

Team Skill 1

Chapter 5: The Five Steps in Problem Analysis

- The five steps in problem analysis.



Problem Analysis

- **Problem analysis** is the process of understanding real-world problems and user needs and proposing solutions to meet those needs.
- **A problem** can be defined as the difference between things as **perceived** and things as **desired**.
 - “what is” vs. “what should be”
 - “what is given” vs. “what is needed”
- **The goal of problem analysis** is to gain a better understanding of the problem being solved before development begins.



The Five Steps in Problem Analysis

1. Gain agreement on the problem definition.
2. Understand the root causes—the problem behind the problem.
3. Identify the stakeholders and the users.
4. Define the solution system boundary.
5. Identify the constraints to be imposed on the solution.

Step 1: Gain Agreement on the Problem Definition

- One of the simplest ways to gain this agreement is to simply write the problem down and see whether everyone agrees.
- Problem statement format:

Element	Description
The problem of ...	Describe the problem
Affects ...	Identify stakeholders affected by the problem
And results in ...	Describe the impact of this problem on stakeholders and business activity
Benefits of a solution ...	Indicate the proposed solution and list a few key benefits

Example: Sales Order Problem Statement

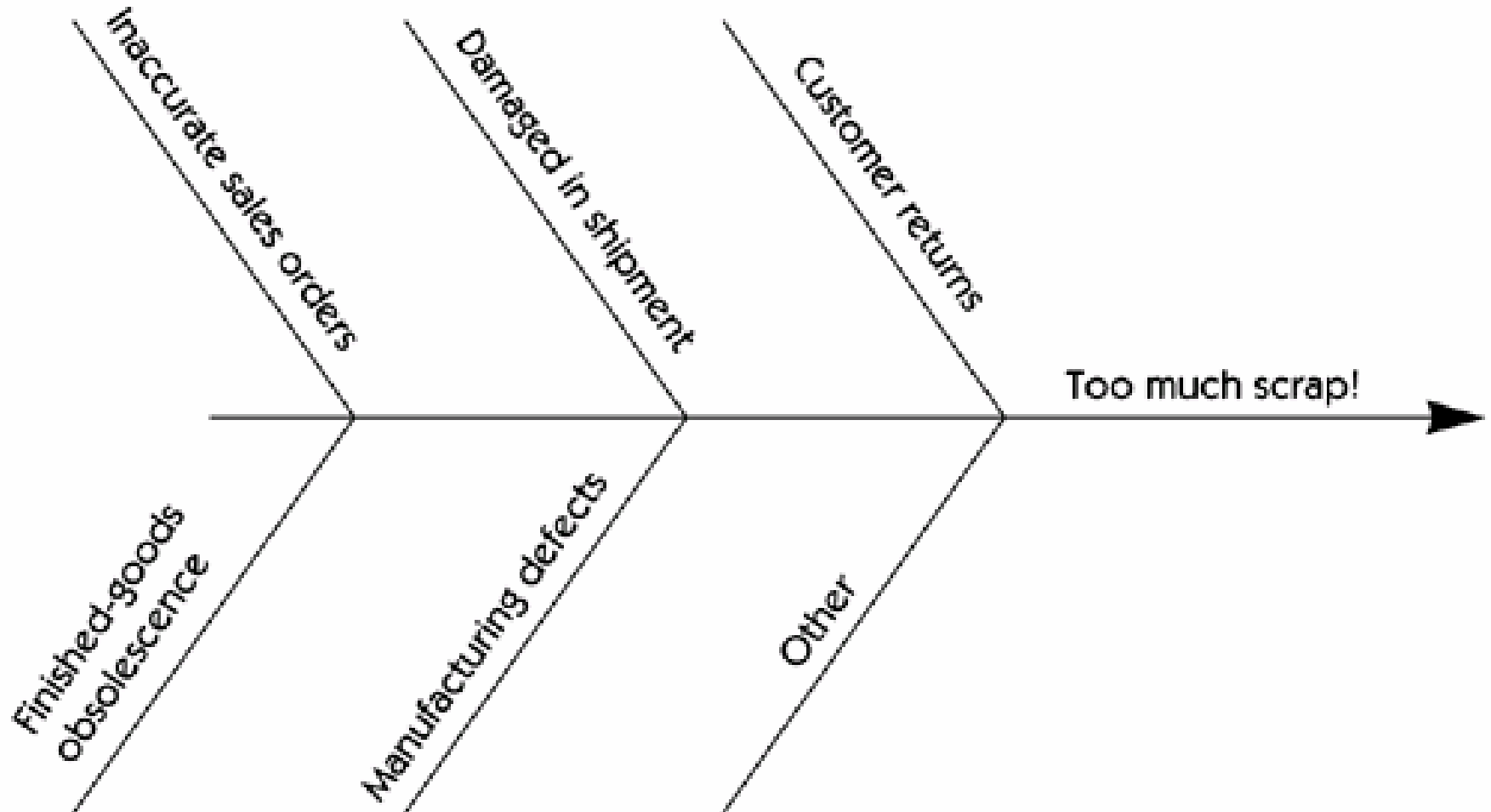
Element	Description
The problem of . . .	Inaccuracies in sales orders.
Affects . . .	Sales order personnel, customers, manufacturing, shipping, and customer service.
And results in . . .	Increased scrap, excessive handling costs, customer dissatisfaction, and decreased profitability.
Benefits of a solution . . .	That creates a new system to address the problem include <ul style="list-style-type: none">• Increased accuracy of sales orders at point of entry• Improved reporting of sales data to management• Ultimately, higher profitability



