identify 24 barriers to smooth the process; the *fish-bone* diagram pinpointed “methods” as the largest category of need for improvement.
- The top seven barriers to the smooth flow of x-ray equipment were ranked using *multiple voting* and *rank ordering*; number one was “Understanding Expectations.”

- The DIG selected a portion of the process to be improved: Vendor x-ray equipment service from the time an equipment problem is identified until the equipment is repaired.
- Using *flow charting*, *brainstorming*, and *multiple voting*, the DIG identified key quality characteristics.
- The DIG *flow charted* and modified the billing process.

**Implement Solutions:** The DIG was empowered to go forward with their recommendation.

**Track Results:** The following results were realized, and documented through constant tracking.

- Service calls reduced from 34 to 16 in a one year period
- Labor time for radiology, accounting and purchasing were reduced
- Equipment “down time” decreased
- A financial gain of \$3,005 was realized
- 21 of 24 identified barriers to the smooth flow of the process were eliminated

— With permission from  
Health Care Advisory Board,  
Total Quality Management, Volume II, 1992

## **Chapter 4**

### **CRAFTSMAN'S TOOL KIT**

***Before operating, a brain surgeon must have the proper tools. Before you can solve complex problems, you must have the proper tools.***

This chapter defines each of the problem solving tools and explains their usage. It also shows where each of the tools is most often used in DO-IT problem solving.

#### **WHERE & WHEN TO USE TOOLS**

Figure 4.1 is a display of the analytical tools that are used in the DO-IT method. The use of each tool is indicated under the step of the DO-IT process where it is most likely to be used. Many of these tools can be used in multiple steps of the problem-solving process. Do not feel confined to use the tool only in that step reported on this graph.

At this point, you want to become acquainted with the types of tools and methods that are used. Uses are described in the following chapters.

#### **WHAT DO THE TOOLS DO?**

Problem-solving requires careful, systematic thinking: logical and statistical analysis. Specific tools are needed to collect and analyze data from the system. Some of these will be new concepts, but ones that will make problem solving easier. The tools are divided into two groups:

**CORE TOOLS:** Those frequently used in problem-solving. They are basic to most problem-solving efforts and should be familiar to all Colleagues. The code "C" in the glossary is used to indicate core tools.

**SPECIAL USE TOOLS:** Those used as appropriate, in complex problem-solving situations. They often provide a greater level of detail and data analysis than core tools. Training in the use of these tools is required, and should be made available for managers and Colleagues.

Figure 4.1

WHERE & WHEN TO USE TOOLS													
	DEFINE PROBLEM			OUTLINE OPTIONS			IMPLEMENT SOLUTIONS			TRACK RESULTS			PAGE #
	STATE PROBLEM	USE DATA SOURCES	SELECT PROJECT TEAM	ANALYZE PROBLEM DATA	IDENTIFY ROOT CAUSES	CONSIDER POSSIBLE SOLUTIONS	CREATE ACTION PLAN	SELL PROPOSAL	IMPLEMENT & MANAGE CHANGE	GET PERFORM FEEDBACK	DEAL WITH PROBLEMS	REFINE/ RECYCLE PROCESS	
<b>CORE TOOLS</b>													
BENCHMARKING	2	1									2	2	1-5
BRAINSTORMING	1		2	1		1	2				1	1	6-2
CONTROL CHART		1								1		2	5-17
COST/BENEFIT ANALYSIS						1	2	2			2	2	6-23
DECISION MATRIX						1					2	2	6-18
FISH BONE CHART				2	1						2	1	6-3
FLOWCHART				1	1	2	2					2	6-8
HISTOGRAM		1								1		2	5-6
MANSYS PROPOSAL GUIDE								1			2		7-1
PARETO CHART		1				2						2	5-8
RUN CHART		1								1		2	5-11
TRACKING CHECKLIST											1		9-1
WORK TRAFFIC DIAGRAM				1		1	2		2		2	2	6-15
<b>SPECIAL USE TOOLS</b>													
CUSTOMER PROXY	2	1					2			2		1	4-3
CYCLE TIME ANALYSIS	2			1		1	2		2		2	2	6-26
FOCUS GROUPS	2	1								2		1	4-4
GANTT CHART									1			2	7-3
INTERVIEWS	2	1								2		1	4-4
SAMPLING	2	1								1		1	4-4
STRATIFICATION					1						2	1	4-4
SURVEYS	2	1								2		1	4-4
VARIANCE ANALYSIS				1	1						1	1	6-31
VARIANCE SOLUTION						1					1	1	6-33
WORK SIMPLIFICATION				1		1					1	1	6-25
1 = Primary Application; 2 = Secondary; Blank = None/Rare.													
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## **GLOSSARY OF TOOLS AND TERMS**

In the following definitions, a (C) indicates a core tool, and (S) indicates a special use tool.

**Benchmarking** (C). Measuring performance against the best organizations in the world. How do we measure up? *Usage: Setting better/greater goals, identifying improved ways of doing work, improving clinical outcomes.*

**Brainstorming** (C). A free thinking approach to generating as many ideas as possible. Quantity of ideas first, then improving them for quality is the goal. *Usage: Creating ideas.*

**Control Chart** (C). A run chart with calculated boundaries of acceptable performance levels used to detect negative trends and variances before an out-of-control condition occurs. *Usage: Identifying when a system requires changes to be made; effective in establishing supply levels and ordering times; establishing staffing levels; and studying/improving clinical outcomes.*

**Cost/Benefit Analysis** (C). A numerical calculation determining the financial relationship between the cost of implementing a change and the benefits that will result from the change. *Usage: Identifying the relationship of benefits realized to costs invested. Is it worth it?*

**Customer Proxy** (S). Colleagues “sit in” for the Customer and experience the process or service as the Customer would. Literally, “walk a mile in my shoes.” *Usage: Effective in gaining an understanding of the situation; generates improved appreciation of another person's position.*

**Cycle Time Analysis** (S). Documentation of each task, work time involved, wait time involved, and the people and processes involved. *Usage: Identifies where and how work steps can be consolidated and wait time reduced. Effective in studying resource consumption (such as time or materials), or improving clinical outcomes.*

**Decision Matrix** (C). A method to quantify the overall weight of each decision opportunity. *Usage: Evaluation of alternatives and/or prioritization of projects.*

**Fish-bone Chart** (C). A Cause-and-Effect diagram used to organize and visualize the relationship between a problem and its possible causes. *Usage: Organizes brainstorming on causes of a problem or ways to effect a solution.*

**Flowchart** (C). A graphic documentation of the flow of work through a process or system including indications for decisions that are to be made. *Usage: Documents current processes, and communicates process flow. Effective in studying a*

*system for improvement, in consolidating a process, saving time, saving space, or savings steps in a process.*

**Focus Groups (S).** Groups of people who share a common part of the process (i.e. input or output), coming together to talk about their feelings and thoughts. *Usage: To gain insight to the opinions and actions of others, and to generate ideas for added value.*

**Gantt Chart (S).** A visual display of time frames, tasks, and accountable parties. *Usage: To manage the implementation of a solution or process.*

**Histogram (C).** A bar graph display of information reporting data collected on intervals or sections of one variable. For example, a one hour time period is broken into five minute time increments which are charted when analyzing a problem. *Usage: Effective in breaking down and measuring the variable activities within one element.*

**Interviews (S).** Provide qualitative data collected from people, usually on a one-to-one basis, or sometimes in a group. It is a forum for exploring answers in detail, and getting a clear understanding of the response. *Usage:*

*Effectively used to probe the detailed opinion of one person, or one aspect of the problem.*

**MANSYS (C).** A manual of management guidance. See the MANSYS section on *Selling a Proposal* for a sample proposal format and rules to be used in selling your solutions. *Usage: To establish common terminology, format, and practice among all managers.*

**Pareto Chart (C).** A bar chart used to quantify and identify the vital few problems or causes which have the greatest impact on a process. *Usage: Identifies the highest causes of utilization of time/materials: a study of resource consumption. It also allows for prioritization of efforts.*

**Run Chart (C).** A connected series of performance points plotted on a graph and connected with a line. *Usage: Documents production, performance, and utilization levels. Excellent for identifying when a change in a system is needed.*

**Sampling (S).** The selection of a specific group representative of a larger group. For example, selecting 25 students out of a class of 100 would be a sampling of the class. *Usage: Effective in getting a rough idea of how the normal portion of a large group would respond to something.*

**Stratification (S).** The analysis of sub groups of data from a larger population of data. For example, of the 300 people in this seminar, how many are under the age of 30; how many are women, etc. Each of these are subgroups of the larger population of 300. Grouping portions of the information in different ways yields greater understanding. *Usage: Effective in analyzing variables that contribute to an overall group action.*

**Survey (S).** Used to collect data from people relative to their “feelings,” “plans,” or “opinions.” An “interview on paper.” *Usage: Effective in gaining input from a large group of people, or gaining input on a variety of topics.*

**Tracking Checklist (C).** A comprehensive list of check points to be reviewed at the completion of implementation. *Usage: To determine if the desired results are occurring.*

**Variance Analysis Worksheet (S).** Through a series of questions, it clearly dissects the causes of the problem and prepares you for creating a solution. *Usage: Determining root causes of problems, or analyzing why a system is not working when it used to.*

**Variance Solution Worksheet (S).** An organized approach to creating solutions to each specific cause in the *variance analysis worksheet*. *Usage:*

*Organizing solutions to variances in system's operations.*

**Work Traffic Diagram (C).** A floor plan or map of the physical facility. *Usage: Used to identify distance and difficulties in the location and traffic flow of materials, people, or processes. Effective as a planning tool when making changes to a system.*

**Notes**

## **Chapter 5**

### **DEFINE PROBLEM**

*Data and measurements validate and define the problem, making it possible to create a successful solution.*

The “D” of DO-IT stands for Define Problem. Figure 5.1 shows the steps involved in defining a problem. Core tools used in this step in problem solving are listed in italics and sequenced in a pattern of frequent use. Although there is a logical sequence to the flow of tools presented in Figure 5.1, your problem situation may not require the use of all of these tools. Choose the tool(s) that are appropriate to your problem. It is possible that some of the tools used in “Outline Options” could also be used, in some situations, to help define the problem. Don’t let general rules of tool usage inhibit your thinking or effective problem solving. Use them wherever you need them. “Special use tools” are listed at the bottom.

**Figure 5.1**

#### **DEFINE PROBLEM**

1. One Sentence Statement—Specific, Exact
2. Use Data & Measures
  - System/Customer Feedback—Input, Process, Output
  - Graph Measures—*Run & Pareto Charts, Histogram*
  - Identify Variances—*Control Chart, Benchmarking*
3. Select The Work Team

#### **SPECIAL USE TOOLS**

- *Focus Groups & Interviews*
- *Sampling & Surveys*
- *Data Stratification*

## ***UNDERSTANDING THE NUMBERS***

Analyzing problems means collecting data and trying to understand what it means. In looking back at the 70's and 80's when America was losing to Japanese competitors, it became clear that one of the advantages the Japanese had was their ability to understand and use performance statistics. Today, American organizations everywhere are using performance statistics in their quest for excellence.

Some of the terms and concepts may seem scary to you at first. But, they are easy to use and understand. Workers at Ford, Motorola, and other leading organizations have learned to use these tools and find them to be of assistance.

## ***THE VALUE OF FEEDBACK***

This chapter will focus on the value of feedback to improving quality and work processes. Distinctions between quantitative and qualitative feedback are made, and direction is provided on how to give and apply feedback to gain improvements in your work processes.

No team has ever performed at its best without the benefit of knowledge about their performance. In sports, there is a passion for statistics. In work, we need the same level of passion for feedback. Too many people are “kept in the dark” and it only creates problems.

Feedback is information provided to an individual or group about its performance. It is a score keeping system. In business, the activity of accounting was developed to “keep score” of performance. Score keeping and feedback are imperative to successfully completing improvement initiatives.

## ***GUIDELINES FOR EFFECTIVE FEEDBACK***

Feedback knows no boundaries. Peers give feedback to one another and supervisors, and supervisors give feedback to Colleagues. Communication is feedback. It occurs regularly, in casual settings, and in formal meetings. Effective feedback must have certain characteristics.

### **Effective Feedback Is:**

- Specific, immediate, & honest
- Defines performance in a measurable way that is meaningful to the team
- Frequently & consistently provided
- Positive, whenever possible

### **FEEDBACK FALSEHOODS**

Sometimes we feel uncomfortable giving feedback to others. This is because we do not see the positive aspects of feedback. We only know the common fears and falsehoods. Avoid the following untruths:

- “No news is good news.” Eventually a team without feedback will find themselves in trouble.
- “They already know how good they are doing so I don’t need to tell them.” People often feel that their performance level is better or worse than it actually is. People perform better when they know the facts.
- “They don’t need feedback. They have been doing the job well for years.” Even the most experienced teams improve with data and analysis.
- “They won’t understand what the feedback means. It will cause questions, changes, and frustration.” Colleagues are intelligent people. Given training on what the feedback is, and how to interpret it, Colleagues will generate ideas on how to employ improvements in their work based on the feedback.
- “It makes people uncomfortable to be told how they are doing.” When feedback is negative, there is usually some level of discomfort associated with it, especially when the person has been working hard at the job. Approaching negative feedback in

the spirit of helpfulness and problem solving depersonalizes the situation and reduces discomfort. We are not interested in blame. We are only interested in improvement.

### **QUALITATIVE & QUANTITATIVE FEEDBACK**

When daily production increases from 55 to 65 units per person there is a clear advance of 10 units per person—a *quantitative* difference that can be measured. There are other measures of performance which are not quantitative, but do reflect important feedback. For example, a person’s feelings, thoughts, or opinions are a source of feedback. The way a Customer “feels” when he leaves your business is important feedback. This is called *qualitative* feedback. *Qualitative* and *quantitative* feedback measurements are needed for each Key Result Area.

If *quantitative* measures indicate that performance is excellent, yet *qualitative* measures indicate a problem, Excellence has not been achieved. Because *quantitative* measures are easier to work with, we attempt to *quantify* the *qualitative* feedback as much as possible. One example of this is found in efforts to quantify Customer service performance. Customer surveys are designed to mark the box that “best represents how you “feel” about a particular issue. Each box, representing a “feeling” is given a *quantitative* value, used to weigh the overall response.

**Assignment**

*Develop quantitative and qualitative performance feedback measures for your job. For example, under the KRA of Productivity, the Director of Nutrition may select a quantitative measure of performance equal to the number of meals prepared each day. For qualitative measures, results from an Colleague survey or suggestion box might be used.*

*List quantitative and qualitative measurements for your job under each KRA. There should be at least two measurements per KRA. Review these measurements with your supervisor. Make arrangements to incorporate the feedback measures into your work.*

KRA	Measurements	
	Quantitative	Qualitative
Customer Satisfaction	_____	_____
	_____	_____
Quality	_____	_____
	_____	_____
People Growth	_____	_____
	_____	_____
Organization Climate	_____	_____
	_____	_____
Innovation	_____	_____
	_____	_____
Productivity	_____	_____
	_____	_____
Economics	_____	_____
	_____	_____

*Supervisor's Approval:*

\_\_\_\_\_

## ***SOURCES OF FEEDBACK***

Some sources of feedback are quantitative, objective, and measurable. Others are qualitative, subjective, and not entirely measurable. All feedback is important. We often overlook important sources of feedback. Learn to cultivate feedback from various sources. Common sources of feedback are:

- Customers
- Vendors
- Visitors
- Results of the process
- Personal behaviors
- Competitors
- Physicians

Remember, feedback is your friend, even when we don't like what we hear.

## ***Assignment***

*List the sources of feedback present in your job. Identify the feedback that is no longer needed (for example, useless reports). Develop new types or sources of feedback that would be of value to you. Review this list with your supervisor to determine how you can have access to this feedback. What information would help you do your job better?*

### ***Feedback Sources***

#### ***Current Sources***

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#### ***New Sources***

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#### ***Supervisor's Approval:***

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## ***TOOLS FOR DEFINING A PROBLEM***

### **A. HISTOGRAM**

A *histogram* is a bar chart depicting a collection of specific data. The data represents portions or segments of *one* variable. *Histograms* are useful in analyzing patterns of performance within one variable. For example, a hospital lab was repeatedly told that it took too long for their test results to be returned to physicians. “Time” is the variable in question. In order to document the facts, the lab recorded the length of time taken to deliver 100 blood tests over a 10 day period. The response times can be seen in Figure 5.2.

The collection and display of data into a *histogram* clarifies the nature of the problem. In Figure 5.2, the following facts are seen;

1. There is a variation in the response time from a high of 10 minutes to a low of one hour.
2. The majority of the tests were done within 20-30 minutes.
3. There are few responses less than 20 minutes, and many greater than 30 minutes.

### ***Assignment***

1. What data can you collect and graph in histograms to assist in solving your problem?

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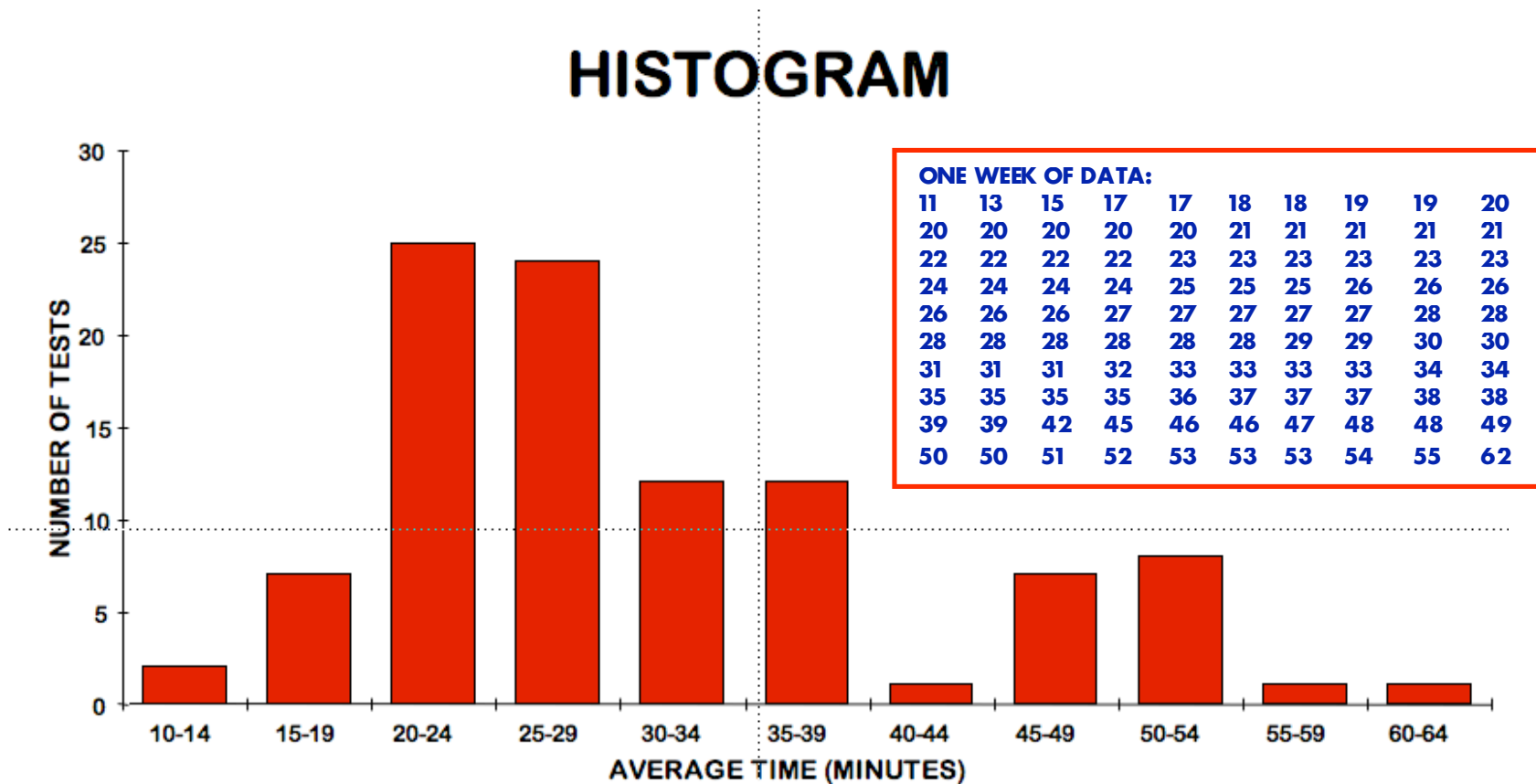
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2. Collect & graph the data. What does it tell you?

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Figure 5.2



**HISTOGRAMS ALLOW ANALYSIS OF DATA PATTERNS**

**EXAMPLE: LAB MINUTES FROM ORDER TO RESULTS DELIVERED**

- HIGH VARIATION: 10 MINUTES - 1 HOUR
- MAJORITY IN 20 - 30 MINUTES
- FEW < 20 MINUTES, MANY > 30 MINUTES

## B. PARETO CHART

The Pareto Principle states that only a few causes, the “vital few,” produce most of the results. When the “vital few” causes have been identified, the question becomes: which cause(s) should we work on first?

Like a histogram, a *Pareto chart* is also a bar graph. The *Pareto chart* displays a number of variables and data in descending order from left to right with the cause or problem having the largest impact shown first. See the following case as an example.

