

# Module 5

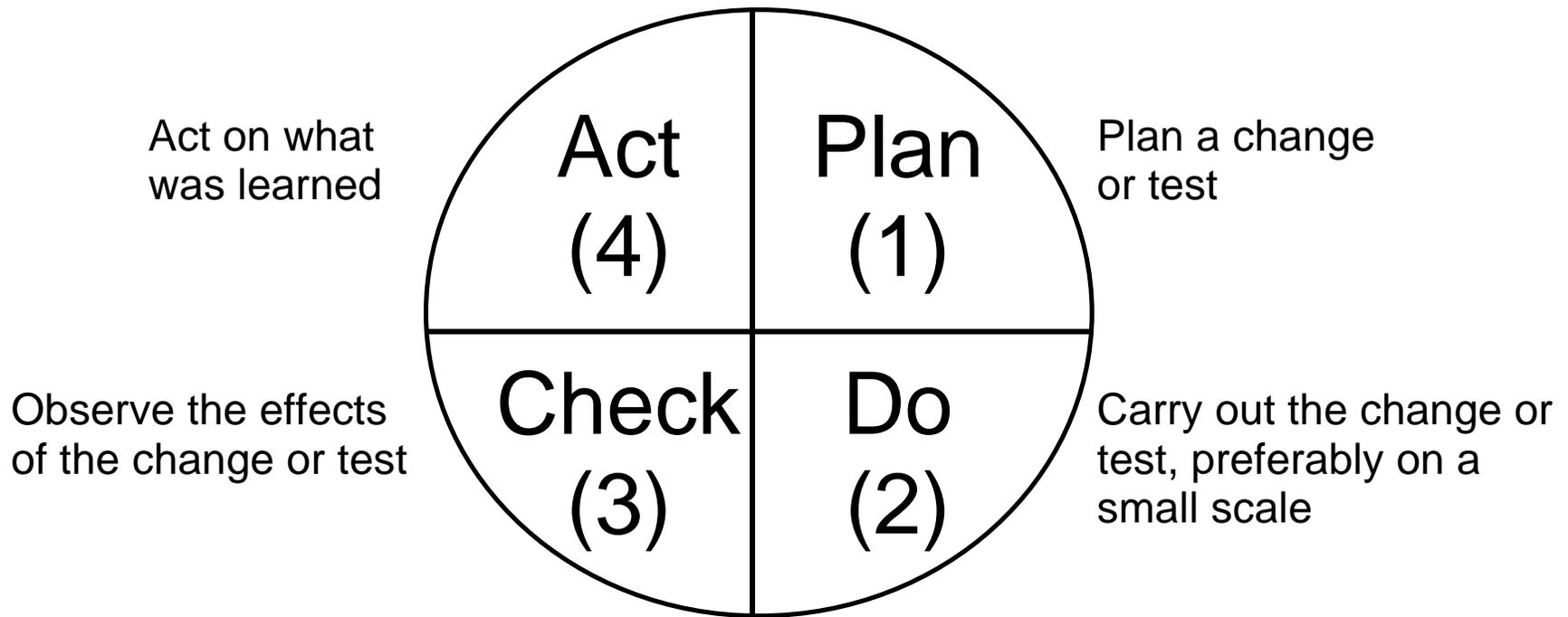
## Team Tool Kit

Upon completion of this module, you will be able to:

- Describe the phases of the PDCA cycle
- Describe the tools available to assist teams using the PDCA cycle
- Use the basic tool kit to develop products using the scenarios provided
- Describe general guidelines for collecting meaningful data

# Plan-Do-Check-Act (PDCA) or Shewhart Cycle

(Deming, 1986)

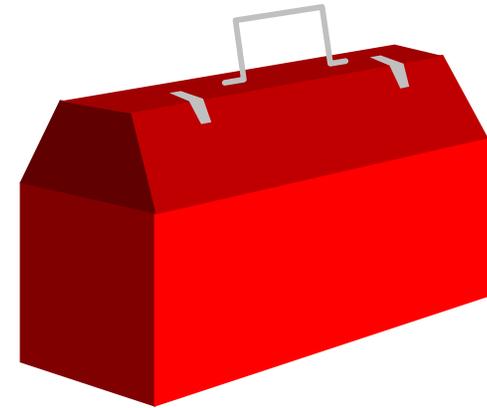


(5) Repeat Step (1), with new knowledge

(6) Repeat Step (2), and onward

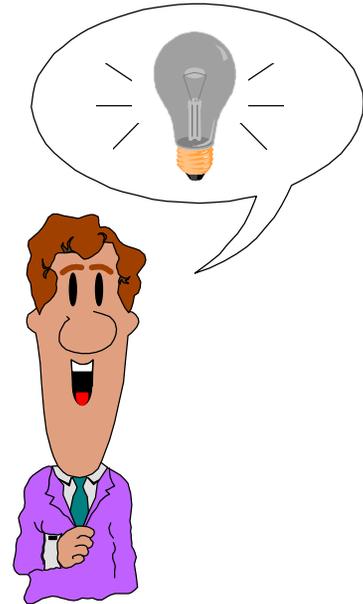
# Basic Team Tool Kit

- Flowcharting
- Brainstorming
- Cause-and-effect diagrams
- Multivoting
- Nominal group technique (NGT)
- Pareto charts



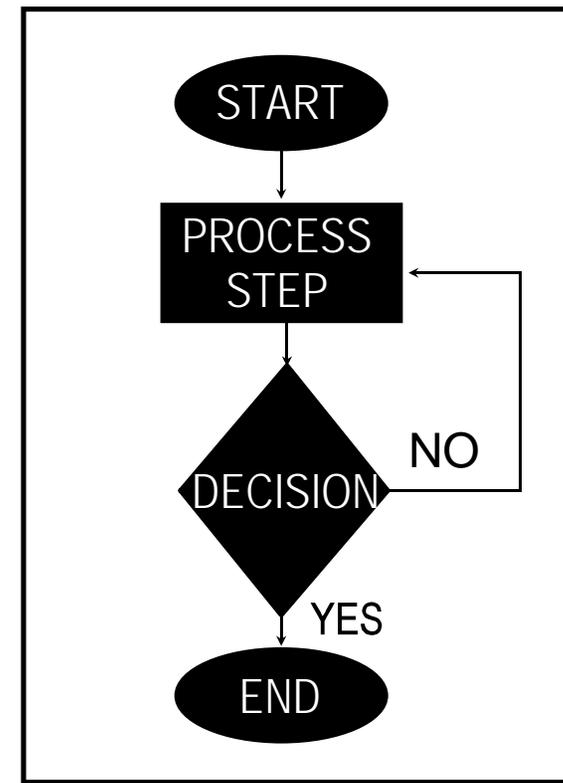
# Purpose of Tools

- Visualize a process
- Pinpoint potential areas for improvement
- Find root causes
- Determine changes
- Implement proposed changes and evaluate effects of changes



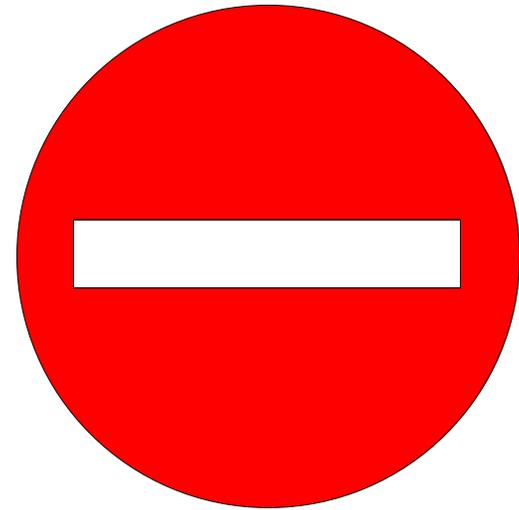
# Flowchart

- Provides documentation
- Examines relationships among process steps
- Uses recognizable symbols



