PXL – IT
42TIN1280 Software Analysis
System and system context - General

Nathalie Fuchs

Luc Doumen

DE HOGESCHOOL
MET HET NETWERK

Hogeschool PXL – Elfde-Liniestraat 24 – B-3500 Hasselt
www.pxl.be - www.pxl.be/facebook

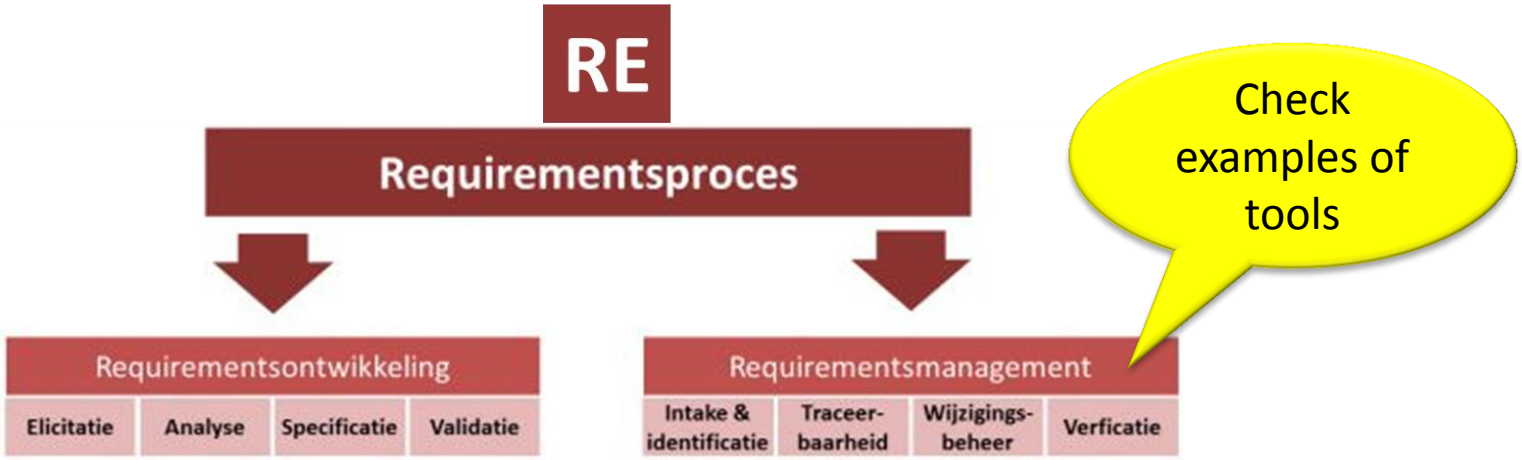
Content

- 4 main activities for requirements development
- System and system context
  - Launching the requirements phase
  - Referring to the IEEE 830 – System Requirement Specification (SRS) - Part 1
  - How to document?
  - The beginning of the specification
  - Naming conventions & definitions
  - Exercises & quizzes
- Questions & answers

4 main activities for requirements development

The process used within this course

- 4 main activities
  - Elicitation
  - Documentation
    - Analysis & Specification
  - Validation, verification & Negotiation
  - Management of requirements



System and system context

System and system context

If you can’t describe what you are doing as a process, you don’t know what you are doing. (Edward Deming)

Launching the requirements phase

- The requirements elicitation 'Kick-off"
  - To achieve consensus of the key stakeholders
  - To ensure that you know enough to start eliciting requirements
  - To ensure that the project is viable
  - To define the scope of the work to be done

A successful project needs precise goals and clear-cut constraints!

Launching the requirements phase

- We do this in parallel
  - Stakeholders
    - Define human society that has some effect on success or otherwise of project. A project stakeholder is someone who gains/loses something (could be functionality, revenue, status, compliance with rules…) as a result of project.
    - Cf. Stakeholder checklists
  - Goals
    - Define success criteria for the project
    - Answer question – ***how will we know if this project is or is not a success?***
    - Are used to guide the project and to help the project team make choices about where to concentrate their efforts.

Launching the requirements phase

- Scope
  - Defines the boundaries of the investigation and the boundaries of the product to be built by the project.

- In practice – brown paper session (post-its, …)
  - Wall 01: Stakeholders
  - Wall 02: Scope
  - Wall 03: Goals
  - Wall 04: Other things

Referring to the IEEE 830 – SRS - Part 1

Table of Contents

Revision History

1. Introduction
   - 1.1 Purpose
   - 1.2 Product Scope
   - 1.3 Glossary
   - 1.4 References
   - 1.5 Overview

Referring to the IEEE 830 – SRS - Part 1

- The business problem (no more than 1 page)
  - A short description of the situation that triggered the development effort
  - Describe the work that should be improved
- Goals of the project - **PAM**
  - What will the product (not) do?
    What is the **p**urpose?
  - What is the business **a**dvantage?
  - How will you **m**easure the advantage?
  - Goals which remain unknown cannot be reached

Get stakeholders commitment on this!