### Case Illustration

#### Pareto Chart: Harvard Community Health Plan - Maternity Ultrasounds

This case illustrates how the *Pareto chart* is used to identify the vital few causes for the large number of ultrasound tests.

**Define Problem:** Utilization of maternity ultrasound exams has grown at an extraordinary rate. Exams are being ordered in unusually high quantities. Why? The answer to this question leads to the next step - figuring out how to manage the underlying reason for ordering so many exams.

**Outline Options:** A physician questionnaire was administered asking why each maternity ultrasound was ordered. The following responses were collected:

<u>Reason for Test</u>	<u>% of Tests Ordered</u>
1st Trimester	6
Dating	26
Estimated Weight	4
Fetal Position	4
Fetal Screen	9
Hydramnios	1
Large for Gestation Age	11
Maternal Issue	2
Rule Out Placenta Previa	9
Small for Gestation Age	21
Other	7
<b><u>Total</u></b>	<b>100 %</b>

To determine the reason for high utilization, the

*Pareto chart* was used. In descending order, with the most frequently cited reason first, and using an accumulated percentage calculation, the chart displays what the “vital few” causes for ordering 80% of the tests were.

In this case, in order to realize a significant reduction in utilization of maternity ultrasound tests, you must affect the top 5 reasons for ordering the test:

1. Dating
2. Small for Gestation Age
3. Large for Gestation Age
4. Rule Out Placenta Previa
5. Fetal Screen

Of the 11 reasons why physicians order sonograms for pregnant women, “Dating” is the most frequently named reason, “small for gestation period” is the second most frequently named reason, etc.

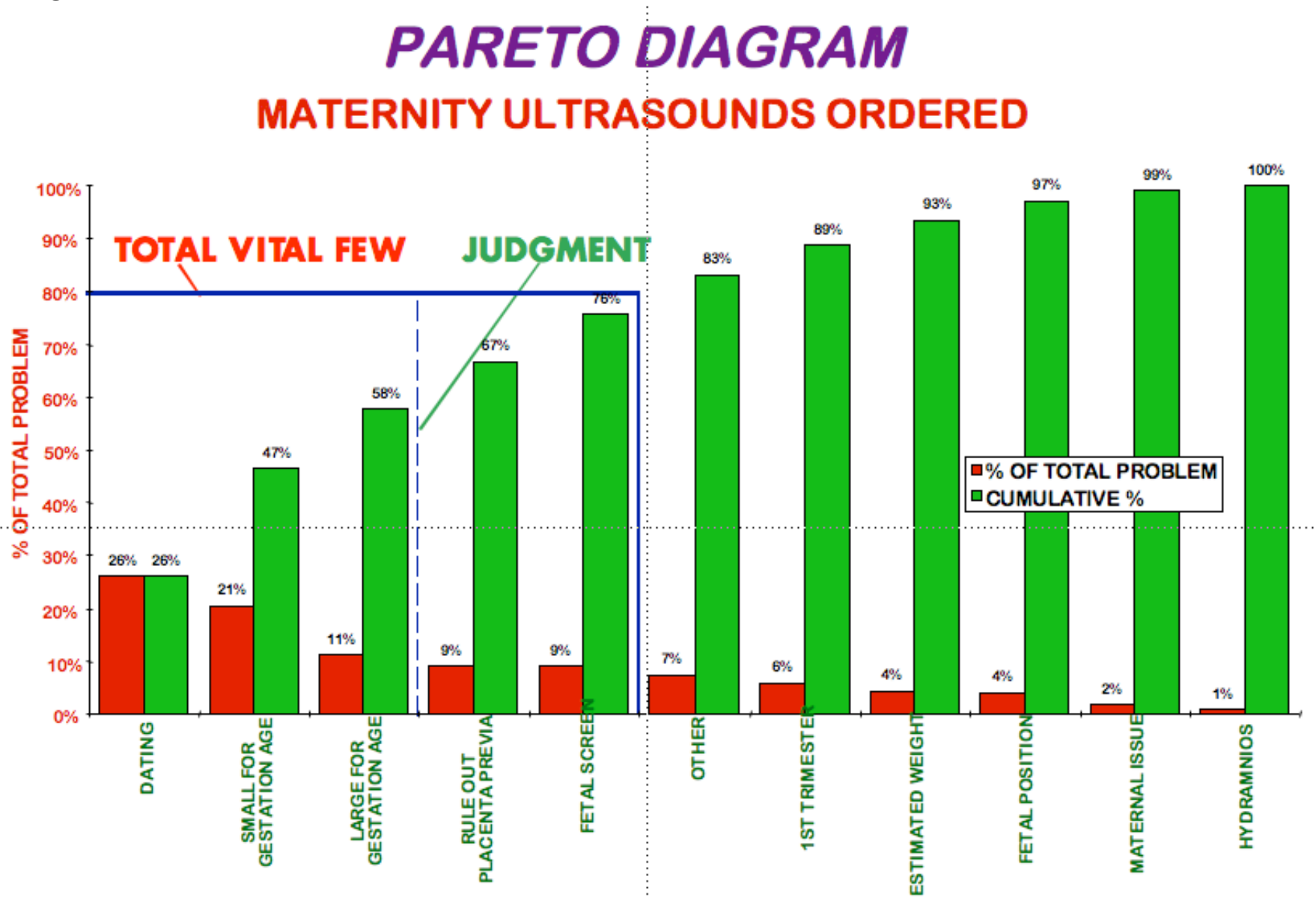
Graphically you can see which reasons have the greatest impact on why physicians order sonograms for pregnant patients.

Because there is a limited amount of resources available to solve any problem, the *Pareto chart* is used to identify the “vital few” contributing problems/causes. The accumulated effect of each of the contributors, starting from the greatest and going to the least determines the “vital few” causes.

The following steps are a quick reminder of how to create a *Pareto chart*.

1. Translate the number of occurrences for each problem into a percentage using the total number of problems as the denominator.
2. Add the percentage of each subsequent cause to the current figure to arrive at a cumulative effect.
3. Connect the data points with a line to see its slope. At the point where the slope of the cumulative line graph begins to level out or fall off, the “vital few” contributors end. In Figure 5.3 this is after the “fetal screen” cause which at that point accounts for a total of 76% of the ultrasound tests. Having identified the “vital few” causes, it is possible that there may not be enough resources to address them all.
4. A judgment call may be needed. Which of the “vital few” causes will we work on first? In this example, we choose to make that judgment call after the three largest contributors which represent 58% of the ultrasound tests ordered. You may choose to address only the first two causes, or perhaps go to the first four causes. The point is: choose to work on those “vital few” causes with the greatest contribution to the overall problem first.

Figure 5.3



—Harvard Community Health Plan

### **Assignment**

### **Notes:**

*Choose a work problem where multiple variables contribute to an overall problem.*

*1. What data from your job can you collect and graph in the Pareto format to identify the vital few contributions to your problem?*

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*2. What are the vital few contributors to your problem?*

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*3. Which of these will you choose to work on first?*

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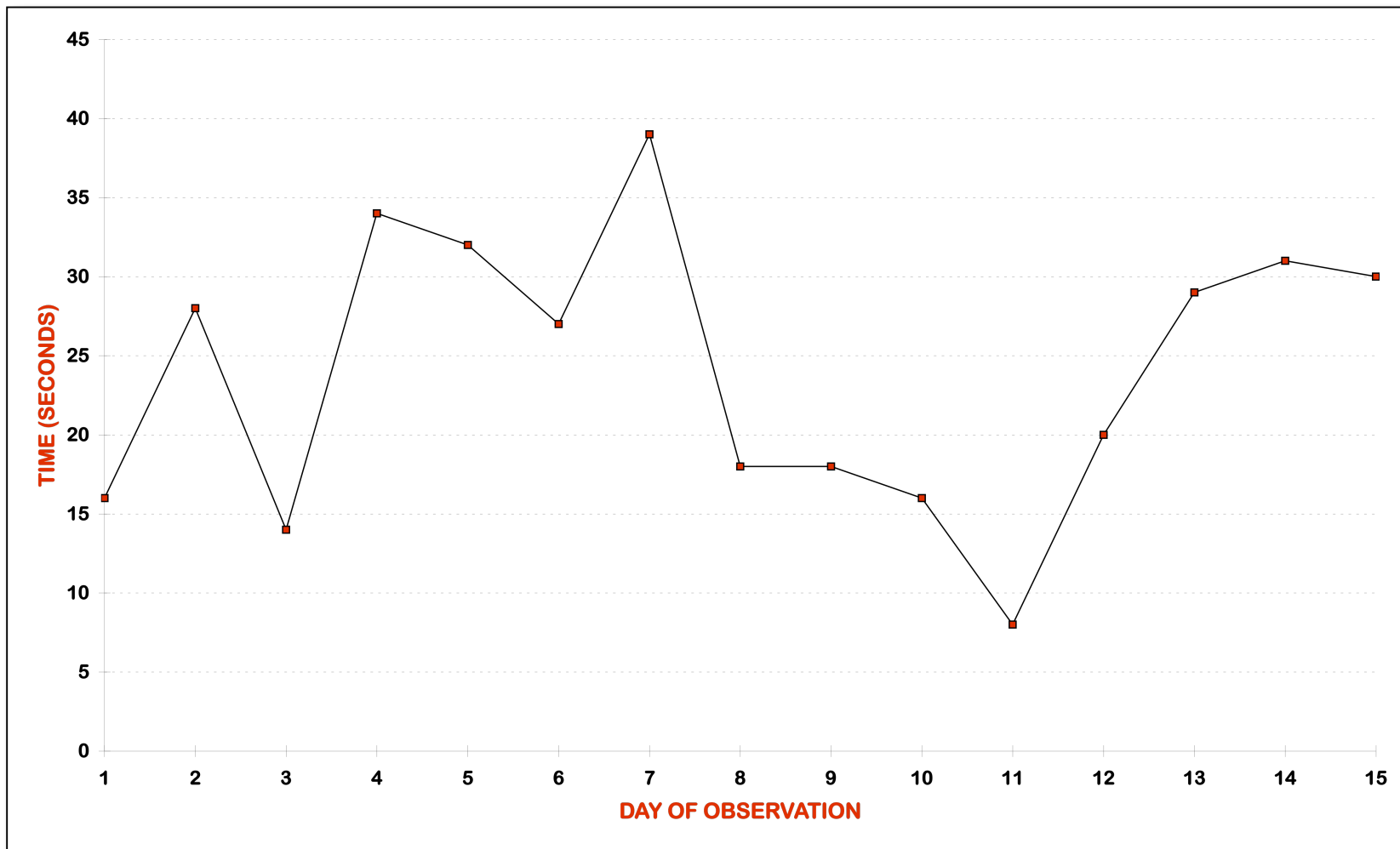
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### **C. RUN CHART**

A *run chart* is comprised of a series of measurements or activities plotted on an X and Y axis, connected with a line. For example, if we recorded the average length of time to respond to a telephone call each day, for the next 15 days, the data might look like that found in Figure 5.4. Plotting this data on an X and Y axis chart, and connecting the points with a straight line creates a *run chart*.

Figure 5.4

## ***RUN CHART***



## MANAGING THE SYSTEM

*Zero defects* occurs when every *output* is an exact duplicate of every other *output*, and each *output* is perfect. Although this is the ultimate goal, it is highly unlikely that your work system is capable of *zero defects* at this time. Instead, there is usually some variability within the performance of any system.

For example, Figure 5.5 represents the length of time it took to answer the telephone on one unit during the time period from 10:00 AM - 11:30 AM over a 15 day period. The chart indicates that there is some range in response time. The differing response rates of performance are called *variability*. The *mean* is the average response time.

To calculate the average or *mean* performance, add the individual performance figures together and divide by the number of responses. Using the response times in Figure 5.5 we calculate the average or *mean* response time to be 24.0 seconds.

(Note: Those unfamiliar with the concept of a normal distribution, “the bell-shaped curve”, may want to refer to Figure 5.15).

**Figure 5.5**

### Telephone Response Time

Day 1	16 seconds
Day 2	28 seconds
Day 3	14 seconds
Day 4	34 seconds
Day 5	32 seconds
Day 6	27 seconds
Day 7	39 seconds
Day 8	18 seconds
Day 9	18 seconds
Day 10	16 seconds
Day 11	8 seconds
Day 12	20 seconds
Day 13	29 seconds
Day 14	31 seconds
<u>Day 15</u>	<u>30 seconds</u>

$$\text{Mean} = 360 \div 15 = 24 \text{ seconds}$$

## CONTROL LIMITS

Some variation in performance is expected within each system. The degree to which variations occur is important. They must be within an acceptable range. To determine acceptable ranges of performance, we use a statistically calculated range bounded by *control limits*.

*Control limits are calculated in this way:*

1. Add up all of the performance points for the problem you're studying, and divide by the total number of performance points or incidences in order to arrive at the *mean*. In the example above, the *mean* was 24.0 seconds to answer the phone.
2. Next, calculate the *standard deviation*. This is done by finding the square root of the mean. If it's been awhile since you used this concept, just use the square root key on any good pocket calculator! In our example the square root of 24.0 seconds is 4.9. The *standard deviation* is an interesting tool because it tells you what percentage of the data observations will normally occur within its range of variance from the mean. Fig. 5.6 indicates the percentage of responses covered for each *standard deviation* selected.

**Figure 5.6**\_\_\_\_

***CALCULATION OF STANDARD DEVIATION***

			% Cases
Mean +/-	# SD =	Range	In Range
24.0 +/-	1 SD (4.9)	19.1 to 28.9	68.26%
24.0 +/-	2 SD (9.8)	14.2 to 33.8	95.44%
24.0 +/-	3 SD (14.7)	9.3 to 38.7	99.72%

Apply the standard deviation concept to data in Figure 5.5. We would expect that about 99% of the time, the phone would be answered in a range of time

of 9.3 to 38.7 seconds. Without going into all the mathematics from which this is derived, let it be said that we are more than 99% certain that any time the phone is answered outside of this range, there is something happening that is not normal. Something so abnormal that it may reveal a significant problem. Stated another way, there is less than a 1% chance that this case would ever happen outside of a range defined as the mean plus or minus three standard deviations.

3. *Control limits* are established by adding and subtracting 3 standard deviations to and from the mean. (Stated another way: *Control limits* = Mean + or - 3 times the square root of the mean). Statisticians refer to this range as the *control limit* on any set of observations. The high end of the range is called the *upper control limit (UCL)*, while the low end of the range is called the *lower control limit (LCL)*. Figure 5.7 shows the application of *control limits* to the data in Figure 5.5.

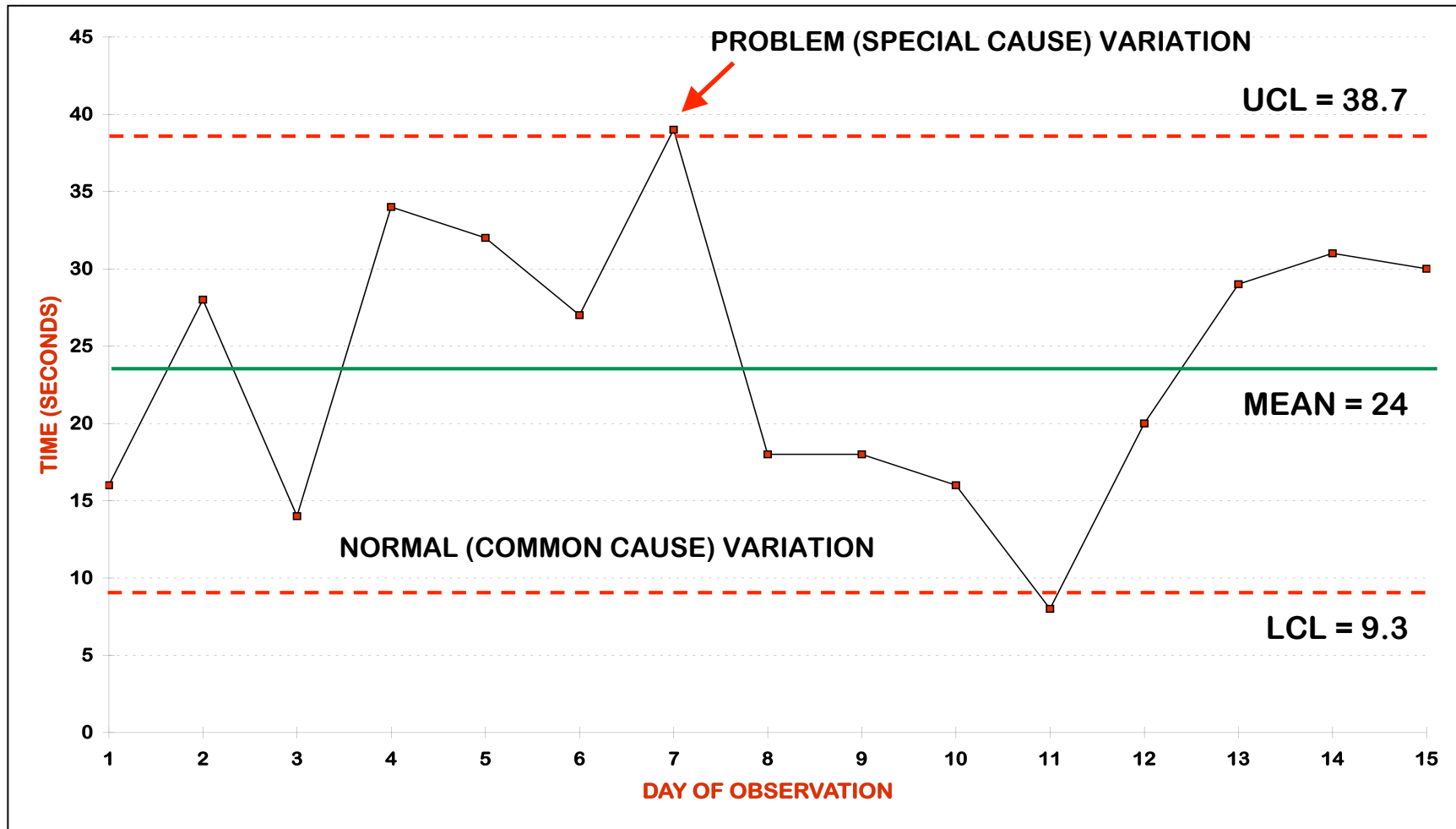
To improve system performance:

1. Eliminate events that fall outside the *control limits* (above the UCL or below the LCL).
2. Reduce the variability in performance within the UCL and LCL.
3. Improve the *mean* performance level, the average performance of the work system.

Figure 5.7

# CONTROL CHART

TIME RECEPTIONIST TAKES TO ANSWER PHONE 10:00 - 11:30



**USE TO DETERMINE IF PROCESS IS STABLE:**

- PLOT ACTUAL PERFORMANCE = RUN CHART
- CALCULATE AVERAGE PERFORMANCE & UCL/LCL
- ID & FIX PROBLEM VARIATION
- IMPROVE PROCESS—REDUCE NORMAL VARIATION/IMPROVE AVERAGE

## **TYPES OF VARIANCES**

There are three types of variance that can occur within a process:

- **Problem Variance.** This is sometimes called *special cause*. It is a variance from system requirements that is outside the UCL/LCL. Something is wrong outside the system in terms of the way it is supposed to operate. As a result, a crisis or problem requiring immediate attention is created.
- **Normal Variance.** This is sometimes called *common cause*. It is a variance from the *mean* or average performance within the UCL/LCL. Normal variances do not mean that system improvements should not be made. In many cases, the *mean* may be inappropriate, or may need to be adjusted. The range of variation may be too broad, and needs to be narrowed.
- **Customer Variance.** This type of variance is not mentioned by other writers on quality. It occurs when whatever we're doing is rejected by the Customer. Let's take a closer look at each type of variance.

### **PROBLEM VARIANCE (SPECIAL CAUSE)**

An error in the operation of a system, but not in the design of the product, is a variance from system

requirements or a “problem” variance. For example, if you buy an ice making refrigerator, and the ice maker doesn't work because a worker didn't wire it correctly, you have purchased a “lemon.” The ice maker is at variance from the system design. The system design is not wrong, but something, in this case, a lack of training of the worker, caused the system to malfunction and create an unacceptable product.

Address the problem of special variance as a one time occurrence. Do not tamper with the system. You will be trying to fix something that is not broken, and cause additional problems that did not previously exist.

However, you may sometimes see a pattern: a number of problem variances. Where such a pattern exists, look first to the system to see if there is something happening within the system prompting the problem variance. In other words, while not tampering with the system is usually good advice, there are situations where variance beyond the *control limits* is due to a poorly designed system and adjustments are called for.

### **NORMAL VARIANCE (COMMON CAUSE)**

Within the UCL and LCL you will see fluctuations in performance around the mean. These are normal, and often referred to as “common” variances of performance. They occur because of variability in the quality of the inputs, or variances in the process of the system. As long as they are within the *control limits*, they do not represent a need for immediate change. In the example of telephone response time, there is a

normal range of variance from 8 seconds to 34 seconds. The variance is due to work interruption by visitors, Colleagues, etc. As long as the variance stays within the *control limits*, we know the system is operating satisfactorily. However, the *control limits* may require adjustment in order to improve system performance further.

To reduce *normal cause* variations, make changes in the system. Modify and improve the inputs to the system, and/or modify the process which is used in the system, in order to change the outputs or results.

