ECE 321 Software Requirements Engineering

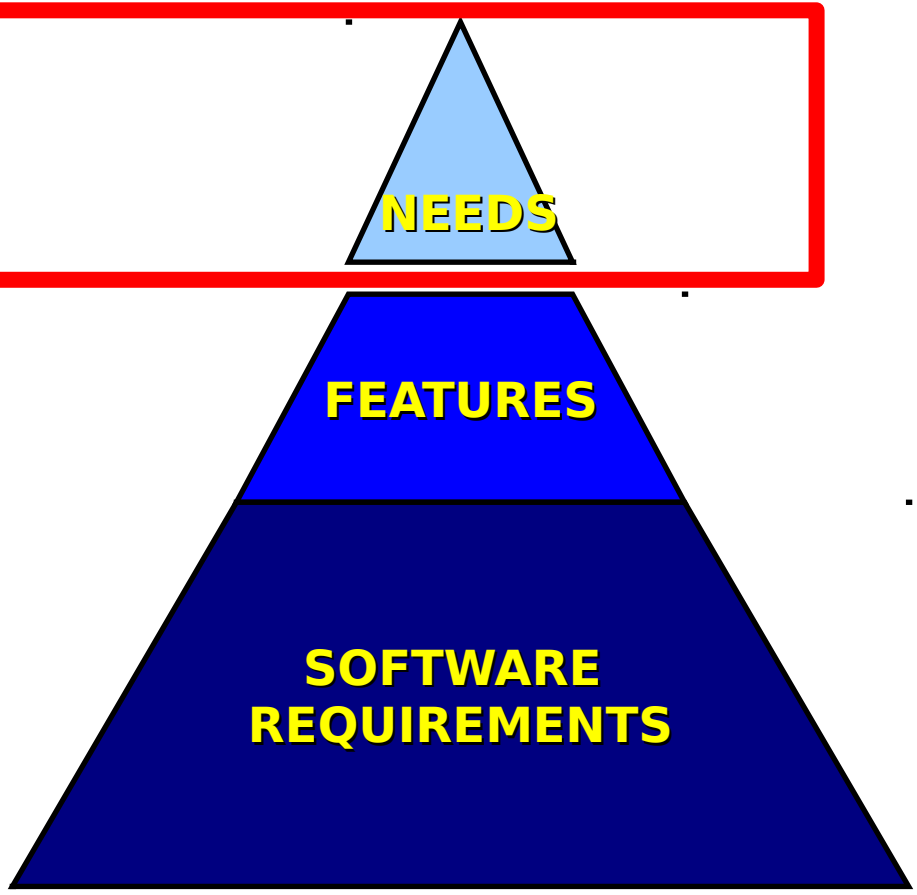
Lecture 4: Requirements elicitation: Understanding and analyzing the problem

The 3 steps of the requirements development process

- **Requirement elicitation**
  - Understanding and analyzing the problem
  - Learning and understanding user needs
- **Requirement specification**
  - Developing a vision document
  - Developing requirement specification document
- **Requirement validation and verification**

The software requirements pyramid

- problem domain
- solution domain



The goals of analysing the problem

- Gaining a good understanding of the problem to solve
  - BEFORE the development begins!
- Identifying root causes of the problem
- Identifying the actors (stakeholders)

Problem analysis steps

1) Gain agreement on the problem definition
2) Understand the root causes
    - Why do we need the system?
3) Identify the stakeholders
4) Define the system boundary
5) Identify the constraints

Step 1: Agreeing on the problem definition

- The simplest solution is to write down the problem definition and see if everyone agrees