PRINCE-2 "Business Case"
RuP "Vision document"

Purpose example (Amsterdam Metro)

Purpose of the refurbishment is to create a modern and efficient metro underground system - easy to understand and pleasant in its use - while respecting and maintaining the original DNA of the East-bound line.

Purpose example

- Find some examples yourself

http://www.denoor /noord-zuid/doel

SPARTACUS is vee
tramlijnen en een
Noord-Lim
fijnmazig
tramlijne
bestaan
afstemt en
mobiliteit.
Limburger zich

http://clairemicklin.com/bike-funchal/
Our goal was to design a new service that would further promote the use of sustainable transportation in Funchal, while reducing traffic congestion and the emission of greenhouse gases. After designing our service, we presented our proposal to stakeholders from CIVITAS MIMOSA and the Câmara Municipal do Funchal (Funchal City Hall).

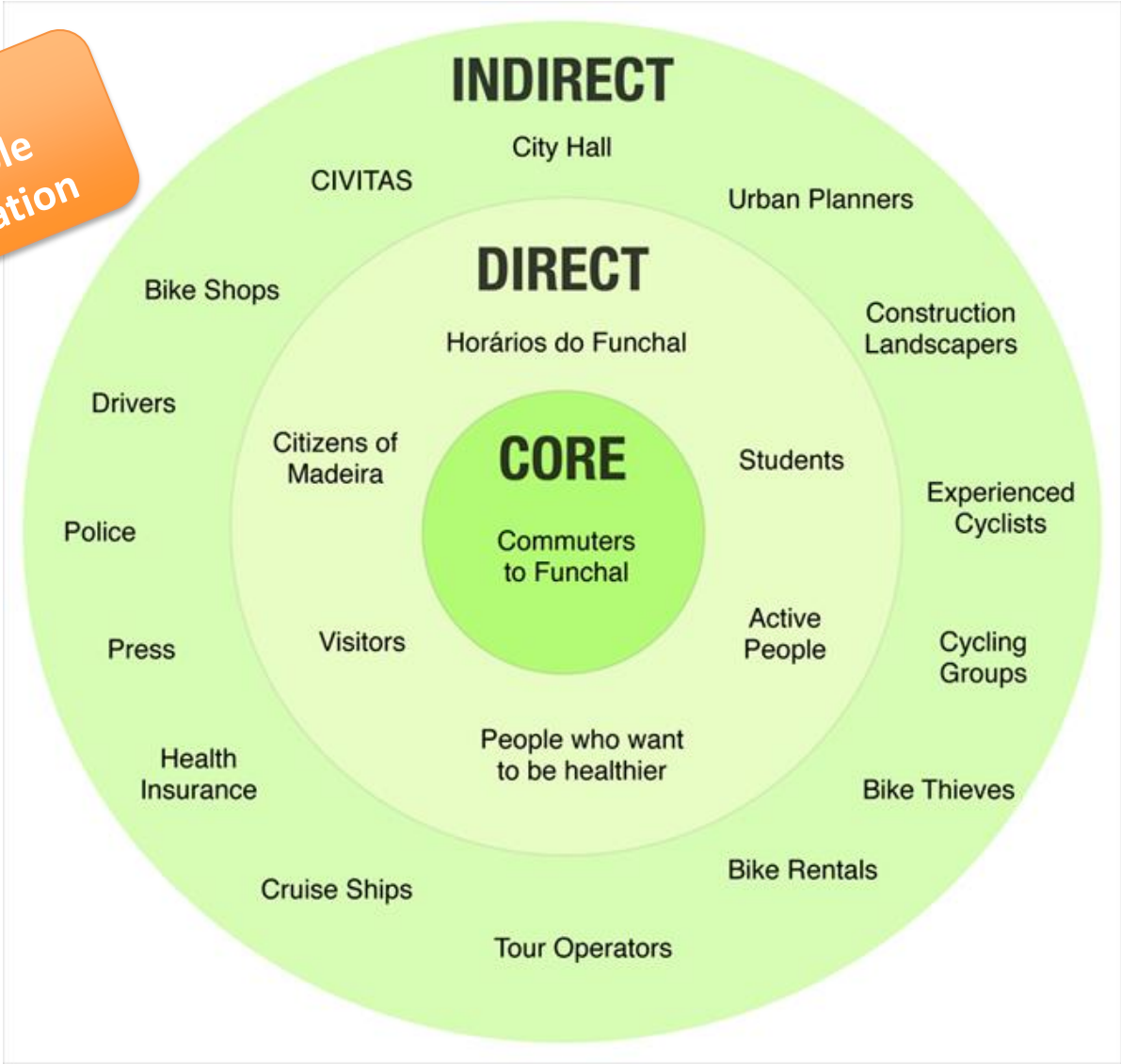
Exploring stakeholders

- **A person or organization that has a (direct or indirect) influence on a system's requirements**
- Anyone who has an interest in the product. The stakeholders may build the product, use it, are affected or have knowledge to build it

