

AQS 200

ROOT CAUSE INVESTIGATION

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



Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Lecture 5

Tools for Problem Understanding

- Flowchart
- Critical incident
- Spider chart
- Performance matrix



Problem Understanding

Purpose & Applications of Flowcharts

Problems that occur are typically connected to business or work processes.

Main purpose of flowchart: Portrays the flow of activity in a process

An appropriate first step in root cause analysis is to make a flowchart of the process.

Problem Understanding

Purpose & Applications of Flowcharts

Flowcharts can be used to:

- Illustrate where problems occur and which problems should be solved
- Provides basis for ensuing root cause analysis & a detailed understanding of the process(es) that contain or influence the problem

Tools for Problem Understanding

Different Types of Flowcharts

- Many shapes & sizes
- Some designed for special purposes
- Variations in amount of information, some less, some more

Tools for Problem Understanding

Different Types of Flowcharts

Three useful types of flowchart

Regular flowchart

Cross-functional flowchart

Flowcharts on several levels

Tools for Problem Understanding

Different Types of Flowcharts

Regular Flowchart

Simply depicts a sequence of activities or tasks
and contains no other information

Tools for Problem Understanding

Different Types of Flowcharts

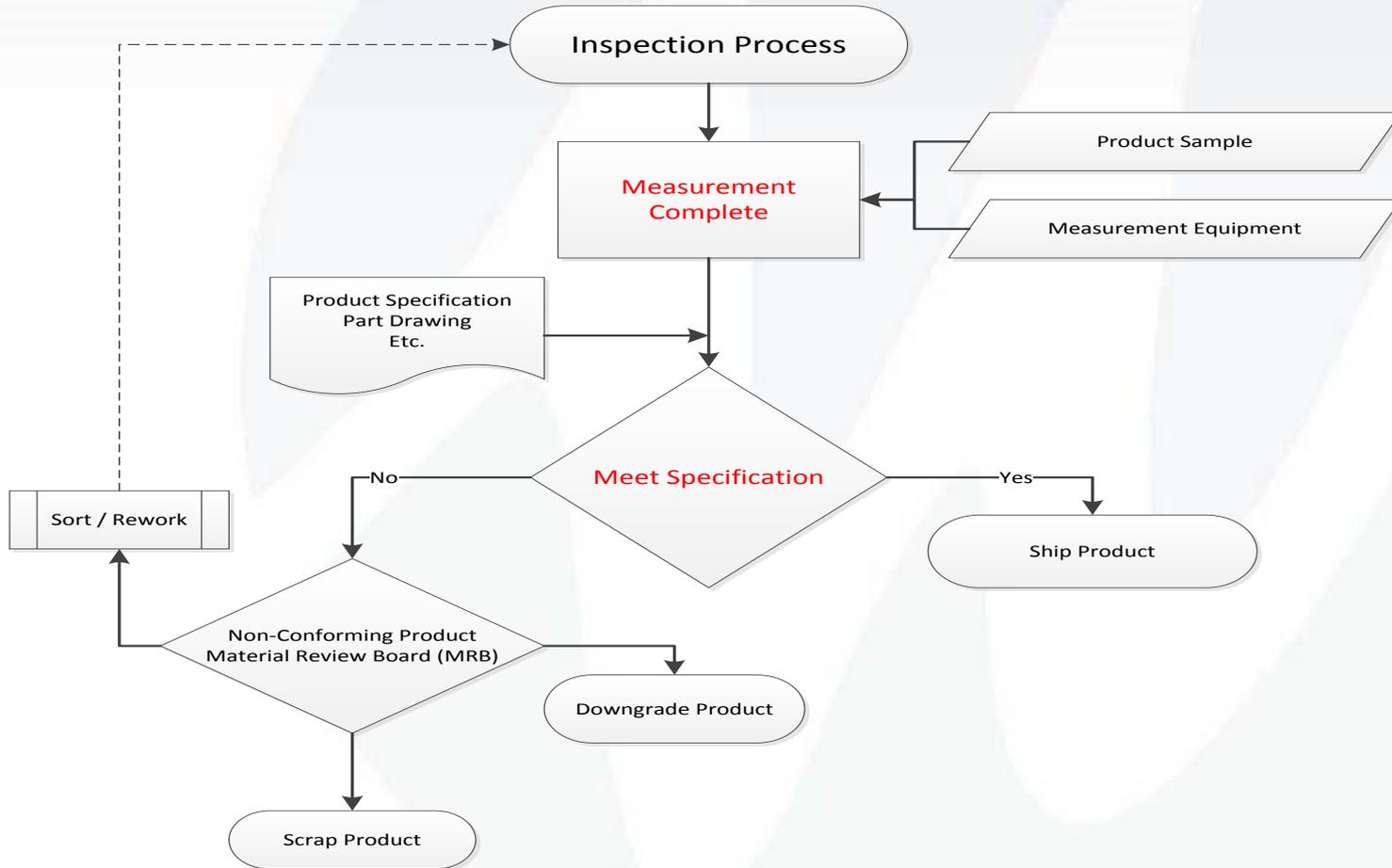
Regular Flowchart

Is a picture of various steps/tasks in a process

- Shows how the operation tasks are connected.
- Shows the order in which they need to be completed.