A template for writing down the problem definition

Element	Description
“... the problem of ...”	Describe the problem

A template for writing down the problem definition

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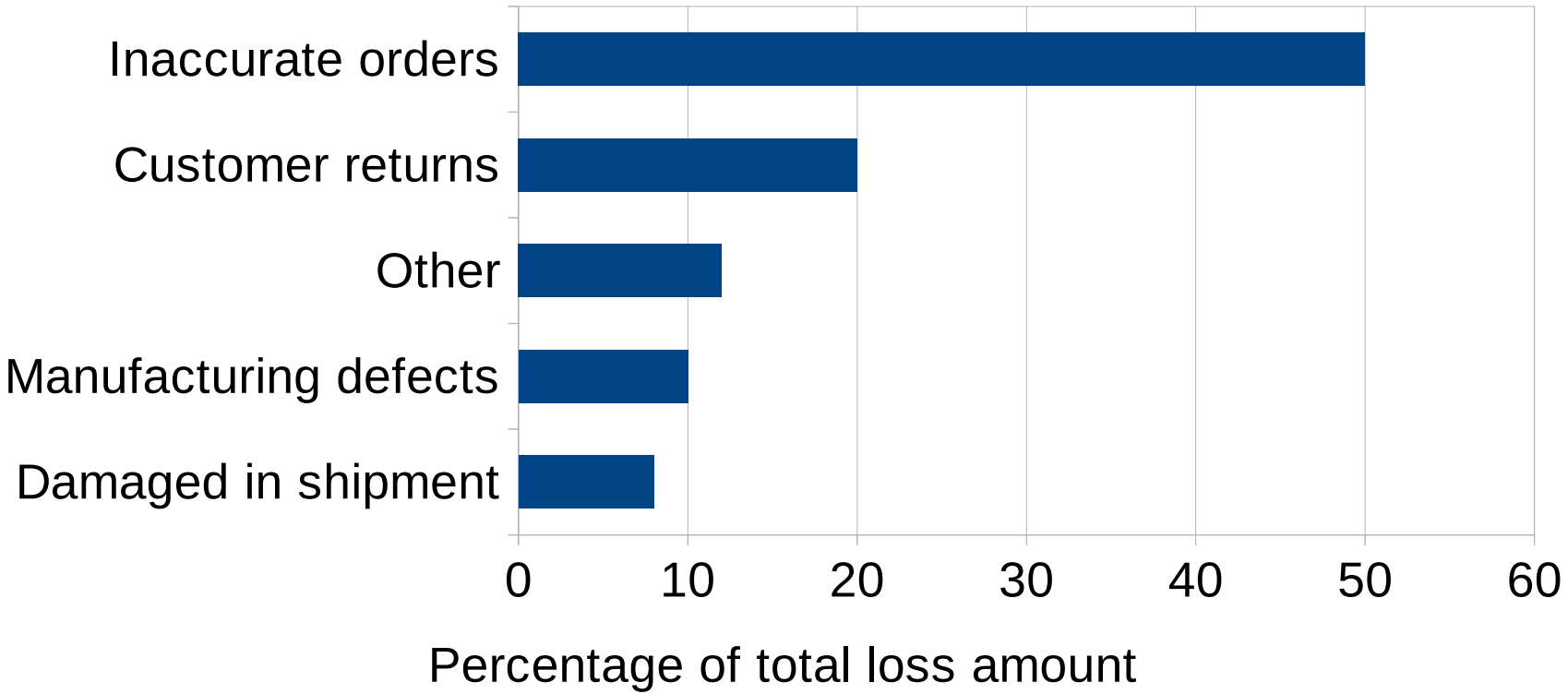
A template for writing down the problem definition

Element	Description
“... the problem of ...”	Describe the problem
“... that affects ...”	Identify the stakeholders who are affected
“... the result of which ...”	The impact of this problem on stakeholders and business activity
“... solution should possess the ... features and bring the ... benefits”	List the desired features and a few key benefits

Step 2: Understanding the root causes

- Enumerate the root causes
  - Try to solve all root causes
  - BUT some root causes are not worth fixing
    - E.g., cost of the fix is larger than cost of the problem
- Prioritize root causes!

Example of root cause prioritization



Step 3: Identify the stakeholders

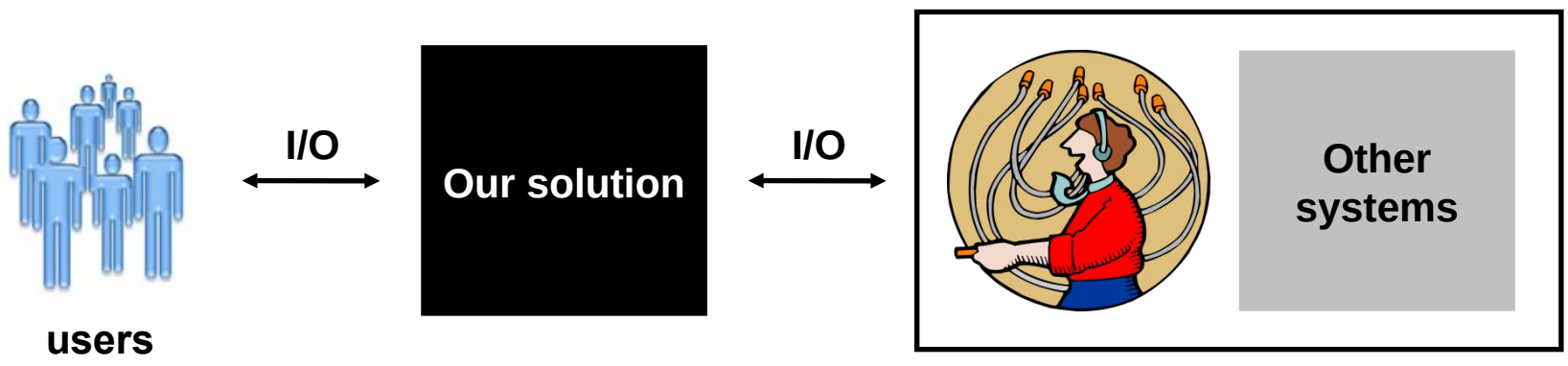
- ALL stakeholders are important
- At this stage focus on ‘direct’ stakeholders
  - Customers
  - End-users
- ‘Indirect’ stakeholders
  - Anyone else affected by the outcome of the project