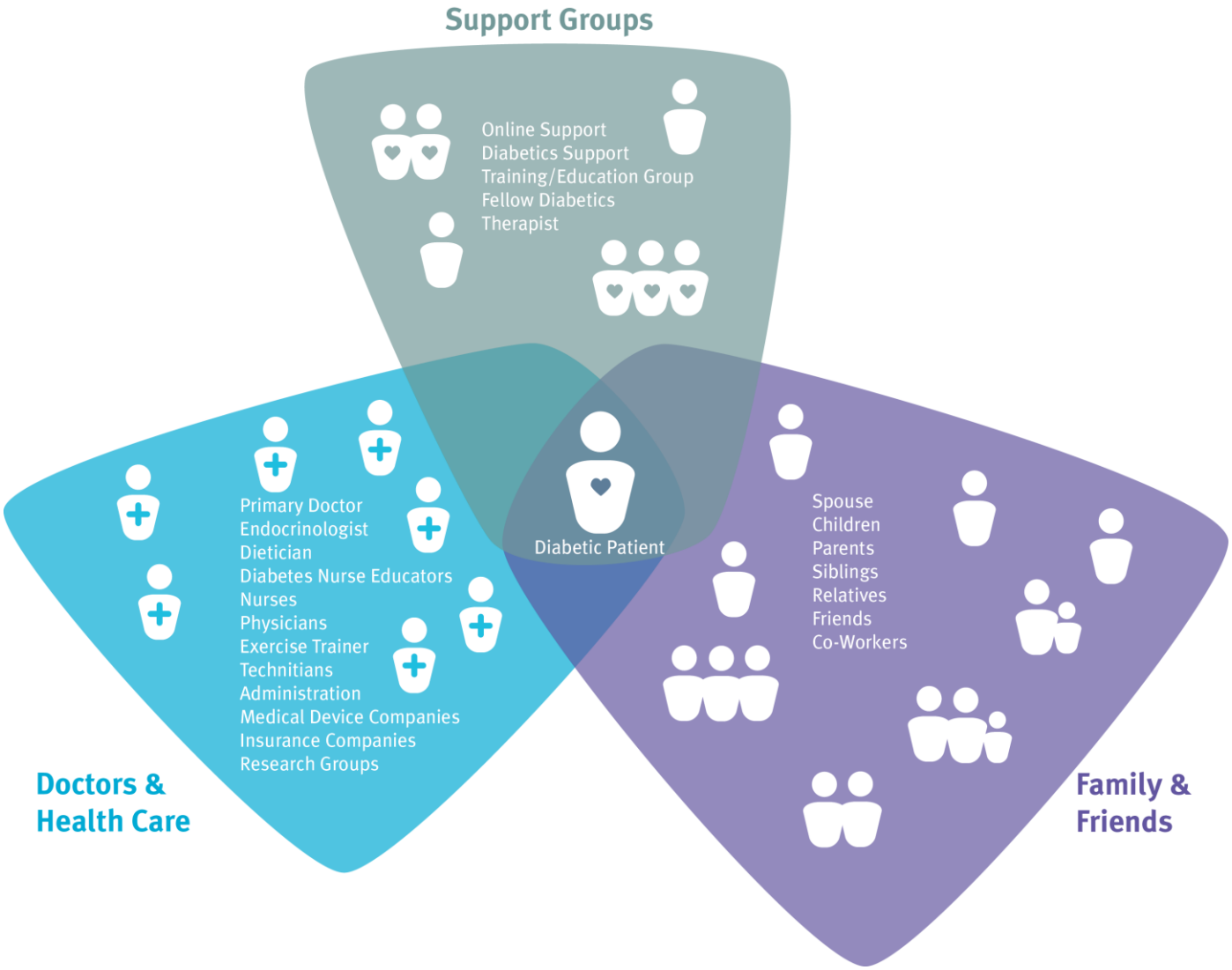
  - Indirect: also where person/organization is impacted
  - Brainstorm a list of stakeholders
  - Document the knowledge area of the stakeholders