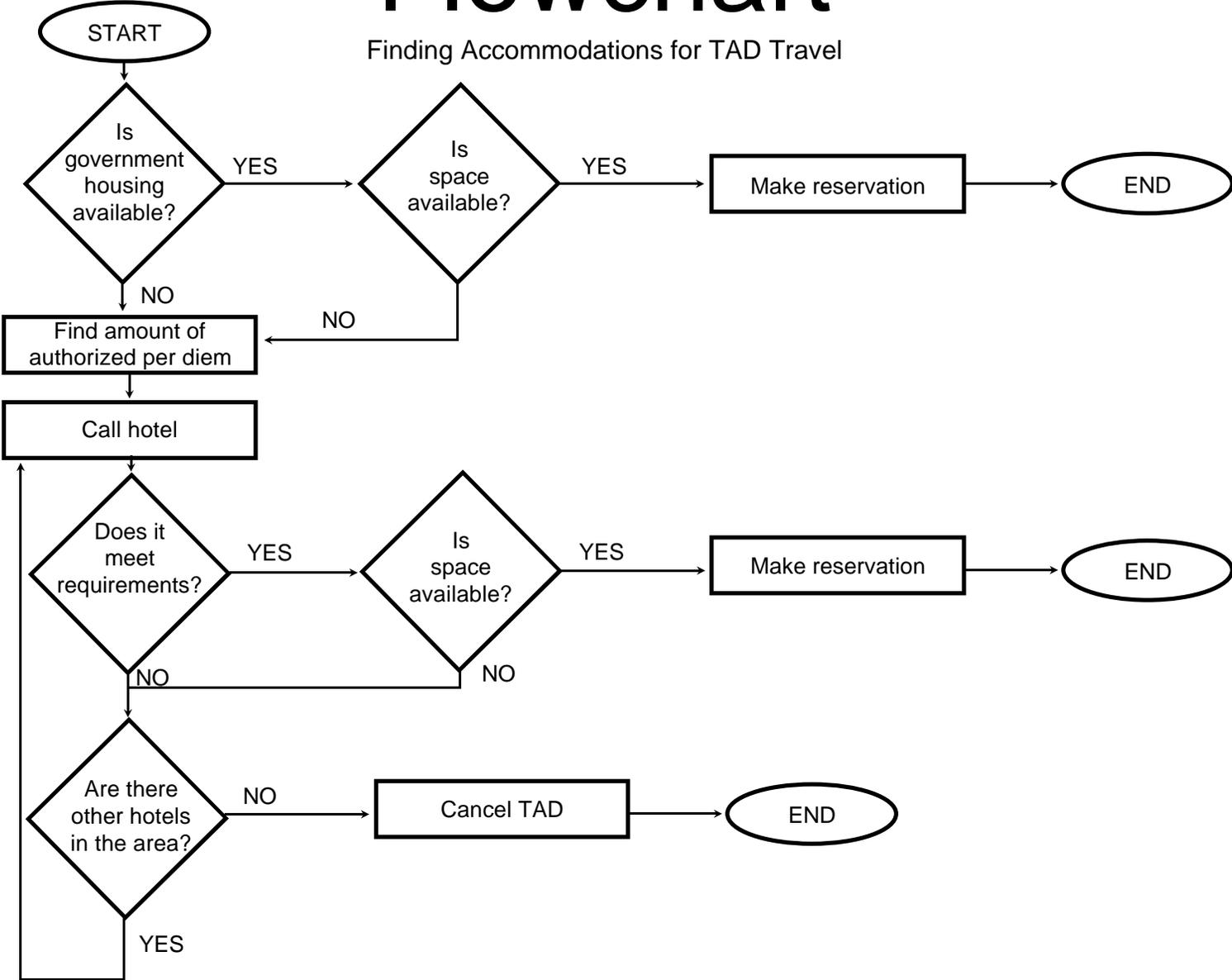
# Flowcharts Identify

- Roadblocks
- Rework
- Opportunities for improvement

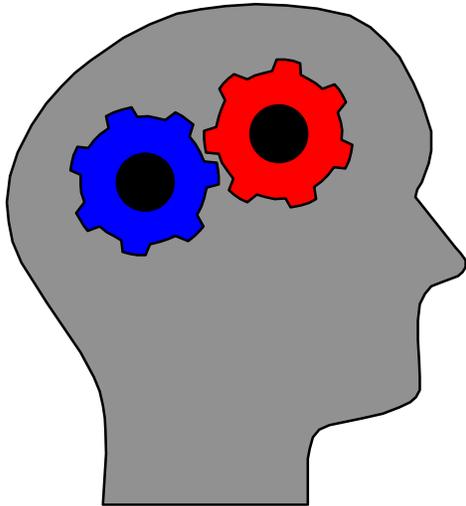


# Flowchart

Finding Accommodations for TAD Travel



# Brainstorming



An idea-generating technique used by teams to generate many ideas in a short period of time.

Ideas are solicited in a non-judgmental manner from all team members.

# Types of Brainstorming

## ■ Structured

All team members take turns in sequence.

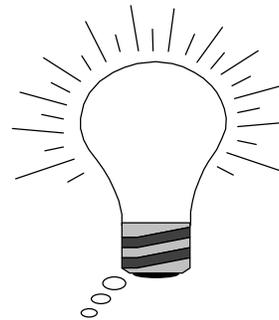
## ■ Unstructured

No sequencing; freewheeling input of ideas.

