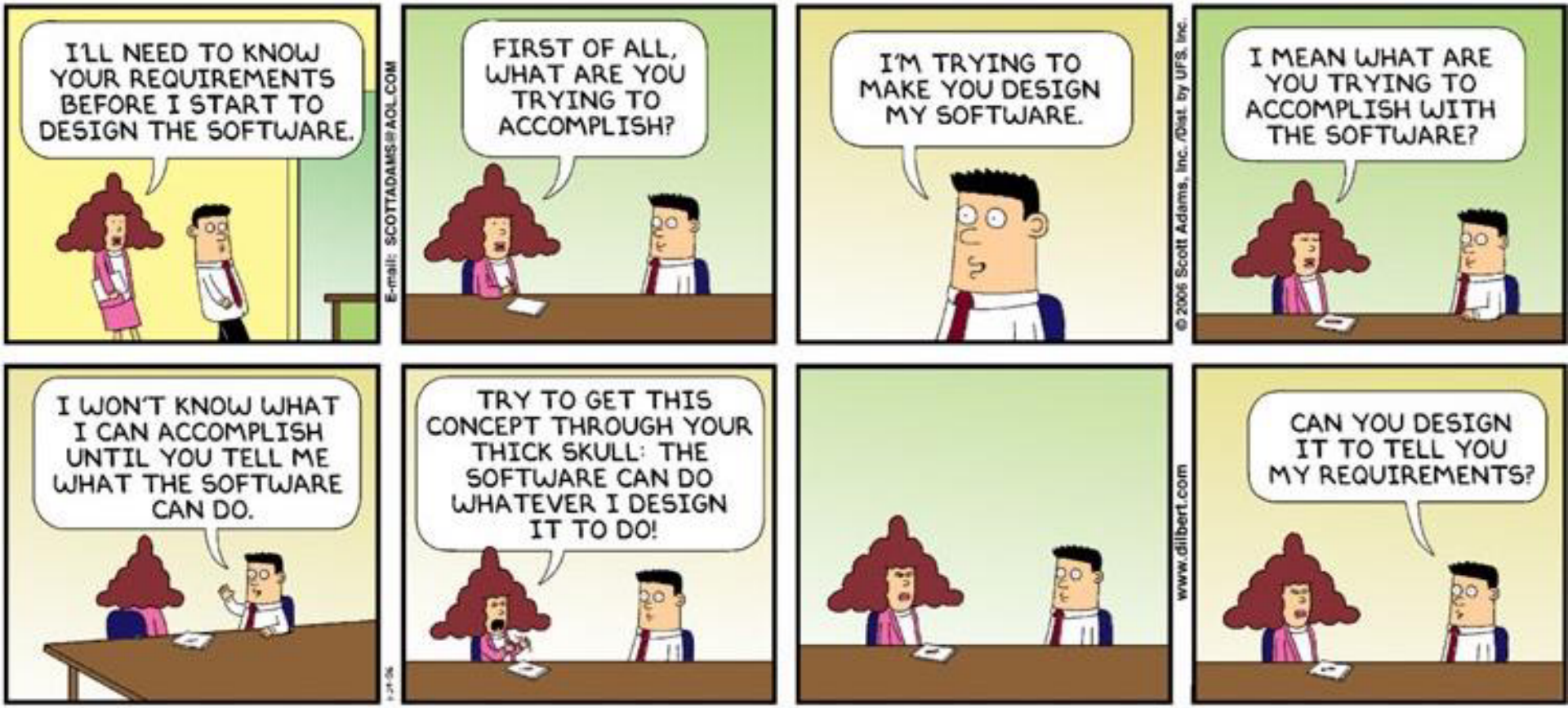
Requirements from the customer's perspective

Dr. Zeinab Teimoori
SENG 3130
Thompson Rivers University

Objectives

- What is the lose-lose-lose situation?
- Lack of proper customer engagement leads to an expectation gap
- Who are the stakeholders?
- Building a healthy customer-developer partnership
  - Rights for software customers
  - Responsibilities for software customers
- The requirements baseline



"The project is steered to success by the customer and programmers working in concert"

Deeper Understanding of Requirements

- Part of the requirements problem results from confusion over the different levels of requirements, business, user, and functional.
- Senior managers state some business objectives and benefits that they expect.
- Business objectives are a core element of the business requirements.
- However, they can't entirely describe the user requirements.
- Users, in turn, can describe tasks they must be able to perform with the system.
- But they can't state all the functional requirements that developers must implement.

Mars Climate Orbiter

- In 1999, the Mars Climate Orbiter disappears around Mars
- Cost: about $125M US
- Problem caused by a misunderstanding between a team in Colorado and one in California
- One team used the metric system while the other used the English system for a key function…

GIRES

- GIRES[1] (Gestion intégrée des ressources)
  - Integrated resource management
  - To replace >1000 existing systems with a central network
  - In 140 organisations / departments
  - Affecting 68000 employees!
- 8-year project of the Quebec government, started 1998
- $80 million budget
- Could not cope with changes to the requirements…
  - Cost of $400 millions after 5 years, and very late
  - Project cancelled in 2003

[1] http://radio-canada.ca/nouvelles/Index/nouvelles/200303/04/012-GIRES.shtml

Canadian Gun Registry [1,2]

- Law adopted in 1995
- Was supposed to cost $119M, with revenues of $117M (net cost of $2M)
- 30 types of permits, long questionnaires, 90% of errors in requests
- Rising costs ($327M in 2000, $688M in 2002, plus others…)
- Many political and legal issues, and a few scandals…
- Customer asked for over 2000 changes in the computer system!
- ~$1B in 2004, probably ~$2B by the time the system is fully functional
- Tons of unhappy customers and taxpayers…
- Not required to register as of September 2023!

[1] Canadian Firearms Registry - Wikipedia
[2] http://radio-canada.ca/actualite/zonelibre/04-02/registre_armes.asp

Example

I work in immunology, and I want a website that will search a database and report all severe outbreaks of the disease that I searched for. My boss has hired you to construct the site.

I want you to develop a set of requirements to describe what you're going to produce.

Given this: Develop a set of requirements to describe what you're going to produce.

First think about:

1. Who do you talk to?
2. What kinds of information do you need to know?
3. Just from this description, what do you need to ask?

Considerations...

Who to talk to:

- You (the client).
- Your boss.
- Potential users (immunologists, researchers, public health officials, etc.).
- IT or development team (to understand technical limitations and integration).