### CUSTOMER VARIANCE

A variance from Customer requirements occurs when the design of the product or output does not meet Customer needs. It is not the blame of the system, worker, or operator. There is no bad piece of equipment. The system is performing the way that it was designed to. The problem is that the system is not designed to meet the Customers' needs. A classic case is that of Texas Instruments. They produced nearly perfect wristwatches which satisfied the variance definitions above. However, Customer requirements were not met, and Seiko drove TI out of the watch business! This serves to remind us that the beauty of our preoccupation with quality management must never blind us to what fits with the Customer's expectations.

## MANAGING THE WORK PROCESS

### CONTROL CHARTS

A *control chart* is a *run chart* with the addition of *upper and lower control limits (UCL & LCL)*. *Control limits* define the outer edges of acceptable performance levels for the system. A control chart serves many functions:

- It shows stability and predictability of the process. When the data points of system performance are plotted, variations in the process are visualized. A flatter *run chart* indicates less volatility, while a jagged *run chart* indicates more volatility. A *run chart* is constructed of a series of data points connected by a line. The distance from one data point on the chart to another is the range of performance. Taking the highest point of performance on the chart and the lowest point of performance on the chart represents the greatest range of performance. Knowing the average or mean range of performance is also important. One goal is to minimize the range of performance.
- It shows normal and problem variation levels. A problem variation occurs when performance is outside of the UCL or LCL. When problem variations occur, the system should be shut down if necessary, and the problem corrected before continuing.

*Normal variations* are the fluctuations in performance that occur within the UCL and normal variations are the fluctuations in performance that occur within the UCL/LCL. They are expected, but this does not mean they are totally acceptable and should not be improved. The UCL and LCL can be adjusted to represent a smaller range of variance and greater stability.

- It compares past performance levels to present performance levels. Figure 5.8 shows that the mean performance level improved from 24.0 seconds to 14.0 seconds after a change was made in the process. Not every change will have positive results. Comparative charting visually displays the progress or problems that have occurred as a result of change.
- It compares your performance level to benchmark performance levels. Visual comparisons of your current performance to goals serve as a reminder of how much progress has been made and how much more is needed. Figure 5.8 reports a benchmark performance level of 6 seconds compared to the improved performance level of 13.5 seconds. To meet the benchmark, more improvement in performance is needed.

The goal is to continuously improve the process by both reducing variations and improving the mean

performance. A *control chart* will be one of the more frequently used quality tools. It appears to be complicated, however you will quickly become familiar with it. To build your *control chart*, follow the sequential steps outlined in Figure 5.9

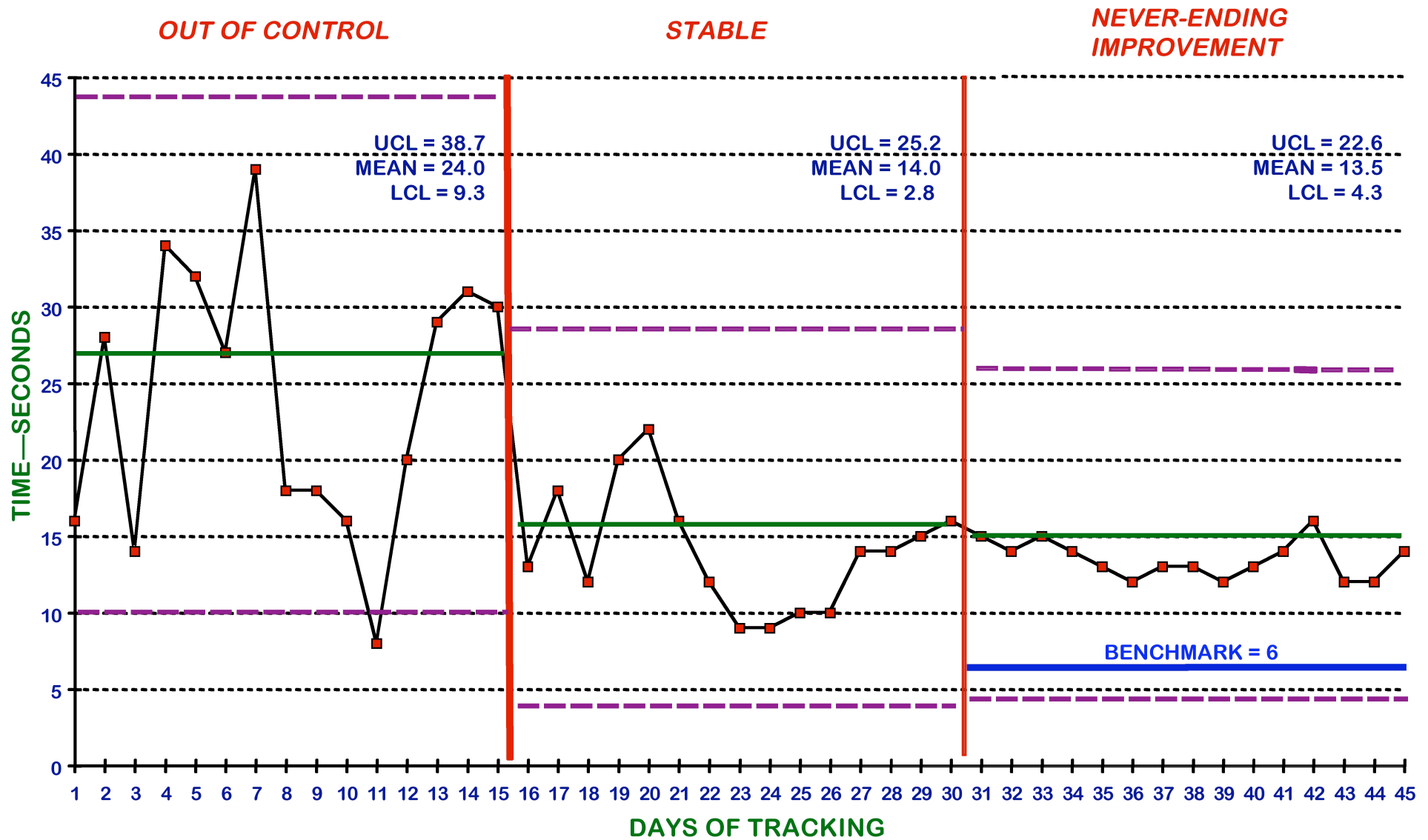
**Figure 5.9**

***HOW TO BUILD A  
CONTROL CHART***

1. Determine Measurement Units
2. Determine Time Frame For Multiple Cycles
3. Plot Data Measurements Over Time
4. Calculate Mean (Average) Performance
5. Calculate UCL & LCL
6. Isolate All Points Above UCL & Below LCL And Determine Cause. These Are “Special Cause” Or Problem Variations
7. Review “Common Cause” Or Normal Variances. Is It Desirable To Reduce Control Limits Further?
8. Make Changes To The Process
9. Monitor Again. Were Improvements Made?

Figure 5.8

# CONTROL CHART



### **CONTROL CHART CAUTIONS**

1. *Stability in a process does not necessarily mean it is a quality process.* A process can be stable and yet be below quality standards. When normal variances are small, it is natural to think that the process is stable and good. A greater range of variance does indicate a less stable process, while a flatter range of variance indicates a more stable process.
2. *Tampering is deadly.* Treating a problem cause variation as a normal cause variation, or vice versa, creates unnecessary additional quality problems. In the example of the ice making refrigerator, the difficulty was a problem variance with the performance of one worker. If the analysis incorrectly identified the system as the defect, then changes to the system would be made when unneeded, and the problem would continue to occur. A negative financial and employee morale impact would result. It is also possible that Colleagues would see the person making the analysis as being out of touch with what's really going on in the work process.

### **Assignment**

1. *Identify a major system in your work where performance data would be useful. Develop a control chart for the system and use it routinely to improve performance.*
2. *Review the UCL and LCL of performance with your supervisor. Monitor for problem variances. Discuss the idea of improving the process further by reducing the variance ranges, or improving the mean performance level.*

*Supervisor's Approval:*

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## **Tool Practice**

### **Hope Springs Eternal Hospital (A)**

Bob O'Mallett, the new CEO of Hope Springs Eternal Hospital, has identified higher standards of productivity and Customer service as a short term goal for the hospital. Specific improvements in performance levels were established for each department.

Following the announcement from Bob O'Mallett, Judy Loops, the VP of Operations, met with Chuck Zapinski, Director of Radiology, to discuss his new performance goals for the next nine months: increase productivity by 15%, and improve Customer Service results to a new level of 98%. In order to begin planning for this change in performance, Chuck called his management and supervisory staff together.

He began the meeting by stating the new department objectives as improved productivity and Customer service within the next 9 months. "What's driving this change?" asked Susan, the day shift supervisor.

"A number of motivating factors are involved," replied Chuck. "First, there is something called 'market share.' Our Marketing Research Department reports that we are serving 25% of the available Radiology market. We should be serving at least 33% and preferably 45% of the market. Then, there are the productivity figures which show a less than acceptable level. We have been consistently reporting a productivity level of 78%. A 15% increase, which is

our goal, would be 90% productive.

"I can't believe that we're only 78% productive," Marsha Clearview, an evening shift supervisor, stated in a defensive and abrupt manner. "We are running our buns off around here, rushing to get everything done, and to get all the patients served. I don't know how we could possibly do more without more staff!"

Chuck nodded acknowledging her statement and continued, "Before meeting with all of you, I pulled together as much information as I could on our Customer Satisfaction levels." See Figures 5.10 and 5.11.

"Yeah, I remember that study," Dave Dolittle, a day shift supervisor remarked. "We did a benchmark study on Customer waiting times with a couple of different companies. McDonald's Restaurants was one of the real interesting ones. They have something called 'Door to Door' time. The time it takes a Customer to enter the restaurant door, get their food, and be ready to leave is called 'Door to Door' time. They say that their Customers are not willing to wait more than 3 minutes door to door before they become dissatisfied."

"I wonder how long our Customers are willing to wait before they become dissatisfied?" Marsha asked of the group nonchalantly.

**Figure 5.10*****Patient Satisfaction - Radiology Department***# of Survey Responses      Reasons for PatientDissatisfaction

12	Busy telephone
5	Noise level
5	Service location
5	Food
8	Personnel attitude
7	Telephone response time
14	Appointment scheduling
14	Billing errors
11	Hospital location - safety
18	Waiting time - reception
16	Waiting time - exam room
2	Parking ease
7	Diagnostic info lacking
<u>2</u>	Visitation hours
126	Total Responses

**Figure 5.11*****Patient Waiting Time Study***

Conducted between 10:00 AM-12:00 PM

<u>Avg.</u>			
<u>Day</u>	<u>Wait(min)</u>	<u>Escorts</u>	<u>Notes</u>
1	12	3	No breaks
2	22	3	1 break ea. 45 min. total
3	15	3	No breaks
4	25	3	30 min. training ea.
5	17	3	No breaks
6	37	3	for 1/2 day, 1 for 1/2 day
7	12	3	No breaks
8	10	3	No breaks
9	23	3	1 break ea. 45 min. total
10	14	3	No breaks
11	32	3	30 min. training ea.
12	16	3	No breaks
13	34	3	3 for 1/2 day, 1 for 1/2 day
14	14	3	No breaks
15	13	3	No breaks
16	22	3	1 break ea. 45 min. total
17	11	3	No breaks
18	27	3	30 min. training ea.
19	19	3	No breaks
20	25	3	1 break ea. 45 min. total
21	16	3	No breaks

**19.8 minutes = Avg. Patient Waiting Time**

**Assignment**

**Calculations**

1. *Create a histogram reporting reasons for patient dissatisfaction. Use the data in Figure 5.10. A blank histogram is provided in Figure 5.12.*
2. *Create a Pareto chart, using data from Figure 5.10. Identify the “vital few” causes of patient dissatisfaction. A blank Pareto chart is provided in Figure 5.13. What are the 8 vital few causes contributing to 79% of all patient dissatisfaction?*
3. *Using data from Figure 5.11, plot a run chart of the average waiting time. Use the blank run chart in Figure 5.14.*
4. *Calculate the mean waiting time and plot it on the run chart.*
5. *Calculate the UCL and LCL and plot them on the run chart, which then becomes a control chart.*