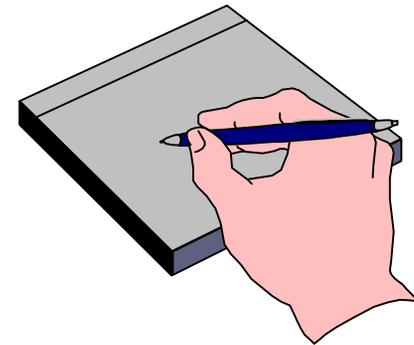
# Sequence of Brainstorming

- Review the topic and define the subject clearly

- Ask for ideas

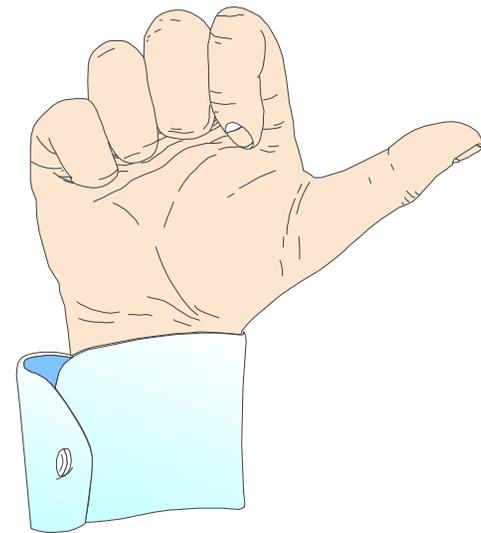


- Write ideas down

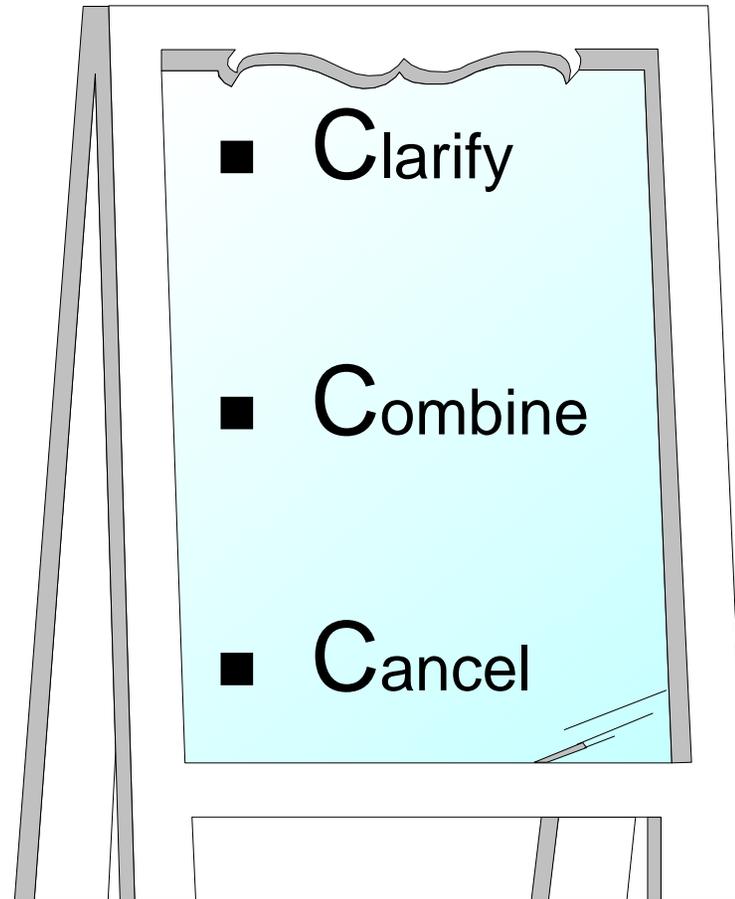


# Rules for Brainstorming

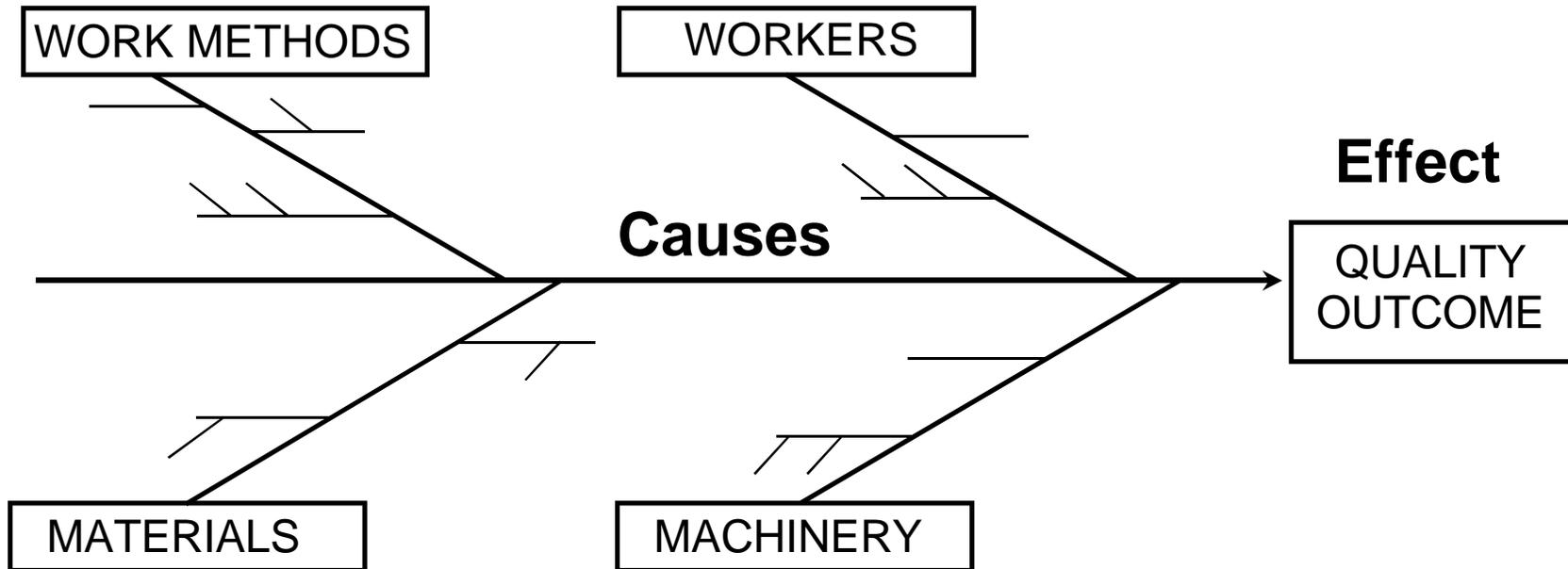
- Everyone's ideas are written down and considered.
- No discussion
- No criticism allowed
- Hitchhike
- Do it quickly



# Follow-up to Brainstorming



# Cause-and-Effect Diagram

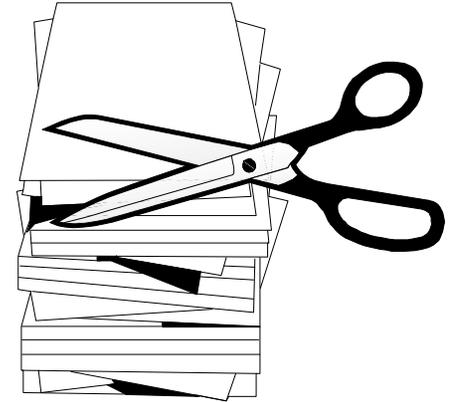


- Represents relationship between "cause" and "effect"
- Enumerates possible causes for an effect
- Aids in analyzing complex problems

# Benefits of Cause-and-Effect Diagrams

- Encourages group participation
- Forces objectivity
- Allows all involved to learn
- Shows the possible causes of variation

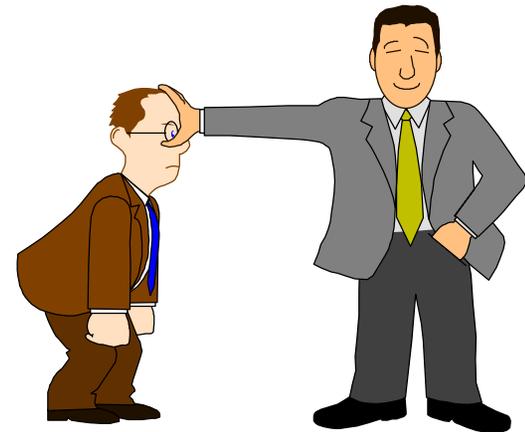
# Multivoting



A repetitive process used by a team to conduct a straw poll to select the most important or popular items from a large list of items generated by the team. The process is conducted with limited discussion and difficulty.

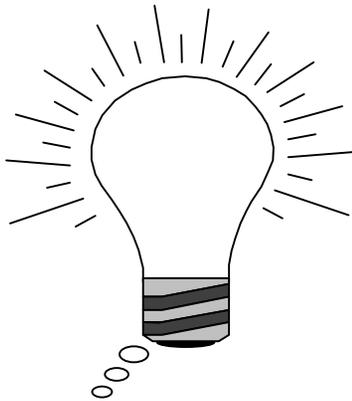
# Nominal Group Technique (NGT)

A weighted ranking technique that allows a team to generate and prioritize a large number of issues without creating "winners" and "losers" among the team members.