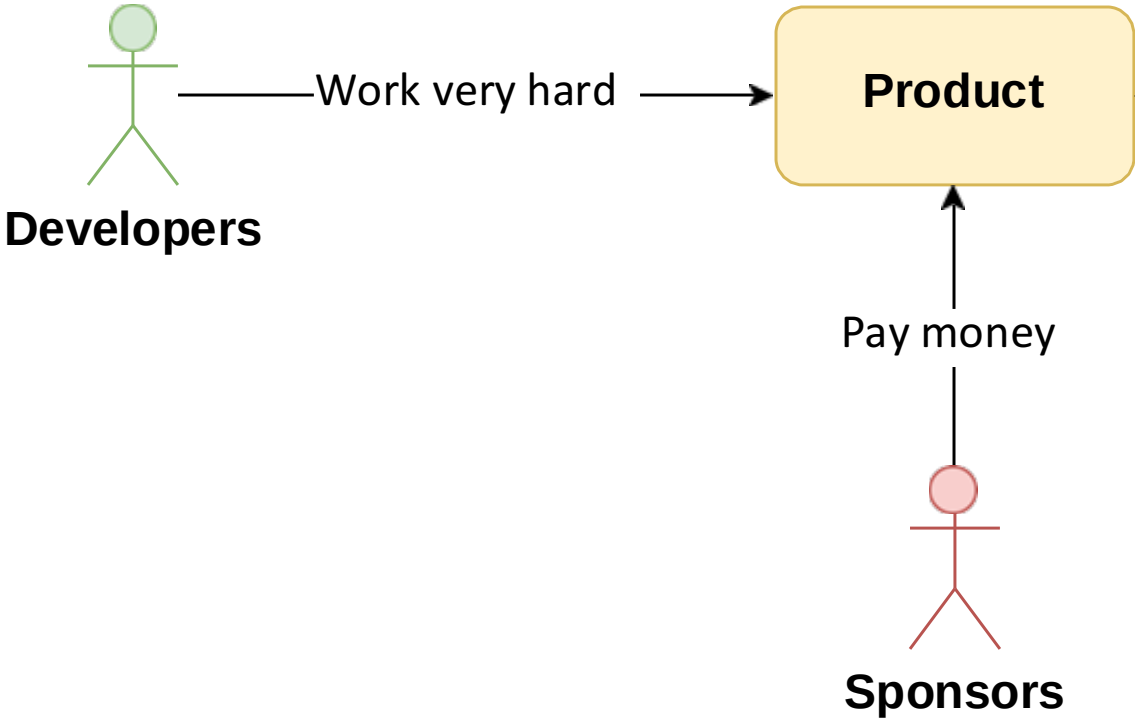
Clarify Objectives:

- What is “severe?”
- What exists already?
  - Is there a database? Is there a known API?
- By the way, interns are not allowed to use the database
- What is the primary goal of the website? Is it for internal use, research, or public awareness?
- What specific diseases should the website be able to search for? Is it limited to certain types, or should it cover all infectious diseases?
- Should the site focus solely on severe outbreaks or also include minor ones for context?

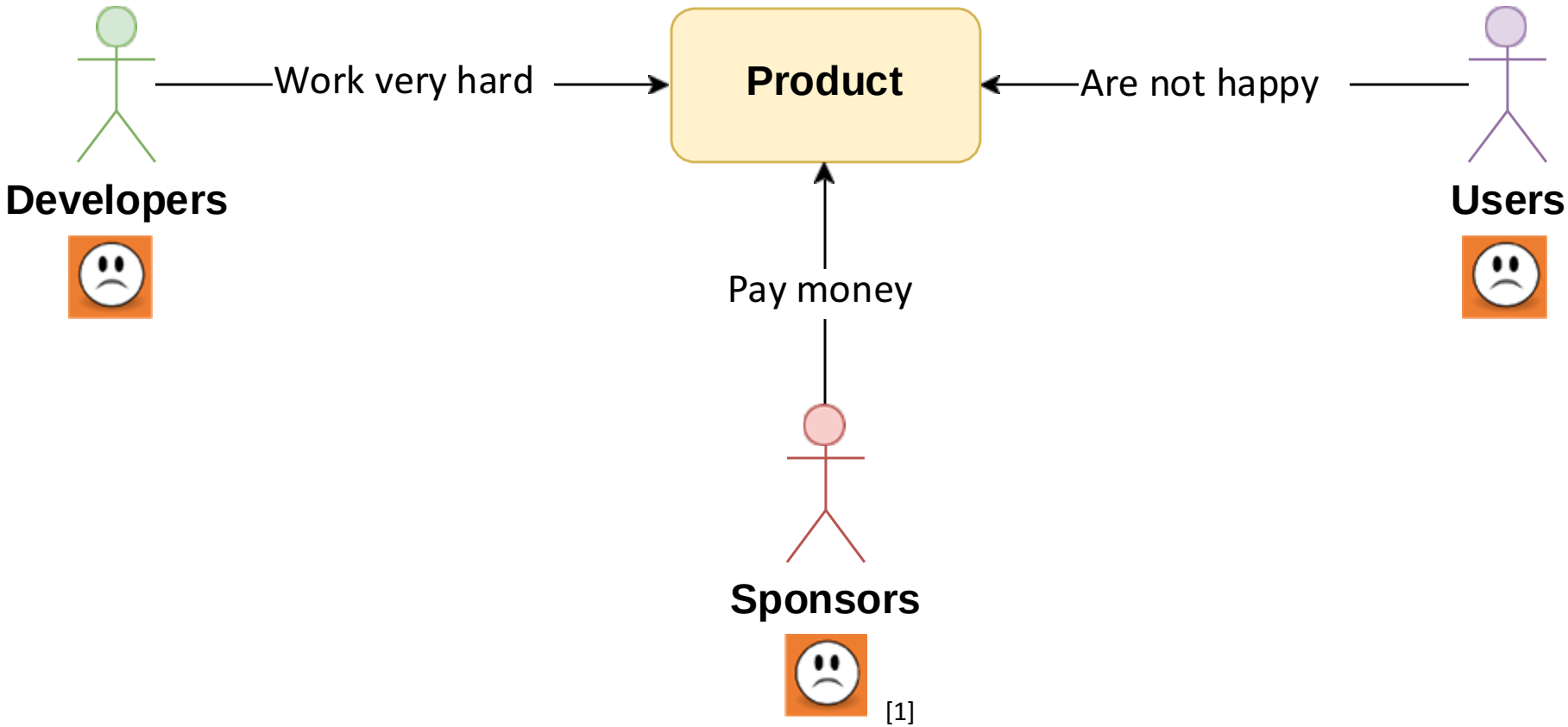
Objectives

- **What is the lose-lose-lose situation?**
- Lack of proper customer engagement leads to an expectation gap
- Who are the stakeholders?
- Building a healthy customer-developer partnership
  - Rights for software customers
  - Responsibilities for software customers
- The requirements baseline

What is the lose-lose-lose situation?