Typical questions about stakeholders

- Who are the users of the system?
- Who is the customer (buyer) of the system?
- Who else will be affected by the system?
- Who will evaluate the system?
- Who will maintain the system?
- Is there anyone else?

Step 4: Defining the system boundary

- Divide the world in two
  1) Our system
  2) ‘Actors’ that interact with or system
     - Can be someone or something



Typical questions about system boundaries

- Who will operate the system?
- Who will supply, use or remove information from the system?
- Where will the system be used?
- What other external systems will interact with the system?

Step 5: Identify the constraints

- Impose restrictions on the degrees of freedom we have in providing a solution
- Each constraint can have severe impact on our solution
  - So we need to know them early!

Types of constraints

- Technical
  - e.g., choice of technology, platform, use of purchased packages
- Economical
  - e.g., financial constraints, licensing issues
- Political
  - e.g., interdepartmental problems

More types of constraints

- System-imposed
  - e.g., compatibility with existing systems, operating systems
- Environmental
  - e.g., regulatory constraints, security, conformation with standards
- Schedule and resources
  - e.g., how long do we have?

Example: CheapAutoParts (CAP) Inc.

- Sells auto parts for individual customers
- Would like a new or upgraded sales system
- Existing in-store sales system supports sales in stores throughout several provinces
- Goal: increase profits by improving procedures

CAP Inc.: Problem definition

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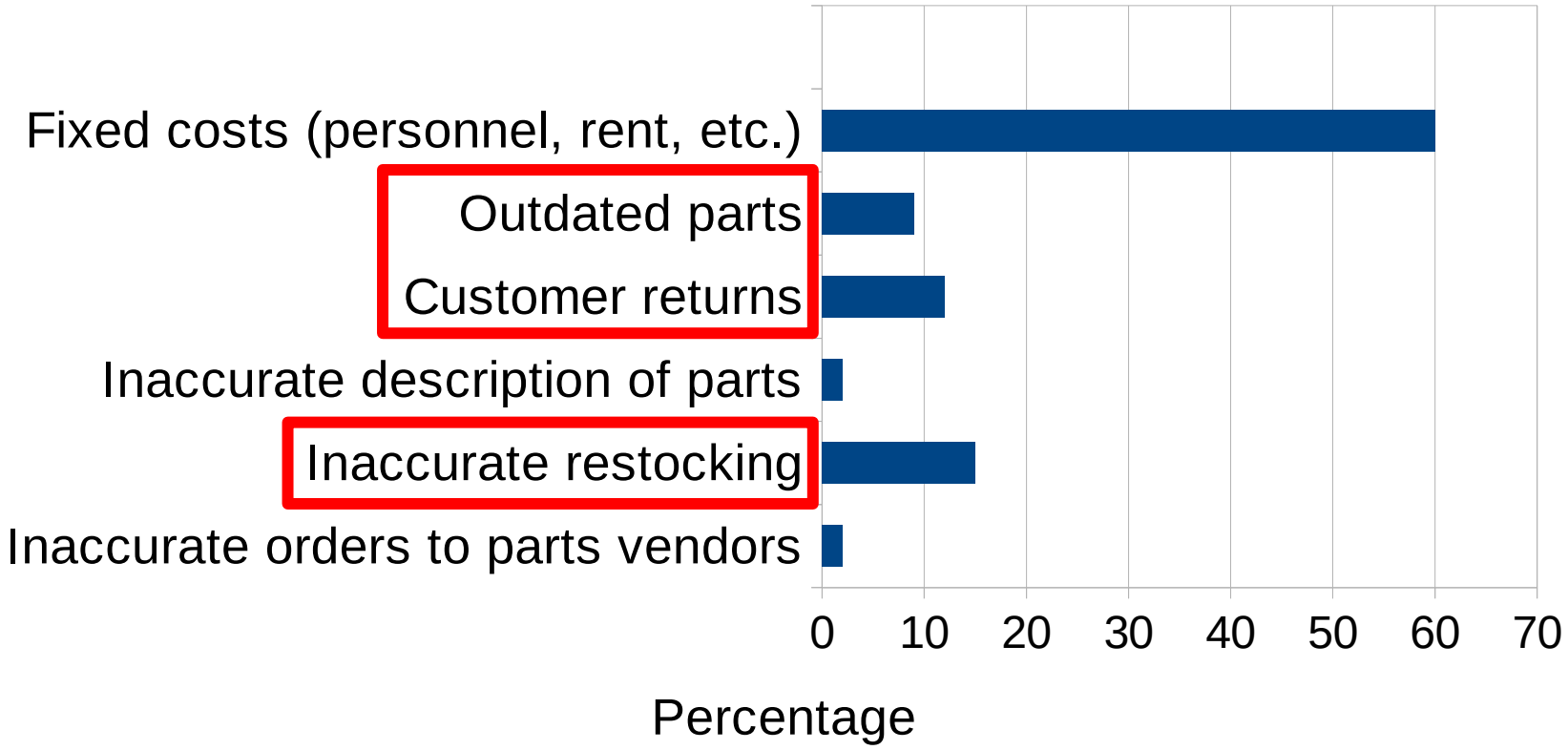
CAP Inc.: Problem definition