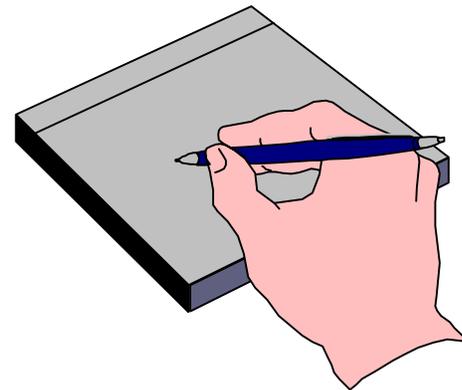


# Nominal Group Technique

Identify the ideas



- Define the task
- Generate ideas
- List all ideas

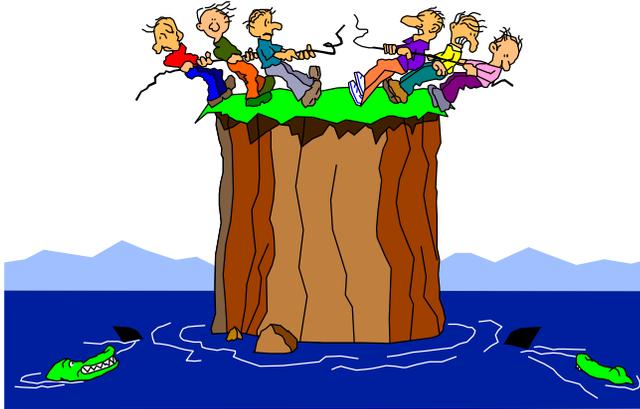


# Nominal Group Technique

Make the selection

- Assign a letter or number
- Rank ideas independently
- Assign ranking to ideas
- Determine highest priority
- Rewrite items in priority order

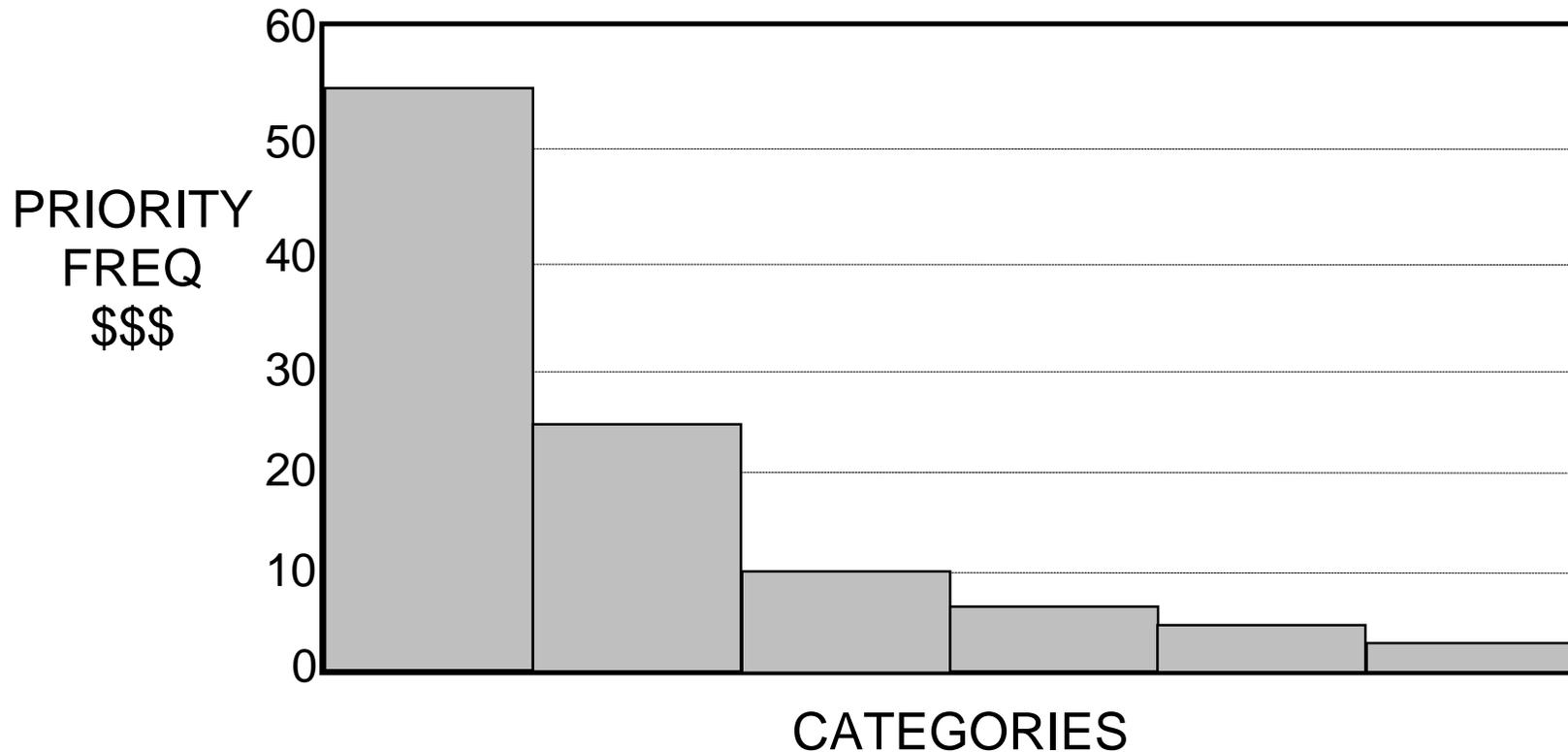
# Benefits of Nominal Group Technique



- Promotes consensus
- Reduces unproductive conflict
- Helps to clarify and order options

# Definition of a Pareto Chart

A vertical bar graph that displays categories in decreasing order of frequency or magnitude from left to right.