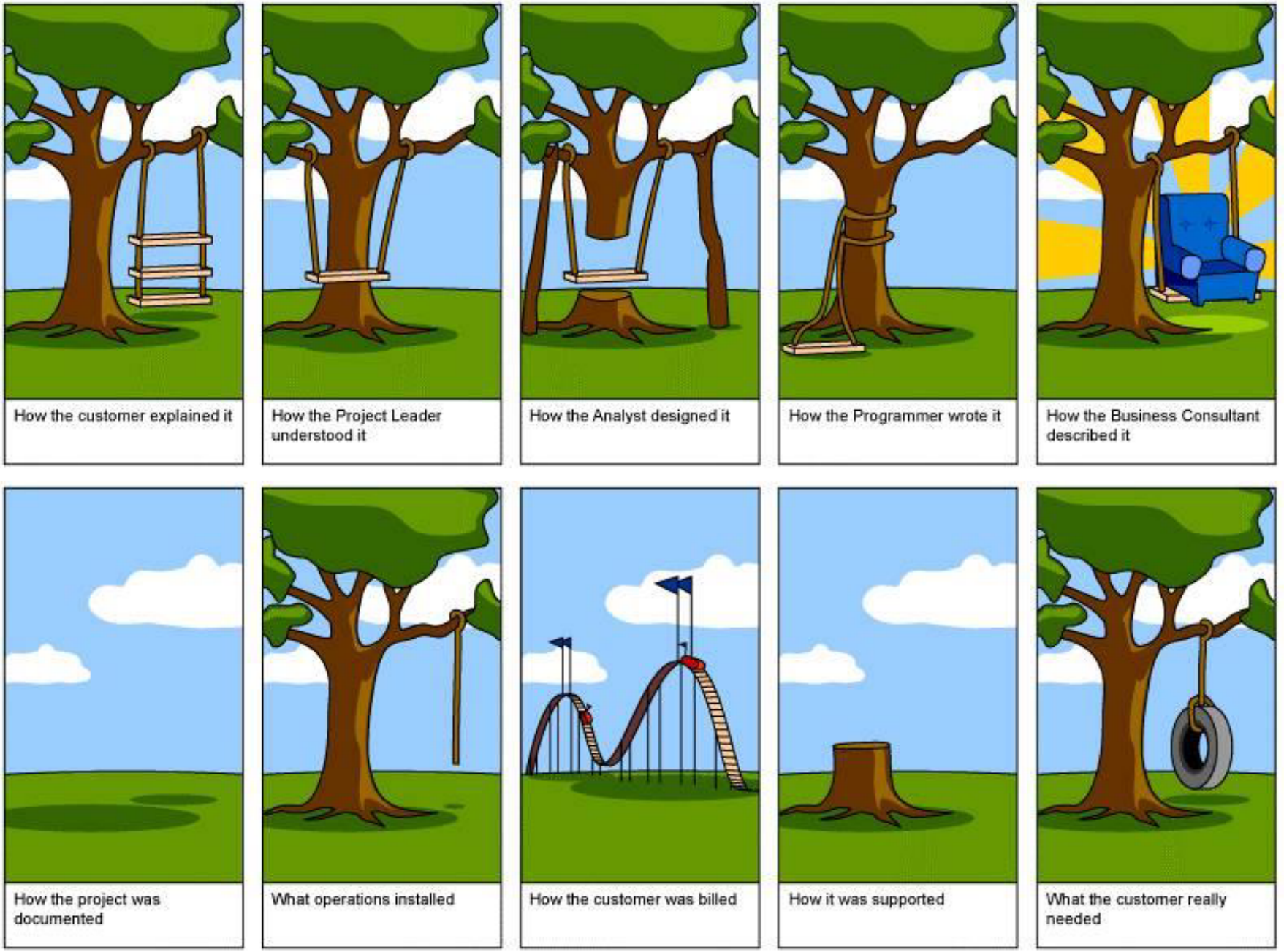


What is the lose-lose-lose situation?



[1] https://clipartix.com/sad-face-clip-art-image-20492/

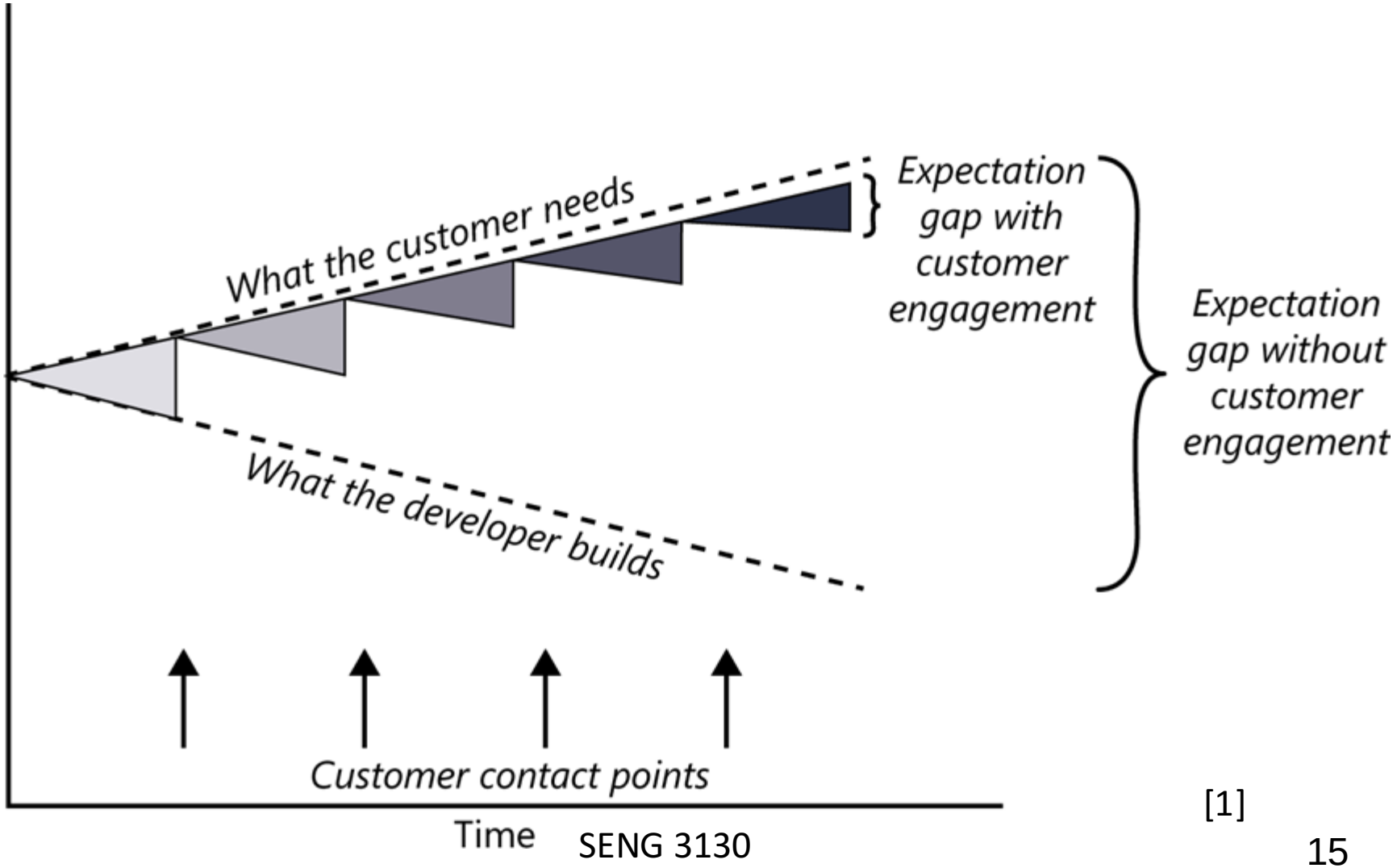
What is the right system to build?