Element	Description
“... the problem of ...”	High sales-related costs connected with the existing sales system
“... that affects ...”	Sales, restocking and billing personnel
“... the result of which ...”	Will lower the cost
“... solution should possess the ... features and bring the ... benefits”	Solution shall be integrated with current architecture, shall provide enhanced reporting capabilities, shall bring additional profits within the existing sales range

CAP Inc.: Root causes



CAP Inc.: Stakeholders

- Customers
  - Chief sales manager
  - Chief financial officer
  - Chief computer system manager
- Users
  - Sales order entry clerks
  - Sales order supervisors
  - Store supervisor
  - Restocking manager
  - Billing clerk

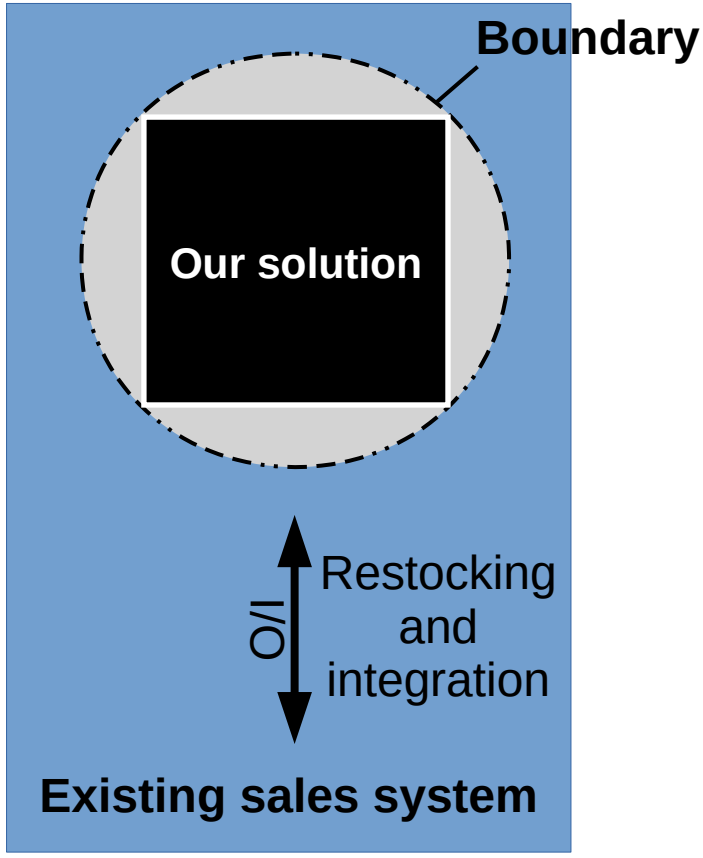
CAP Inc.: More info about stakeholders

- Who else will be affected by the system?
  - Parts vendors (via existing system interface)
  - Management (new reporting)
- Who will evaluate the system?
  - Chief sales manager
  - Chief computer system manager
  - Network admin crew
  - Two sales order entry clerks