Stakeholder mapping

Madeira Sustainable transportation



Stakeholder mapping



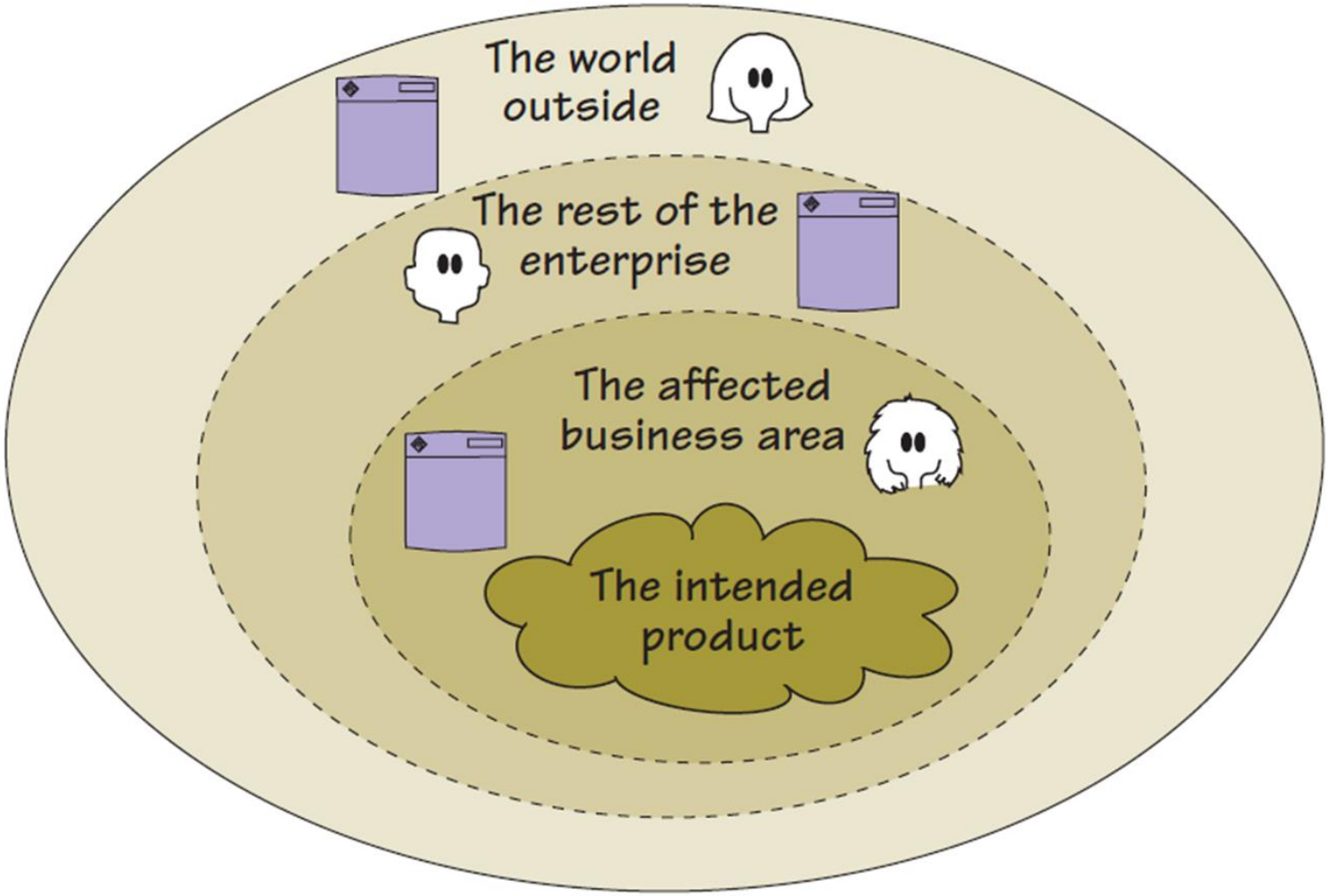
Stakeholders checklist

Illustration only

- Project manager
- Business experts
- Designers
- Testers
- Client / sponsor
- Users / buyers
- Usability experts
- Operations
- Maintenance
- Security
- Safety services
- Support / helpdesk
- Manufacturing
- Marketing
- Lawyers
- Professional bodies
- Special interest groups
- Technology experts
- Etc.

Forgotten stakeholders means forgotten requirements!

Stakeholders checklist - tool



Stakeholders checklist - Excel

Illustration only

Stakeholder Role (The job title, department or organisation that indicates a stakeholding)	Stakeholder Name (The name(s) of the responsible stakeholder(s)	Necessary Involvement (Estimate of when and how much time)	Classes of Knowledge: Goals	Business Constraints	Technical Constraints	Functionality	Look and Feel	Usability	Performance
Client									
Customer(s)									
Business/Subject Experts									
Future Ideas Specialists									
Current System Specialists									
Clerical User									
Technical User									
Potential User									
Sales Specialist									
Marketing Specialist									
Aesthetics Specialist									
Graphics Specialist									
Usability Specialist									
Safety Specialist									
Security Specialist									
Cultural Specialists									
Legal Specialists									
Environmental Specialists									
Maintenance Specialists									
Packaging Designer									
Manufacturer									
Product Installer									