Objectives

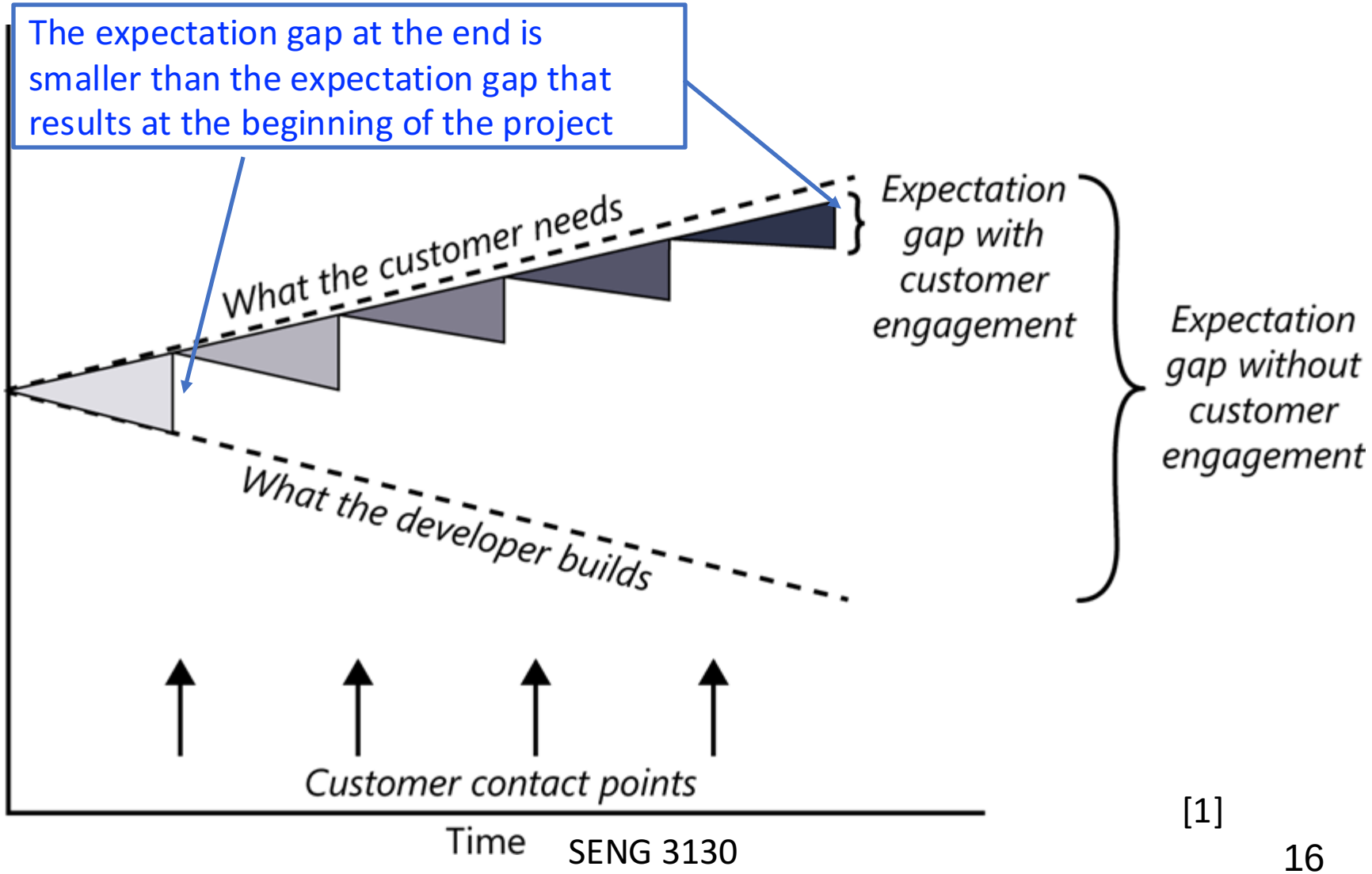
- What is the lose-lose-lose situation?
- **Lack of proper customer engagement leads to an expectation gap**
- Who are the stakeholders?
- Building a healthy customer-developer partnership
  - Rights for software customers
  - Responsibilities for Software Customers
- The requirements baseline

Lack of proper customer engagement leads to an expectation gap



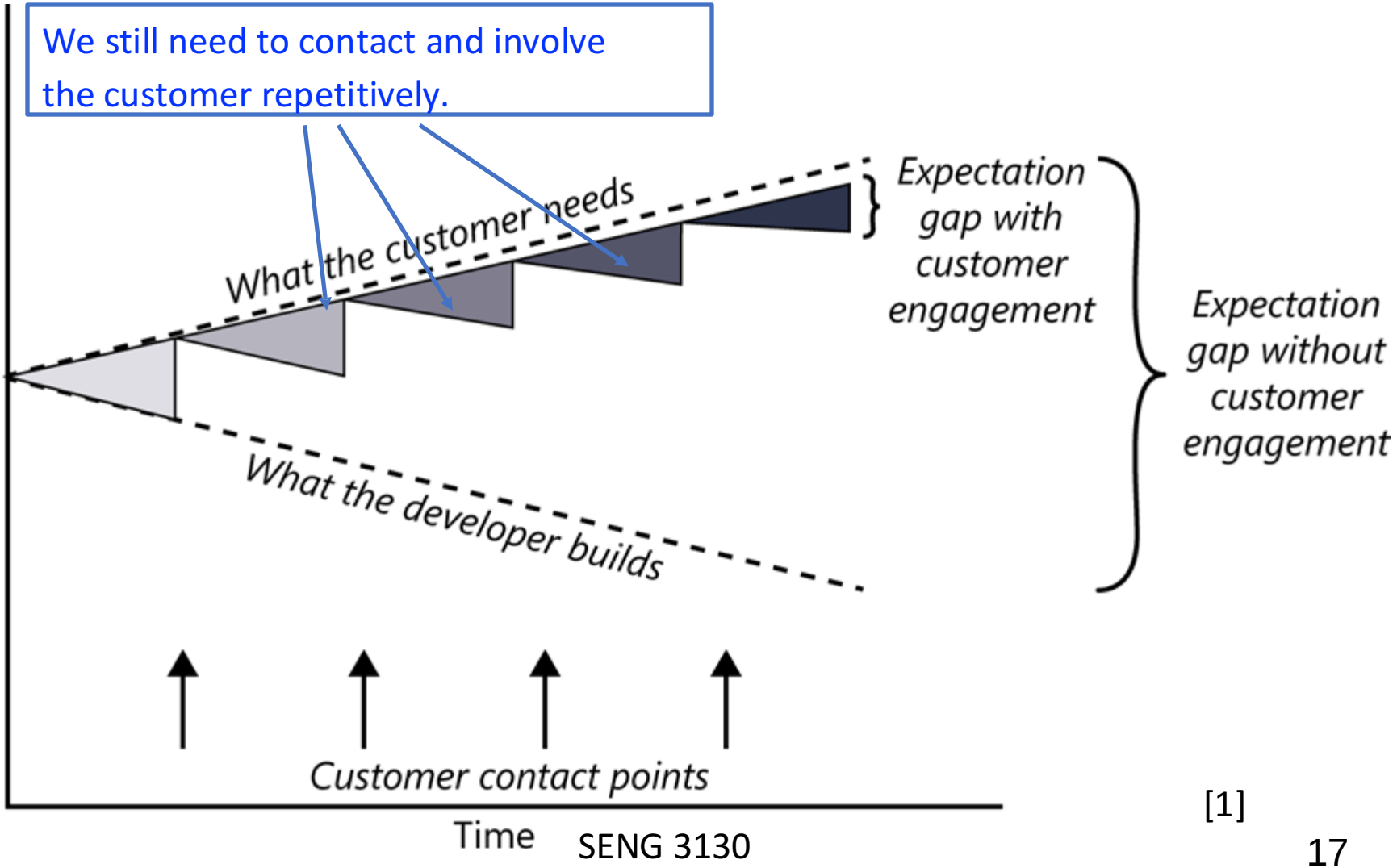
[1]

