PXL – Digital
42TIN1280 Software Analysis - System & System Context

Week 03 – semester 01

Luc Doumen

Nathalie Fuchs

DE HOGESCHOOL MET HET NETWERK

Elfde-Liniestraat 24, 3500 Hasselt, www.pxl.be

Content

- Subdisciplines of Requirements Engineering
- System and system context
  - Launching the requirements phase
  - Referring to the IEEE 830 – System Requirement Specification (SRS) template
  - How to document?
  - The beginning of the specification
  - Naming conventions & definitions
  - Exercises & quizzes
- Questions & answers

Subdisciplines of Requirements Engineering

Subdisciplines of Requirements Engineering

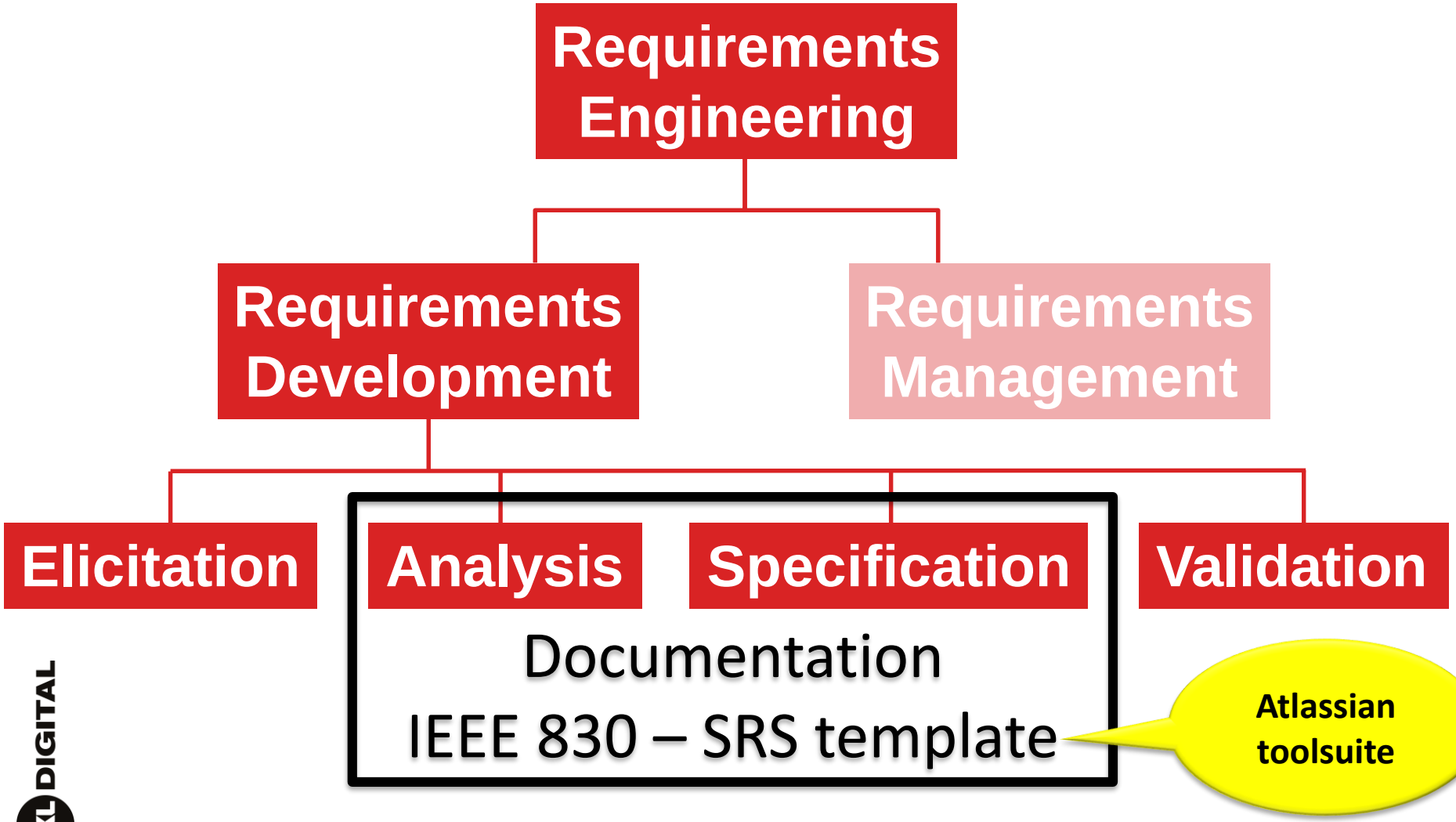
Requirements Engineering

Requirements Development

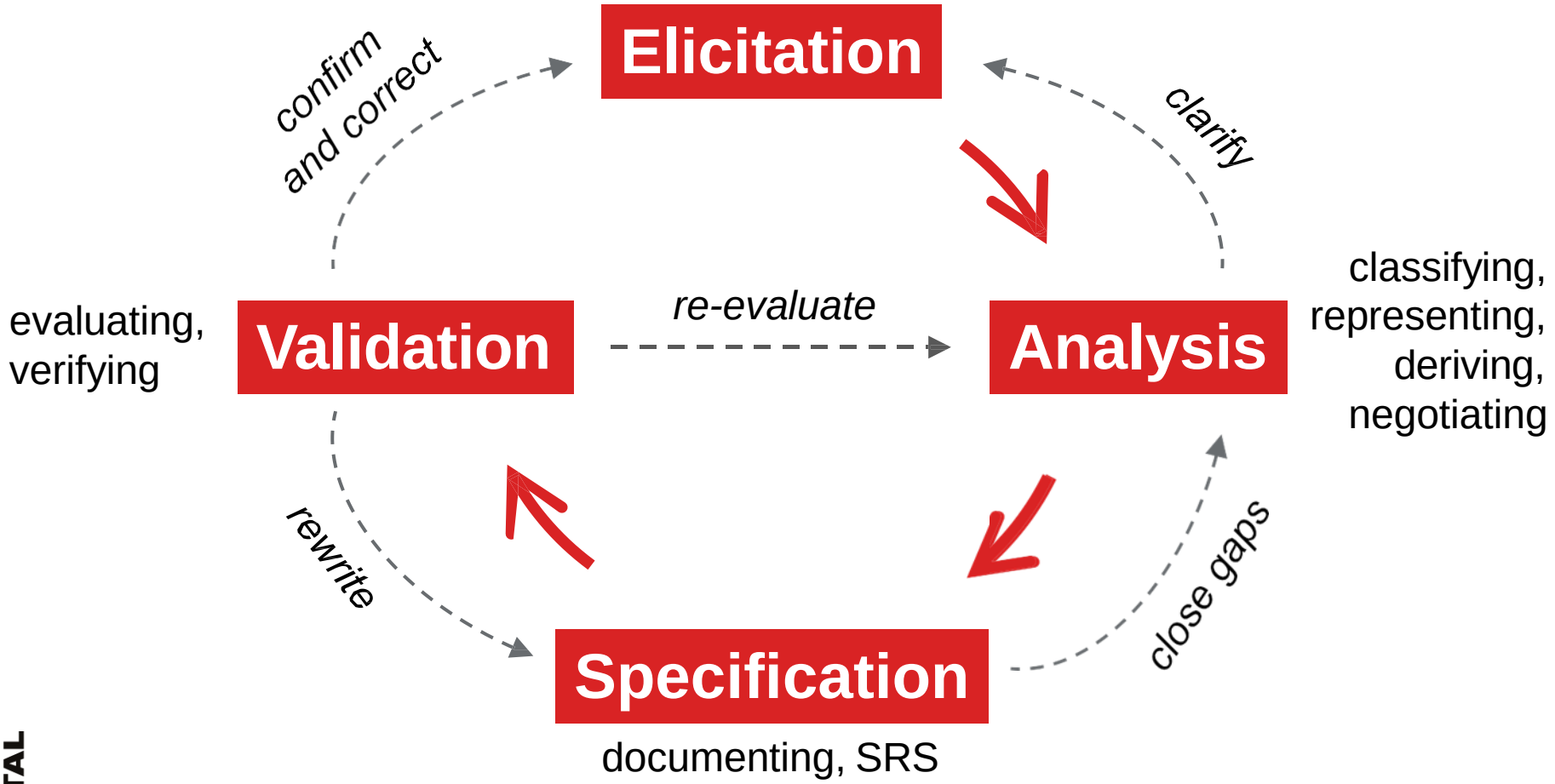
Requirements Management

See lecture "A Structured Approach to Requirements Analysis" for more on this topic!