Stakeholder analysis – Example01

Type stakeholder	Voorbeelden	Type van invloed
Interne stakeholders	Werknemers	Primaire Stakholders
	Managers	Primaire Stakeholders
	Aandeelhouders	Primaire Stakeholders
	Investeerders	Primaire Stakeholders
	Ondernemingsraad	Primaire Stakeholders
	Iemand die een project financiert	Primaire Stakeholders
Externe stakeholders	Leveranciers	Primaire Stakeholders
	Klanten	Primaire Stakeholders
	Media	Secundaire Stakeholders
	Crediteuren	Primaire Stakeholders
	Concurrenten	Secundaire Stakeholders
	Een gebruiker van een system	Primaire Stakeholders
	Business experts (consultants)	Secundaire Stakeholders
	Hacker	Primaire Stakeholders
Interface stakeholders	Overheid (EU/Nationaal)	Secundaire Stakeholders
	Lokale overheid	Primaire Stakeholders
	Maatschappij	Secundaire Stakeholders
	Consumentenbond	Secundaire Stakeholders
	Kamer van Koophandel	Secundaire Stakeholders
	Opleidingen & Scholen	Secundaire Stakeholders

Stakeholder analysis – Example02

Table 4-2: Sample Stakeholder Analysis

	KEY STAKEHOLDERS				
	Ahmed	**Susan**	**Erik**	**Mark**	**David**
Organization	Internal senior management	Project team	Project team	Hardware vendor	Project manager for other internal projects
Role on project	Project sponsor and one of the company's founders	DNA sequencing expert	Lead programmer	Supplier of some instrument hardware	Competitor for company resources
Unique facts	Quiet, demanding, likes details, business-focused, Stanford MBA	Ph.D. in biology, easy to work with, has toddler	Very smart, best programmer I know, weird sense of humor	Head of a start-up company, he knows we can make him rich if this works	Nice guy, one of the oldest people at company, has three kids in college
Level of interest	Very high	Very high	High	Very high	Low to medium
Level of influence	Very high; can call the shots	Subject matter expert; critical to success	High; hard to replace	Low; other vendors available	Low to medium
Suggestions on managing relationship	Keep informed, let him lead conversations, do as he says and quickly	Make sure she reviews specifications and leads testing; can do some work from home	Keep him happy so he stays; emphasize stock options; likes Mexican food	Give him enough lead time to deliver hardware	He knows his project takes a back seat to this one, but I can learn from him

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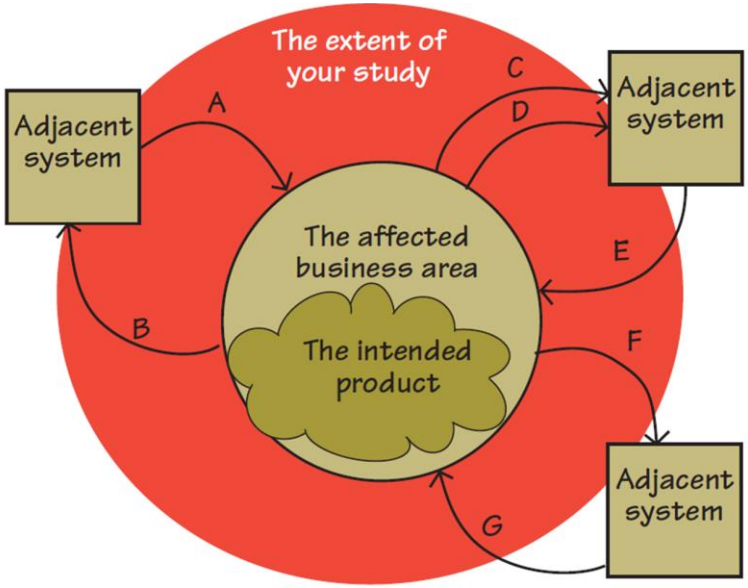
Users of the product

- The purpose of identifying the users, so that you can understand the work that they do
- and the product you must build for them
- For the users, write a section in your specification to describe all the known and potential users and their attributes
- ***The actors for the use cases to be defined later***