Tools for Problem Understanding

Flowchart Example



Tools for Problem Understanding

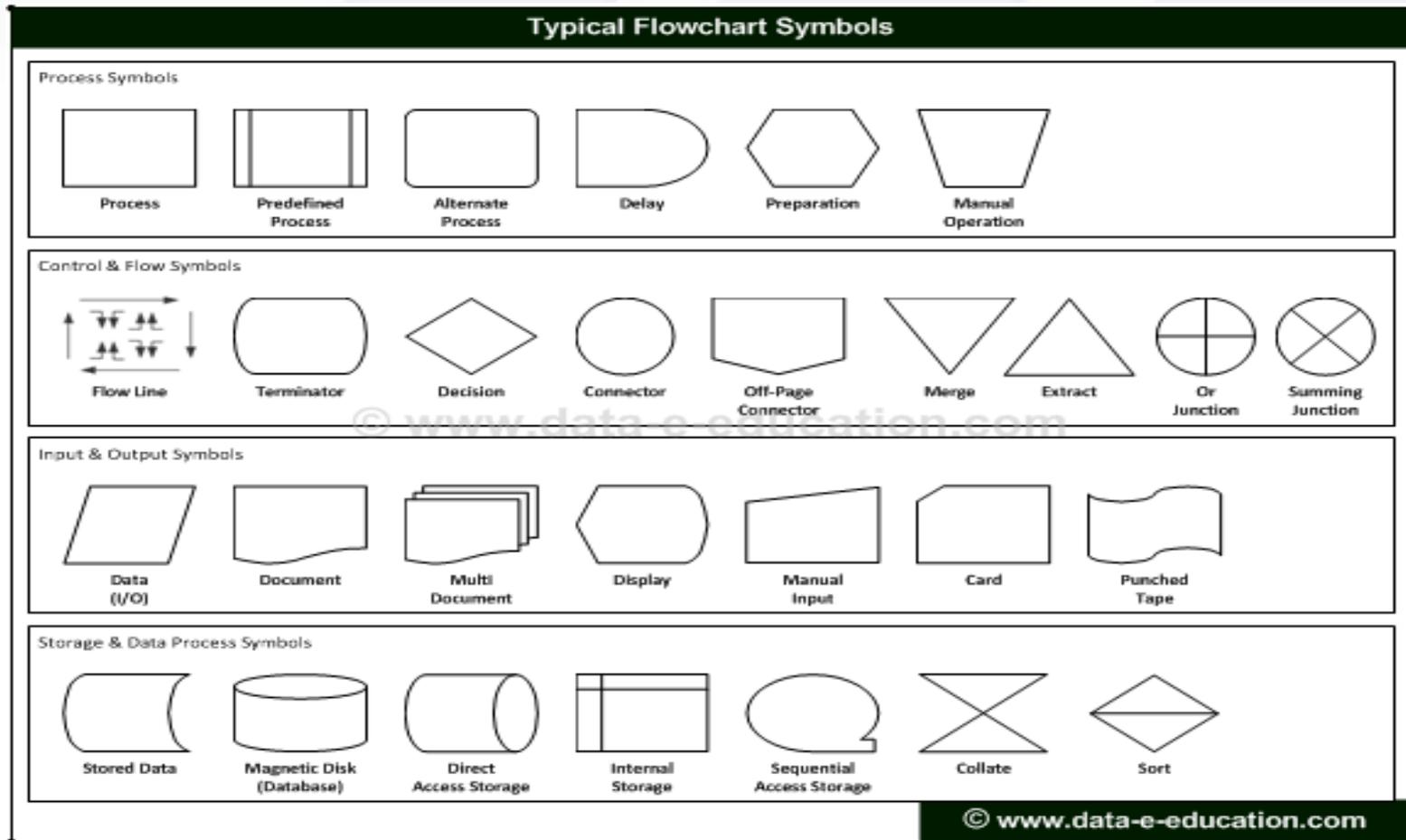
Different Types of Flowcharts

Variety of flow chart types, with specific symbols

- basic flowchart shapes (US units)

Tools for Problem Understanding

Flowchart Symbols



Tools for Problem Understanding

Basic Flowchart Symbols

Solid lines and arrows are used to connect the symbols and direct the user. Dotted lines may also sometimes be used. The difference between solid and dotted lines would be indicated on the flowchart.

Start/End: indicates the starting point and ending point of the task/operation/process being depicted.

Process: indicates an action step in the operation being depicted.

Document: indicates a document will be needed or a document will be created.

Tools for Problem Understanding

Basic Flowchart Symbols

Decision: typically contains a question and directs the user based on the response

Data: used to indicate what results are expected or what information may be needed.

Sub-process: used when one of the action steps is the result of another process that is not included on the current flowchart.