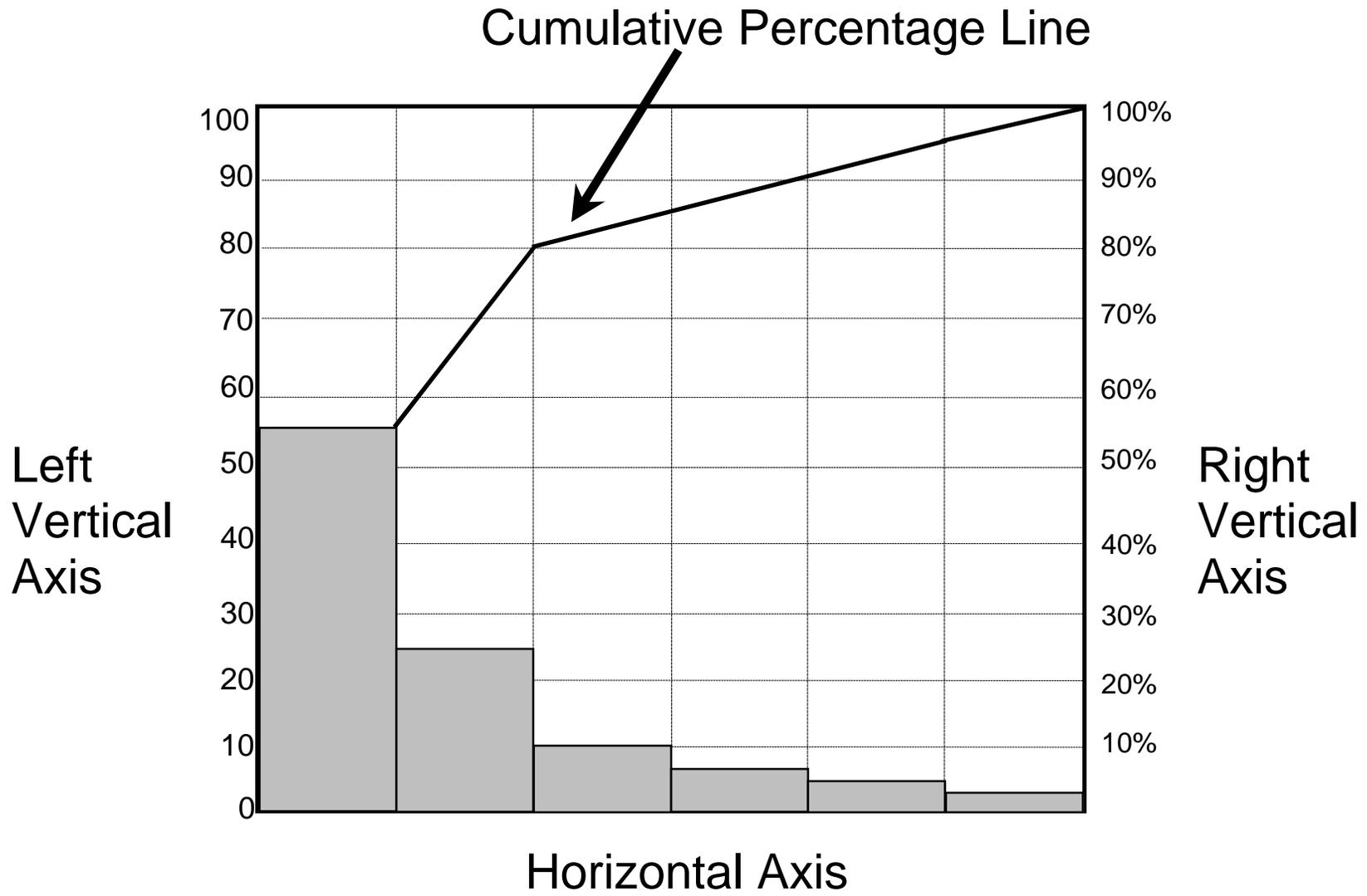
# Common Organizational Questions

- What are our most prominent areas of loss in quality?
- What are the most prominent causes of those losses?

# Pareto Analysis

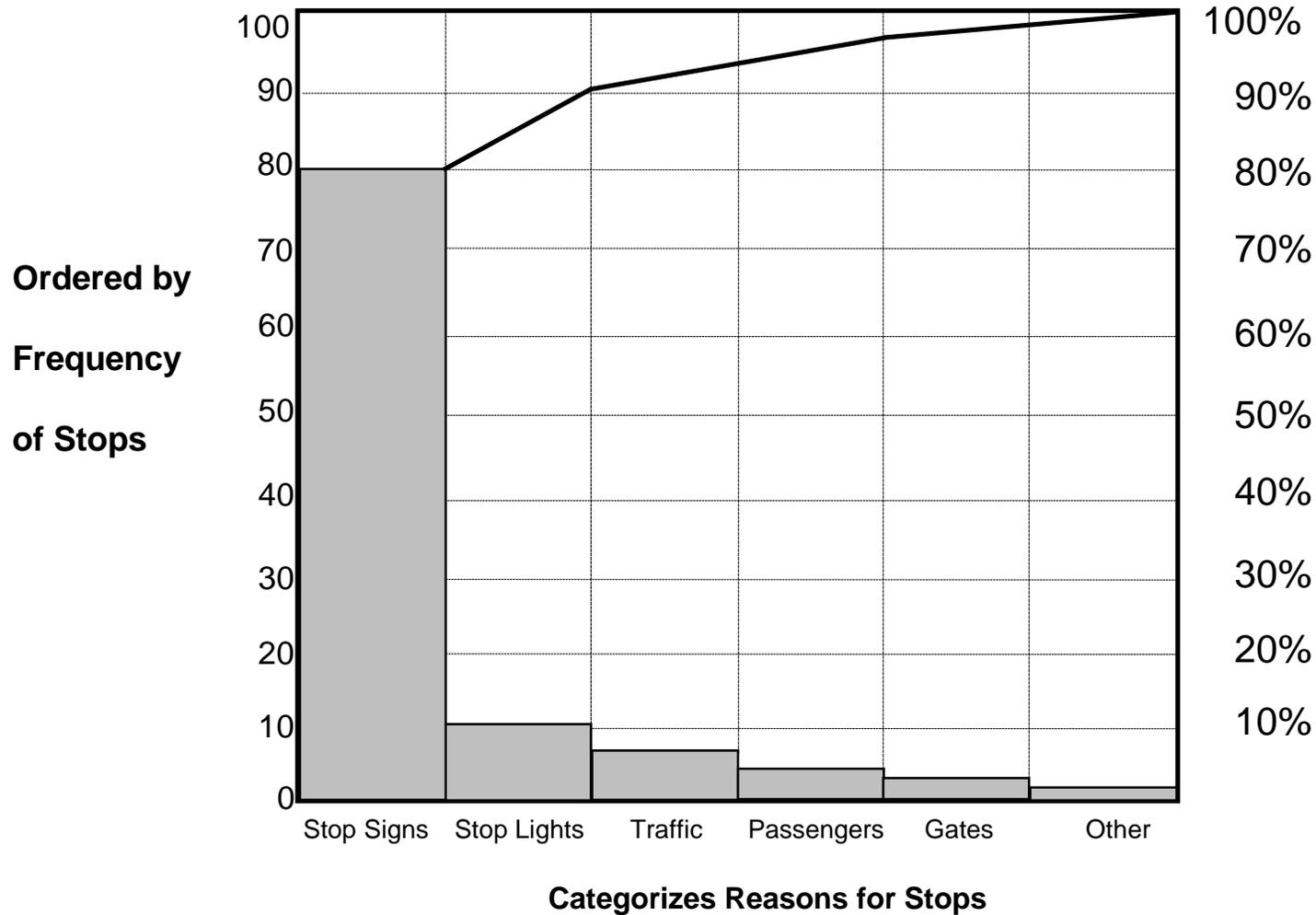
- "Vital few and the useful many"
- "80/20 Rule"