Figure 5.12

## **HISTOGRAM: PATIENT DISSATISFACTION**

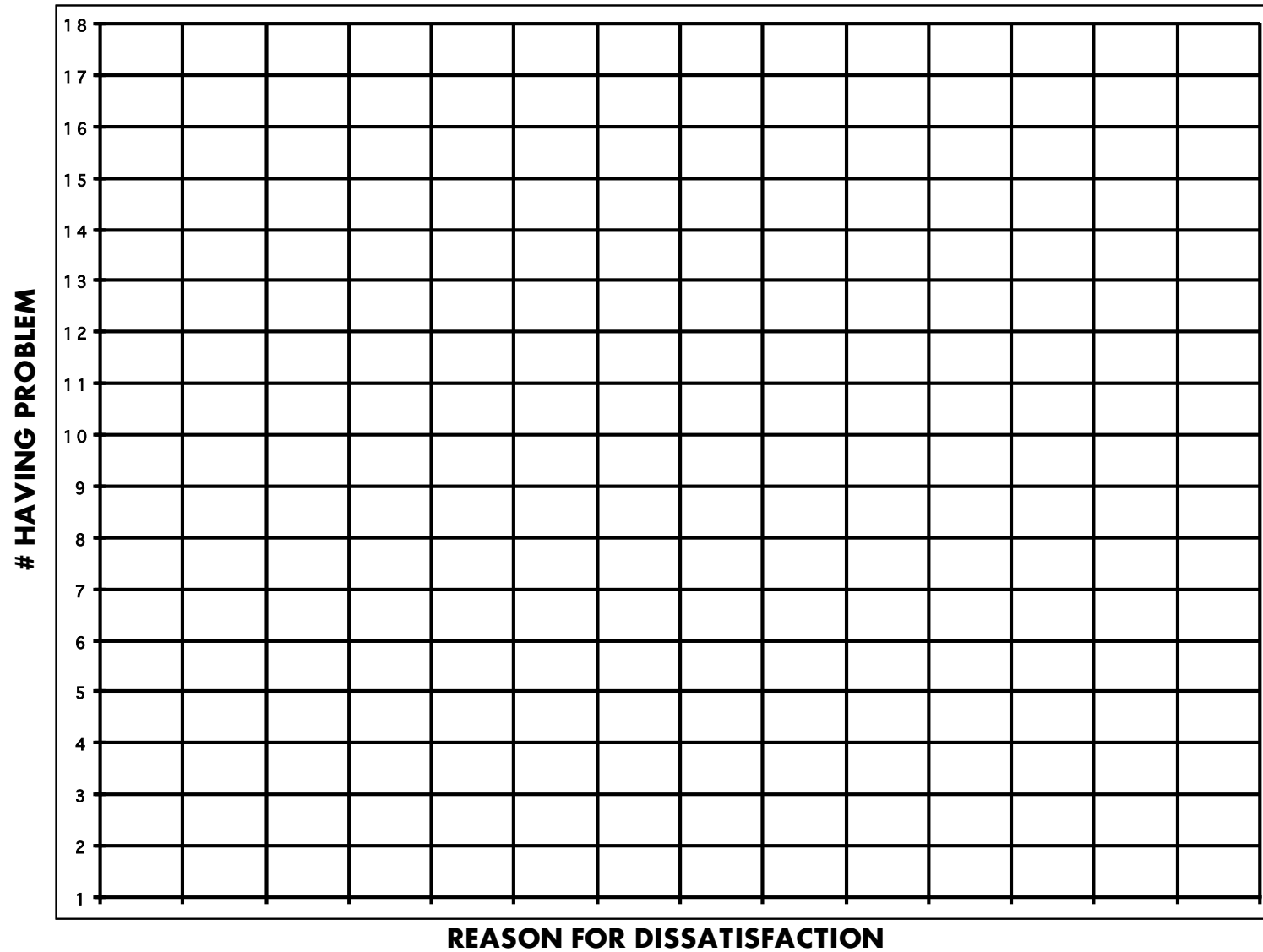


Figure 5.13

## ***PARETO CHART: PATIENT DISSATISFACTION***

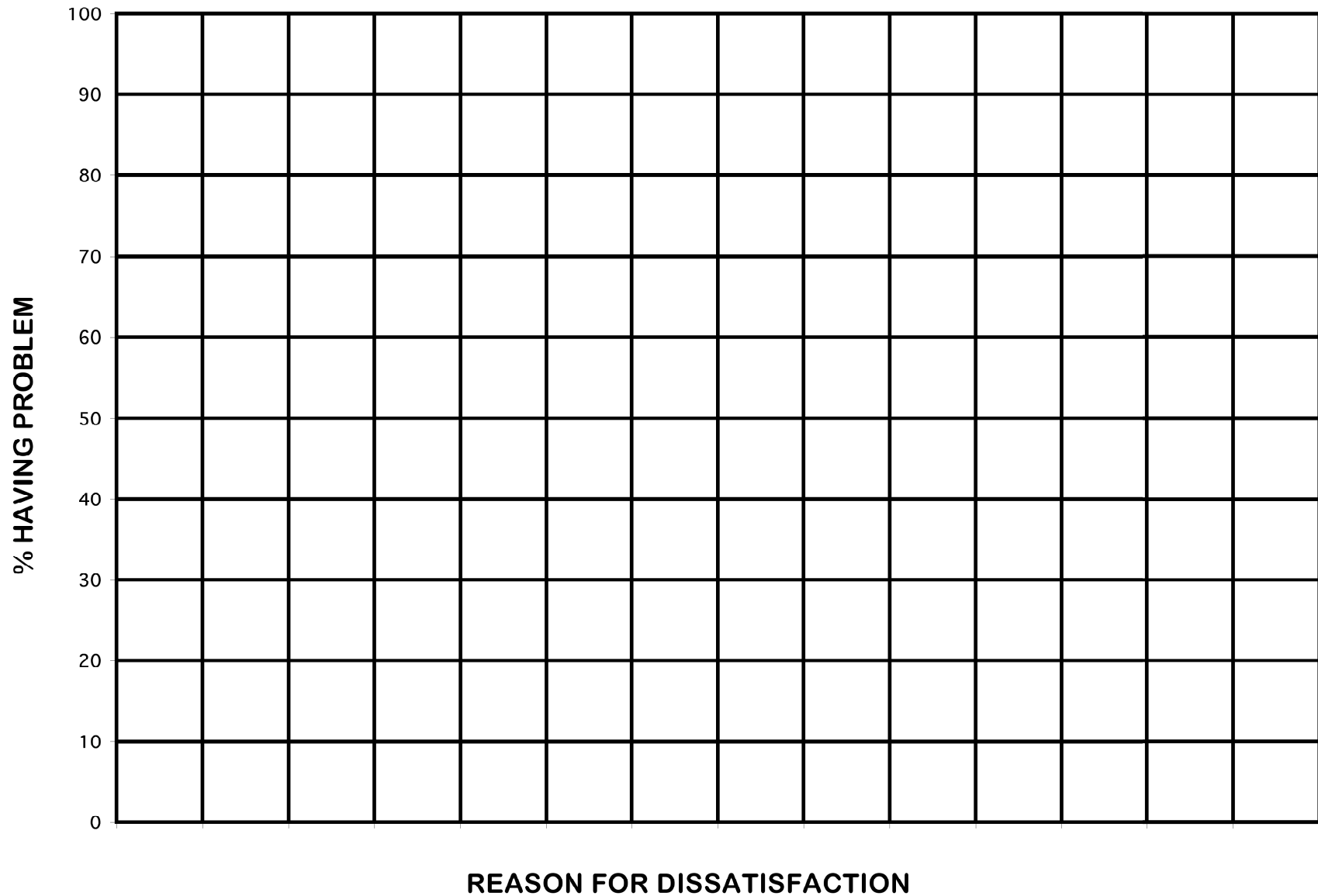


Figure 5.14

***RUN CHART: AVERAGE PATIENT WAITING TIME***

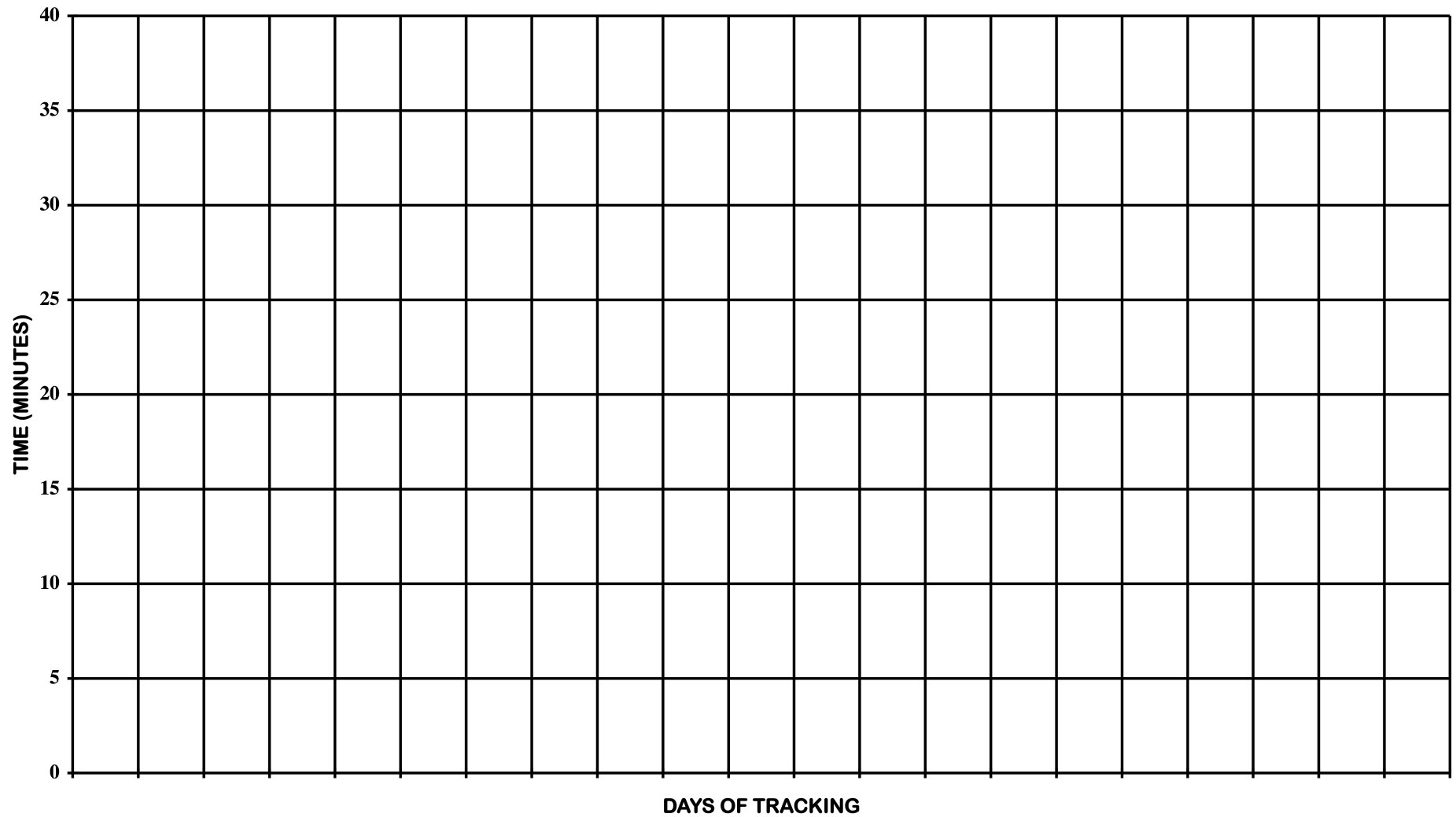
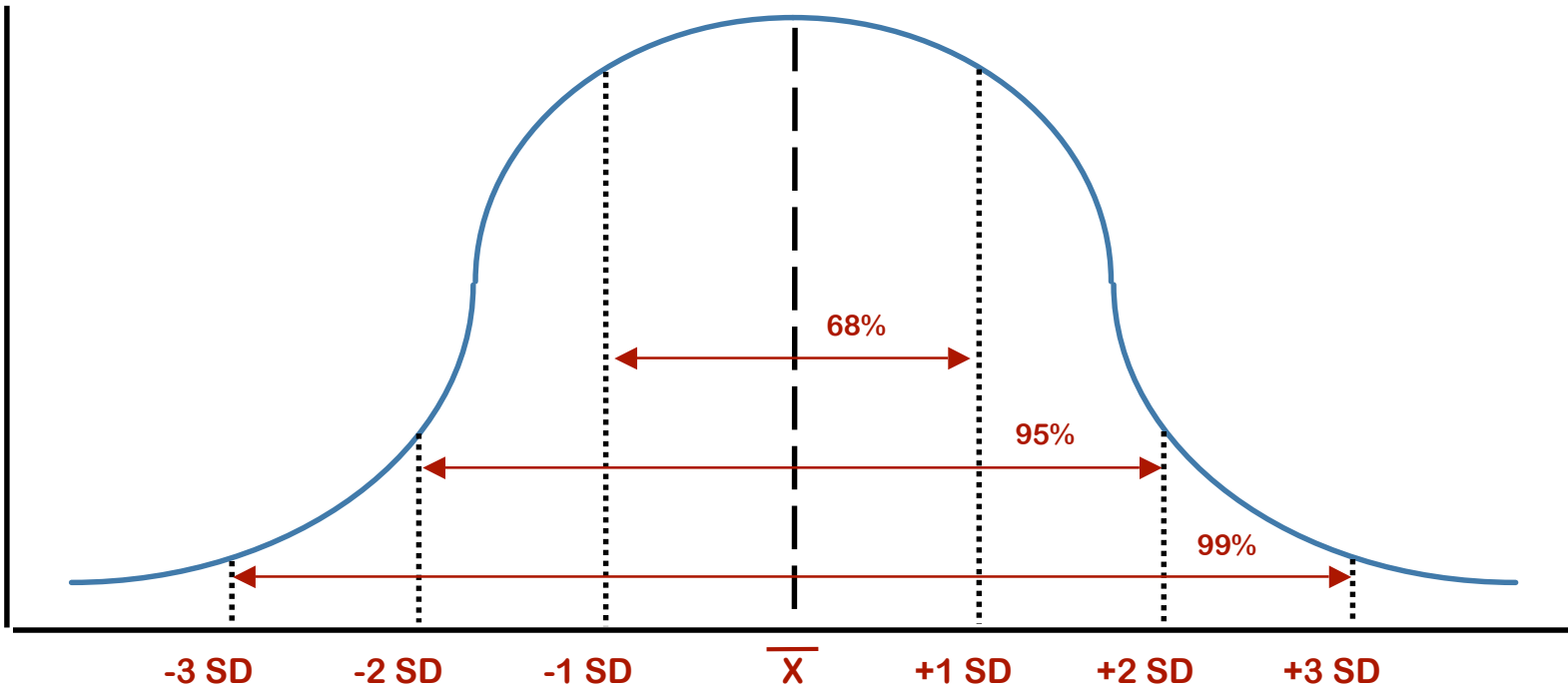


Figure 5.15

# PREDICTING PROBLEMS

“VARIANCE IS BAD” WHEN NOT “CLOSE ENOUGH FOR JAZZ”



1. NEARLY ALL EVENTS SHOW A NORMAL DISTRIBUTION WITH MOST VARIANCE NEAR THE MEAN, & DECLINING AWAY FROM THE MEAN
2. VARIANCE CAN BE EXPRESSED AS STANDARD DEVIATION, WHERE:  $\text{SD} = \sqrt{X}$  —
3. THE AMOUNT OF VARIANCE UNDER THE CURVE IS DEPENDABLY:
  - BETWEEN  $\pm 1\text{ SD} = 68.26\%$  • BETWEEN  $\pm 2\text{ SD} = 95.44\%$  • BETWEEN  $\pm 3\text{ SD} = 99.72\%$
4. HENCE, WE CAN “PREDICT WITH CONFIDENCE”, STATE WITH A HIGH DEGREE OF CERTAINTY, THAT ANY DATA POINT OUTSIDE THIS RANGE IS UNLIKELY
5. CONTROL LIMITS ARE USUALLY SET AT 2 OR 3 SD ABOVE & BELOW THE MEAN

**Notes**

## Chapter 6

# OUTLINE OPTIONS

*There are often several solutions to a problem. Talent lies in determining which will be the best.*

Outline Options is the “O” of DO-IT. There is a sequential use of the tools which minimizes the amount of time invested in identifying appropriate solutions. Study the procedural steps for outlining options in Figure 6.1. Tools listed in italics are core tools and frequently build upon one another. “Special Use tools” are used when additional analytical assistance is needed. Remember, use only the tools that help you get the job done.

Figure 6.1

### OUTLINE OPTIONS

1. Analyze Problem Data
  - Begin with *Brainstorming*
  - Pinpoint Possible Problem Causes—*Fish-bone Chart*
2. Identify Root Causes—Push For Consensus
  - Determine Why Problem Occurred—*Variance Analysis*
  - Document Current Process—*Flowchart, Work Traffic Diagram*
3. Consider Possible Solutions & Controls
  - Generate Alternatives—*Variance Solution*
  - Test Concept: Chart, Pilot, Customer Response
  - Choose Best Alternative—*Decision Matrix, Cost/Benefit Analysis*

### SPECIAL USE TOOLS

- Work Simplification
- Cycle Time Analysis
- Variance Analysis/Solution
- Stratification

## A. BRAINSTORMING

Several “core” and “special use” tools are applied to problem solving. Let’s look at the particulars of these tools, and start with one of the most important and widely used: *brainstorming*. See Figure 6.2 for a summary on *brainstorming*.

**Figure 6.2**

### ***BRAIN-STORM!***

Purpose: Generate Many & Zany Ideas

- Avoid Small, Tunnel, One Best Answer Thinking

Rules:

- Always Visualize On Flip charts
- Create Options Furiously, Praise All Ideas
- No Criticism, No Analysis, No Discussion
- Do Critical Thinking Last—Do Ideas Fit The Facts?

Techniques:

- Random—Most Common
- Round Robin—Controls Contribution
- Paper Slips—Least Threatening
- Nominal Group Technique—Paper Slips + Discussion + Group Thinking

When *brainstorming*, always use a flip chart or large board to record all ideas as they are generated. A large board is important because all participants should be able to see the list as it is being created. The four most often used techniques in *brainstorming* are:

**Random.** People voice their ideas as they are generated. There is no pattern or priority to the process. This is the most common style of *brainstorming*. Some people feel stifled by this style.

**Round Robin Style.** Go around the room one by one in a sequence, each person being responsible for giving a new idea. This style is easiest to facilitate, and forces participation.

**Paper Slip Style.** Each person writes down their ideas on a slip of paper. The papers are put into a hat and the facilitator draws ideas from the hat, reading them to the group. Others in the room add to the idea list as they go. This style is more comfortable for those who are shy.

**Nominal Group.** Paper slip technique + discussion + group thinking.

When an adequate number of ideas have been generated, and the group has nothing more to add, it is time to process the ideas. The objective in processing a list of ideas is to separate those ideas which the group feels are most important, need rapid attention, or have greatest impact, etc., from the others. This is best done through a *voting* or *ranking* of the ideas.

### Assignment

1. Identify a problem needing improvement. Choose a number of people to gather in a brainstorming session on this problem. Brainstorm solutions.

2. Review the results with your supervisor. Which solutions will you implement?

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Supervisor's Approval:

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### B. FISH-BONE CHARTS

When a problem situation has been identified, the next step is to determine why the problem is occurring. Knowing the “why” of the occurrence provides the basis for developing solutions. *Fish-bone charts*, named after their fish-bone appearance, are also known as *cause-and-effect diagrams*. They are a means of collecting and displaying, in an orderly fashion, the ideas on what “caused” the problem, or ideas on how to effect a solution. Figure 6.3 is an example of a completed *fish-bone chart*. Figure 6.4 is an example of the basic structure of a *fish-bone chart* still waiting to be used.

### CONSTRUCTING A FISH-BONE CHART

Use the following steps to construct a *fish-bone chart*.

1. Pinpoint the problem and write the problem statement or effect at the end of the diagram where the word “problem” is located.
2. List all the sources of the problem that you can think of. Group thinking and brainstorming are good here. Use the 7Ms of input as a regular starting point. Add or delete others that do not apply. Organize your thoughts around the 7Ms.
3. Identify the specific causes under each of the 7M headings. For example, if machinery is a problem area, then what exactly is it about the machinery that is causing the problem? In our example, causes include lack of enough machinery, machinery in need of repair, and machinery that does not work efficiently.
4. Identify the one or two most likely causes of the problem.

The intent of the *fish-bone chart* is to organize your thoughts around what is causing the problem. Once organized and visualized, it is easier to zero in on the most likely root causes. At that point, you would go on to other problem-solving tools discussed later in the chapter.

Figure 6.3

# ***FISH BONE CHART*** ***(CAUSE & EFFECT CHART)***

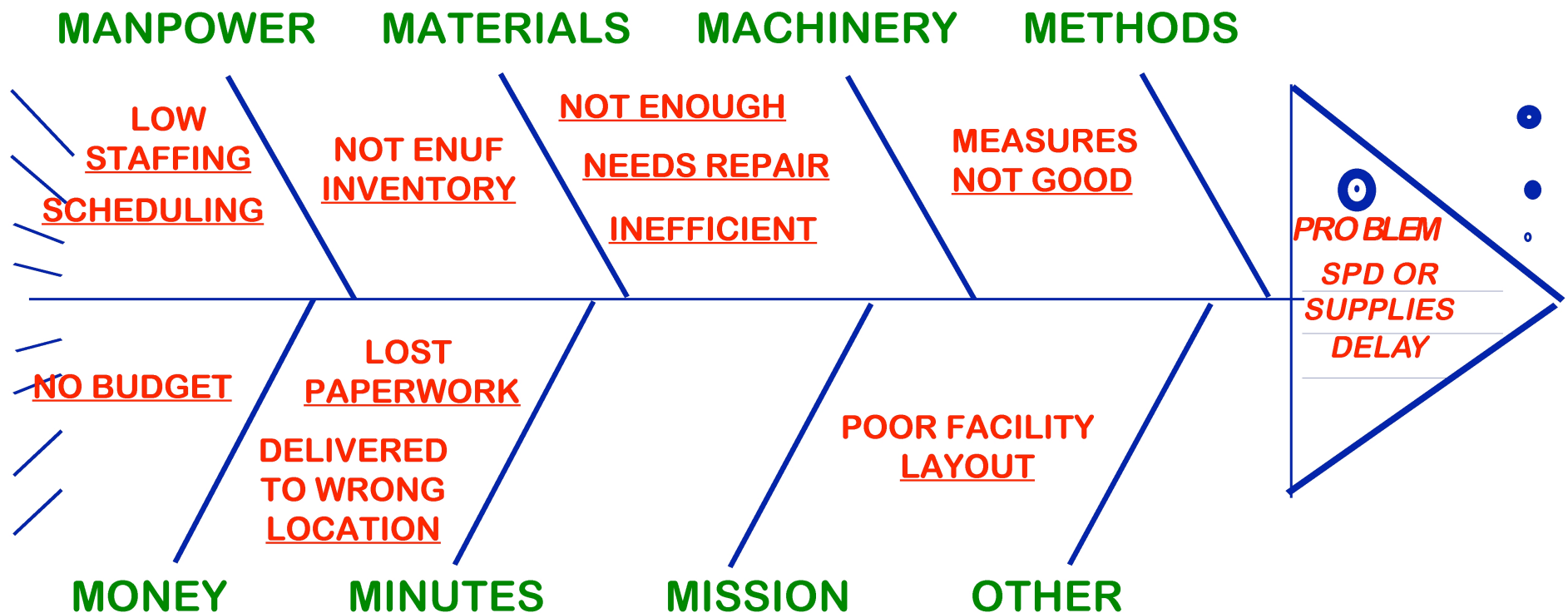
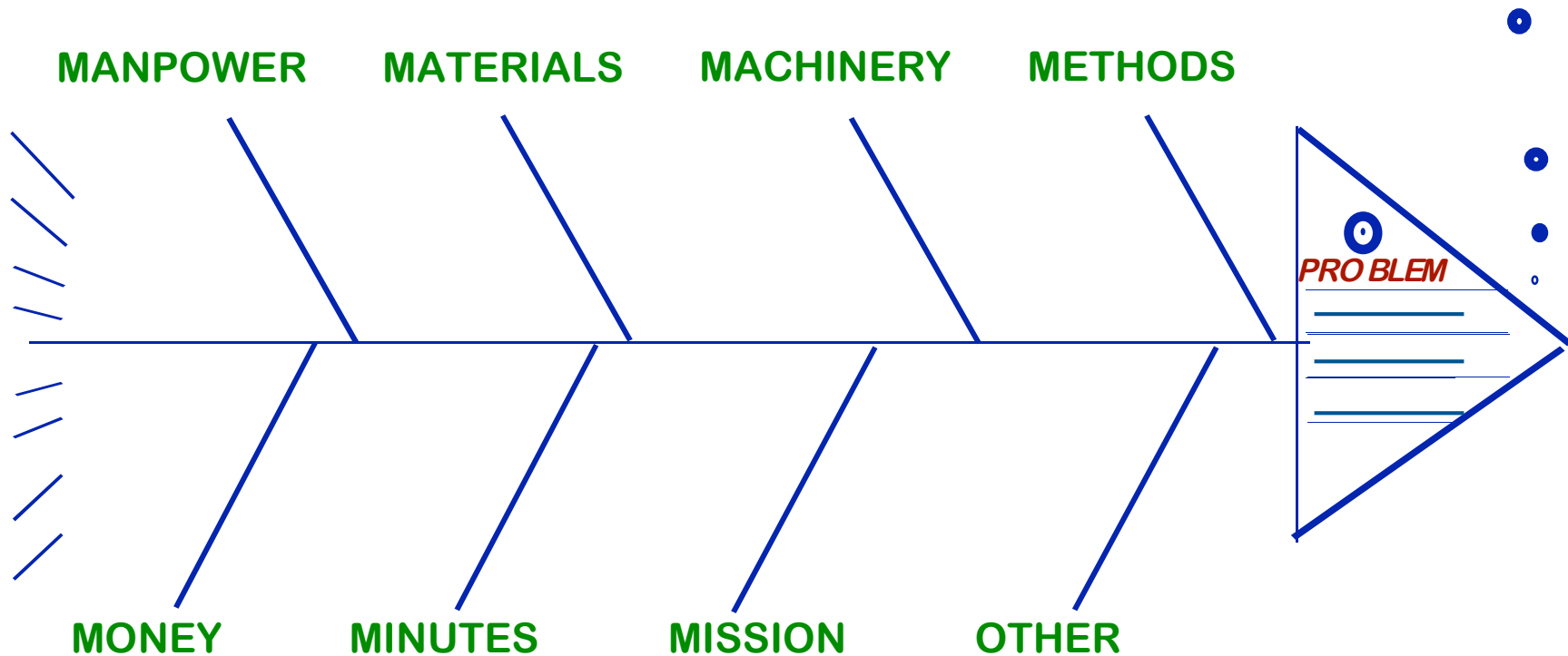


Figure 6.4

## ***FISH BONE CHART (CAUSE & EFFECT CHART)***



### ***USED TO ID CAUSES:***

1. WRITE PROBLEM STATEMENT
2. LIST SOURCES OF PROBLEM
3. ID SPECIFIC POSSIBLE CAUSES
4. ID 1 OR 2 MOST LIKELY CAUSES

### ***TYPICAL SYSTEM ERRORS***

Errors or weaknesses in the system may be occurring now. Even in organizations that have reached a level of excellence, errors may occur from time to time. To relieve problems and identify options, look first to *typical system errors*: those commonly found to bog down and retard system performance. Figure 6.5 separates typical system errors into each of the 7 input categories.

It has been found that 90% of the things that go wrong in an organization are because of the *system*, not the people. It is the *system* that is the enemy of quality, and that stands in the way of good people trying to do their jobs. The message is clear: Change the system!

### ***Assignment***

*Using the 7Ms, identify areas of system weakness in a work process you routinely do. Find ways to improve upon the weaknesses in the system. Review this with your supervisor for implementation.*

#### ***Areas of Process/System Weakness***

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#### ***Improvement Recommendations***

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#### ***Supervisor's Approval:***

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Figure 6.5

## ***TYPICAL SYSTEM ERRORS***

### **MANPOWER**

- EXCESS LAYERS & BUREAUCRACY
- LACK EMPOWERMENT & TRAINING
- RIGID JOB STRUCTURES
- NO JIT STAFFING
- STAFF UNDERUTILIZATION

### **MACHINERY**

- INFERIOR QUALITY
- DOWNTIME
- TOOL DEFICIENCY
- OUTPUT MISMATCH
- WRONG LOCATION

### **MINUTES**

- BOTTLENECKS
- MISSING INFORMATION
- INCOMPATIBLE FORMATS
- DUPLICATE PAPERWORK
- STAFF-TIME UNDERUTILIZATION

### **MISSION**

- DEADEND ASSIGNMENTS
- NO DIRECTION, AMBIGUOUS
- NO SUPPORT

### **MATERIALS**

- INFERIOR QUALITY
- NO JIT—MORE LABOR, COST
- INCONVENIENT LOCATION

### **METHODS**

- VARIABLE OR UNSTABLE
- DON'T UNDERSTAND OUTPUT NEEDS
- NO DATA, POOR MEASURES
- NOT USING ANALYTICAL TOOLS

### **MONEY**

- WORK DUPLICATION, WASTE
- REGULATIONS & POLITICS
- LOW SPENDING AUTHORITIES

## C. FLOW CHARTING

## Notes

*Flow charting* is a means of documenting a process. It makes the process visual, spots bottlenecks, assists in the evaluation of alternatives, and is the basis for joint understanding. Figure 6.6 shows a number of the most frequently used flow charting symbols. When changes are made in a process, documentation of the revised process clearly communicates what actions are being taken, and preserves the intended process.

*Flow charting* a process makes it easier to find ways to improve it. Waiting times can be easily identified as well as steps that could be combined, eliminated, or changed. A flowchart depicting a typical hiring process is illustrated in Figure 6.7.