Tools for Problem Understanding

Different Types of Flowcharts

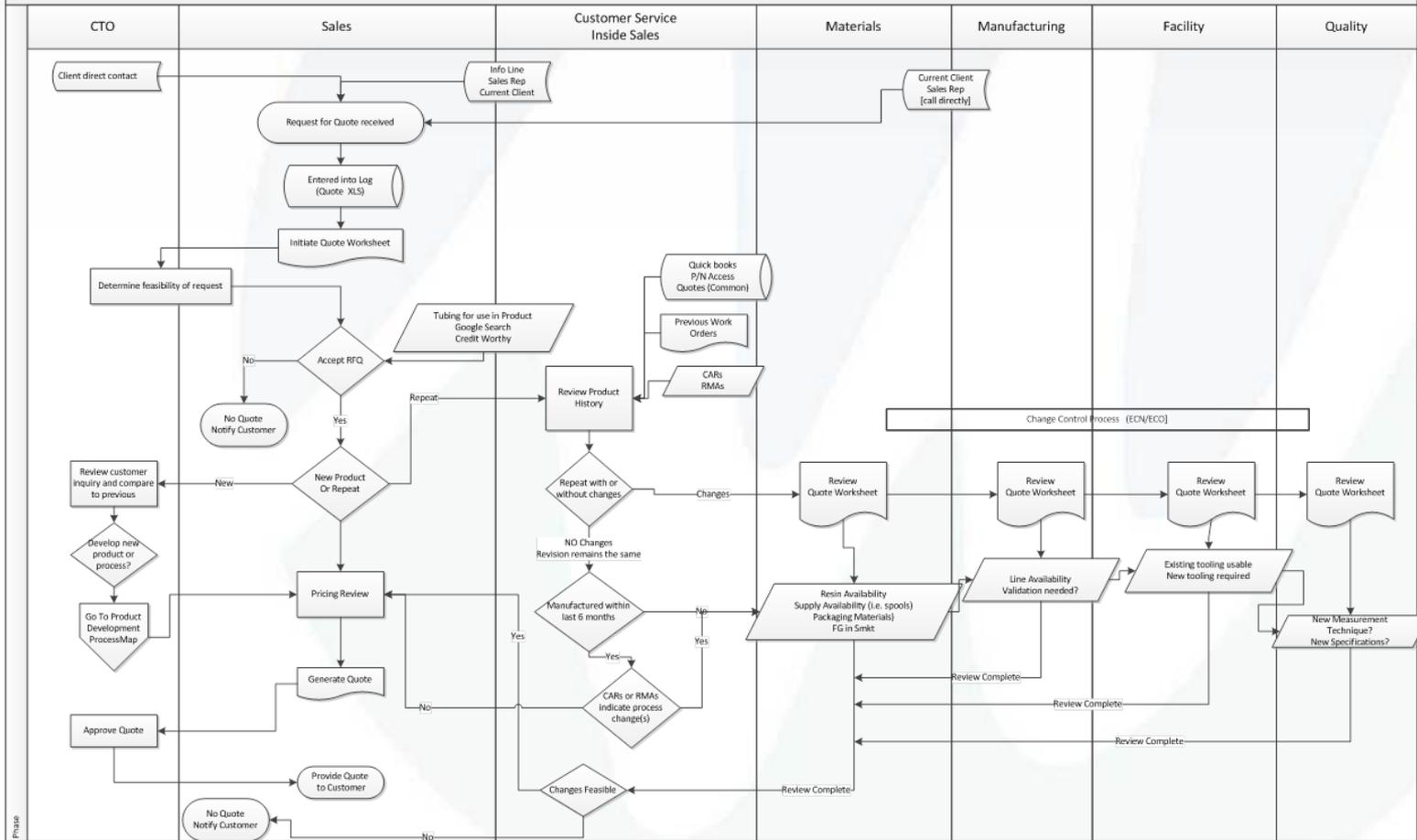
Cross-functional Flowchart

- Additionally indicates which person or department is responsible for each of the activities or tasks
- Can also contain information on the duration of the activities, how much they cost, etc.

Tools for Problem Understanding

Cross-Functional Flowchart Example

Title: Inquiry Receipt - Request for Quote
 Scope: Product or Prototype, Samples excluded



Tools for Problem Understanding

Different Types of Flowcharts

Flowcharts on several levels

- Enables adding more details
- Simple flowchart forms the top-level chart – gives clear overview of the processes
- Each step detailed in a new chart on a level below to provide specific information
- There can be many levels for complex processes

Tools for Problem Understanding

Steps in Using Flowcharts

1. Identify personnel involved in the process to be flowcharted & coordinate a meeting.
 - Room with whiteboard
 - maybe different color sticky notes

Tools for Problem Understanding

Steps in Using Flowcharts

2. Define the internal and/or external customers of the process. Include:
 - The input needed for the process
 - The suppliers of the input
 - The output they receive

Tools for Problem Understanding

Steps in Using Flowcharts

3. Identify the main activities or tasks taken during the process that convert input to output.
 - *Start with the end product/service (i.e., output) and work backwards.*

Tools for Problem Understanding

Steps in Using Flowcharts

4. Use sticky notes in different colors to represent activities, products (or services), documents and other elements of the process.

Tools for Problem Understanding

Steps in Using Flowcharts

5. To map the process, place the sticky notes in a sequence (flow) that best depicts the current process.

Tools for Problem Understanding

Steps in Using Flowcharts

6. Create an electronic version of the flowchart as required.

(can take a picture)

Tools for Problem Understanding

Flowcharts

Exercise 5a

Create Flowchart

Tools for Problem Understanding

CRITICAL INCIDENT

Purpose: to understand what the most troublesome symptoms in a problematic situation really are.

Tools for Problem Understanding

Critical Incident

Helps:

- Understand which aspects of the problem need to be solved.
- Realize the nature of the problem and its consequences.

Tools for Problem Understanding

Critical Incident Example

A management consulting firm had grown successfully and now employs 75 consultants. A new sales technique was introduced as standard procedure where multidisciplinary teams of three would visit potential clients.

This created frustration among the consultants who felt the technique was not effective but could not tell exactly what was wrong.

Tools for Problem Understanding

Critical Incident Example

After a particularly frustrating client visit, two of the consultants initiated a *critical incident session* to understand what was wrong.

All of the consultants were asked to identify their respective critical incidents.

Tools for Problem Understanding

Critical Incident Example

Critical Incidents Identified by One of the Consultants

- Suggesting a different solution than Thomas at SysCom
- Quoting an hourly rate in the meeting instead of in a written offer
- Being late for the meeting with ADA
- Showing up without having had the time to prepare properly

Tools for Problem Understanding

Critical Incident Example

A summary of the critical incidents reported by all of the consultants is shown in the following table consisting of ***Type of Incident*** and ***Frequency***.