Step 2: Understand the Root Causes (The Problem Behind the Problem)

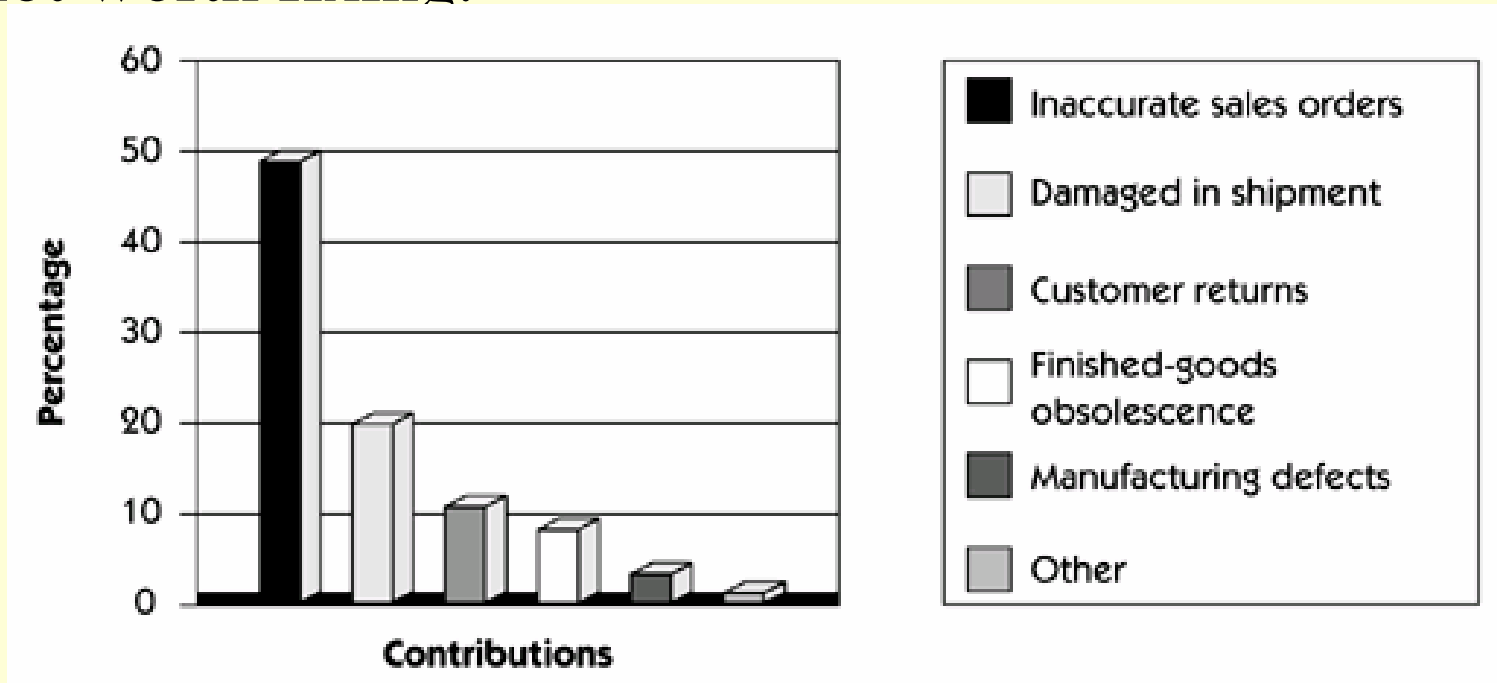
- **Root cause analysis** is a systematic way of uncovering the root, or underlying, cause of an identified problem or a symptom of a problem.
- **Example:** a mail-order catalogue company addresses the problem of insufficient profitability
 - cost of non-conformance: cost of waste produced
 - Too much scrap

Fishbone Diagram of Root Causes



Pareto Chart of Root Causes

- Quality data demonstrates that many root causes are simply not worth fixing.