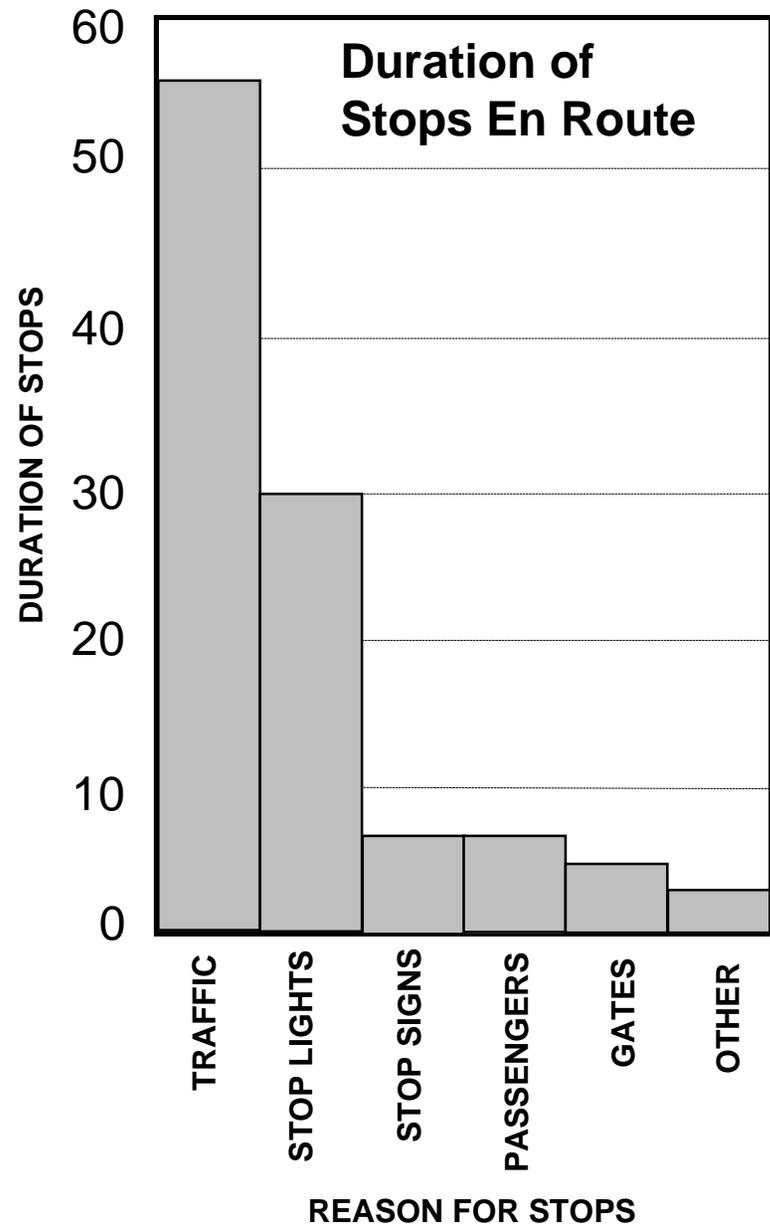
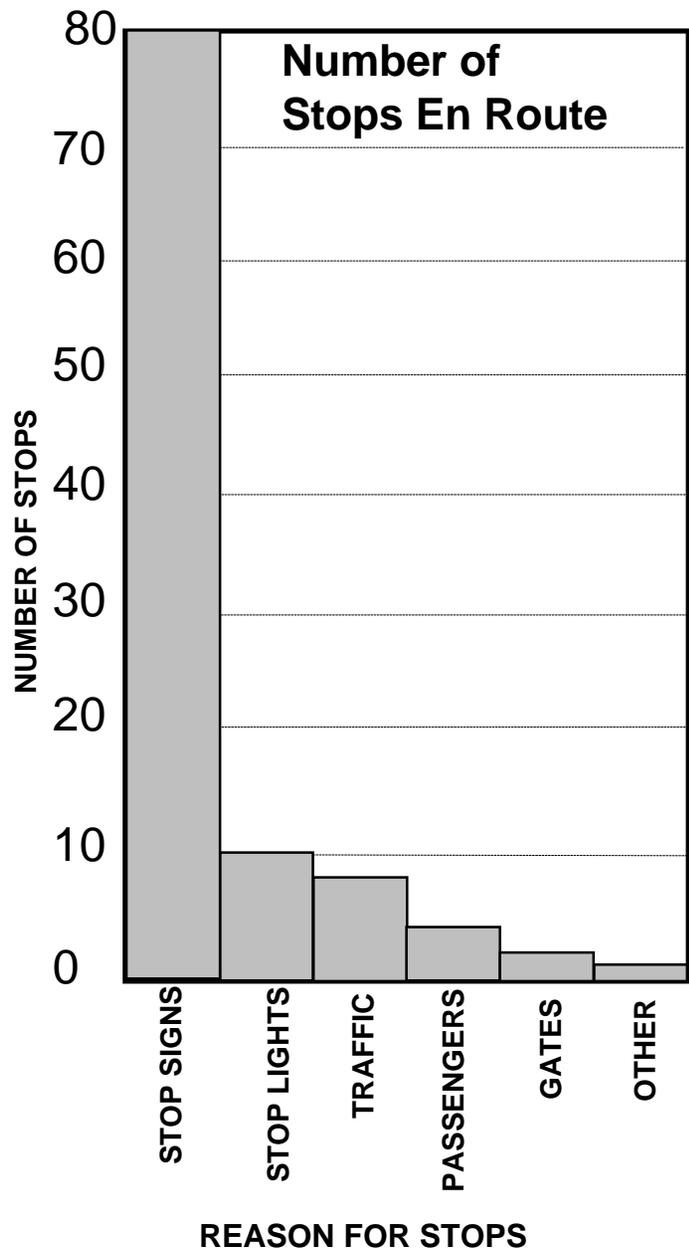
# Parts of a Pareto Chart