### ***Assignment***

*1. Flowchart a work process you think is too ponderous, or where mistakes seem to happen over and over. Accurate flow charting requires a thorough understanding of the process. How many times did you have to ask questions as to what happens next in the process? Review the flowchart with your supervisor to see if anything is missing.*

*2. Discuss the benefits of the flowchart with your supervisor. Which processes should be documented in a flowchart format?*

*Supervisor's Approval:*

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Figure 6.6

# FLOWCHART SYMBOLS



**INPUT/OUTPUT: SIGNIFIES WHEN SOMETHING ENTERS/LEAVES WORKFLOW**



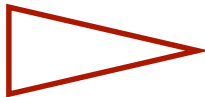
**PROCESS**



**DECISIONS**



**DOCUMENT**



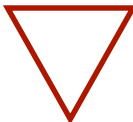
**INSPECTION**



**WAIT**



**TRANSPORT/MOVEMENT**



**FILE**



**CONNECTOR, CHART EXIT/ENTRY**



**OFFPAGE CONNECTOR**



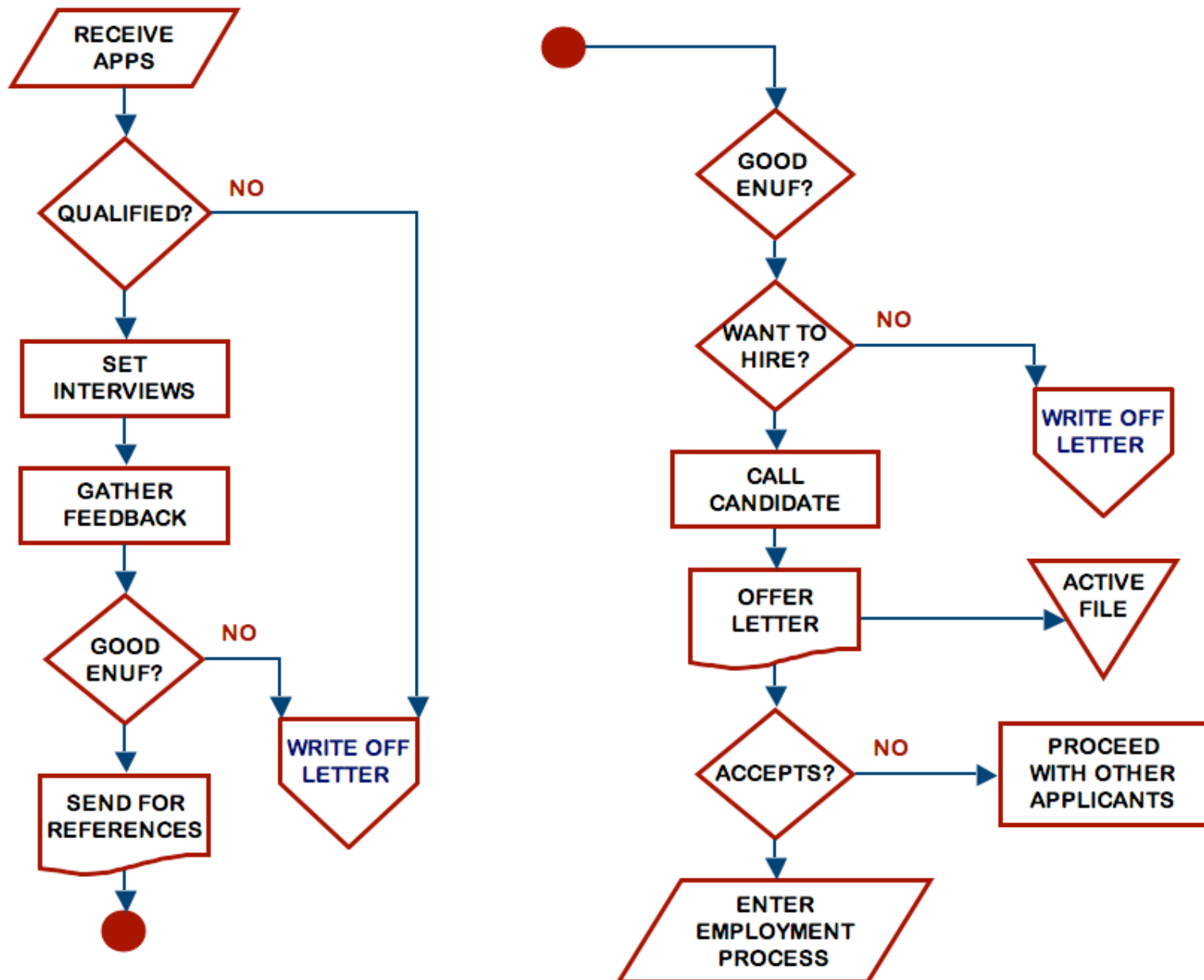
**TERMINATION**

## PURPOSES:

- **MAKES PROCESS VISIBLE**
- **ALLOWS SIMPLIFYING**
- **SPOTS BOTTLENECKS**
- **BASIS FOR UNDERSTANDING**

Figure 6.7

# HIRING A NEW ASSOCIATE



## **Tool Practice**

### **Hope Springs Eternal Hospital (B)**

Chuck Zapinski, Director of Radiology, continued the department meeting by stating that several complaints had been made by the nursing staff. They say it is taking us too long to test the patients. Add to all this the letter that Bob, the CEO, just received from an unhappy patient and there's no question why attention was drawn to our department's performance. Here, let me read the letter to you."

*Dear Mr. O'Mallet,*

*I recently had to come to your hospital for X-rays. We arrived at the outpatient admission office where we were told to be seated. 20 minutes later we were called to the counter. They collected my personal information and my insurance information. I then waited 15 minutes longer while they verified my insurance coverage. Finally I was given a file of papers and directed to walk to the Radiology Department. (Where are your wheel chairs?) Upon arrival in Radiology, I then waited another 20 minutes until the girl could talk with me. When it was my turn, I gave them my file, but had to fill out even more papers! Then I waited again. 15 minutes later they took me to a changing room where I prepared myself for the exam.*

*I spent more than an hour just waiting in various parts of your hospital. Everywhere I went people were waiting along side of me. Isn't there some way your staff could work on a better schedule so we would not have to wait so long?*

*Respectfully,*

*Mrs. Longtime N. Commin*

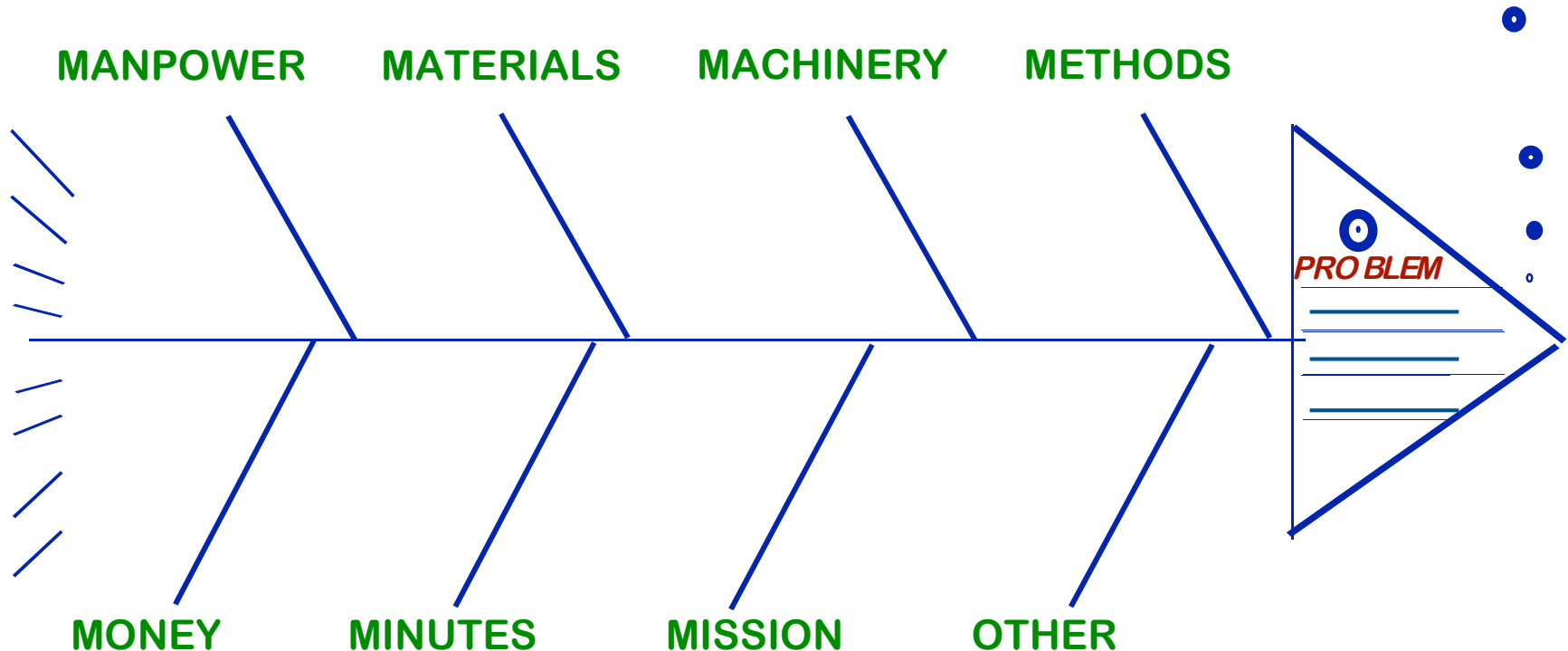
### **Assignment**

- 1. Flowchart the admission process described in Mrs. Commin's letter. Use the space in Figure 6.8.*
- 2. What is the total amount of "waiting time" Mrs. Commin experienced from the first registration desk to the exam room?*
- 3. Using a fish-bone chart and brainstorming techniques, what are some of the problems contributing to the long wait time? A blank fish-bone chart is provided in Figure 6.9.*
- 4. Can you find ways to improve this work process? Flowchart a revised admission process. Use the space in Figure 6.10.*

**Figure 6.8—Flowchart**

Figure 6.9—Fish Bone

## ***FISH BONE CHART (CAUSE & EFFECT CHART)***



### ***USED TO ID CAUSES:***

1. **WRITE PROBLEM STATEMENT**
2. **LIST SOURCES OF PROBLEM**
3. **ID SPECIFIC POSSIBLE CAUSES**
4. **ID 1 OR 2 MOST LIKELY CAUSES**

**Figure 6.10—Revised Flowchart**

## D. WORK TRAFFIC DIAGRAM

Figures 6.11 and 6.12 represent *work traffic diagrams* that are essential for solving problems that involve transport of material, products, or people. Location of tools, inputs, processes, and outputs are critical to reducing cycle times and general work efficiencies. A *work traffic diagram* can show one floor of the building, numerous floors, or the entire campus. Hospitals are notorious for poor floor plan layouts, and therefore find *work traffic diagrams* to be of great value.

The benefits of a *work traffic diagram* are:

- Visual representation of locations
- Easier identification of problems & bottlenecks
- Proper perspective of distances & non contributing work travel

## Assignment

1. *Identify a process within your work area where plans for improvement are being made. Join the work group responsible for designing the changes and complete the following tasks:*

- *Review the work traffic diagram and become familiar with it, or*
- *If one is not already designed, create a work traffic diagram documenting the old and the new process.*

2. *Locate the work traffic diagram or map for the entire hospital, and become familiar with it. If one does not exist, discuss the merits of creating one with your supervisor. Create a task group with the goal of developing an organization map to be used.*

3. *Review your work with your supervisor.*

*Supervisor's Approval:*

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Figure 6.11

## WORK TRAFFIC DIAGRAM MEDICATION CARDS

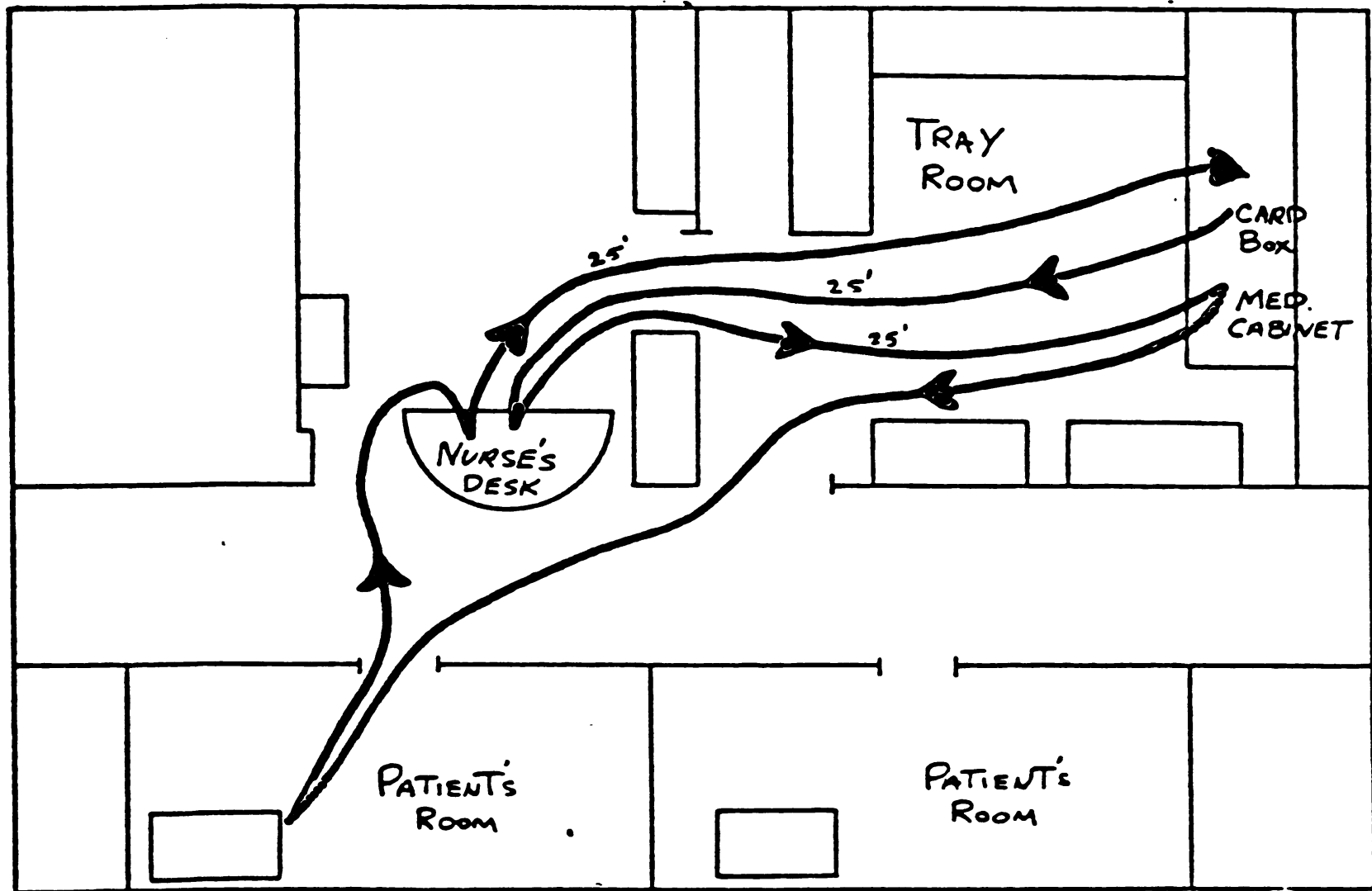
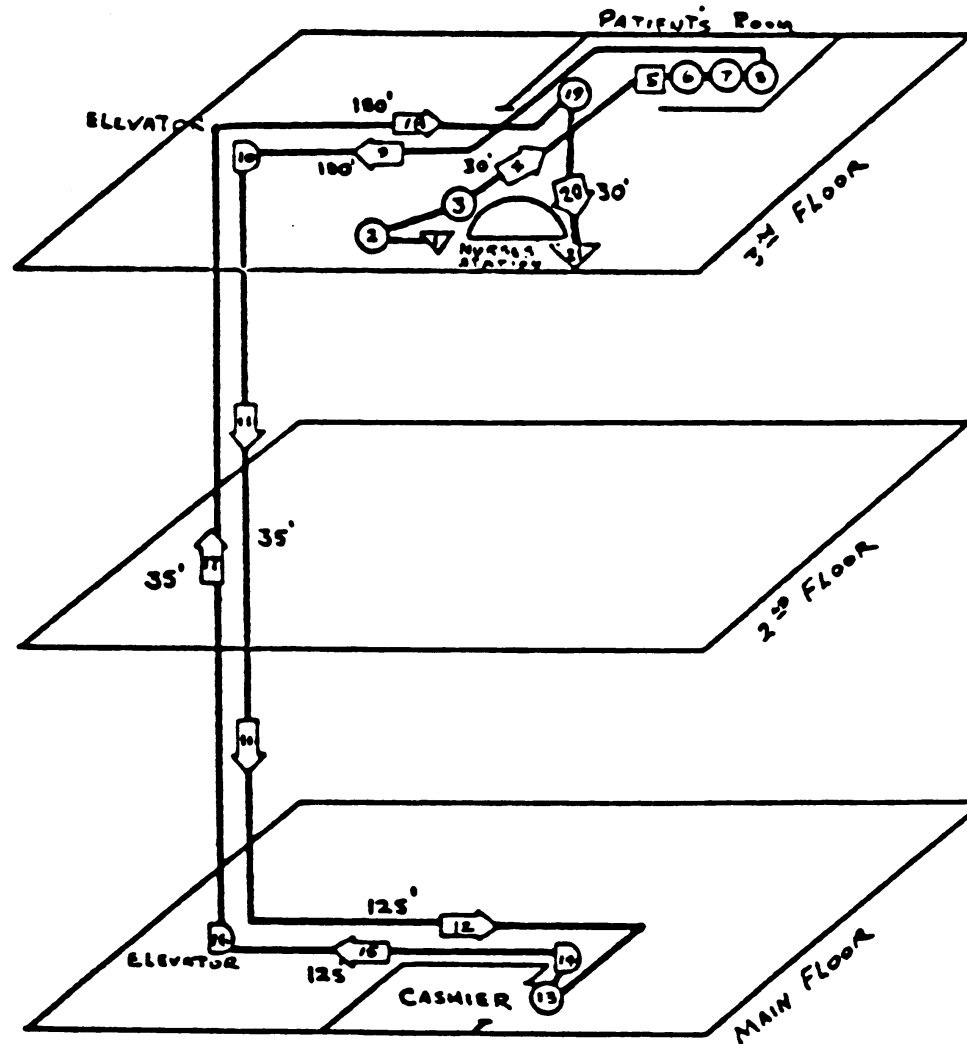


Figure 6.12

# WORK TRAFFIC DIAGRAM

## HANDLING OF PATIENTS' VALUABLES



—The Management of Hospital Employee Productivity, AHA

## E. DECISION MATRIX

There are always a number of workable solutions for any problem. Deciding which is the best solution is a problem in itself. If alternatives were based solely on tangible costs and benefits, it would make the decision easier. Unfortunately most alternatives are a combination of tangible and intangible costs and benefits, and this adds complexity to the decision. A tool that is helpful in making decisions or prioritizing ideas is the *decision matrix*. It quantifies each aspect of the various alternatives, and helps determine the best possible solution. The best decision will be the one that meets all of your requirements, provides the greatest results, and requires the least amount of change or investment of resources. Figure 6.13 outlines each step in creating a *decision matrix*.

## WEIGHING SOLUTIONS

The *decision matrix* quantifies and weighs the characteristics of each solution by assigning an overall relative weight to each alternative. The relative weight, in addition to understanding possible adverse consequences involved, determines the best balanced choice of solutions. Figure 6.14 represents a sample of a *decision matrix*.

In this example, most of the members in the family originally thought that a dog was the pet best suited to meet the needs. But when they discussed it thoroughly using a *decision matrix*, the weighted values showed that a cat would be a better selection.