Lack of proper customer engagement leads to an expectation gap



[1]

Lack of proper customer engagement leads to an expectation gap



[1]

Objectives

- What is the lose-lose-lose situation?
- Lack of proper customer engagement leads to an expectation gap
- **Who are the stakeholders?**
- Building a healthy customer-developer partnership
  - Rights for software customers
  - Responsibilities for Software Customers
- The requirements baseline

Who are the stakeholders?

- *"A **stakeholder** is a person, group, or organization that is actively **involved** in a project, is **affected** by its process or outcome, or can **influence** its process or outcome."*[1]
- Stakeholders include:
  - **Project team**: developers, testers, project managers
  - **Developing organization**: sales stuff, support team (maintainers), legal stuff, and training team
  - **Outside the developing organization**: Customer, company auditors, government agency (think about other regulators), and negative stakeholders (e.g., competitors)

Who are the customers?

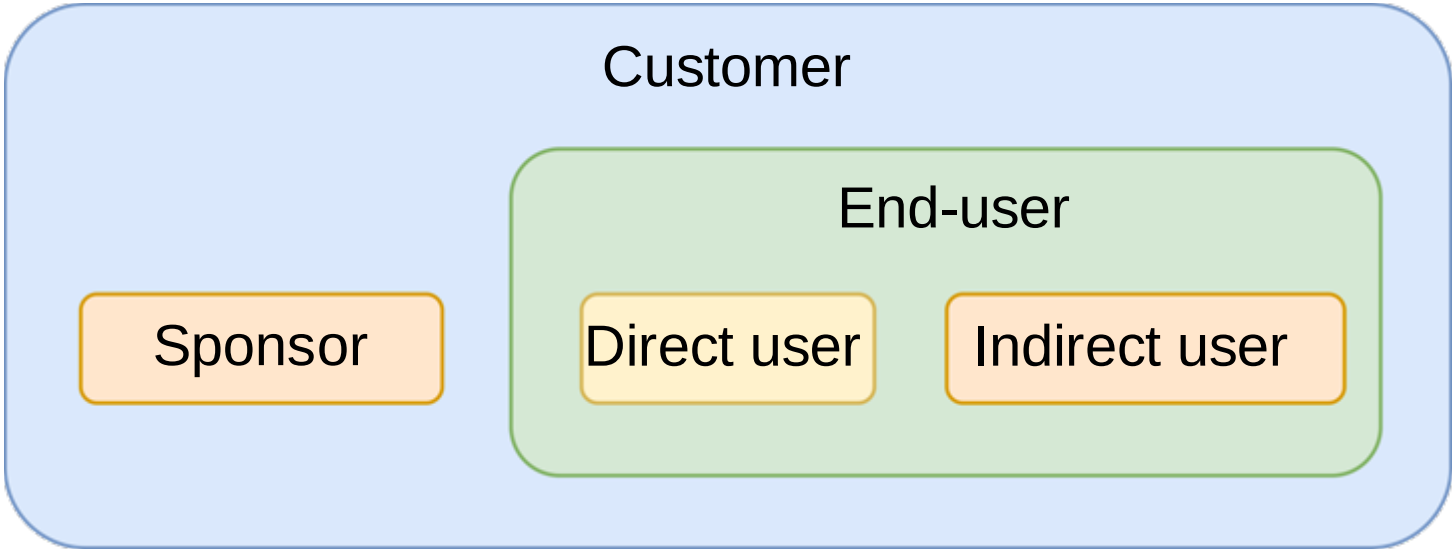
- "Customers are a subset of stakeholders. A customer is an individual or organization that derives either direct or indirect benefit from a product."[1]
- Benefits can be functional and financial benefits.

Who are the customers?

- "Customers are a subset of stakeholders. A customer is an individual or organization that derives either direct or indirect benefit from a product."[1]
- Benefits can be functional and financial benefits.

Building a train, the passengers will get a functional benefit as they travel from place to another. Malls and shop owners can achieve financial benefits from the passengers' travels.

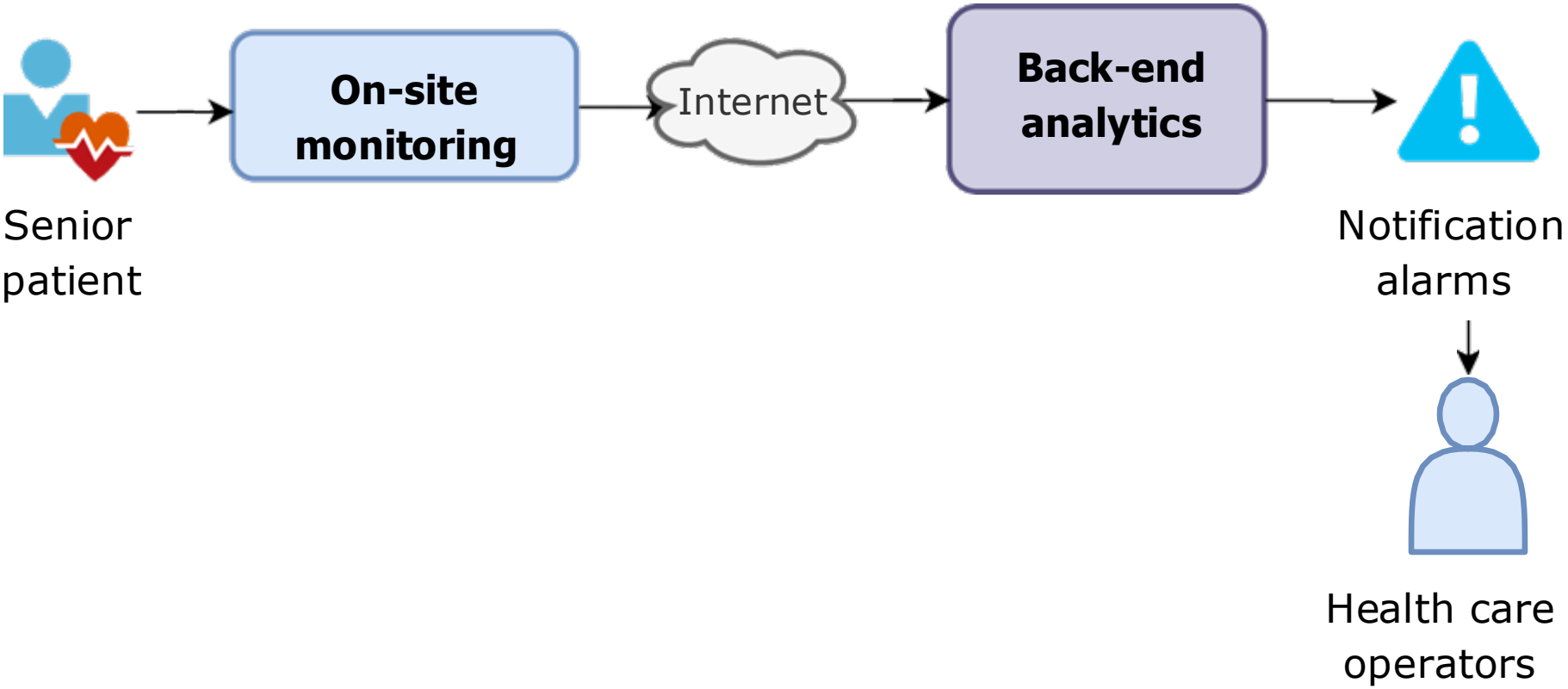
Who are the customers?