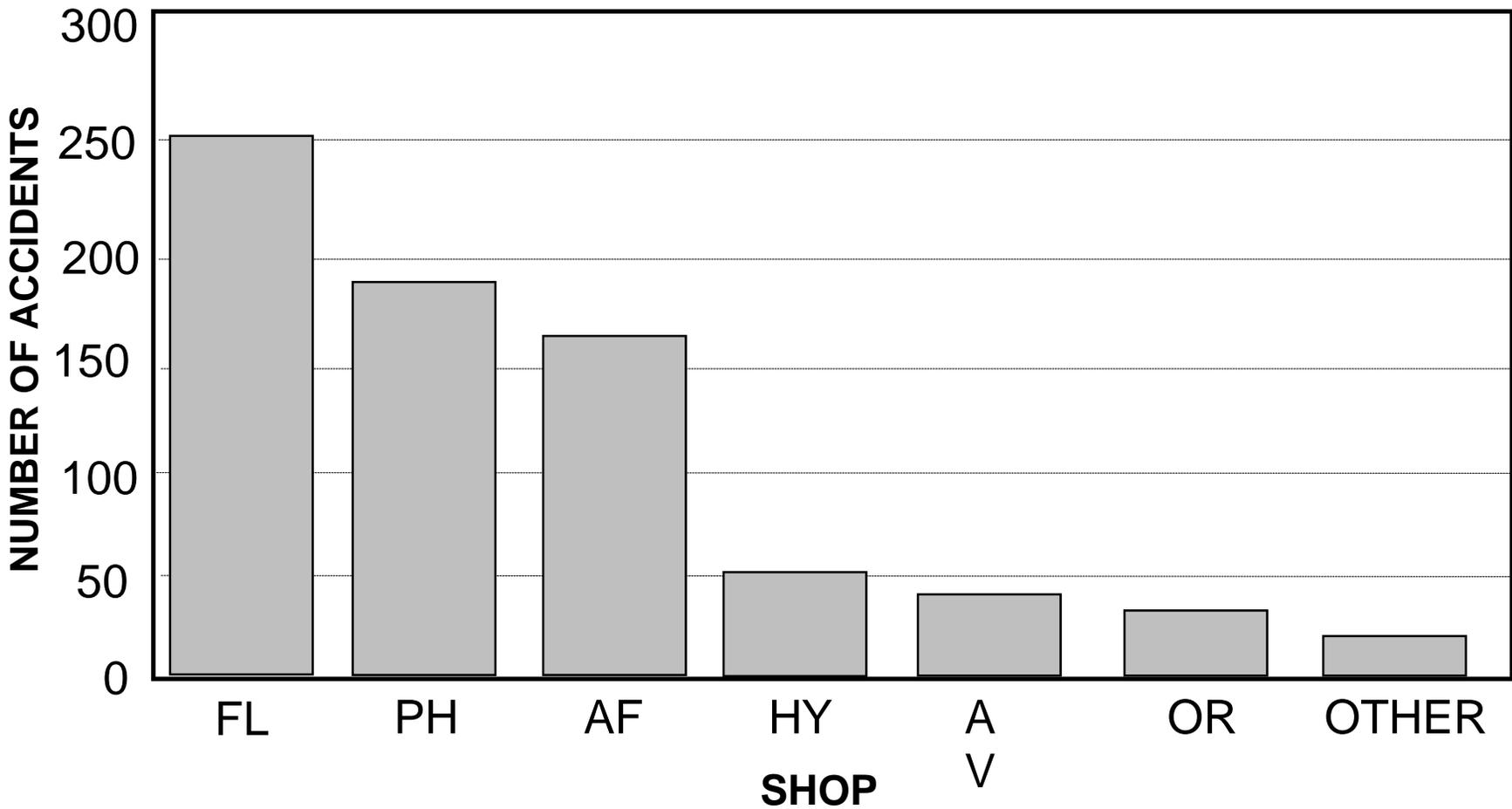
# Pareto Chart Example

## Number of Stops En Route

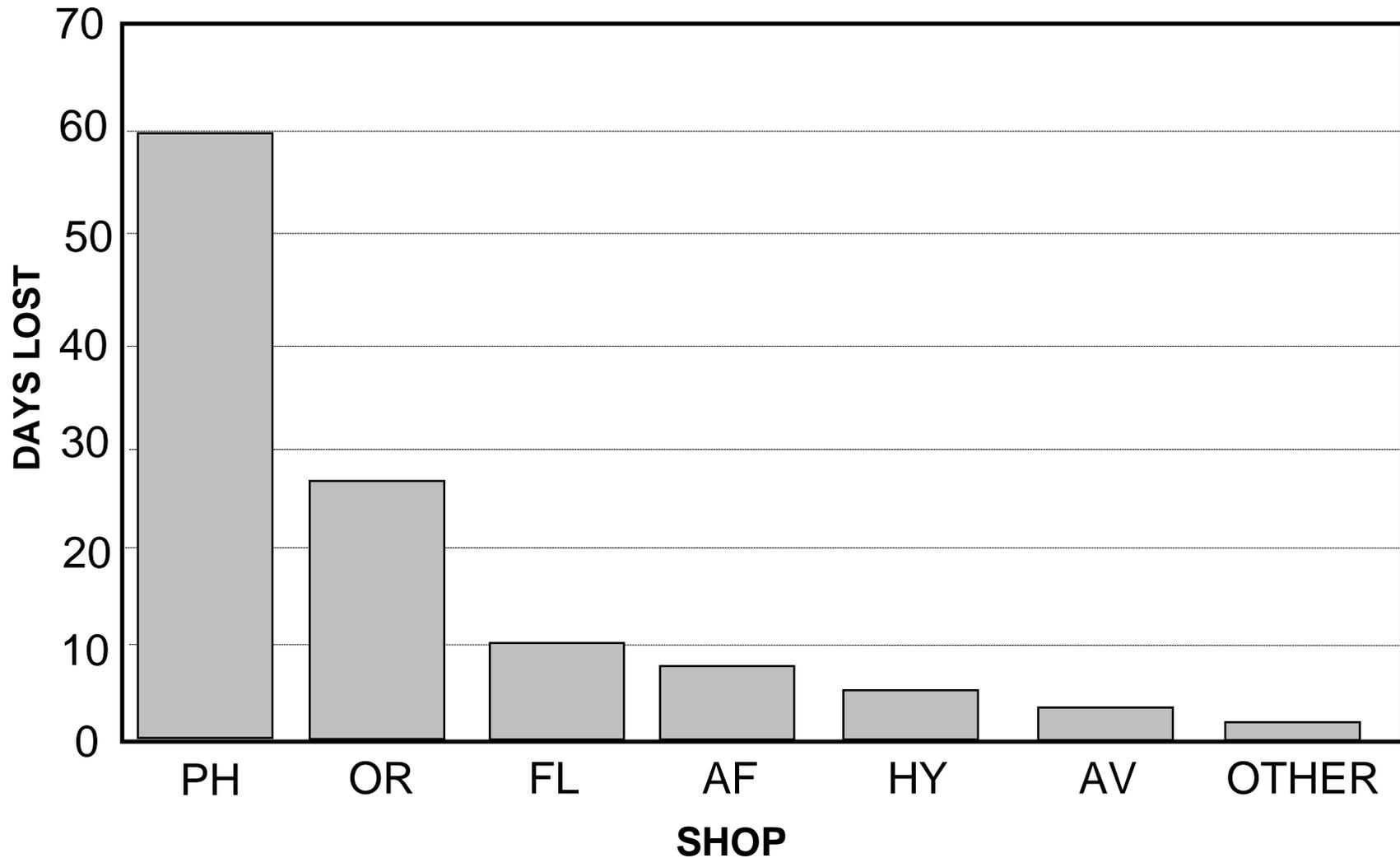




# Number of Accidents by Shops for a Quarter



# Days Lost Because of Accidents by Shop for a Quarter



# How to Construct a Pareto Chart

- Determine categories
- Develop ways to collect data
- Compute frequencies/values
- Compute percentages

Step 1 → Step 2 → Step 3

**Sum for each  
category and  
grand total**

**Percentage  
each  
category  
contributes  
to total**

**Cumulative  
percentage  
for each  
category**

# Compute Frequencies

Sum of all categories

We are  
counting  
days lost  
because of  
accidents  
"by shop"