- A replacement of the existing sales order entry system can be at least a partial solution to the problem of too much scrap.



Unfolding the Problem

Problem to Solve

- Lack of Profitability



- Cost of Conformance



- Too much scrap



- Inaccurate sales orders

Technique Applied

Total Quality Management

Fishbone Diagram

Pareto Chart

New software solution



Step 3: Identify the Stakeholders and the Users

- Understanding the needs of the users and other stakeholders is a key factor in developing an effective solution.
- A stakeholder is anyone who could be materially affected by the implementation of a new system or application.

Step 3: *(Cont'd)*

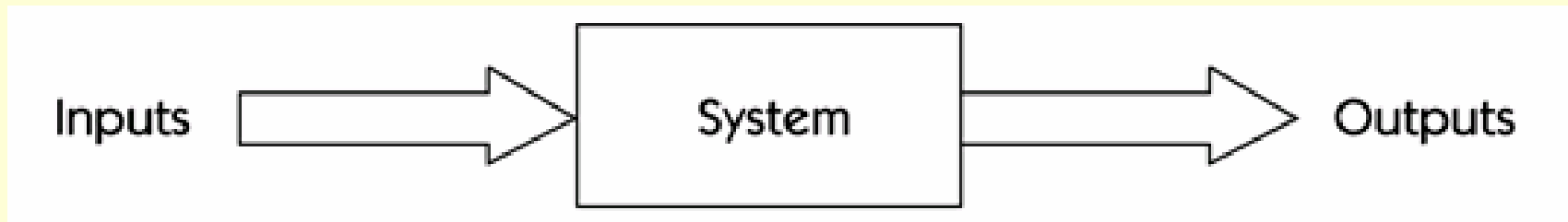
- The following questions can be helpful in identifying stakeholders
 - Who are the users of the system?
 - Who is the customer (economic buyer) for the system?
 - Who else will be affected by the outputs the system produces?
 - Who will evaluate and approve the system when it is delivered and deployed?
 - Are there any other internal or external users of the system whose needs must be addressed?
 - Who will maintain the new system?
 - Is there anyone else who cares?

Example: Users and Stakeholders of Sales Order Entry System

Users	Other Stakeholders
Sales order entry clerks	MIS director and development team
Sales order supervisor	Chief financial officer
Production control	Production manager
Billing clerk	

Step 4: Define the Solution System Boundary

- We divide the world in two:
 1. Our system
 2. Things that interact with our system



- **System Boundary** is an interface between the system and the environment or other systems

What is a system?

Examples:

Political system
Educational system
Computer system
Library system ...