Who are the customers?

- Customers include direct user, indirect user, executive sponsor.
- Business requirements come from sponsors
- User requirements should come from people who
  - will actually use the product, either directly or indirectly. These direct/indirect users often called end users.
- In many situations, the customer and the user are the same. If they are different, we have to be sure that there is no conflict between the user requirements and the business requirements.

A remote patient monitoring (RPM) system



What is the type of this stakeholder?

Senior patient

Patient's family

Health care operator

Ministry of health

Hospital manager

Biomedical engineering

IEEE Standard Committee

Healthcare Information Standards Committee

Indirect user

Regulators

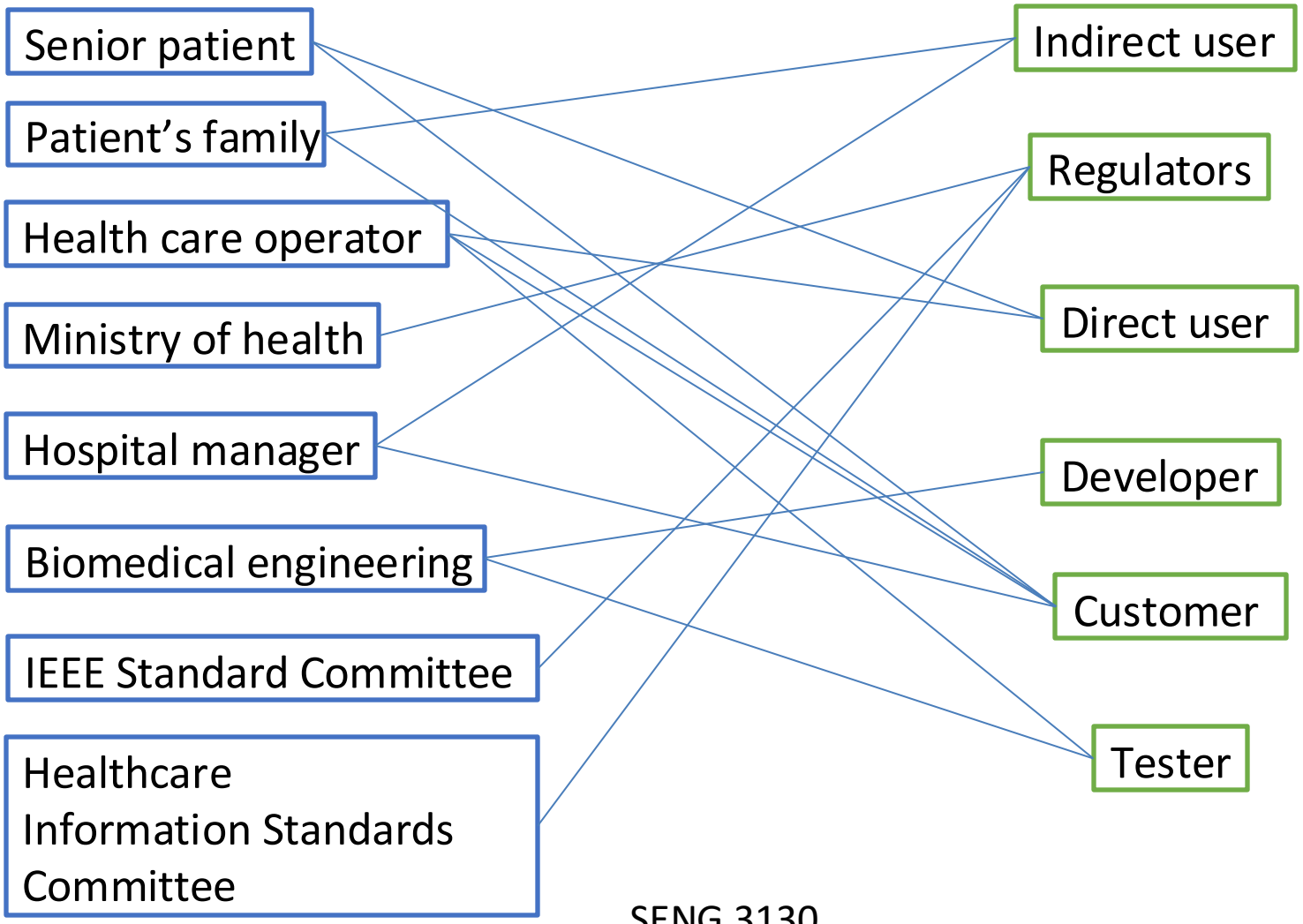
Direct user

Developer

Customer

Tester

What is the type of this stakeholder?



Practical advice for interacting with the customers

- Try to discover the different types (e.g., direct and indirect users) of your customers
- Involve all customers frequently and as early as possible
- Contact customers **directly** as much as possible and try to avoid **customer surrogates**
- Build a healthy customer-developer partnership

Objectives

- What is the lose-lose-lose situation?
- Lack of proper customer engagement leads to an expectation gap
- Who are the stakeholders?
- **Building a healthy customer-developer partnership**
  - **Rights for software customers**
  - Responsibilities for Software Customers
- The requirements baseline

The customer-development partnership

- The customer-development partnership contains two main parts:
  - **Rights for Software Customers**
  - **Responsibilities for Software Customers**

Rights for software customers

Right #1: To expect BAs to speak your language

- The BA should use business terminology (not technical ones)
- The customers should teach BA their business vocabulary

Rights for software customers

Right #2: To expect BAs to learn about your business and your objectives

- BA will gradually understand the business needs and business objectives
- How the system fits into your world

Rights for software customers

Right #3:To expect BAs to record requirements in an appropriate form

- *"Requirements should be written and organized in a way that the customers find easy to understand."* [1]

Rights for software customers

Right #4:To receive explanations of requirements practices and deliverables

- BA should explain the value of writing a certain document. For example, if the BA writes a diagram (like a flowchart or use case), the BA should describe the symbols' meaning in the diagram and the benefits of writing this diagram.[1]

Rights for software customers

However, change always has a price.