**Figure 6.13**

### ***CREATING A DECISION MATRIX***

1. One Sentence Statement: What's The Target?
2. List Objectives: What's A Good Decision?
3. Classify Objectives: What Counts & How Much?
  - Required—3 Tests
    - Critical to Success/Failure
    - Measurable
    - Realistic/Practical
  - Desireds—Assign Numeric Value to Each
    - Assign Weight 1-10, Force Spread
4. Generate Alternatives
5. Evaluate Alternatives: Do They Stack Up?
  - Requireds: No/Go Means Stop
  - Desireds: Rate Degree Alternative Satisfies Each 1-10 Rating
  - Rate Degree Satisfied All Desired = Choice
6. Do Threat Analysis: What Could Go Wrong?
  - Threat-Probability x Seriousness (1-10)
7. Make Best Balanced Choice

*Adapted from The Rational Manager, Kepner & Tregoe*

Figure 6.14

<b>DECISION MATRIX</b>													
<b>DECISION STATEMENT:</b> PICK THE BEST POSSIBLE PET FOR OUR FAMILY & CIRCUMSTANCES													
<b>OBJECTIVES</b>		<b>ALTERNATIVES</b>											
		<b>A. FISH</b>		<b>B. BIRD</b>		<b>C. DOG</b>		<b>D. CAT</b>		<b>E. HORSE</b>		<b>F. HARLEY</b>	
<b>REQUIRED:</b>		<i>GO/NO GO</i>		<i>GO/NO GO</i>		<i>GO/NO GO</i>		<i>GO/NO GO</i>		<i>GO/NO GO</i>		<i>GO/NO GO</i>	
<i>SMALL, LESS THAN 15#</i>		GO		GO		GO		GO		NO GO		NO GO	
<i>NOT MORE THAN \$200</i>		GO		GO		GO		GO		GO		NO GO	
<i>NO ALLERGY</i>		GO		GO		GO		GO		GO		GO	
<b>DESIRED:</b>	<b>WEIGHT</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>
	1 to 10	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S
<i>SOFT &amp; FURRY</i>	7	1	7	7	49	10	70	10	70				
<i>SNUGGLY</i>	2	1	2	4	8	6	12	10	20				
<i>ALREADY TRAINED</i>	6	1	6	8	48	8	48	10	60				
<i>SANITARY</i>	6	4	24	6	36	7	42	10	60				
<i>FRIENDLY</i>	8	8	64	8	64	10	80	1	8				
<i>QUIET</i>	10	10	100	3	30	1	10	9	90				
<b>TOTALS</b>			203		235		262		308				

Figure 6.15

<b>DECISION MATRIX</b>													
<i>DECISION STATEMENT:</i>													
<b>OBJECTIVES</b>		<b>ALTERNATIVES</b>											
		<b>A.</b>		<b>B.</b>		<b>C.</b>		<b>D.</b>		<b>E.</b>		<b>F.</b>	
<b>REQUIRED:</b>		<i>GO/NO GO</i>		<i>GO/NO GO</i>		<i>GO/NO GO</i>		<i>GO/NO GO</i>		<i>GO/NO GO</i>		<i>GO/NO GO</i>	
	<b>WEIGHT</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>	<b>SCORE</b>	<b>TOTAL</b>
<b>DESIRED:</b>	1 to 10	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S
<b>TOTALS</b>													

### **Assignment**

1. *Identify a problem in your work area where several alternative solutions would work. Use the decision matrix model and Figure 6.15 to determine the best alternative solution to the problem.*

2. *Review the final decision with your supervisor. Do you agree on the solution?*

*Supervisor's Approval:*

---

### **Tool Practice**

#### **Hope Springs Eternal Hospital (C)**

The supervisors and managers of the Radiology Department began brainstorming ways to reduce patient dissatisfaction. A list of three worthy improvements was generated. The group could not come to consensus on which improvement was most worthy of their initial efforts.

Use the *decision matrix* tool in Figure 6.16 and the following information to determine which improvement should be undertaken first.

Options:

1. Increase staffing. Add a part time patient escort position now. Many applicants are available.
2. Research the purchase of a new admitting system. The minimal expense would be \$100,000 for the system. All staff will need to be retrained.
3. Purchase more equipment. The cost will be in excess of \$15,000 and the delivery time is two months.

### **Assignment**

*Using the Decision Matrix Tool provided in Figure 6.16, assume that the "go/no go" decisions are correct as indicated in the chart. You are to assign an appropriate weight, score and total value to each of the three alternatives. Which appears to be the alternative of choice for you?*

Figure 6.16

DECISION MATRIX													
DECISION STATEMENT: PICK THE BEST POSSIBLE OPTION TO REDUCE PATIENT DISSATISFACTION													
OBJECTIVES		ALTERNATIVES											
		A. + STAFF		B. PROCESS		C. + EQUIP		D.		E.		F.	
REQUIRED:		GO/NO GO		GO/NO GO		GO/NO GO		GO/NO GO		GO/NO GO		GO/NO GO	
POSITIVE ROI		GO		GO		GO							
CAN DO IT NOW		GO		NO		GO							
DESIRED:	WEIGHT	SCORE	TOTAL	SCORE	TOTAL	SCORE	TOTAL	SCORE	TOTAL	SCORE	TOTAL	SCORE	TOTAL
	1 to 10	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S	1 to 10	W x S
NO CAPITAL EXPENSE													
SHORT TRAINING TIME													
HAS OTHER BENEFITS													
TOTALS													

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## ***COST/BENEFIT ANALYSIS***

A *cost/benefit analysis* defines the relationship between the costs of a change, financial and non financial, and the benefits derived from the change. This tool is most frequently used to evaluate alternatives and prepare for the financial needs required by a solution. Sometimes the best financial decision as dictated by a *cost/benefit ratio* is not the best solution to choose. In any case, a good ratio should accompany a good decision.

### **TYPES OF COSTS AND BENEFITS**

There are two types of costs and two types of benefits associated with any change.

1. Tangible: things that you can see, touch, and feel – \$\$
2. Intangible: things that you cannot necessarily see, touch, or feel.

#### Costs

Morale, attitude  
Labor market impacts  
Indirect costs  
Resistance; apathy  
Customer dissatisfaction

#### Benefits

Morale, attitude  
Labor market  
Indirect benefits  
Political benefits  
Customer satisfaction

## **CALCULATION OF COST/BENEFIT RATIO**

The following steps direct you to preparing a summary *cost/benefits ratio*:

1. Identify the total costs and tangible benefits associated with changing the system.
2. Translate tangible benefits into quantifiable dollars.
3. Create the ratio: costs/benefits. Use the figures developed in step 1 and step 2. If the costs are greater than the sum of the benefits in the first year, it is possible that this is not a good thing to do.
4. List expected positive and negative intangibles, and any measures that can be made on these.
5. Add the intangible costs and benefits to the original calculation and create a second ratio. If the costs are greater than the sum of the benefits in the first year, it is possible that this is not a good thing to do.

### **WHAT DOES COST/BENEFIT RATIO TELL?**

When the *cost/benefit ratio* is less than one, a positive financial situation exists: the benefits are greater than the costs. For example, if a *cost/benefit ratio* is 1/3 it

means that for every \$1 of cost invested, \$3 of benefit is received, or a positive margin of \$2.

To reduce the *cost/benefit ratio* to its simplest form, use a basic algebraic equation.

Sample:

$$\begin{array}{rcl} \frac{\$10 \text{ Cost}}{\$30 \text{ Benefit}} & = & \frac{1}{X} \\ \\ 10X & = & 30 \\ \\ X & = & \frac{30}{10} \\ \\ X & = & 3 \end{array}$$

For every \$1 invested, \$3 in benefits are realized.

### **Assignment**

*1. Apply the cost/benefit analysis in solving a current problem. Review the calculations with your supervisor. Does it make sense to go forward with the decision in light of the cost/benefit analysis?*

*2. With your supervisor, discuss the value of tangible and intangible costs and benefits, and how to arrive at appropriate dollar estimates for intangibles.*

*Supervisor's Approval:*

---

## Tool Practice

### Hope Springs Eternal Hospital (D)

#### Cost/Benefit Analysis:

Assume: Increasing the number of additional staff hours would appear to resolve patient dissatisfaction at Hope Springs Eternal Hospital. The annual cost of adding staff hours is \$3,750. The average income per patient is \$5,500. The hospital realized 40% of this income as “gross profit.” 60% of the income goes to cover all other operating expenses except staffing.

#### *Assignment*

1. *If the Radiology Department were to lose 5% of their vital few dissatisfied patients, how many patients would they lose? (Reference Figure 5.10, page 5 – 22. Use the 79% cutoff on the Pareto chart for all calculations in Part D of this case.)*
2. *If adding the additional staff hours retains the otherwise lost customers (number calculated in step 1 above), how much gross income is gained by the hospital by adding this staff position? How much gross profit is added to the hospital by adding this position?*

*Consider the cost (\$3,750) of the additional staff. How much net profit do retained Customers contribute to the hospital? Clue: net profit = gross*

*profit less staffing expenses.*

3. *What is the tangible cost/benefit ratio? (Use gross profit for your benefit calculation.)*

### ***SPECIAL USE TOOLS***

“Special use tools” are more advanced tools, but are not necessarily more difficult to use than core CI tools. Understanding how these tools are used better equips you to manage the solution(s) to a problem. Become familiar with these tools and refer to the workbook to assist you in using them whenever necessary.

#### **A. WORK SIMPLIFICATION**

*Work simplification* is a tool helpful in designing or improving a work area and an individual’s job. Rather than focusing on the flow of a work process from one area to another, it focuses on the work done by an individual. *Work simplification* principles make anyone’s job easier and reduce wasted motion. See Figure 6.17 for details for *work simplification* techniques.

**Figure 6.17**

**WORK SIMPLIFICATION**

*Find Simpler & Better Ways To do Work*

Improve Work Place

- Environmental Conditions–Light, Heat, Sound
- Organize: Reduce Clutter, Finding Time

Tools

- Near Work Station & All Tools Needed Provided
- No Sharing Tools–Responsible for Own

Principles of Motion

- Preposition Work/Supplies–A Fixed Place
- Shorten Transport Distance
- Work Within Arm’s Length
- Do Similar Work in Batches Whenever Possible
- Safety 1st: Lift With Legs: Slide, Don’t Carry

Work Management

- No Re-dos, Do It Right The First Time
- Don’t Do Same Piece of Work Over & Over
- Automate Tasks/Systems Wherever Possible
- Assign to Lowest Possible Worker Level
- Make Process Improvements: Reduce Variations, Costs, Cycle Times

**Assignment**

*1. Identify a task in your present job that could be done in a simpler way. What changes would you make?*

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**B. CYCLE TIME ANALYSIS**

A *cycle time analysis chart* is designed to document each task that is done, including the amount of time, distance, and people involved in each step. Using this information, the cycle of work can be analyzed. Tasks and/or time frames can be reduced, eliminated, or consolidated. It is different from a *flowchart* in that the degree of detail is greater and it focuses on time reduction. Figure 6.18 represents a sample *cycle time analysis chart* before streamlining the work process. Figure 6.19 shows the work process after streamlining. In this example, reductions were made in the waiting times and distance traveled by creating satellite pharmacies on major nursing units.





**Assignment**

- 1. Select a piece of work or information in your job which travels from one location to another either within your department or outside your department. For example, medications given to patients on nursing units travel from the pharmacy to the nursing unit, then to the patient, with many steps in between. Use the cycle time analysis chart in Figure 6.20 to document the process that you select.*
- 2. Analyze the current process and improve upon it by reducing cycle times and improving convenience or quality. Look at wait times as a target for improvement. Document the revised work process on the chart and summarize the pros and cons of the change.*
- 3. Review the improved process with your supervisor and decide when these changes can be made.*

*Supervisor's Approval:*

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6 – 30

### C. VARIANCE ANALYSIS

It is often not enough to identify the cause of the problem. We also need to *understand* the cause of the variance. If your group is good at problem solving and feels confident that *fish-boning* has been enough, then you might choose not to use the *variance analysis worksheet*. Other groups will skip *fish-boning* and start with the *variance analysis* tool, which they prefer. Remember, you are the master craftsman. Use the tool that makes most sense to you given the problem you're working on. Experience with the tools will give you a greater sense of which is most appropriate to your problem.

Five questions provide the information needed to analyze the variance cause and assist in finding a solution.

1. What is the problem?
2. Where is it located?
3. When does it occur?
4. Who does it affect?
5. What size or magnitude is it?

Figure 6.21 represents a *variance analysis worksheet* answering these five questions. In this example, the problem is slow delivery of tools from the Sterile Processing Department to the Operating Room. There

are a number of reasons causing the slow delivery including low staffing, short scheduling, lack of equipment, and lost paperwork. Using low staffing as the example, we know that the department manager controls the staffing that occurs daily, and it affects the patients and physicians. The person who can fix this part of the problem is the department manager. Using the five questions, the problem solving team isolated and analyzed the problem to the point where an answer can now be designed to solve the problem.

Figure 6.21

<b>VARIANCE ANALYSIS WORKSHEET</b>							
<b>PROJECT NAME: SPD DELIVERY</b>			<b>PROBLEM STATEMENT: SLOW DELIVERY SPD TO OR - 10+ MINUTES</b>				
<b>1. SPECIFY THE PROBLEM</b>			<b>2. ANALYZE IS/IS NOT</b>		<b>3. ID ROOT CAUSES</b>		
	<b>PROBLEM IS</b>	<b>PROBLEM IS NOT</b>	<b>WHAT IS DISTINCTIVE ABOUT IS?</b>	<b>WHAT'S CHANGED ABOUT/AROUND THE IS?</b>	<b>POSSIBLE CAUSES/INPUTS (FROM FISH BONE)</b>	<b>A. MOST LIKELY CAUSE?</b>	<b>A. WHO CONTROLS IT?</b>
						<b>B. HOW CAN THIS BE TESTED/VERIFIED?</b>	<b>B. WHO CAN FIX IT?</b>
<b>WHAT'S THE PROBLEM?</b>	10+ MINUTE DELIVERY TIME, SPD TO OR ON STAT ORDERS	NORMAL DELIVERIES WITHIN OK TIME MARGIN	FAST DELIVERIES ONLY ONES AFFECTED	DEPT HEAD LEFT STAFF TURNOVER	LOW STAFFING SHORT SCHEDULING LACK EQUIPMENT LOST PAPERWORK	<b>A.</b> ADD HOURS?	<b>A.</b> DEPT HEAD
						<b>B.</b> FILL VACANCIES	<b>B.</b> DEPT HEAD
<b>WHERE'S IT LOCATED?</b>	SPD	OTHER DEPTS OR O.R.				<b>A.</b>	<b>A.</b>
						<b>B.</b>	<b>B.</b>
<b>WHEN DOES IT OCCUR?</b>	DAY SHIFT ON WEEKDAYS, ALL SHIFTS ON WEEKEND	EVENING & NIGHT SHIFTS DURING WEEK	STARTED 2 WEEKS AGO		WORK SCHEDULES ARE DIFFERENT  DIFFERENT PEOPLE ARE INVOLVED IN SPD	<b>A.</b> PEOPLE DON'T KNOW ROPES	<b>A.</b> DEPT HEAD
						<b>B.</b> ROTATE STAFF & TRAIN DAY CREW	<b>B.</b> DEPT HEAD
<b>WHO DOES IT AFFECT?</b>	DOCTORS, PATIENTS OR STAFF	SPD STAFF				<b>A.</b>	<b>A.</b>
						<b>B.</b>	<b>B.</b>
<b>WHAT SIZE/ MAGNITUDE?</b>	50% OF TIME, 12 X PER DAY	NOT ALL THE TIME, EVEN DURING PROB PERIOD	UNKNOWN	UNKNOWN, MEET WITH OTHER DEPT		<b>A.</b>	<b>A.</b>
						<b>B.</b>	<b>B.</b>

## D. VARIANCE SOLUTION

Having better understood the cause of the problem, we're ready to create a more effective solution than we could have without this work. There are two ways to solve a problem:

1. Change the inputs
2. Change the work process

The *variance solution analysis* worksheet organizes the plan for making improvements. Each category of possible change is identified for you. Fill in the areas that are appropriate to each variance cause. See Figure 6.22 for an example of a completed *variance solution worksheet*.

## Assignment

*For the following assignments, use the blank fish-bone chart, variance analysis, and variance solution worksheets on the next pages (Figures 6.23, 6.24, and 6.25).*

- 1. Identify a problem within your work scope. Use the fish-bone chart to organize your ideas on what is causing this problem.*
- 2. Use the variance analysis and variance solution worksheets to organize your action plan for improvement.*
- 3. Review your ideas and the chart with your supervisor. Make the changes necessary to solve the problem.*

*Supervisor's Approval:*

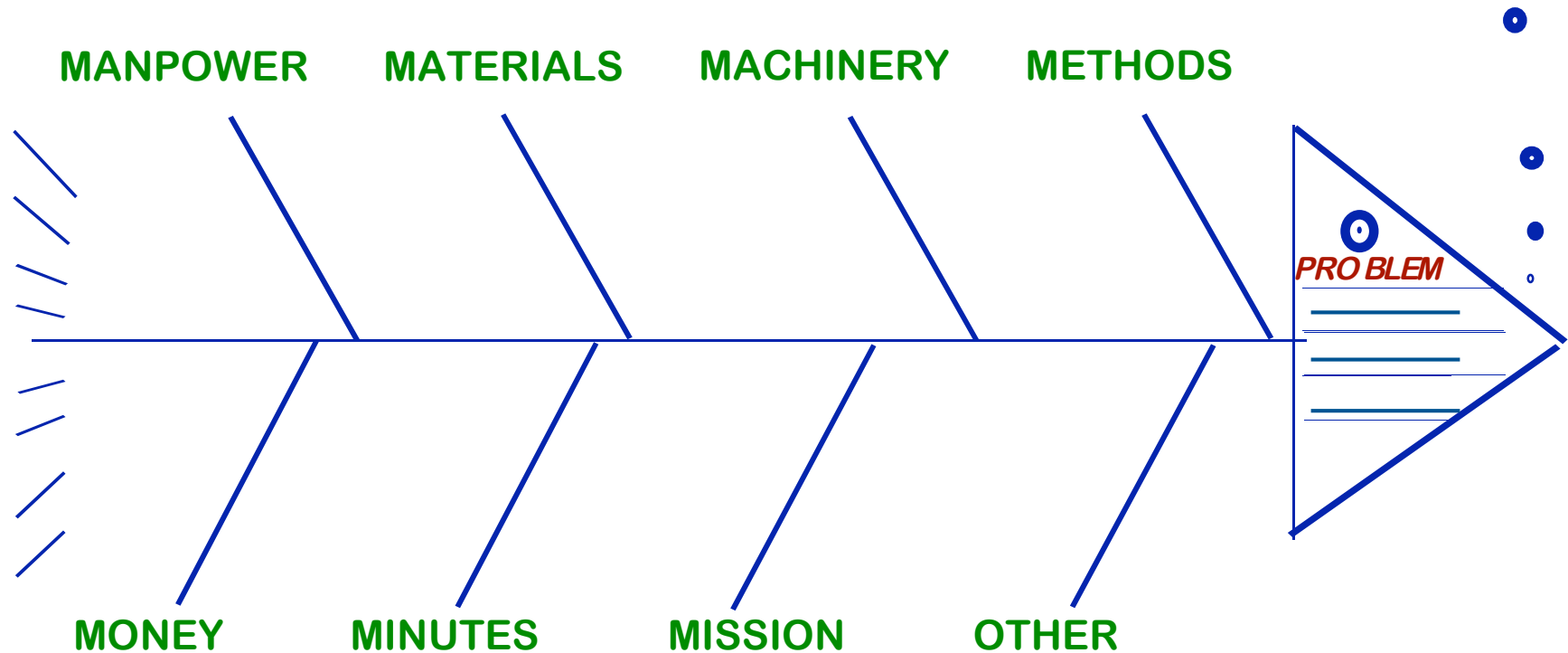
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Figure 6.22

<b>VARIANCE SOLUTION WORKSHEET</b>							
<b>PROJECT NAME: SPD DELIVERY</b>				<b>PROBLEM STATEMENT: SLOW DELIVERY SPD TO OR - 10+ MINUTES</b>			
<b>1. LIST CAUSES</b>		<b>2. POSSIBLE SOLUTIONS/CHANGES TO BE MADE</b>					
<b>VARIANCE CAUSE</b>	<b>INPUTS/ SUPPLIER (MATERIAL)</b>	<b>WORK PROCESS (METHODS)</b>	<b>TOOLS &amp; EQUIPMENT (MACHINES)</b>	<b>CYCLE TIME REDUCTION (MINUTES)</b>	<b>HUMAN NEEDS (MANPOWER)</b>	<b>REDUCE WASTE (MONEY)</b>	<b>GOAL/ PURPOSE (MISSION)</b>
A. LOW STAFFING  SHORT SCHEDULING				SPD TO RUN A CYCLE TIME ANALYSIS TO SPOT "WASTE"	REDO SCHED FOR WEEKDAYS  AGGRESSIVE RECRUIT???		
B. NEW SPD STAFF, UNTRAINED		CREATE A VIDEO TAPE, CLEAN UP PROCEDURE MANUAL			BUDDY SYSTEM TO TRAIN NEWBIES		ROTATE SPD STAFF TO SEE WHY "STAT" IS SO URGENT
C. LACK OF EQUIPMENT	LOOK AT QUAL OF TOOLS WE ARE BUYING. SUPPLIER GOOD ENUF?			A. RECONDITION B. PURCH NEW C. LEASE EQUIP			
D. LOST PAPERWORK			A. ATTACH FORM TO ORDER  B. EST "ORDERS IN PROCESS" FILE				
E.							

Figure 6.23

## ***FISH BONE CHART (CAUSE & EFFECT CHART)***



### ***USED TO ID CAUSES:***

1. WRITE PROBLEM STATEMENT
2. LIST SOURCES OF PROBLEM
3. ID SPECIFIC POSSIBLE CAUSES
4. ID 1 OR 2 MOST LIKELY CAUSES

Figure 6.24

VARIANCE ANALYSIS WORKSHEET							
PROJECT NAME:			PROBLEM STATEMENT:				
1. SPECIFY THE PROBLEM			2. ANALYZE IS/IS NOT		3. ID ROOT CAUSES		
	PROBLEM IS	PROBLEM IS NOT	WHAT IS DISTINCTIVE ABOUT IS?	WHAT'S CHANGED ABOUT/AROUND THE IS?	POSSIBLE CAUSES/INPUTS (FROM FISH BONE)	A. MOST LIKELY CAUSE? B. HOW CAN THIS BE TESTED/VERIFIED?	A. WHO CONTROLS IT? B. WHO CAN FIX IT?
WHAT'S THE PROBLEM?						A. B.	A. B.
WHERE'S IT LOCATED?						A. B.	A. B.
WHEN DOES IT OCCUR?						A. B.	A. B.
WHO DOES IT AFFECT?						A. B.	A. B.
WHAT SIZE/ MAGNITUDE?						A. B.	A. B.