Exploring scope



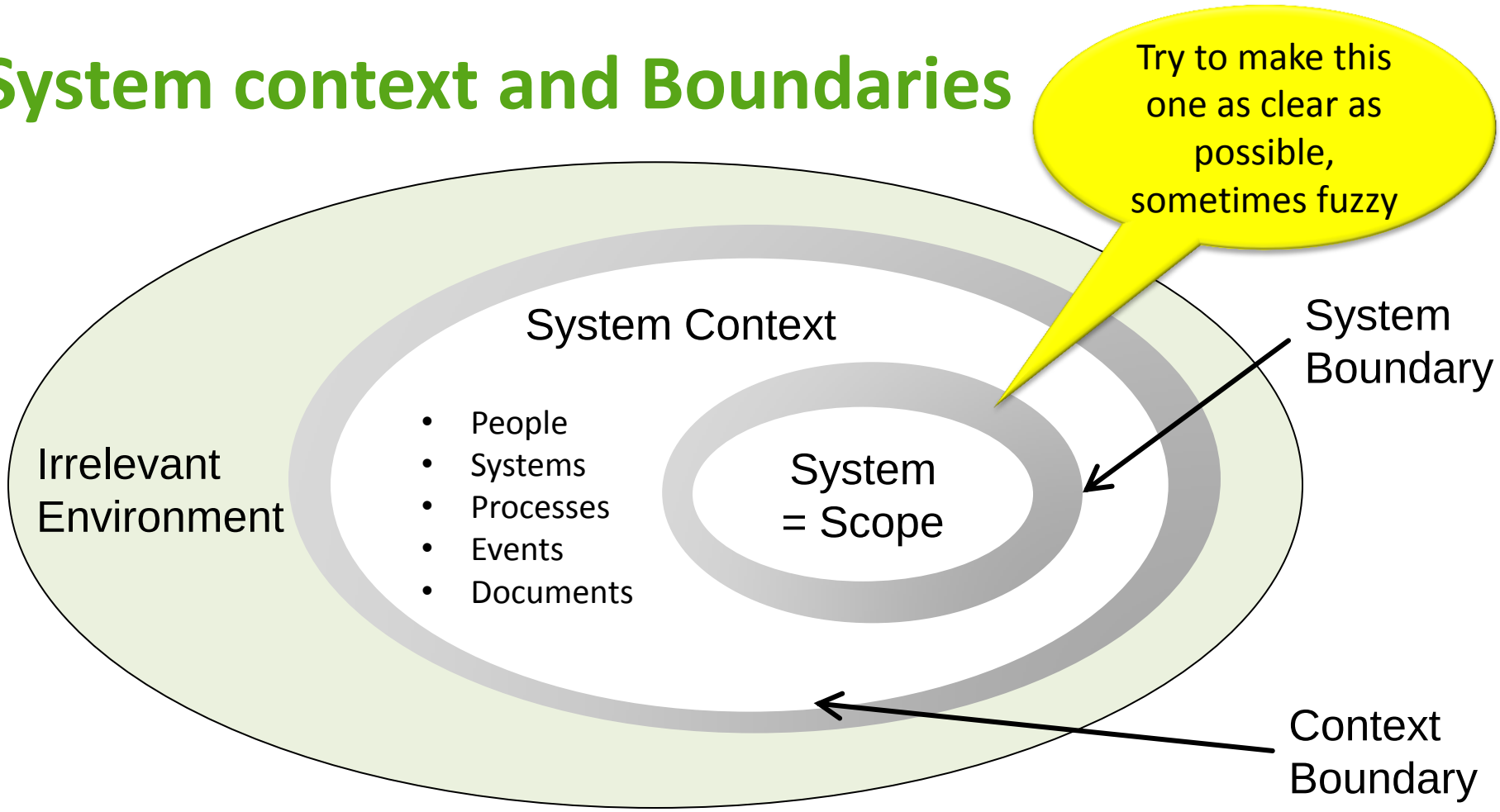
- Defining the boundary of your investigation
- "What sort of information do I need from which stakeholders and how does it all fit together?
- Convenient way of expressing your scope of investigation is to draw a context diagram
  - My system and boundary of my system?
  - Context and boundary of my context?
  - Irrelevant environment?

Check "slides "How to draw a context diagram"

Exploring other things

- During a Stakeholder, Goal, Scope workshop people will think of other points, subjects, ideas that are outside the purpose of the workshop but you do not to forget them.
- Cf. table of contents of IEEE 830 - Example SRS
- Examples “Other Things” wall
  - Rrisk, security requirement, design idea ➔ on post it note
  - Note contents nr, name of person who raised it and stick on wall
  - When ready to explore each subject ➔ starting point created

System context and Boundaries



Beware of the **grey zones**! Both system boundary and context boundary can shift over time. (e.g. changing laws, aspects that become relevant for the planned system, …)

System Context

- Source of requirements for a system
- Source = “aspects that initiated or influenced the definition of the requirements”
- Potential aspects: !!!
  - ***Persons*** (stakeholders or groups of stakeholders)
  - ***Systems*** (technical systems, software and hardware)
  - ***Processes*** (technical, physical or business processes)
  - ***Events*** (technical or physical)
  - ***Documents*** (e.g. laws, standards, system documentation)

Context analysis checklist

Users groups

- Type
- Skills & Knowledge
- Education
- Physical attributes
- Job characteristics
- List of tasks

Tasks

- Goal
- Output
- Side effects
- Frequency
- Duration
- Flexibility
- Physical & mental demands
- Dependencies
- Safety
- Criticality