Right #5: To change your requirements

- Customer cannot think of all her/his requirements upfront
- It is not practical to expect that requirements will remain static
- Changes happen, but we should respond to changes in the requirements by
  - highlighting the impact of the change on the timeline
  - possible solutions to meet the agreed timeline

Imagine that we are the first customer who wants to build a "Time Tracking System"

[3]

[1] https://www.pinterest.ca/pin/247909154464440029/

[2] https://clipartix.com/clock-clip-art/

[3] https://dlpng.com/png/1410913

Imagine that we are the first customer who wants to build a "Time Tracking System"

[3]

[1]

[1] https://www.pinterest.ca/pin/247909154464440029/

[2] https://clipartix.com/clock-clip-art/

[3] https://dlpng.com/png/1410913

Imagine that we are the first customer who wants to build a "Time Tracking System"

[3]

[1]

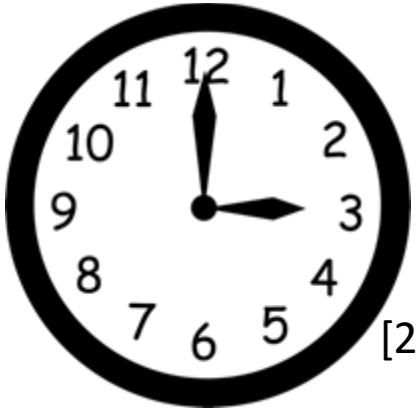
[2]

[1] https://www.pinterest.ca/pin/247909154464440029/
[2] https://clipartix.com/clock-clip-art/
[3] https://dlpng.com/png/1410913

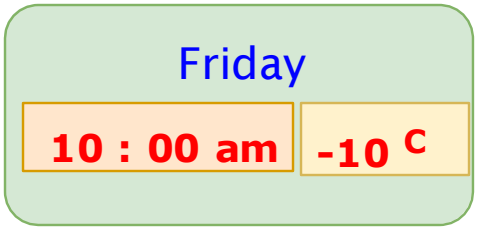
Imagine that we are the first customer who wants to build a "Time Tracking System"

[3]

[1]



[2]



[1] https://www.pinterest.ca/pin/247909154464440029/

[2] https://clipartix.com/clock-clip-art/

[3] https://dlpng.com/png/1410913

Rights for software customers

Right #5: To change your requirements

- Changing the requirements is a fact, but how to handle it determines the success of the project.

Rights for software customers

Right #6: To expect an environment of mutual respect

Requirements discussions can be frustrating if the participants don't understand each other.

Rights for software customers

Right #7:To hear ideas and alternatives for your requirements and for their solutions

You want to avoid “paving the cow paths.”

A creative BA also adds value by proposing new capabilities that customers haven’t even envisioned.

Rights for software customers

Right #8: To describe characteristics that will make the product easy to use

- Customer define the characteristics, or quality attributes that make the software easier or more pleasant to use (*user-friendly*).

Rights for software customers

Right #9: To hear about ways to adjust requirements to accelerate development through reuse

- Customer should be flexible to accept the reuse of a standard solutions. For example, the automatic and standard way to login/authenticate to the system.

Rights for software customers

Right #10: To receive a system that meets your functional needs and quality expectations

- This is the ultimate customer right.
- It can happen only if you clearly communicate all the information that will let developers build the right product

Objectives

- What is the lose-lose-lose situation?
- Lack of proper customer engagement leads to an expectation gap
- Who are the stakeholders?
- Building a healthy customer-developer partnership
  - Rights for software customers
  - **Responsibilities for Software Customers**
- The requirements baseline

Responsibilities for software customers

Responsibility #1: To educate BAs and developers about your business

- Customer should accept a situation when BA says “I understand now the requirements”, and then comes with additional questions later. [1]
- BAs aren’t likely to be aware of knowledge that you and your peers take for granted.

Responsibilities for software customers

Responsibility #2: To dedicate the time that it takes to provide and clarify requirements

Be patient with this iterative approach to developing and refining the requirements.

Responsibilities for software customers

Responsibility #3: To be specific and precise when providing input about requirements

- It's fine to temporarily include to be determined (TBD) markers in the requirements to indicate that additional exploration or information is needed.
- Pinning down details is tedious and time consuming (or because someone wants to evade being held accountable for his decisions).
- Otherwise, you're relying on the BA or developers to guess correctly.

Responsibilities for software customers

Responsibility #4: To make timely decisions about requirements when asked

Responsibilities for software customers

Responsibility #5: To respect a developer's assessment of the cost and feasibility of requirements

- It is a mutual responsibility as BA and developers should provide a realistic cost estimate, and the customer should respect the estimated cost.

- You can rewrite requirements in a way that makes them attainable or cheaper.

  - An action to take place "instantaneously" isn't feasible, but ("within 50 milliseconds") might be achievable.

Responsibilities for software customers

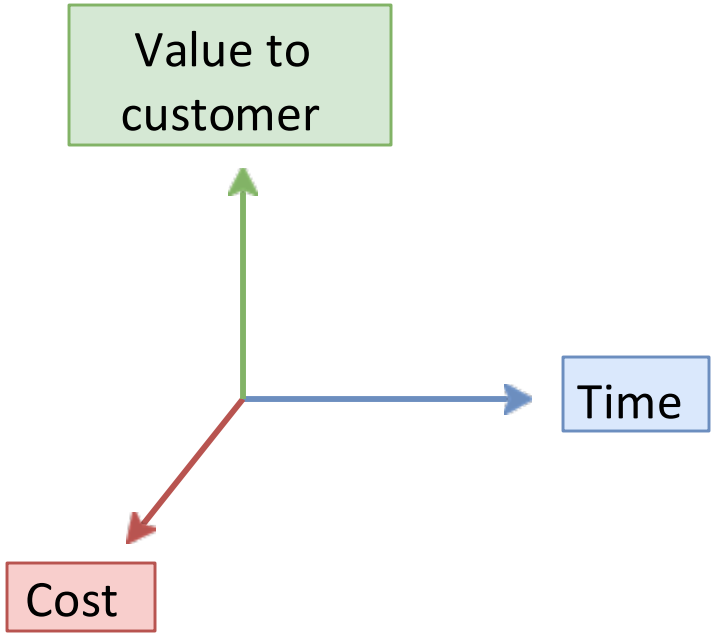
Responsibility #6: To set realistic requirement priorities in collaboration with developers

- We have to define priorities. In other words, we cannot say *"everything is very important"*

> Few projects have the time and resources to implement every bit of functionality all customers want.

Responsibilities for software customers

Customer has to prioritize the requirements then make proper decisions about balancing the time, cost, and the value of the implemented requirement to the end-user.



Responsibilities for software customers

Responsibility #7: To establish acceptance criteria

- A requirement is verifiable if we know how to test it or prove that it has been met.
- *"To establish acceptance criteria (i.e., predefined conditions) that the product must satisfy to be judged acceptable".* [1]

Responsibilities for software customers

Responsibility #7: To establish acceptance criteria (cont.)