Tools for Problem Understanding

Critical Incident Example

Type of Incident	Frequency
Embarrassment by disagreeing with colleague	112
Being unprepared, thus giving a bad impression	39
Revealing too much information about prices or approaches	21
Losing a client to a competitor	14
Being late for meetings when the partner is already there	8
Not being able to suggest solutions to the client's problem	8
Feeling an obvious lack of chemistry with the client	5
Getting into an argument with the client	3
Spilling coffee on the client	1

Tools for Problem Understanding

Steps in Using Critical Incident

1. Identify participants from all departments and functional areas involved in the problem situation.

Tools for Problem Understanding

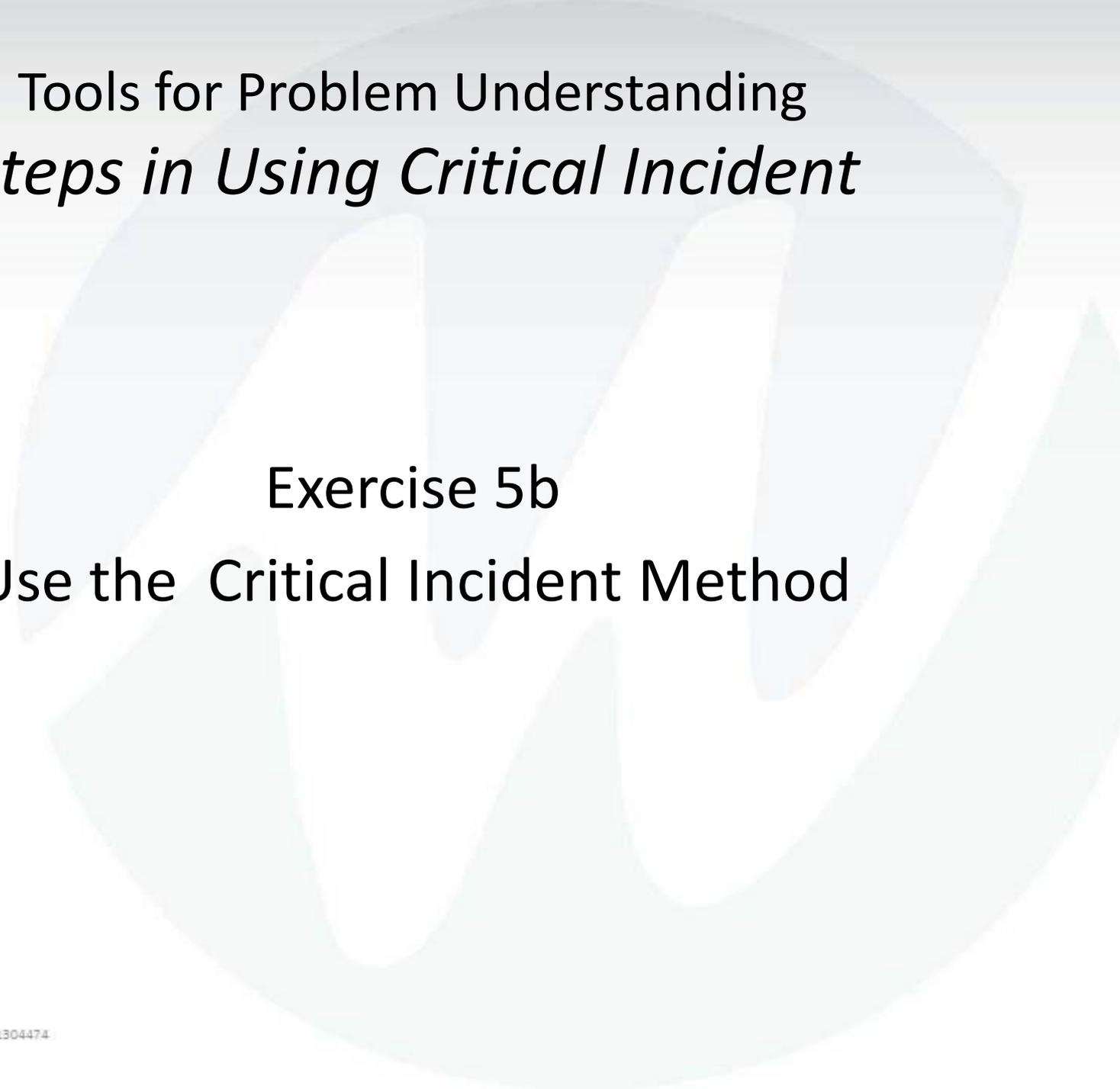
Steps in Using Critical Incident

2. Ask each participant to answer in writing questions like:
 - Which incident last week was most difficult to handle?
 - What created the biggest problem relative to customer satisfaction?
 - Which incident cost the most? (extra resources or direct expenditures?)

Tools for Problem Understanding

Steps in Using Critical Incident

3. Collect, sort and analyze answers based on the frequency of different incidents.
4. Graphically present the sorted list to show the criticality of each incident.
5. Use the most critical incidents as starting points to search for problem causes.



Tools for Problem Understanding
Steps in Using Critical Incident

Exercise 5b

Use the Critical Incident Method

Tools for Problem Understanding

SPIDER CHARTS

Purpose: To give a graphical impression of how the performance of business processes (or problem areas) compares with other organization.

Tools for Problem Understanding

Spider Charts

Applications:

- Determine which problem is most critical.
- Compare the seriousness of problems and causes.