Context analysis: User groups

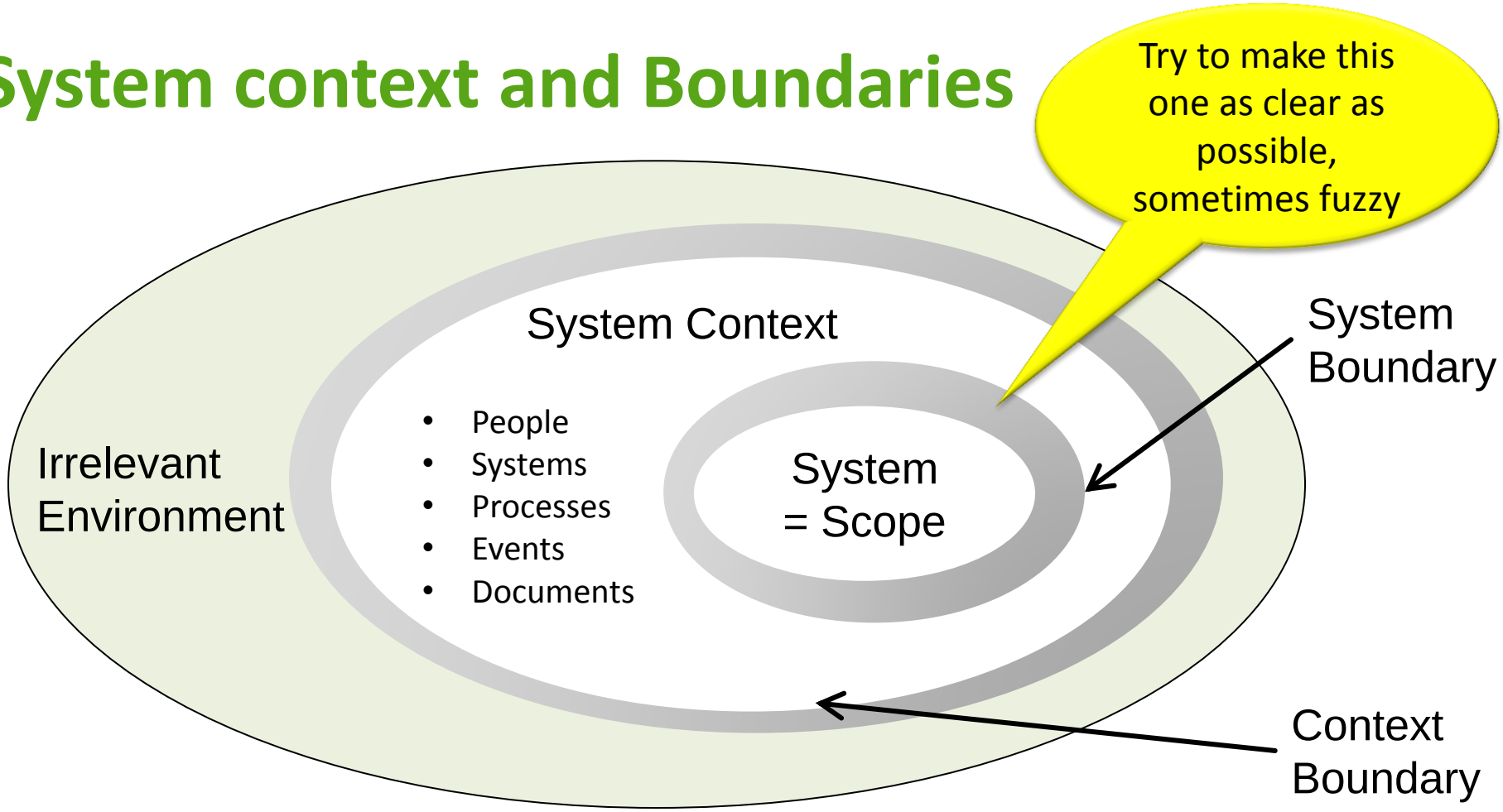
- The functionality and usability of a product is effected by its context of use
- Context is characterized by:
  - The users of the product
  - The tasks they carry out
  - The working environment
  - …
- Tool : Context of Use checklist MuSIC
  - Must - Should
  - Important - Critical

System boundary

- Which aspects should be covered by the system?
- Which aspects are to be left in the environment of the system?

- Identify the part of the environment that will interact with the planned system to determine the system boundary

System context and Boundaries



Beware of the **grey zones**! Both system boundary and context boundary can shift over time. (e.g. changing laws, aspects that become relevant for the planned system, …)

System context and Boundaries

- How to document?
  - Context diagrams
    = Data flow diagrams level zero
    - Sources in the environment are modelled (i.e. origin or destination of information flows between the system and the environment)
  - Use case diagrams:
    - actors (persons or other systems) in the environment with their relation to (the use cases of) the system are modelled
  - Domain models

The beginning of the specification

- How much do you know?
- Enough to gather the req.'s?
- Do you have a measurable purpose?
- Do you know all the stakeholders and users?
- Is the context clearly defined?
- Should you proceed or ask for more and better information?

Naming conventions & definitions

- Misunderstood words cause problems
- Start a list of important terms to be used by the stakeholders
- This will be enlarged and refined later
- If your names invoke the right meaning they save hours of explanation
- Check for internal and industry-standards

➢ Are all glossary terms used in requirements?