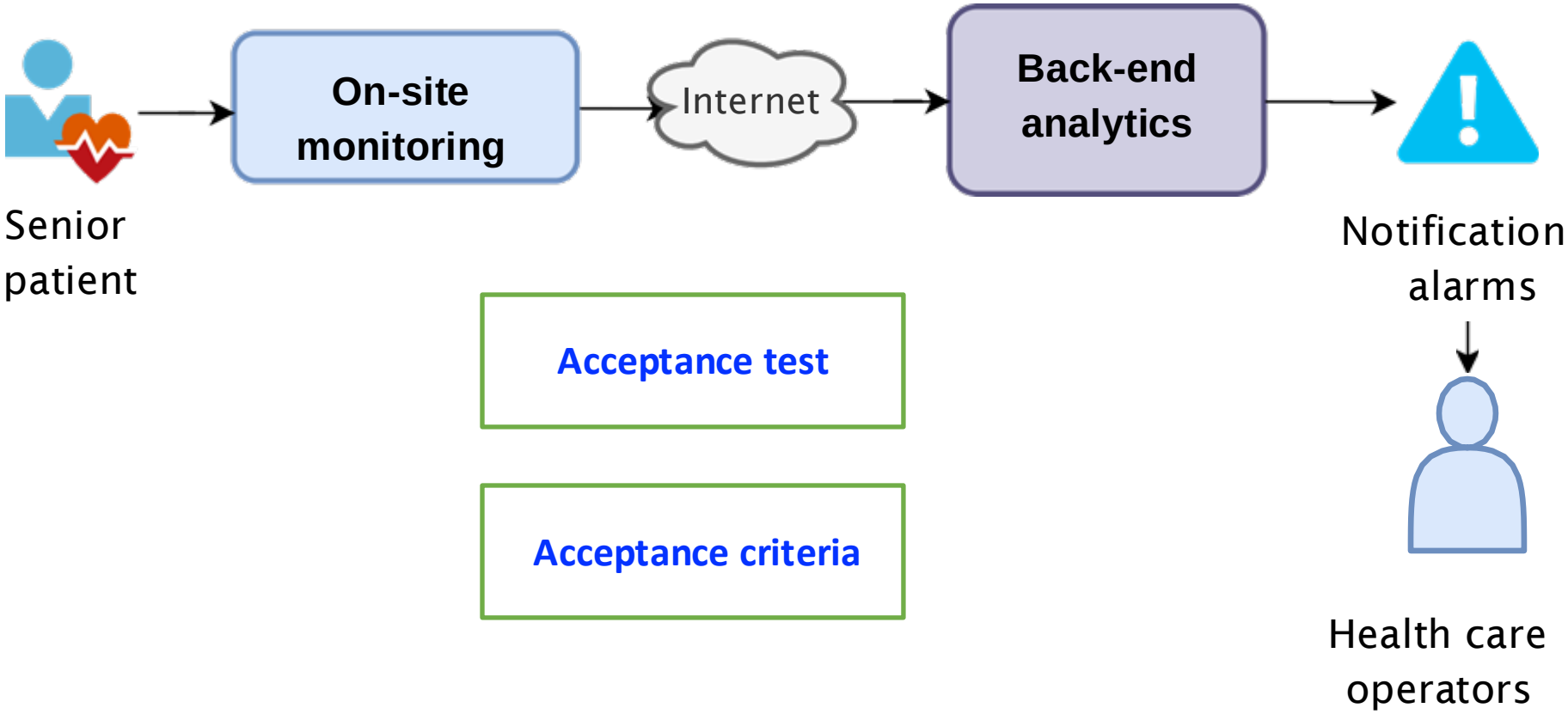
- Acceptance criteria can be defined via different techniques such as:
  - *Acceptance test: the user defines the test scenarios that need to run successfully to be sure that the product fulfills the requirements.*
  - *A certain metric that reflects the acceptable quality attributes.*

Responsibilities for software customers

For the airline system, the acceptance tests include the passengers check-in scenario, flight status inquiry.

For the online shopping system, the acceptance criteria include performance (e.g., all the orders should be fulfilled within 2 seconds) the reliability (e.g., the system should not be down more than 30 seconds per year).

What are the acceptance criteria for the "remote patient monitoring system"?



What are the acceptance criteria for the "remote patient monitoring system"?

Acceptance test

- Verify that the system can connect remotely to patient devices
- Check if the system accurately records and transmits patient vitals
- Confirm that the system sends timely alerts to healthcare providers in case of abnormal readings.
- Evaluate if healthcare providers and patients can easily use the system.
- Ensure data is stored correctly and can be retrieved by healthcare professionals.
- Test how the system performs under increased load
- Ensure the monitoring devices have sufficient battery life and durability.
- Confirm the system provides user-friendly health summaries and insights.

Acceptance criteria

- The system should maintain a stable and secure connection with the patient's monitoring device 95% of the time.
- Data accuracy should be within 2-5% of clinical equipment readings, with 99% uptime.
- Alerts should trigger within 5 seconds of abnormal reading detection
- 95% of test users should complete common tasks without external assistance within 5 minutes
- Data should be available for retrieval 100% of the time, with search functionality returning results in less than 3 seconds.
- The system should handle a 50% increase in load without more than a 2-second delay in performance.
- Devices should operate for at least 24 hours continuously without requiring recharge
- 90% of patients should find the system's reports clear and helpful

Responsibilities for software customers

- Responsibility #8: To review requirements and evaluate prototypes

- Responsibility #9: To promptly communicate changes to the requirements

Continually changing requirements poses a serious risk

The later in development a change is introduced, the greater its impact.

- Responsibility #10: To respect the requirements development process

Objectives

- What is the lose-lose-lose situation?
- Lack of proper customer engagement leads to an expectation gap
- Who are the stakeholders?
- Building a healthy customer-developer partnership
  - Rights for software customers
  - Responsibilities for Software Customers
- **The requirements baseline**

The requirements baseline

- Reaching agreement on requirements
  - *"Customers agree that the requirements address their needs."* [1]
  - *"Developers agree that they understand the requirements and that they are feasible."* [1]
  - *"Testers agree that the requirements are verifiable."* [1]
  - *"Sponsors agrees that the requirements will achieve their business objectives."* [1]
- After **signing off** the requirement, the requirements are baselined.

The requirements baseline

- *"A baseline of the requirements agreement is a snapshot of it at a point in time."* [1]
- *"A requirements baseline is a set of requirements that has been reviewed and agreed upon and serves as the basis for further development."* [1]

"I agree that this set of requirements represents our best understanding of the requirements for the next portion of this project and that the solution described will meet our needs as we understand them today. I agree to make future changes in this baseline through the project's defined change process. I realize that changes might require us to renegotiate cost, resource, and schedule commitments." [1]

Summary

- BAs should contact end-users **as early as possible**. Also, they **frequently** involve users.
- Requirements can change. However, it is essential to
  - **learn how to handle such changes**.
- **Mutual respect** between customers and developers can help them explain and **handle their fears**, which ends up with delivering **successful products**.

Things to do

- Read Chapter 2 of the textbook
- Start researching the project topic:
- “Transportation Route Optimization System”

References

1. Software Requirements (Developer Best Practices) Karl Wiegers, Joy Beatty, 3rd Edition, Microsoft Press, 2013, ISBN-10: 0735679665