Tools for Problem Understanding

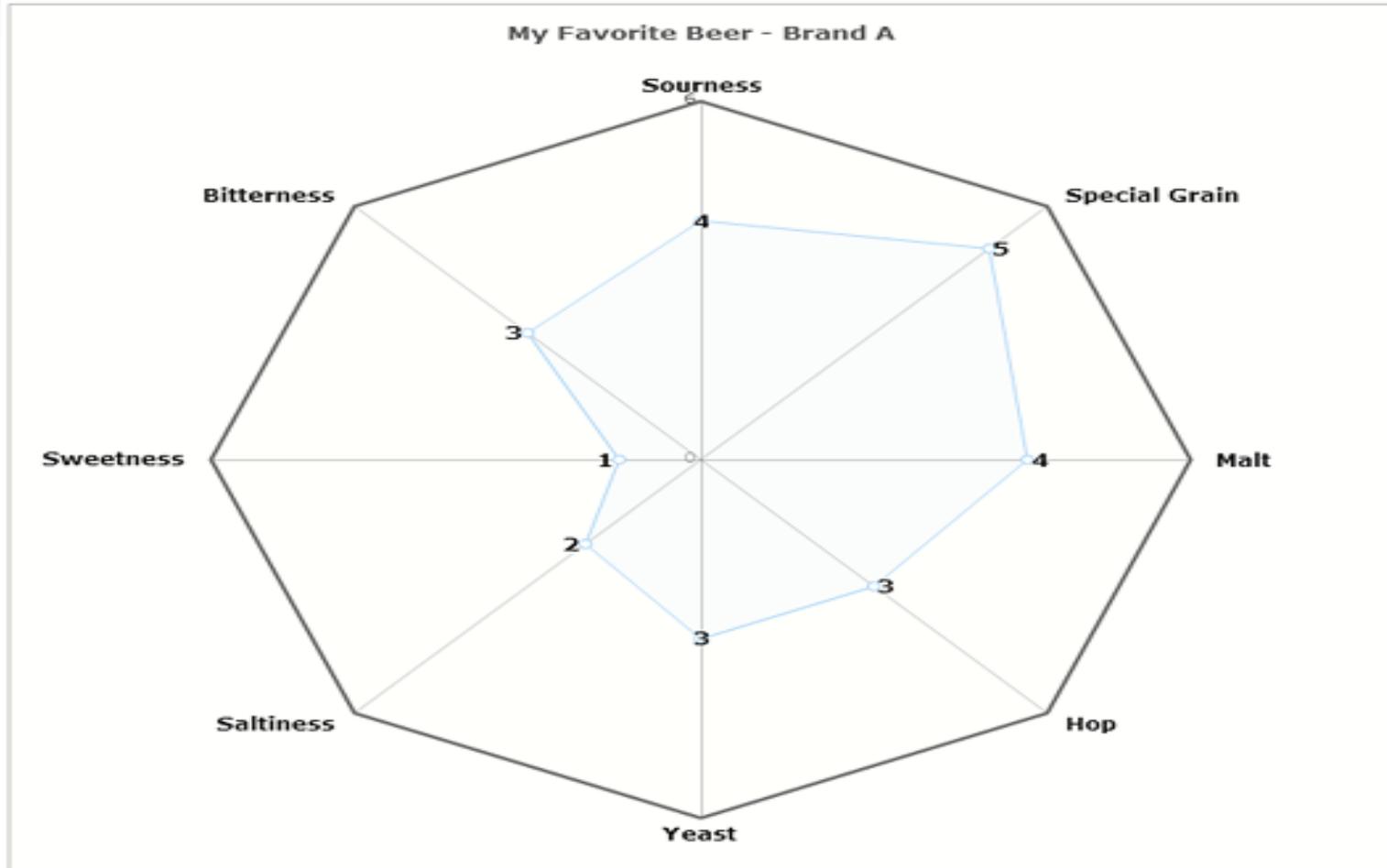
Spider Chart Example

Two examples using a spider chart:

- Evaluating your favorite beer
- Beer comparison between Brand A & Brand B

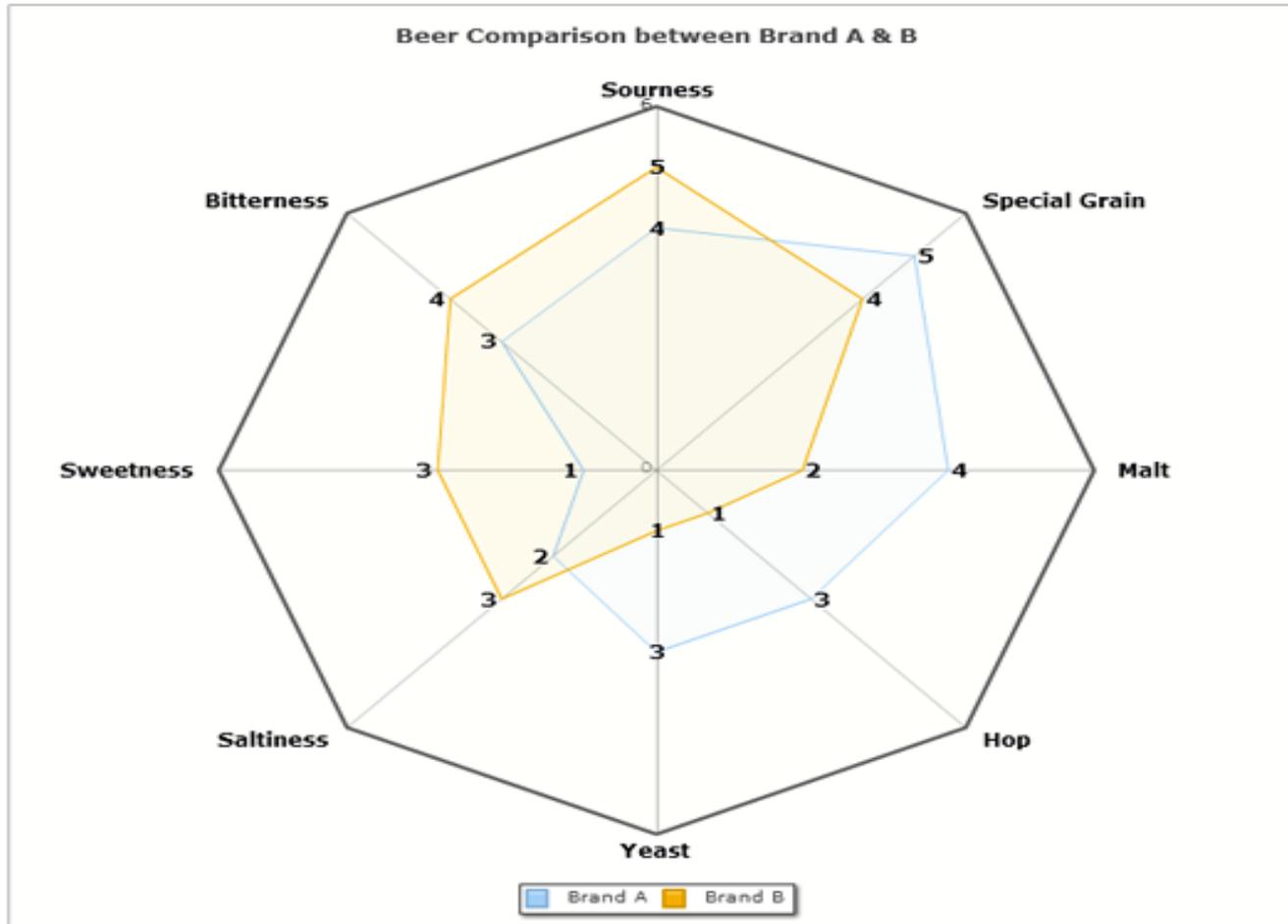
Tools for Problem Understanding

Spider Chart Example



Tools for Problem Understanding

Spider Chart Example



Tools for Problem Understanding

Steps in Using Spider Charts

1. Collect the information needed to construct the spider chart:
 - Data from market analysis
 - Surveys
 - Competitor analysis

Tools for Problem Understanding

Steps in Using Spider Charts

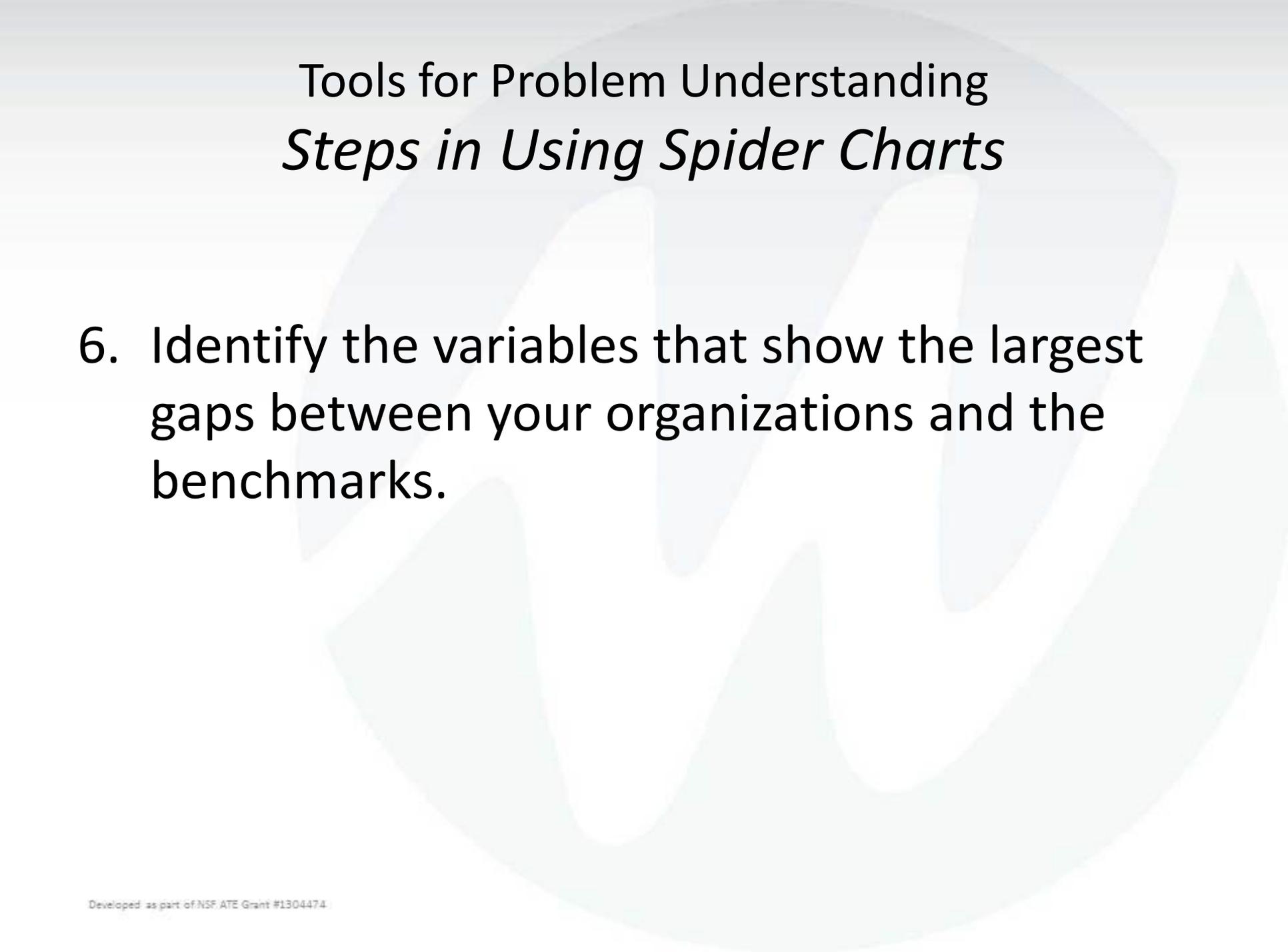
2. Assign one variable to each spoke in the chart.
3. Divide each spoke into logical segments by using a separate unit of measurement for each variable.