Quiz questions

- Quiz questions about:
  1. Introduction and Foundations
  2. System and System Context

Quiz questions - Introduction

1.1 You have to recruit a requirement engineer. Which combination of skills is the best combination?

- A ☐ linguistic competent, analytical thinking, testing skills;
- B ☐ communication skills, moderation skills, ability to convince
- C ☐ domain knowledge, coding skills, testing skills;
- D ☐ project management skills, moderation skills, an ability to display empathy;

Quiz questions - Introduction

1.2 A person is about to be assigned to your project as a requirements engineer. What is the biggest risk?

- The requirement engineer:
- A ☐ doesn't have project management skills;
- B ☐ has no domain knowledge;
- C ☐ is introvert and shy;
- D ☐ is new in this organisation, so he doesn't have any knowledge about the organisation.

Quiz questions - Introduction

1.3 Which of the following statements best describes the term "stakeholder"?

- A ☐ everyone whose wishes have to be considered in the requirements specification;
- B ☐ all members of the project team;
- C ☐ a person or organization that has a (direct or indirect) influence on a system's requirements;
- D ☐ the total of all people named as a source for any requirements specification.

Quiz questions - Introduction

1.4 Which of the following statements typically characterizes the relationship between a requirements engineer and a stakeholder in the role of a tester?

- A ☐ The requirements engineer provides input for the work of the stakeholder;
- B ☐ The results of the requirements engineer are being managed by the stakeholder;
- C ☐ The stakeholder provides input for the work of the requirements engineer;
- D ☐ The stakeholder monitors the work of the requirements engineer;
- E ☐ The work of the requirements engineer is not related to the mentioned role of the stakeholder.

Quiz questions - Introduction

1.5 During an acceptance test a defect was detected, which could be attributed to the requirements having been incorrectly interpreted by the software developers. Which of the statements fits this circumstances? Pick the **two** you think are best

- A ☐ the correction will only generate minor costs, since only the requirements specification must be changed;
- B ☐ the defect should already have been recognized during the review of the requirements specification;
- C ☐ in the worst case, it could happen that the architecture has to be reworked which would generate substantial costs;
- D ☐ the defect should already have been recognized during the system test.

Quiz questions - Introduction

1.6 Which 3 of the following skills are important for the requirements engineer?

- A ☐ Communication skills
- B ☐ Analytical thinking
- C ☐ Conflict resolution
- D ☐ Testing skills

Quiz questions - Introduction

1.7 Which statements are TRUE/FALSE for Requirements

- True False
- ☐ ☐ There are three kinds of requirements: functional, quality and constraints.
- ☐ ☐ Quality requirements describe functionality.

Quiz questions - Introduction

1.8 Which **one** of the following is **not** one of the four major activities of requirements engineering?

- A ☐ Requirements management
- B ☐ Requirements elicitation
- C ☐ Requirements validation and negotiation
- D ☐ Requirements scoping

Quiz questions – System and context

2.1 To determine scope and boundaries of a system context diagrams are often being used. Which **three** of the following attributes are compulsory in context diagrams?

- A ☐ scope;
- B ☐ content;
- C ☐ context;
- D ☐ interfaces (with its environment);
- E ☐ people.

Quiz questions – System and context

2.2 Consider the following statement about scope and context. Which statements are TRUE/FALSE?

- True False
- ☐ ☐ by setting the scope we specify what “outside” and “inside” means – in relation to the system;
- ☐ ☐ requirements engineering cannot involve different scopes (e.g. enterprise, department, IT system, etc.);
- ☐ ☐ context describes the size of the system;
- ☐ ☐ scope describes the organisations, neighbouring systems, functionality (or similar) with a connection to the target system;
- ☐ ☐ requirements are always restricted by the scope.

Quiz questions – System and context

2.3 At the beginning of a project, the boundary between a system and its context is often diffuse, the so-called 'grey zone'. Indicate which of the following statements are true and which are false.

- True False
- ☐ ☐ a diffuse boundary is often not recognized for a long time because it is not depicted in the context diagram;
- ☐ ☐ a diffuse boundary between a system and the context indicates that the interfaces between the system and the environment have not yet been clarified;
- ☐ ☐ a diffuse boundary between a system and the context exists mainly at the beginning of a RE process and must be managed during the course of the RE process.

Quiz questions – System and context

2.4 Indicate which of the following statements about the main purpose of a context diagram are true and which are false:
A context diagram is used ….

- True False
- ☐ ☐ to identify system boundaries;
- ☐ ☐ to test the requirements from the point of view of consistency and clarity;
- ☐ ☐ to identify all stakeholders of the system;
- ☐ ☐ to illustrate the sequencing of the exchange between the system and its context.

Quiz questions – System and context

2.5 Indicate the items of information which are mandatory for them to be visible in a context diagram (multiple answers possible)

- A ☐ system name;
- B ☐ neighbouring technical systems;
- C ☐ system functions;
- D ☐ logical outputs;
- E ☐ system parameters;

Quiz questions – System and context

2.6 Which statements are TRUE/FALSE for Requirements Engineering?

- **True False**
- ☐ ☐ A full understanding of system context is essential for successful requirements engineering.
- ☐ ☐ The system boundary is **not** likely to shift during the requirements engineering process.

Questions & answers