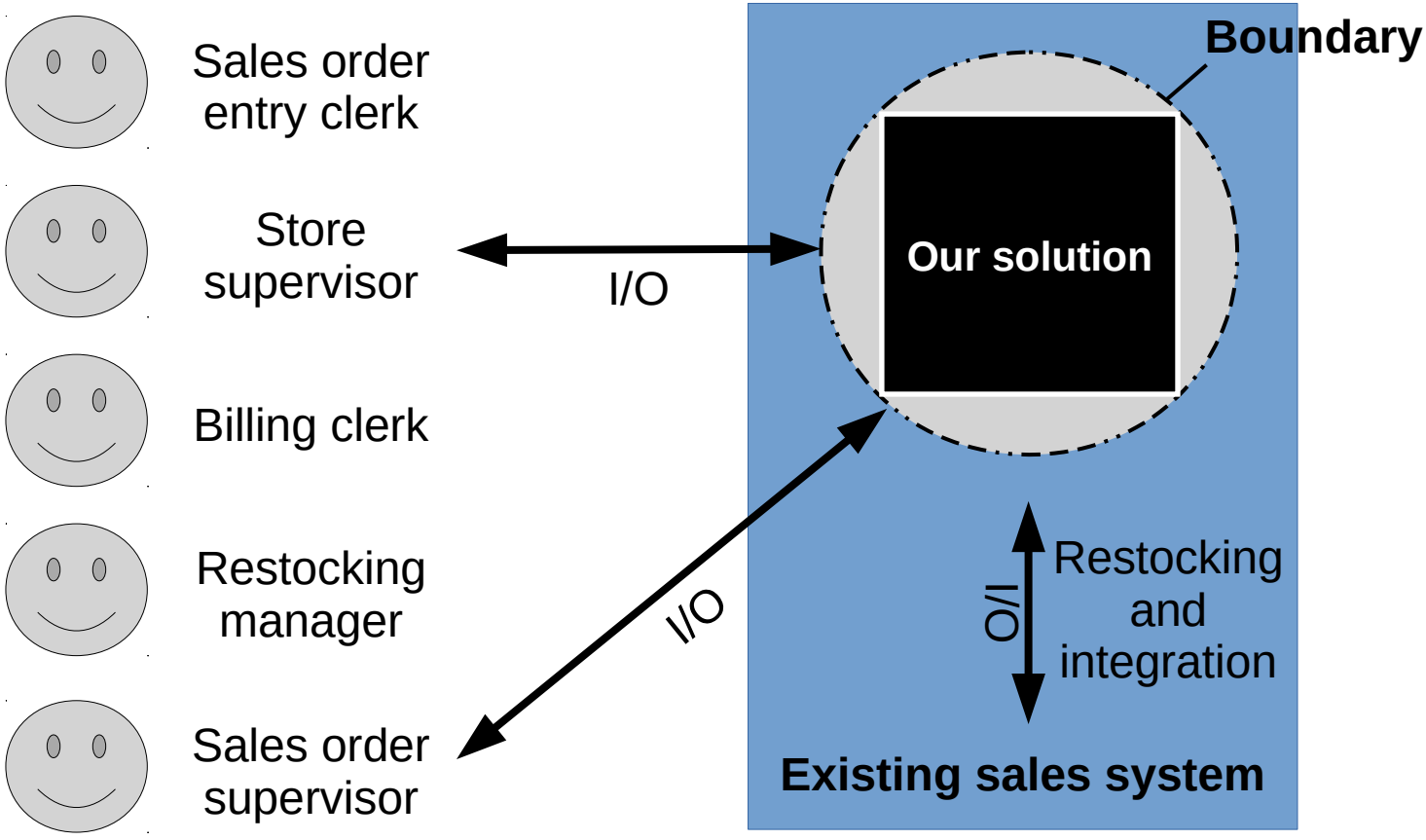
CAP Inc.: Even more info about stakeholders

- Are there other internal or external users of the system?
  - Software maintenance clerk
- Who will maintain the system?
  - Existing network admins and chief computer system manager
- Is there anyone else?
  - Representative of company that designed existing system