The farther from the center of the chart the higher the performance.

Tools for Problem Understanding

Steps in Using Spider Charts

4. Plot the performance data for each variable along the correct spokes using different colors or symbols to separate the data points from different organizations.
5. Draw lines between the data points for each organization to generate performance profiles.



Tools for Problem Understanding

Steps in Using Spider Charts

6. Identify the variables that show the largest gaps between your organizations and the benchmarks.

Tools for Problem Understanding

Exercise 5c
Create Spider Chart

Tools for Problem Understanding

PERFORMANCE MATRICES

Purpose: Used to illustrate current performance and importance at the same time, helping to arrive at a sense of priority.

Tools for Problem Understanding

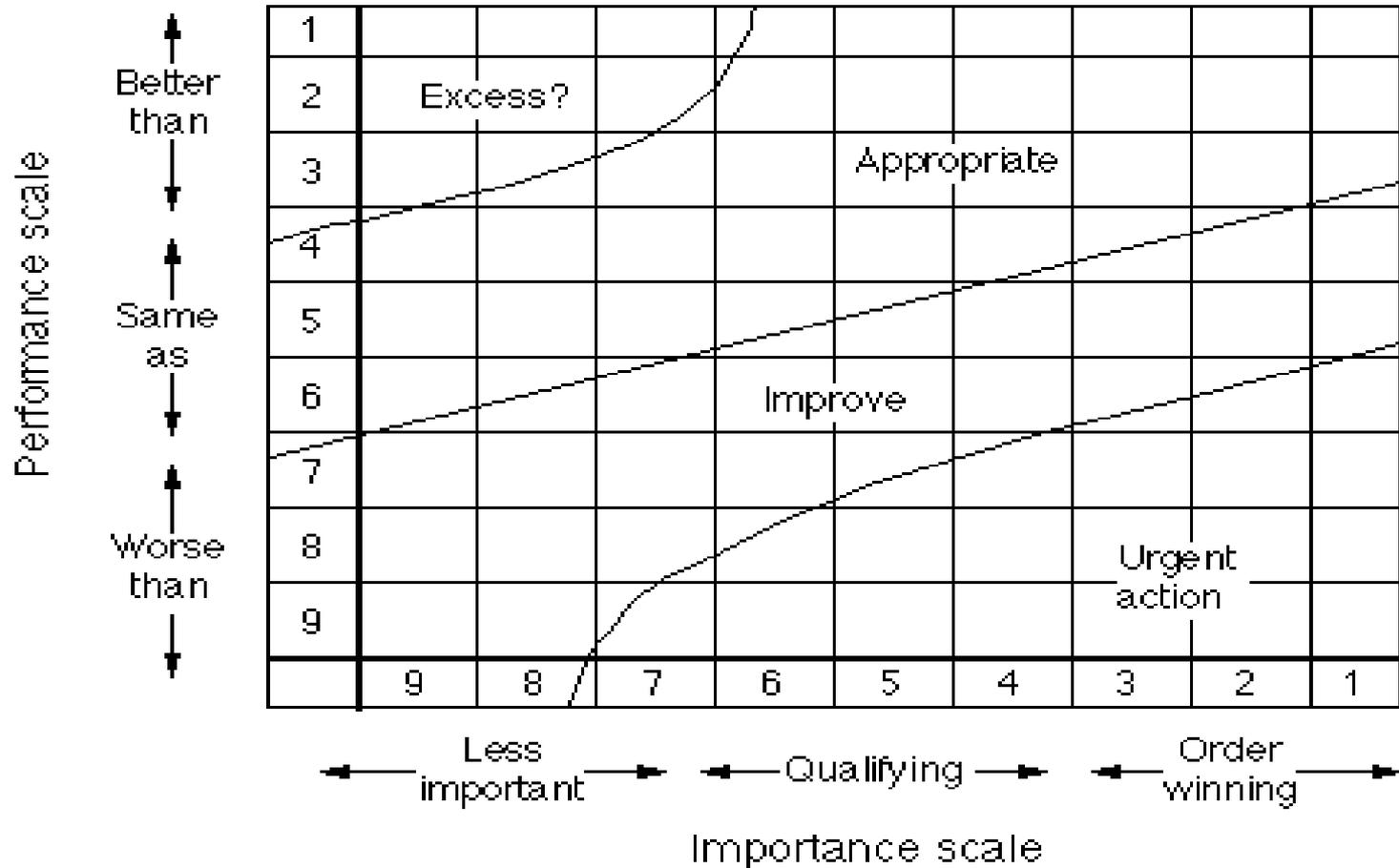
Performance Matrices

Applications:

- Which aspect of the problem is most important to attack
- Which causes will give the most relief if removed

Tools for Problem Understanding

Performance Matrix Example



Tools for Problem Understanding

Performance Matrix

Four Quadrants of the Matrix

Unimportant (low importance, low performance)

The performance level of this aspect of the problem is low but it is also low importance thus making it unnecessary to improve.