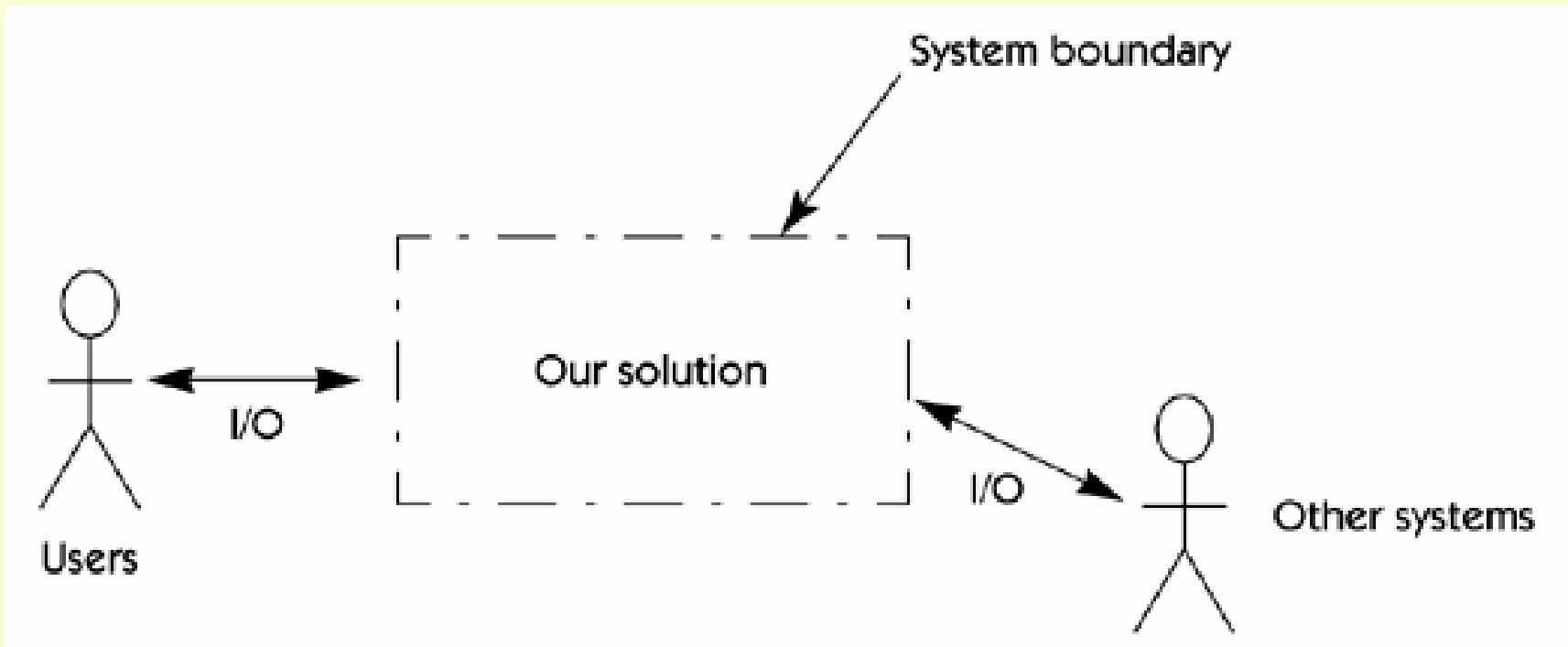


Systems Main Characteristics

- Exists in an environment,
- with a boundary.
- Has inputs and outputs.
- Has interfaces for communications.
- May have sub-systems.
- Has a control mechanism,
- with feedback and feed-forward.

Actors

- An actor is someone or something outside the system that interacts with the system





Identifying Actors: Helpful Questions

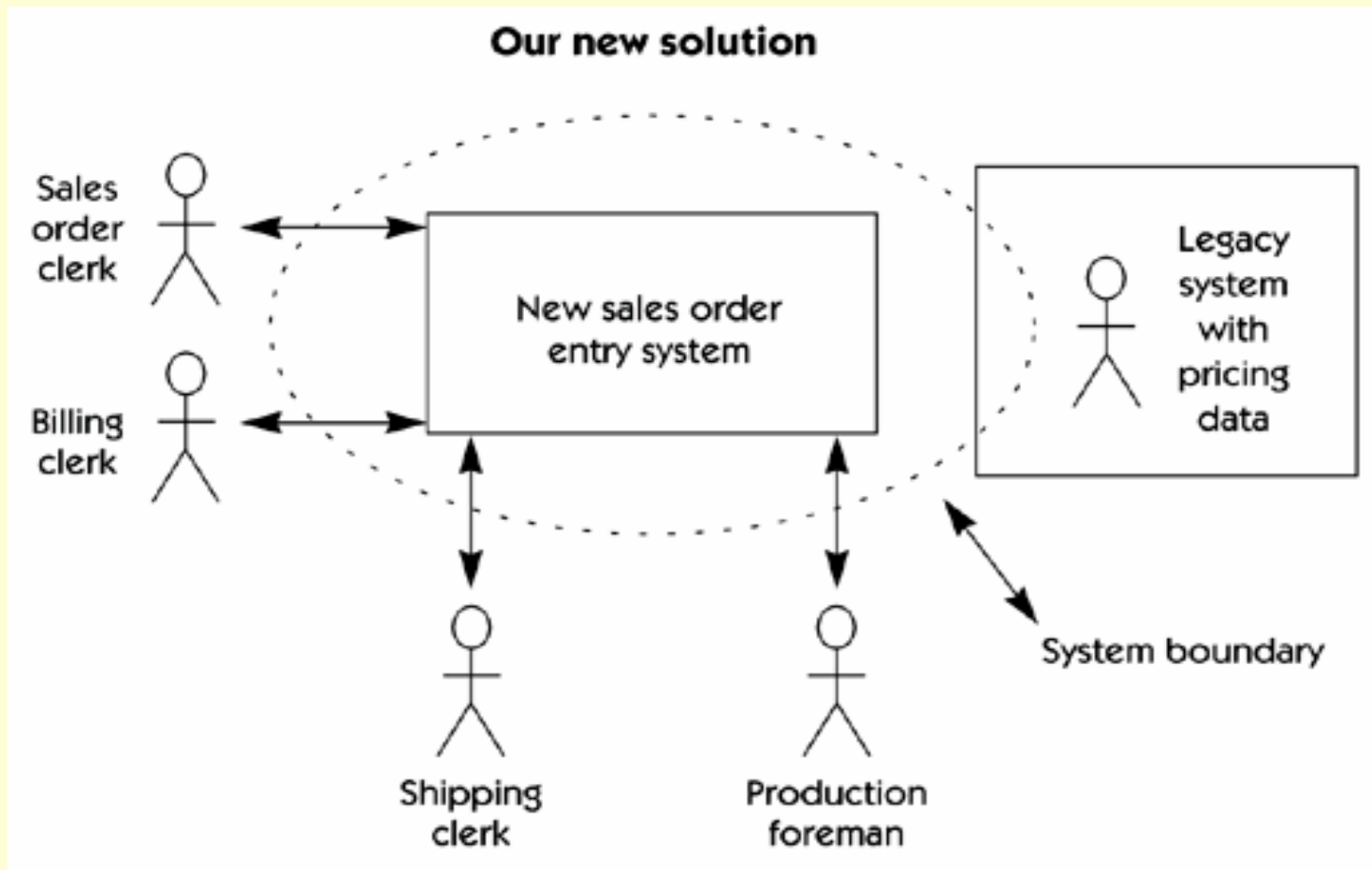
- Who will supply, use, or remove information from the system?
- Who will operate the system?
- Who will perform any system maintenance?
- Where will the system be used?
- Where does the system get its information?
- What other external systems will interact with the system?