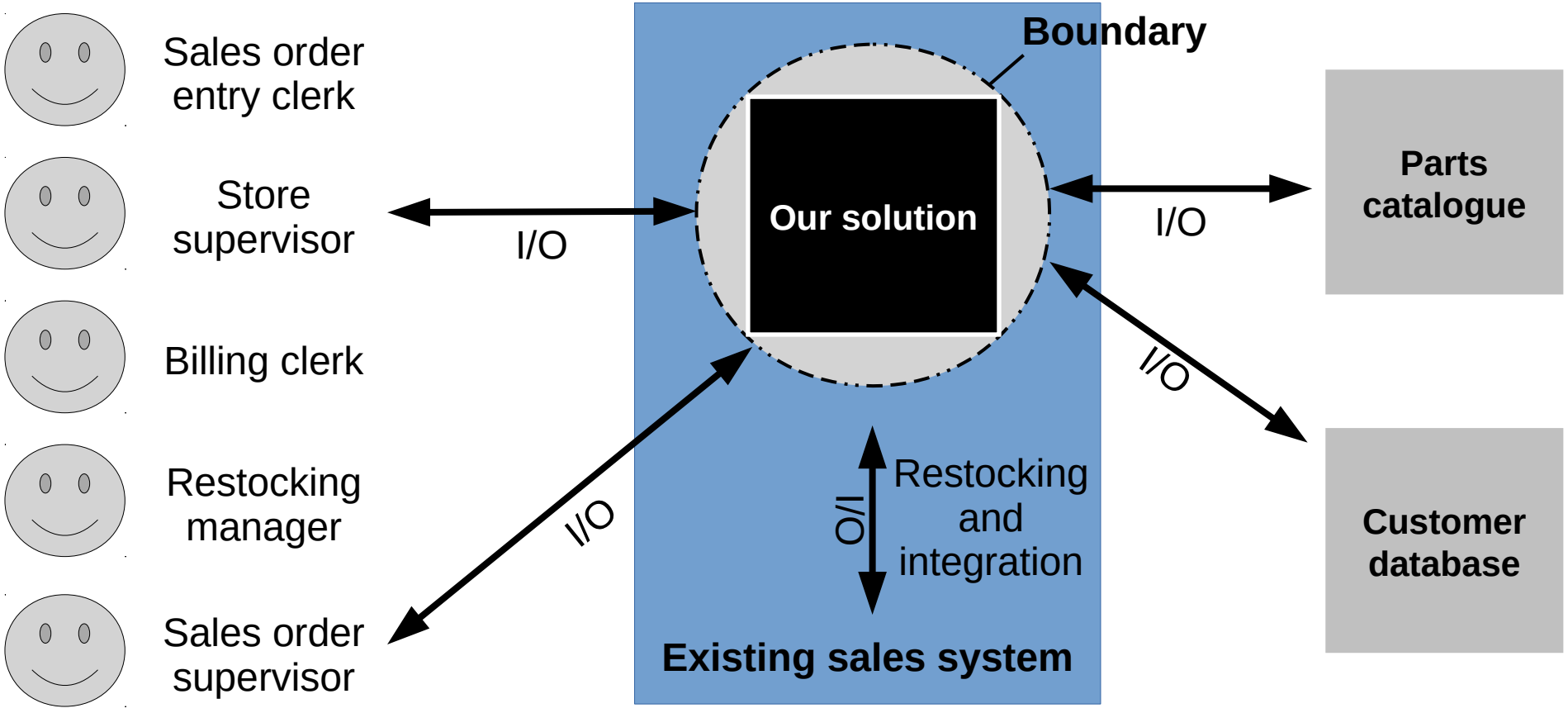
CAP Inc.: The system boundary



CAP Inc.: The system boundary



CAP Inc.: The system boundary



CAP Inc.: More info about the system boundary

- Who will operate the system?
  - Sales order entry clerks
  - Restocking manager
  - Billing clerk
- Who will supply or remove information from the system?
  - One local restocking manager

CAP Inc.: Even more info about the system boundary

- Where will the system be used?
  - Main server room of the company
- Where does the system get its information?
  - Existing sales system
  - Existing customer’s database
  - External parts catalogue
- What other external systems will interact with the system?
  - None

CAP Inc.: Constraints

- Economical
  - Cost of solution to each root cause must be less than the benefits that we gain over it in a year
- System-imposed
  - Must provide easy to use interface with existing users

Learned lessons today

- 5 steps in problem analysis
  - Identify problem definition
  - Identify root causes
  - Identify stakeholders (customers and users first)
  - Identify system boundary
  - Identify constraints

- Don’t forget next week’s assignment!

- The lab is also starting next week!