Tools for Problem Understanding

Performance Matrix

Four Quadrants of the Matrix

Overkill (low importance, high performance)

The performance level of this aspect of the problem is high but not especially important. Therefore, improvement for this aspect is not necessary.

Tools for Problem Understanding

Performance Matrix

Four Quadrants of the Matrix

Must be improved (high importance, low performance)

Aspects that fall into this quadrant have high importance but low performance. Therefore, these aspects are the starting point for making improvements.

Tools for Problem Understanding

Performance Matrix

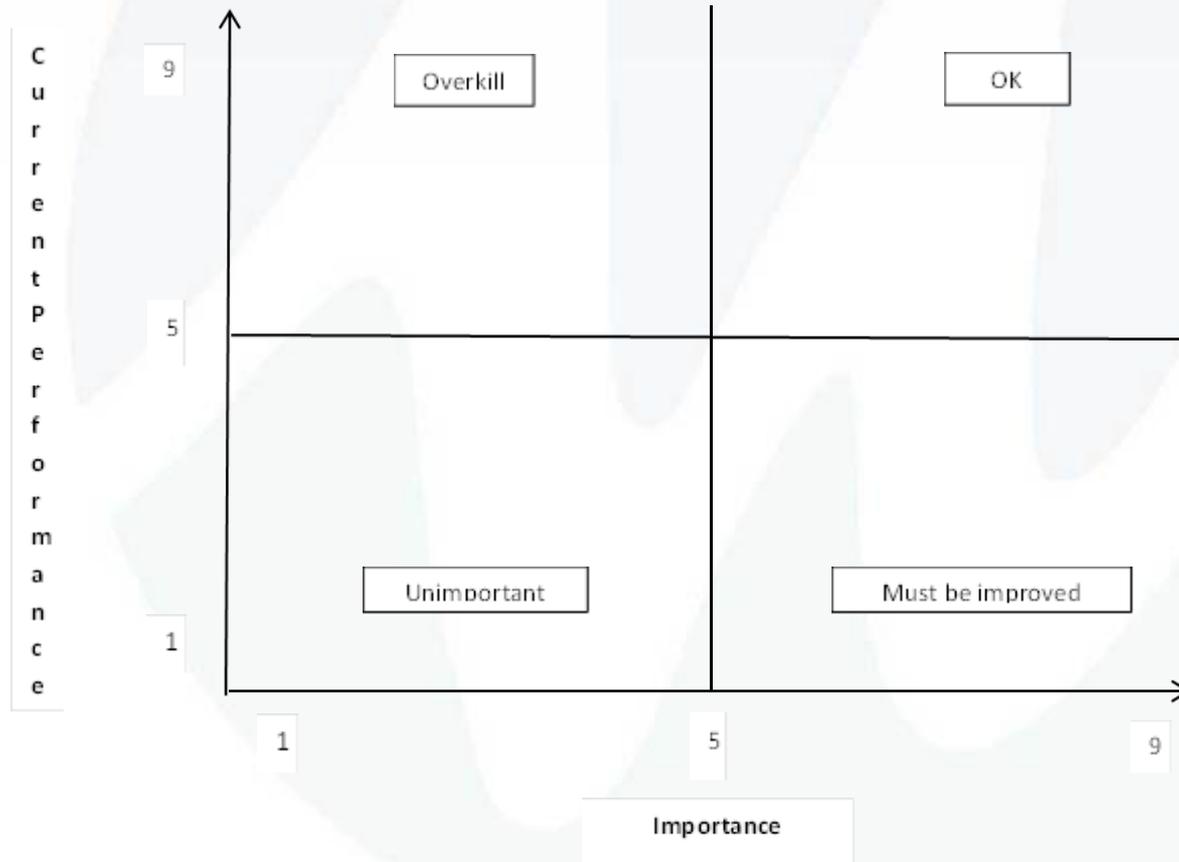
Four Quadrants of the Matrix

OK (high importance, high performance)

A golden rule is that areas where performance is already good should also be improved. However, aspects of the problem in the “Must be improved” quadrant should be improved first.

Tools for Problem Understanding

Performance Matrix - Four Quadrants



Tools for Problem Understanding

Performance Matrix

Four Quadrants of the Matrix

If no aspects of the problem fall within the “Must be improved quadrant”, then the aspects in the “OK” quadrant become the starting point for improvements.

Tools for Problem Understanding

Steps for Using Performance Matrix

1. Construct an empty chart by placing importance on horizontal axis and current performance on vertical axis.
2. Decide which problems, factors or issues to analyze.

Tools for Problem Understanding

Steps for Using Performance Matrix

3. Place each factor in the chart according to its position along the two axes, using symbols to identify each factor.

Tools for Problem Understanding

Steps for Using Performance Matrix

4. Divide the chart into four quadrants approximately in the middle of each axis. If many factors are clustered in one area, place the division lines farther to one side.
5. Determine which factors fall within the quadrants.

Tools for Problem Understanding
Steps for Using Performance Matrix

Exercise 5d

Create a Performance Matrix

Tools for Problem Understanding

- Flowcharts
- Critical incident
- Spider chart
- Performance matrix