Figure 6.25

VARIANCE SOLUTION WORKSHEET							
PROJECT NAME:		PROBLEM STATEMENT:					
1. LIST CAUSES	2. POSSIBLE SOLUTIONS/CHANGES TO BE MADE						
VARIANCE CAUSE	INPUTS/ SUPPLIER (MATERIAL)	WORK PROCESS (METHODS)	TOOLS & EQUIPMENT (MACHINES)	CYCLE TIME REDUCTION (MINUTES)	HUMAN NEEDS (MANPOWER)	REDUCE WASTE (MONEY)	GOAL/ PURPOSE (MISSION)
A.							
B.							
C.							
D.							
E.							

**Notes**

## **Chapter 7**

# **IMPLEMENT SOLUTIONS**

***Implementation is the moment of truth when a solution is judged as to its goodness.***

Implement Solutions is the “I” in DO-IT. This chapter identifies the various reasons for weak solutions, and gives specific directives on how to improve solutions. Figure 7.1 outlines the sequence of action steps for effective implementation.

**Figure 7.1**

### **IMPLEMENT SOLUTIONS**

1. Test For Solution Worthiness
2. Sell Your Solution–*MANSYS Guidelines*
3. Create Action Plan & Implementation  
Schedule–Gantt Chart
4. Implement & Address Change Resistance

Special Use Tools

- *Gantt Chart*

## **A. TEST FOR SOLUTION WORTHINESS**

For each problem there are numerous solutions. Executives look for the most worthy and best fitting solution. To increase chances of getting approval, consider the following checklist for solution worthiness. It’s not enough just to have a good idea or make a proposal. In fact, it’s been said that:

$$\text{Effective Decision Making} = \text{Idea Quality} + \text{Idea Acceptance}$$

To be sure your proposal will be accepted, use the following checklist. Does your proposal pass these tests?

- Fit With Values And Mission?
- Fit With KRAs?
- Does It Yield A Competitive Advantage?
- Will Other Projects Be Delayed?
- Fit With Today’s Organization Emphasis?
- How Important Is It To The Future?
- Does It Cost A Lot?
- Have All Departments Been Consulted?
- How Will Change Factors Be Managed?
- Is Political Wiring Accomplished?

If other projects will be impacted by your proposal, prepare your case by making contact with those who would be affected. Explain the concept and get their feedback. This will better prepare you to debate the worthiness of your recommendation and to get cooperation from others. The likelihood of receiving approval will be greater and your credibility increased.

### **Assignment**

1. *Does your organization have a standardized format for submitting recommendations for approval? If so, review the format and put a copy in your file for future reference.*

2. *If not, develop a work group to design a standardized format for all work group recommendations. Reference the MANSYS manual for an example. This assures standardization of information on recommendations, and an easier approval process for you.*

Supervisor Approval: \_\_\_\_\_

### **B. SELL YOUR SOLUTION**

Presentation of the recommendation is critical to approval. Although presentation is secondary to the substance of the idea, it has a powerful impact on receptivity.

For example: you go to dinner at a fine restaurant and order their best steak dinner. The waiter brings you a fantastic looking steak, but serves it on dirty china. The presentation is poor, and you are immediately turned off to the idea of eating. As a result, you will never know if the steak was exceptional or not, just as you will never know if a recommendation is good or not when it is rejected because of poor presentation.

Presentation can have a “killing” or “thrilling” effect. Figure 7.2 gives pointers on how to make a good presentation.

**Figure 7.2**

#### ***SELLING YOUR SOLUTIONS***

1. Be Concise, Calm, Cool & Collected
  - Rehearse—Don’t Ramble, Appear Scattered
  - Organized—Visuals, Handouts, Flip charts
  - Always Present Completed Staff Work
2. Follow Organization Proposal Format
  - Statement Of The Problem & Objectives
  - Assumptions Made
  - Summary Data Findings & Measurements
  - Cost/Benefit & ROI Arguments
  - Alternative Ideas Considered
  - Plan for Implementation
  - Benefits of Recommendation
  - Potential Problem Areas
  - Accountable Parties
3. Close: Q & A: Request Approval

## ***SPECIAL USE TOOL***

## **Notes**

“Special use tools” are more advanced tools, but are not necessarily more difficult to use than core CI tools. Understanding how these tools are used better equips you to manage solution(s) to a problem. Become familiar with these tools, and refer to the workbook to assist you in using them whenever necessary.

## **GANTT CHART IMPLEMENTATION**

Many fantastic solutions fall short of their potential because of sloppy or ineffective implementation. The *Gantt chart* is designed to manage the implementation process. It provides a summary of all tasks to be done, time frames for start and finish, and accountable parties. Figure 7.3 is a sample *Gantt chart*.

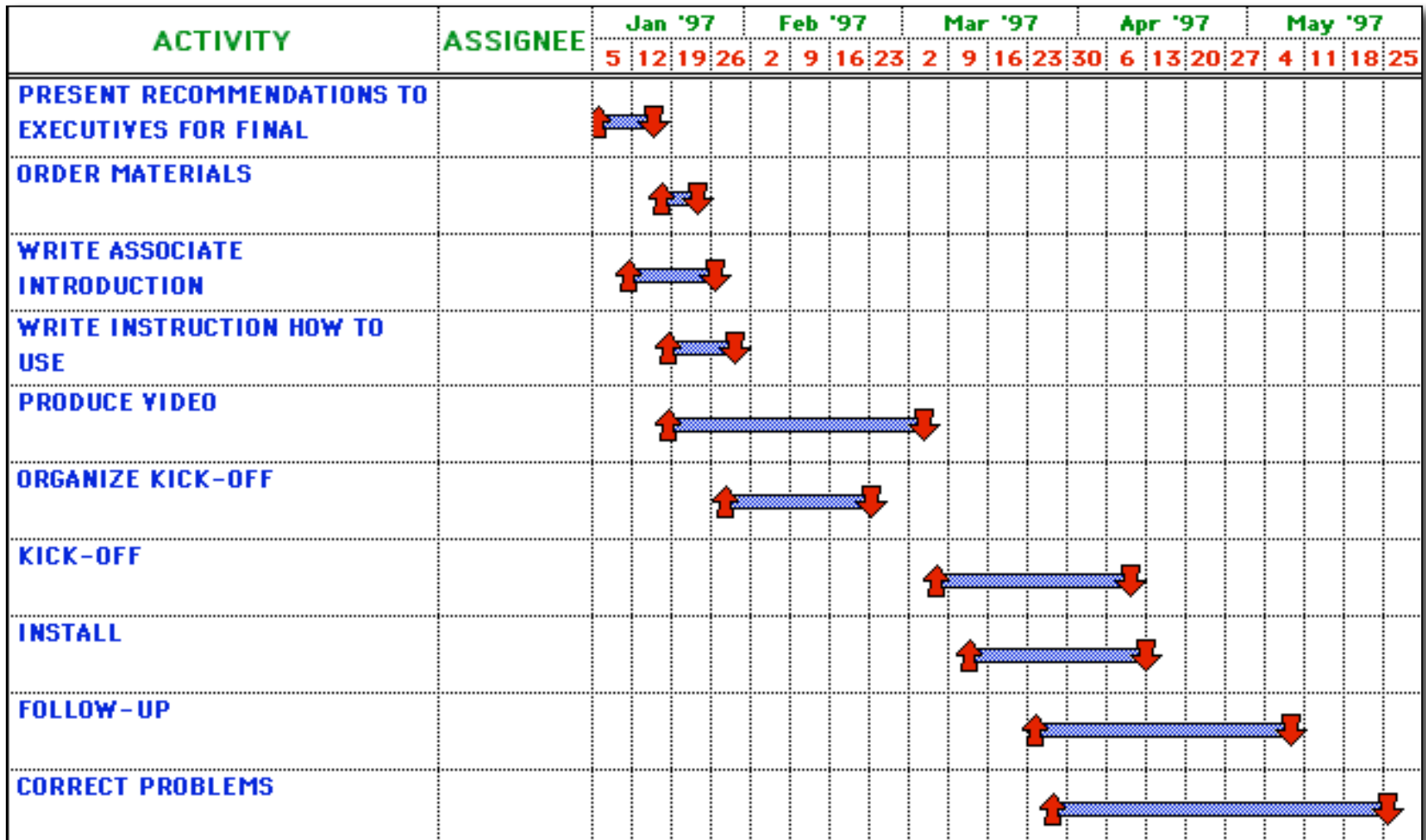
### ***Assignment***

- 1. Identify a process that you are planning to implement. Create a Gantt chart to display the time frames, tasks, and accountable parties. Figure 7.4 is provided for you to use.*
- 2. Discuss the merits of the Gantt chart process with your supervisor. What problems will be avoided if a Gantt Chart is used?*

*Supervisor's Approval:* \_\_\_\_\_

Figure 7.3

# GANTT CHART





**Notes**

## **Chapter 8**

# **GROUP DYNAMICS**

Proper management of group dynamics increases the probability of task group success!

By their nature, task groups involve a variety of personalities, attitudes, experiences, and work styles, and therefore group dynamic management skills are essential. There are several basic tools and rules that assist in effectively managing group dynamics.

1. Allow no interruptions to the meeting. No beepers, telephone calls, etc.
2. Use flip charts at each meeting. Focus the group's attention by making notes on the flip chart. This also serves as a record of the meeting.
3. Circulate a meeting agenda in advance. Stay with the agenda. Deviations from the plan are "time eaters" and do not necessarily add value to the process.
4. Make role assignments. Task group training details the responsibilities for each role.
5. Use the CI tools!

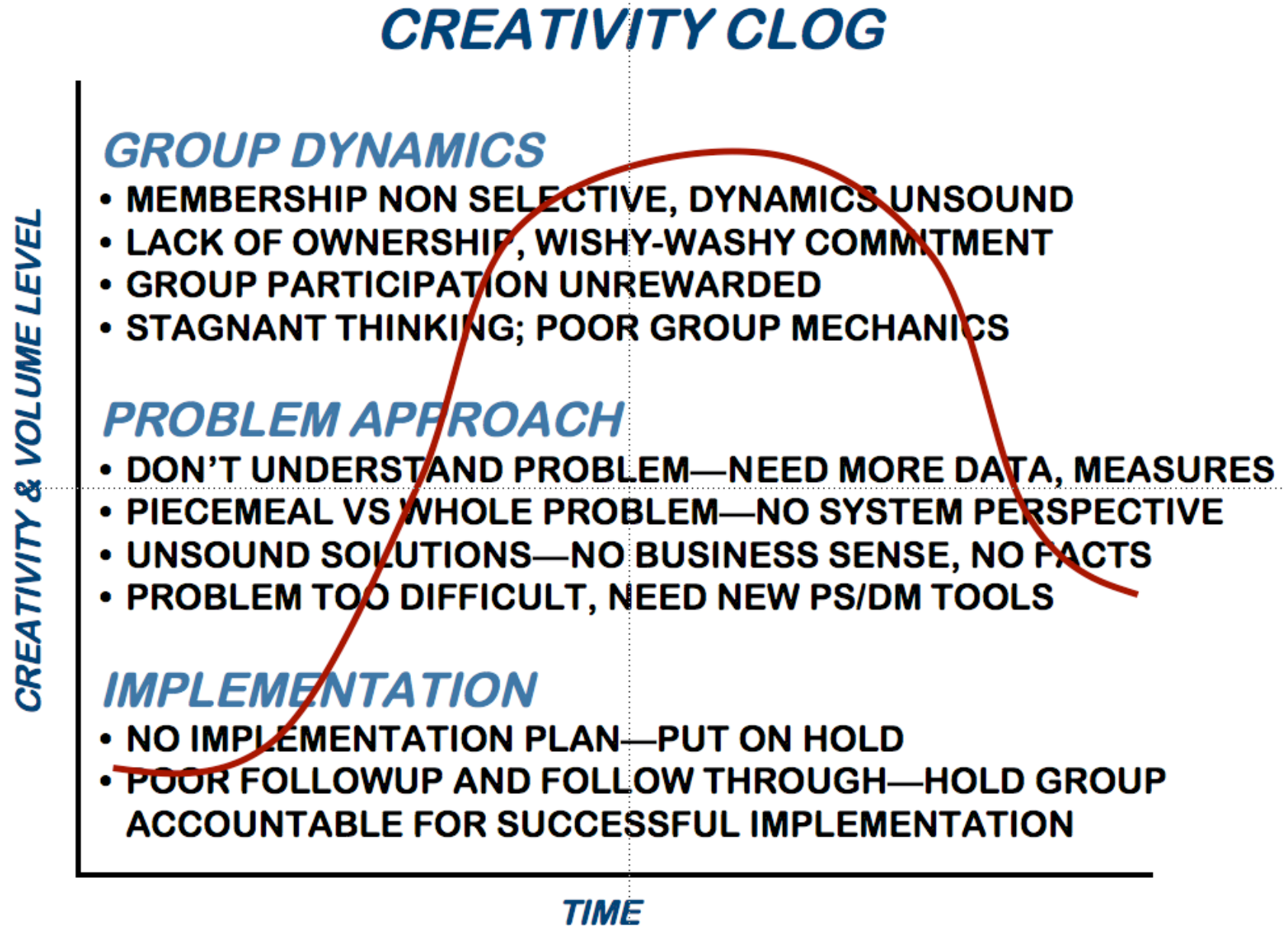
## **CREATIVITY CLOG**

Yes, it happens to all of us at some time. You just can't think of a new or different approach to the problem. "Dry Brain Syndrome" or "Creativity Clog" occurs. It is a natural consequence of efforts to problem-solve. The normal level of creativity is elevated in the early stages of problem-solving when the obvious and easy suggestions are made. As suggestions are eliminated and greater levels of creativity are required, the number and type of recommendations slows or plateaus. See Figure 8.1.

Many of you have been working with a problem solving process in groups for several months and experiencing various degrees of success. Some work groups are more successful than others because of varying degrees of:

- Skill and knowledge levels of participants,
- Manpower, time, and energy,
- Other problems that interfered with the group's functioning.

Figure 8.1



**Assignment**

1. *Think of an experience you have had in the task group process. Do you feel that you or your group has experienced Creativity Clog?*

2. *What ideas do you have for breaking through Creativity Clog?*

3. *Review these ideas with your supervisor. Plan to implement your recommendations as soon as possible.*

*Supervisor's Approval:*

**IMPROVING GROUP PROCESS**

Solutions to improving the effectiveness of the problem-solving process lie in improving the system and training staff in advanced analytical and statistical skills. There are several ways to improve the group problem-solving process.

To power up a group and overcome barriers that slow it down, follow the directions outlined in Figure 8.2.

The basic rule to remember is that if your group has difficulty in dealing with a work process problem, you should pause and ask, "Are we having a group process problem?" If so, first spend time in getting group dynamics right, then return to the work problem.

Figure 8.2

# IMPROVING SMALL GROUP PROCESS

## SOLVE TIME RELEASE PROBLEM

- SPECIFY #HR/DAY FOR GROUP WORK
- SPECIFY DAYS FOR GROUP WORK
- DO NOT DISTURB SIGNS, BEEPER RULES
- HIRE FLOATERS, MANAGER SUBBING
- MONITOR ROI, DEMONSTRATE VALUE

## IMPROVE GROUP SELECTION & DYNAMICS

- DON'T SELECT DEADHEADS, DON'T KEEP NON PERFORMERS
- 3-R GOOD GROUP/INDIVIDUAL PERFORMANCES
- STOP PROJECT WORK & FIRST "GET GOOD GROUP" DYNAMICS

## TRAINING IN PROCESS & TOOLS

- MEMBER ROLE ASSIGNMENT & TRAINING; FACILITATOR TRAINING
- MANDATORY USE OF FLIP CHARTS
- FACILITATOR & GROUP PERFORMANCE FEEDBACK
- NO MORE SHOOTING FROM THE HIP—USE THE TOOLS!

## IMPROVING SOLUTION RATE

- NON TRADITIONAL THINKING, OUTSIDE THE BOX
- BETTER MANAGEMENT OF IMPLEMENTATIONS
- MEASURE: DID IT SOLVE THE PROBLEM
- SOLUTION RE-EVALUATION BY DIG

## EXECUTIVE SUPPORT

- FAST FEEDBACK, RAPID APPROVALS
- MONETARY SUPPORT, PUSH FOR CHANGE
- POLITICAL BARRIER BOMBER

### Case Illustration

#### Abbott-Northwestern Hospital Reducing Cardiovascular Expenses Over \$3 Million

This case illustrates how effective group dynamics were used to problem solve among physicians, managers, nurses, and technical professional people working together to construct and implement an improved clinical practice.

**Define Problem:** The cardiovascular program is the largest product line in the hospital and was targeted for improvements in competitive position and reduction in resource use.

#### Outline Options:

1. The hospital used *written surveys* and *focus groups* to identify concerns of physicians, patients, and payers. Research isolated Customer service and lower costs as the key issues.
2. A Coronary Care Value Enhancement Task Force (task group) consisting of three cardiologists, three cardiovascular surgeons, and managers from critical care nursing, pharmacy, radiology, and the lab, met to reduce the cost of DRG 107, coronary bypass without catheterization.
3. The team analyzed the practices of each of 18 surgeons and 16 cardiologists practicing at the hospital, measuring:

- Average room and board costs
- Average length of stay
- Average stays in the ICU and telemetry unit
- Average costs generated by pharmacy,
- X-ray, laboratory, and other ancillary services

4. The team constructed the “ideal physician profile” with total costs \$4,000 below the hospital’s average. The profile was shared with each MD privately in comparison with their own practice pattern.

#### Implement Solutions:

5. The committee suggested changes be made in several areas:

- Create protocols to accelerate extubation, reducing time in intensive care
- Create protocols to reduce use of telemetry
- Standardize standing orders for open heart surgery patients reducing tests ordered per case
- Begin educational programs informing patients and family of recovery expectations before discharge
- Stratifying low risk PTCA patients and eliminate standby surgery team for low risk patients
- Simplify catheter procedure

6. A telemetry nurse team studied unit productivity, recommending the establishment of a critical care technician, and elimination of several RN positions and a late night secretary.

### Track Results

1. LOS for DRG 107 dropped to 9.8 days, a 1.4 day reduction. Patient stay for uncomplicated cases dropped from nine to seven days.

2. Nursing hours per patient day in the telemetry unit dropped from 6.5 hours to 5.5 hours.

3. An overall expense reduction of \$3.5 million on \$55 million net revenues was realized.

4. LOS for coronary bypass with cardiac cath (DRG 106) dropped by 2.3 days within one year.

5. 12.9 direct hours of nursing care per patient in ICU were eliminated.

6. Total tests per case dropped 11%.

7. Nursing hours per day on the PTCA unit dropped from 10 hours to 6.79 hours for an annual savings of \$332,880.

8. Eliminating the standby surgery team saved \$1,600 per low risk PTCA patient.

9. Catheter simplification saved \$25,000 per year.

— With permission from The Health Care Advisory Board,  
Total Quality Management Volume II, 1992,  
“Team-Building and Patient Care Values  
Underlie Cost-Cutting Initiatives at Minneapolis’  
Abbott-Northwestern,”  
Healthcare Productivity Report, Jan.1990.

### Assignments:

1. What procedures within our hospital would benefit from the use of a process such as this?

2. How will you go about identifying and prioritizing the procedures that will undergo such a process as this?

3. What barriers do you expect as you begin this process, and how do you plan to overcome them?

Supervisor’s Approval:

## **Chapter 9**

### **TRACK RESULTS**

***Lack of follow through could mean that a good idea wind up going nowhere. Follow through keeps things from falling through the cracks.***

The “T” of DO-IT is to Track Results. In the past, solutions have been lacking in success due to poor follow through. Follow through answers the problems presented by unplanned barriers and errors in implementation. It gives a good solution a second chance for success.

There are three major areas involved in effective tracking. First, find out how well the solution is working. Second, deal with problems that come up, and there always are some. Finally, decide whether this process needs to be refined or whether it is satisfactory for now. Figure 9.1 details the steps in this process.

Special use tools for Tracking Results include:

- *Customer Proxy*
- *Focus Groups*
- *Interviews*
- *Stratification*
- *Surveys*
- *Variance Analysis/Solution*

### **ACCOUNTABILITY FOR TRACKING RESULTS**

The team which defined the problem, outlined the options, and implemented the solutions is also the team to follow up. These are the people most familiar with the problem and the construction of the solution. They are best prepared to efficiently resolve current problems in implementation. It is not enough to recommend a solution and then walk away from it. The problem remains the group’s problem, it’s “their baby.”

Continuous tracking is essential. Establish a schedule for tracking changes. Each schedule will be different depending on the frequency upon which results are available, and the extent to which the system was changed. Large system changes require frequent monitoring in early phases, while smaller system changes may require less frequent initial monitoring. In both cases, a tracking system must be developed. Assign one person the accountability for monitoring or tracking system results.

The *tracking checklist* is designed to organize follow up on implementation. However, each project is unique, and may require additional tracking elements to be added to the checklist. Use the *tracking checklist* as a starting point for organizing follow up efforts, but do not stop there. Ask yourself the question: How will I know if this idea is a success? The answer to this question leads to additional measurements for tracking. Choose four or five measurements to track which will be key indicators of the success of the efforts. Track them carefully. A number of groups also use information from the project’s *Gantt chart* and/or *variance solution worksheet* as part of their follow up monitoring.