PH	60	
OR	25	
FL	10	
AF	5	
HY	3	
AV	2	
OTHER	+	1
<hr/>		
TOTAL		106

# Compute Frequencies

Sum percent for each category

Percent  
each  
category  
contributes  
to total

$$PH = 60$$

TOTAL FOR  
ALL = 106

$$\frac{60}{106} = 56\%$$

56%

24%

9%

5%

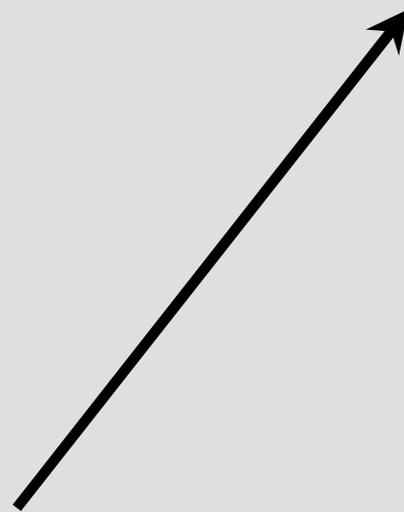
3%

2%

1%

+

100%

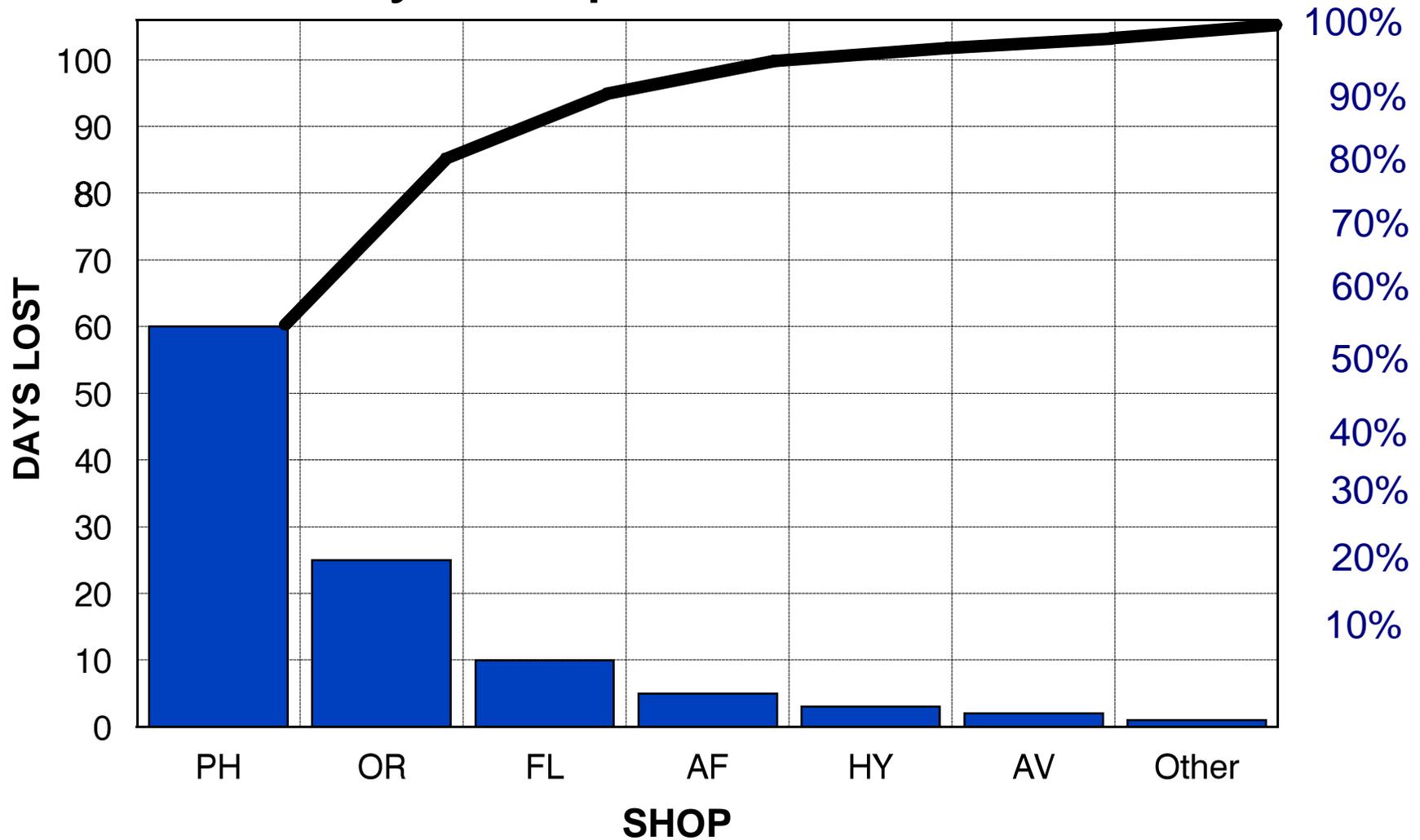


# Compute Frequencies

Sum cumulative percent for each category

+	PH	56	→	56%
	OR	24		
		<hr/>		
+		= 80	→	80%
	FL	9		
		<hr/>		
+		= 89	→	89%
	AF	5		
		<hr/>		
		= 94	→	94%
+	HY	3		
		<hr/>		
		= 97	→	97%
+	AV	2		
		<hr/>		
		= 99	→	99%
+	OTHER	1		
		<hr/>		
		= 100	→	100%

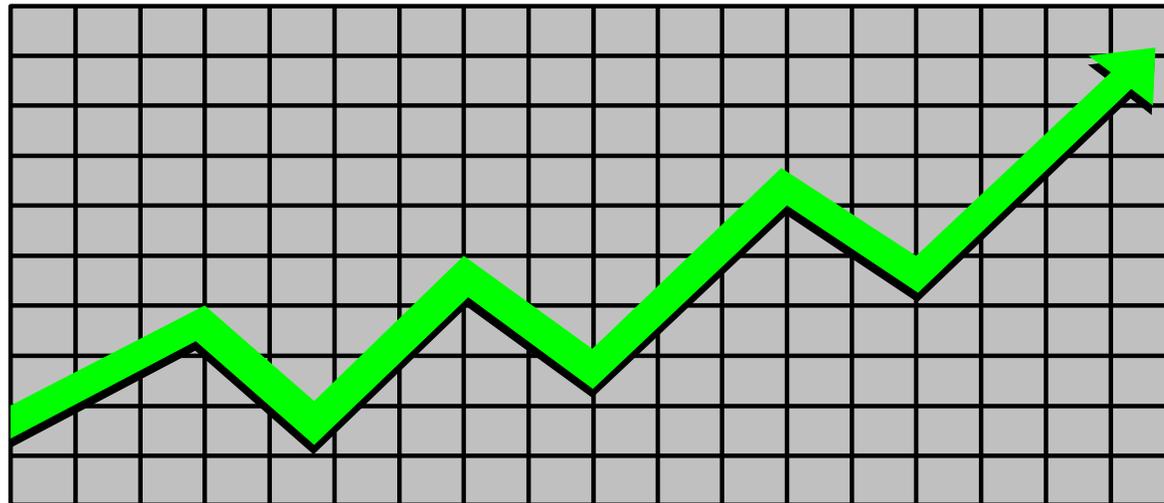
# Days Lost Because of Accidents by Shop for a Quarter



# Definition of Data

Information, especially information organized for analysis or used as the basis for decision making

Webster



# Types of Data

- Subjective

- Objective

  - Attribute

  - Variable

# Objective Data Types

## Attribute

## Variable

### Characteristics

countable (no. of instances)  
classification (yes/no)

measurable  
continuous

### Examples

number of defects  
military/civilian

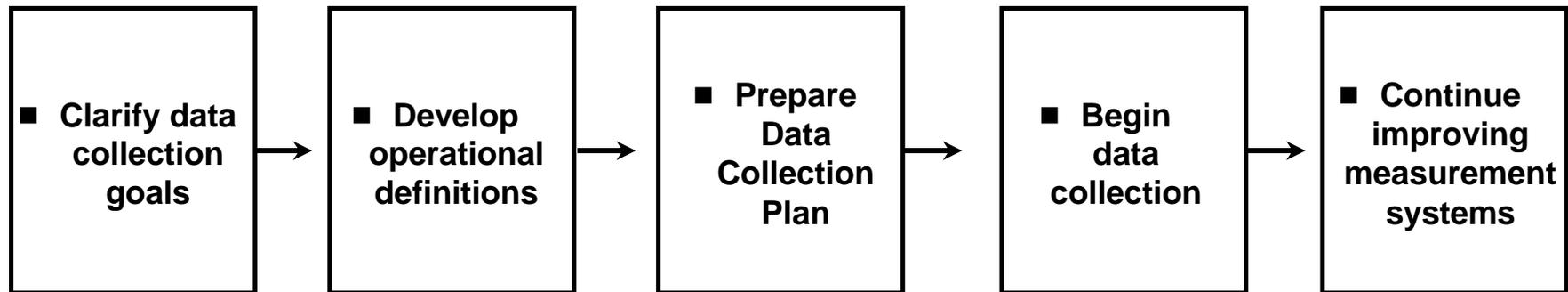
length  
weight  
time

### Data

12 red beads  
10 military/5 civilian

10 inches  
212 pounds  
5 seconds

# Data Collection as a Process



# Summary

- PDCA
- Basic team tool kit
- Data collection