These questions help to construct a system perspective.₁₇



System Perspective

- It is a block diagram that describes the boundaries of the system, the users, and other interfaces





Step 5: Identify the Constraints to Be Imposed on the Solution

- A **constraint** is a restriction on the degree of freedom we have in providing a solution.
- A variety of sources of constraints must be considered.

Potential Sources of System Constraints

Source	Sample Considerations
Economics	<ul style="list-style-type: none">• What financial or budgetary constraints apply?• Are there costs of goods sold or any product pricing considerations?• Are there any licensing issues?
Politics	<ul style="list-style-type: none">• Do internal or external political issues affect potential solutions?• Are there any interdepartmental problems or issues?
Technology	<ul style="list-style-type: none">• Are we restricted in our choice of technologies?• Are we constrained to work within existing platforms or technologies?• Are we prohibited from using any new technologies?• Are we expected to use any purchased software packages?



Potential Sources of System Constraints


Systems

- Is the solution to be built on our existing systems?
- Must we maintain compatibility with existing solutions?
- What operating systems and environments must be supported?

Environment

- Are there environmental or regulatory constraints?
- Are there legal constraints?
- What are the security requirements?
- What other standards might restrict us?

Schedule and resources

- Is the schedule defined?
 - Are we restricted to existing resources?
 - Can we use outside labor?
 - Can we expand resources? Temporarily? Permanently?
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Sources of Constraints and Their Rationale for Sales Order Entry System

Source	Constraint	Rationale
Operations	An exact copy of sales order data must remain on the legacy database for up to one year.	The risk of data loss is too great; we will need to run in parallel for three months.
Systems	The applications footprint on the server must be less than 20MB.	We have limited server memory available.
Equipment budget	The system must be developed on the existing server and host; new client hardware for users may be provided.	We need to control costs and maintain the existing systems.
Personnel budget	Staffing resources are fixed; no outsourcing is possible.	The current budget calls for fixed operating costs.
Technology mandate	A new object-oriented methodology should be used.	We believe that this technology will increase productivity and increase the reliability of the software.



Key Points

- **Problem analysis** is the process of understanding real-world problems and user's needs and proposing solutions to meet those needs.
- **The goal of problem analysis** is to gain a better understanding of the problem being solved, before development begins.
- **To identify the root cause**, or the problem behind the problem, **ask the people directly** involved.
- **Identifying the actors** on the system is a key step in problem analysis.

What's Next?





Problem Analysis for More Specific Applications

- Ch 6: Business modeling, techniques for IS/IT applications
- Ch 7: Systems Engineering, techniques for embedded applications

... But we'll skip these.