**Notes**

Figure 9.1

# TRACK RESULTS

## 1. GET FEEDBACK ON HOW IT'S TRACKING

- DECIDE DATA NEEDS: BY WHOM, HOW OFTEN, HOW REPORTED & TO WHO?— **TRACKING CHECKLIST, HISTOGRAM**
- USERS' SUBJECTIVE OPINIONS—ASSIGN STEWARD MONITOR
- WHAT DO VARIANCE MEASURES REVEAL? WHAT PROBLEMS SHOW UP ON PARETO & CONTROL CHARTS?

## 2. DEALING WITH BUMPS IN THE ROAD

- SMOOTH FEATHERS, DON'T BLAME, RECONVENE GROUP
- MISTAKES—SUCCESS AT LEARNING WHAT WON'T WORK
- DEFINE THE BUMP—WAS IT ANTICIPATED
- WHAT'S MISSING?  $\Delta = D \times M \times P > \text{COSTS}$
- DECIDE WHETHER TO PATCH OR RECYCLE DO-IT

## 3. REFINING—HEART OF CI

- SOLUTIONS INVARIABLY REVEAL NEW PROBLEM PIECES
- FIRST ROUND ADEQUATE, SOMETIMES INSUFFICIENT
- OTHER TOOLS & BRAINS: SURVEYS, INTERVIEWS, FOCUS GROUPS

Figure 9.2

TRACKING RESULTS CHECKLIST					
PROJECT NAME:	DATE:				
<div>IMPLEMENTATION</div> <div> 1 All steps of plan carried out?  2 Project done on time &amp; in budget?  3 All affected by the change involved?  4 Were all parties communicated with?  5 Was follow through adequate? </div>			YES	NO	NOTES:
<div>CUSTOMER FEEDBACK</div> <div> 1 Is the Customer happy?  2 What expectations not yet met?  3 What do measures show?  4 What quantitative measures needed? </div>			YES	NO	NOTES:
<div>SYSTEM FEEDBACK</div> <div> 1 What do Associates report?  2 What do suppliers suggest?  3 Who needs a report on progress?  4 What quantitative measures needed? </div>			YES	NO	NOTES:
<div>SOLUTION PROBLEMS</div> <div> 1 Was the timing acceptable?  2 What problems still exist?  3 What do variances reveal?  4 Are variances acceptable?  5 Was Solution adequate?  6 If not, can it be improved now? </div>			YES	NO	NOTES:
<div>HUMAN FACTORS/PROBLEMS</div> <div> 1 Any people barriers in the way?  2 3-Rs provided to support change?  3 What political barriers need attention? </div>			YES	NO	NOTES:
<div>MEASUREMENT OF VALUE/ROI</div> <div> 1 What tangible pay off has provided?  2 What is the estimated Spay off  3 What intangible benefits?  4 Was the result worth the work? </div>			YES	NO	NOTES:
<div>CONCLUSION</div> <div> 1 Was the change beneficial?  2 Should solution be left as is, or revised?  3 Who should be included in this decision?  4 Should results be communicated? </div>			YES	NO	NOTES:

## **Chapter 10**

### **TOOLS PRACTICE**

*To learn from those who have gone before, and excel beyond them, remember that practice makes perfect! As you use the CI tools, they will feel more and more natural and friendly.*

#### **Assignment:**

1. Create a Pareto chart, using Figure 10.1 What dissatisfies contribute to 70% of the problem?

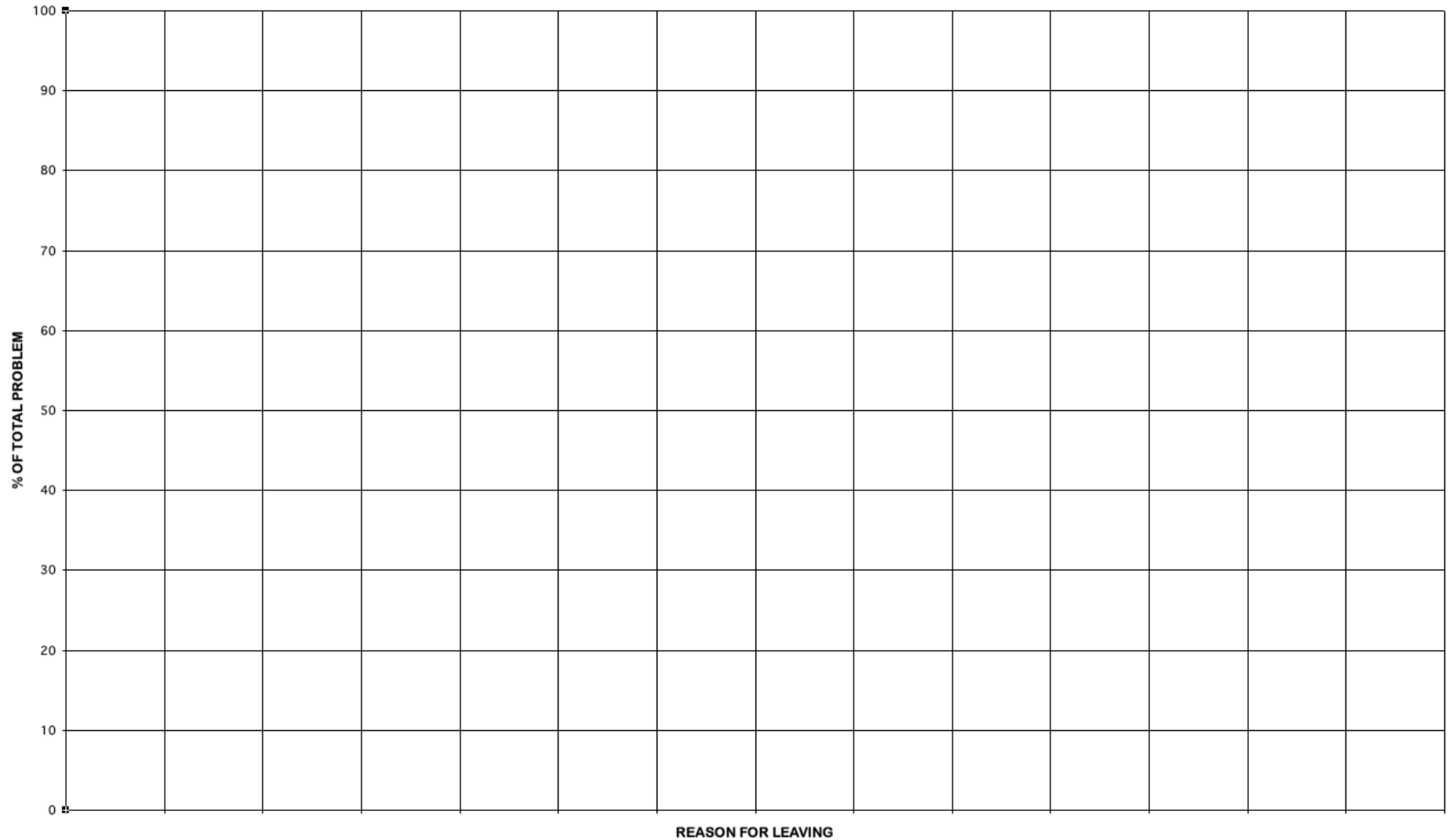
### **Growing Family Hospital (A)**

Growing Family Hospital recently learned that many ER patients were leaving the hospital before receiving medical treatment. This represented a lost business opportunity for the hospital. A Customer survey was conducted to find out why patients were walking out. The survey results are as follows:

<u>Reasons For Leaving</u>	<u># Of Responses</u>
Lack of confidentiality	35
Waiting too long - registration	56
Waiting too long - room	46
Just can't wait anymore	39
Uncomfortable furniture	8
No feedback on their medical status	7
Rude staff	9
Total	200

Figure 10.1

**PARETO CHART:  
REASONS FOR LEAVING ER**



## Growing Family Hospital (B)

Through the use of the *Pareto chart* developed in Part A of this practice case, hospital managers knew they had to untangle even more details surrounding this problem. There seemed to be a pattern to the long wait times. Could it be that the wait times were longer in the evening than in the morning hours? In order to prove their hypothesis, they conducted a specific Customer survey of patients using the ER in the morning hours, and a second survey for those using the ER in the evening hours. The question asked was, “How long did you wait in the ER before you were taken to a patient care room?” Here are the results.

### Part A: ER Waiting Times 8:00 AM - 12:00 Noon

<u>Time Waiting</u>	<u># Of Responses</u>
10 minutes	5
20 minutes	15
30 minutes	20
40 minutes	13
50 minutes	11
60 minutes	8
60+ minutes	<u>21</u>
Total	100

### Part B: ER Waiting Times 8:00 PM - 12:00 Midnight

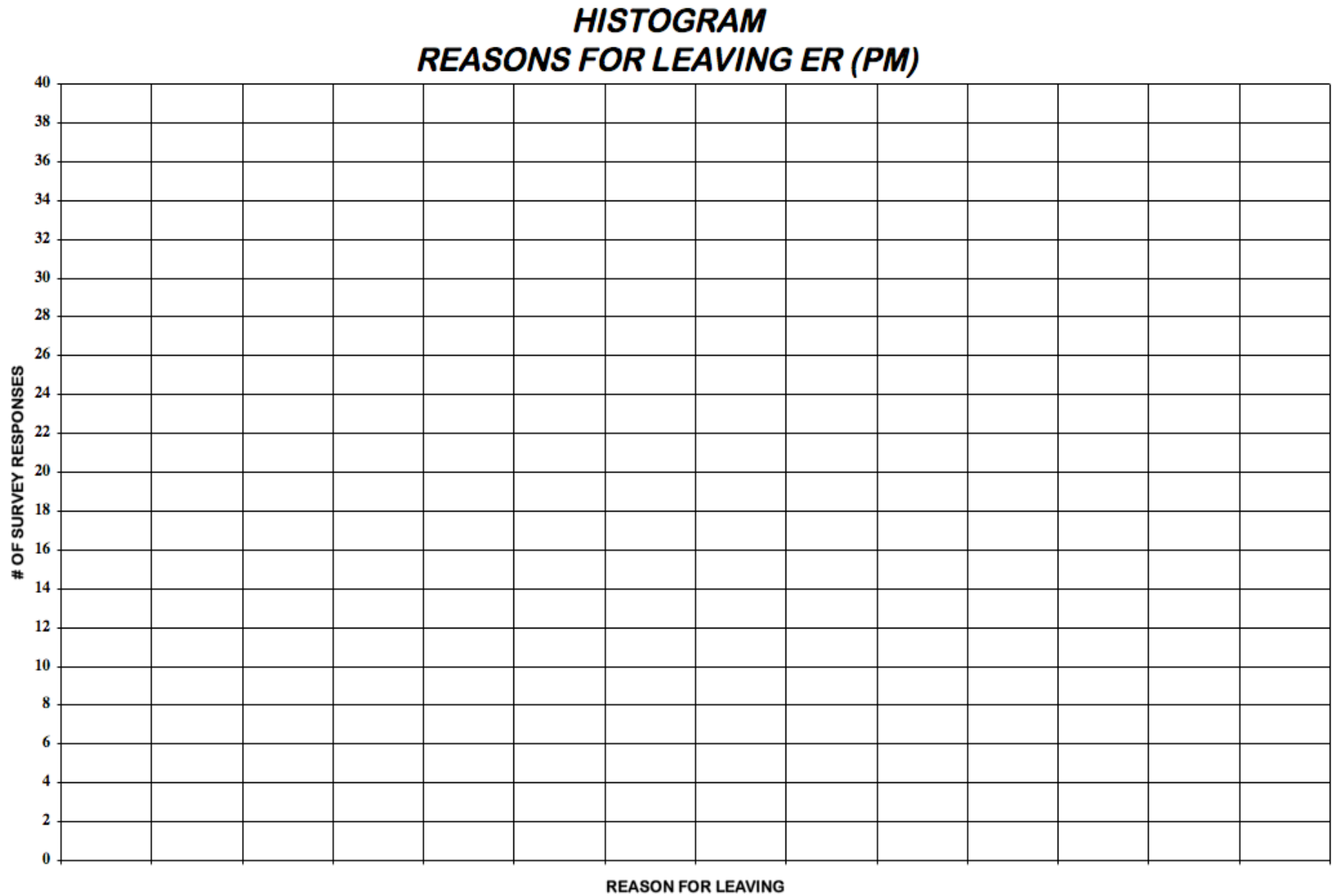
<u>Time Waiting</u>	<u># Of Responses</u>
10 minutes	5
20 minutes	5
30 minutes	8
40 minutes	18
50 minutes	18
60 minutes	30
<u>60+ minutes</u>	<u>21</u>
Total	100

### ***Assignment:***

- 1. Create one histogram of the ER waiting times for the morning survey and one histogram for the ER waiting times for the evening data. Figure 10.2 and 10.3 have been provided for you.*
- 2. Assuming that 20 minutes is the maximum acceptable waiting time that a patient is willing to endure before becoming unhappy, would you say that Growing Family Hospital has a problem in the ER in the AM? Is there a waiting time problem in the PM? Which problem should they address first?*



Figure 10.3



## Growing Family Hospital (C)

A report from one of the surveyed patients described his experience like this:

“I arrived at the ER with my son at 11:00 AM. His arm was broken and he was in terrible pain. I put him on one of the hard plastic chairs while I waited in line to tell my story (some softer furniture would be better for injured people). It was 40 minutes later before anyone could take my information! The paperwork was finally completed. ‘When would we see the doctor?’ I asked. ‘Not just yet,’ the nurse replied. They had to verify my insurance coverage. That took another 15 minutes, and the nurse said she was ‘rushing’ to get it done that fast.

“At 11:45 I am approached by another nurse who tells us that someone would be with us soon. 30 minutes goes by. I am angry. My son is in great pain! ‘Where is the doctor?’ I asked sharply. ‘It won’t be much longer,’ is the reply I get. 30 more minutes goes by! I become irate. It seems no one wants to take care of my son! I am ready to leave and go to another hospital!

“The nurse calms me down and takes us to an exam room. We wait 20 minutes longer before someone comes to examine my son. They briefly look at him and then leave. 15 minutes later they return with another medical staff person and redo the exam all over again! The two doctors leave together without telling me what is going on. 10 minutes later, one of them returns to the room to tell me that an X-ray is needed.”

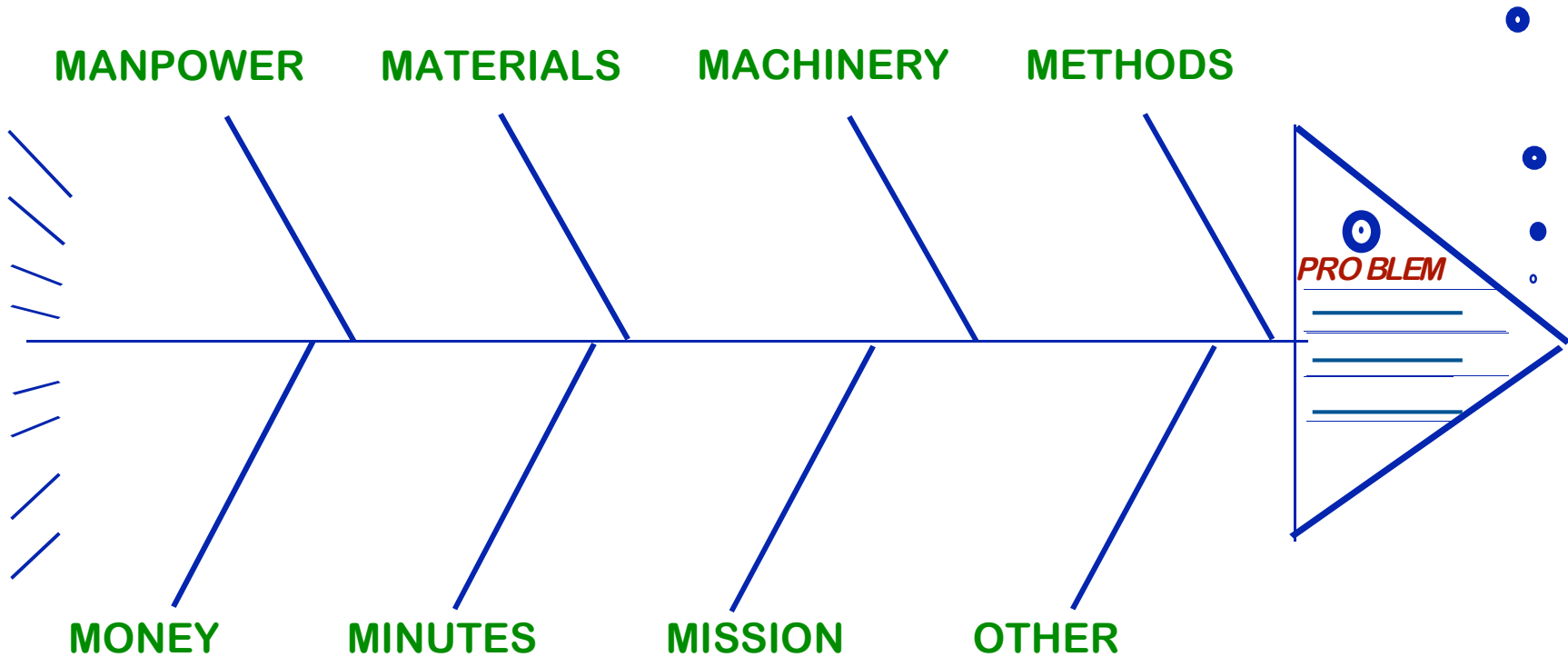
### **Assignment:**

1. *Flowchart the ER experience. Use Figure 10.4.*
2. *What are the obvious Customer irritants?*
3. *Using a fish-bone chart, brainstorm why these Customer irritants exist. Use Figure 10.5.*
4. *What ideas do you have for improving the ER experience?*

**Figure 10.4—Flowchart**

Figure 10.5

## ***FISH BONE CHART (CAUSE & EFFECT CHART)***



### ***USED TO ID CAUSES:***

1. **WRITE PROBLEM STATEMENT**
2. **LIST SOURCES OF PROBLEM**
3. **ID SPECIFIC POSSIBLE CAUSES**
4. **ID 1 OR 2 MOST LIKELY CAUSES**

## Growing Family Hospital (D)

### Calculation

Growing Family Hospital knows that it is losing about 50 patients each month because of long Emergency Room wait times and other Customer irritations. If they can reduce the cycle time to serve patients, and add 1 FTE as an ER Ombudsman to reduce other irritants, it is likely that they will be able to salvage at least half of the walk out business. The cost to add 1 FTE is \$45,000 per year. The hospital loses \$5,200 for each lost patient.

#### **Assignment:**

- 1. What is the cost/benefit ratio for one year if a position of 1 FTE Ombudsman position is filled?*
- 2. Reduce the cost/benefit ratio to it's simplest form. For every \$1 invested in the Ombudsman position, how many dollars are returned to the hospital?*
- 3. 60% of each dollar received by the hospital goes to cover operating expenses, 40% of each dollar received goes toward gross profit. How much gross profit will the hospital experience if it salvages 25 patients each month?*
- 4. What will the net profit to the hospital be if 25 patients are salvaged each month by adding the 1 FTE Ombudsman is added?*

**Notes**

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Figure A.1

WHERE & WHEN TO USE TOOLS													
	DEFINE PROBLEM			OUTLINE OPTIONS			IMPLEMENT SOLUTIONS			TRACK RESULTS			PAGE #
	STATE PROBLEM	USE DATA SOURCES	SELECT PROJECT TEAM	ANALYZE PROBLEM DATA	IDENTIFY ROOT CAUSES	CONSIDER POSSIBLE SOLUTIONS	CREATE ACTION PLAN	SELL PROPOSAL	IMPLEMENT & MANAGE CHANGE	GET PERFORM FEEDBACK	DEAL WITH PROBLEMS	REFINE/ RECYCLE PROCESS	
CORE TOOLS													
BENCHMARKING	2	1									2	2	1-5
BRAINSTORMING	1		2	1		1	2				1	1	6-2
CONTROL CHART		1								1		2	5-17
COST/BENEFIT ANALYSIS						1	2	2			2	2	6-23
DECISION MATRIX						1					2	2	6-18
FISH BONE CHART				2	1						2	1	6-3
FLOWCHART				1	1	2	2					2	6-8
HISTOGRAM		1								1		2	5-6
MANSYS PROPOSAL GUIDE								1			2		7-1
PARETO CHART		1				2						2	5-8
RUN CHART		1								1		2	5-11
TRACKING CHECKLIST											1		9-1
WORK TRAFFIC DIAGRAM				1		1	2		2		2	2	6-15
SPECIAL USE TOOLS													
CUSTOMER PROXY	2	1								2		1	4-3
CYCLE TIME ANALYSIS	2			1		1	2		2		2	2	6-26
FOCUS GROUPS	2	1								2		1	4-4
GANTT CHART									1			2	7-3
INTERVIEWS	2	1								2		1	4-4
SAMPLING	2	1								1		1	4-4
STRATIFICATION					1						2	1	4-4
SURVEYS	2	1								2		1	4-4
VARIANCE ANALYSIS				1	1						1	1	6-31
VARIANCE SOLUTION						1					1	1	6-33
WORK SIMPLIFICATION				1		1					1	1	6-25
1 = Primary Application; 2 = Secondary; Blank = None/Rare.													
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