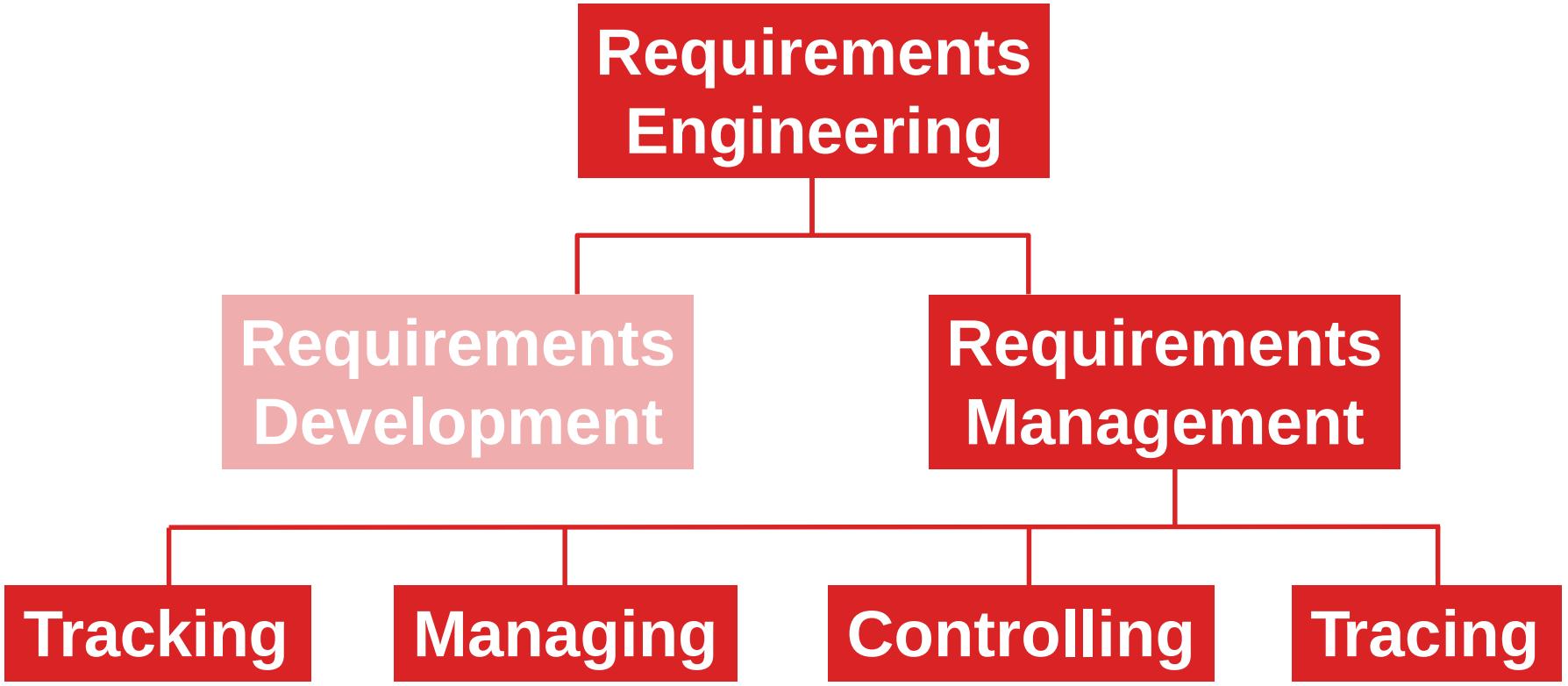
Subdisciplines of Requirements Engineering



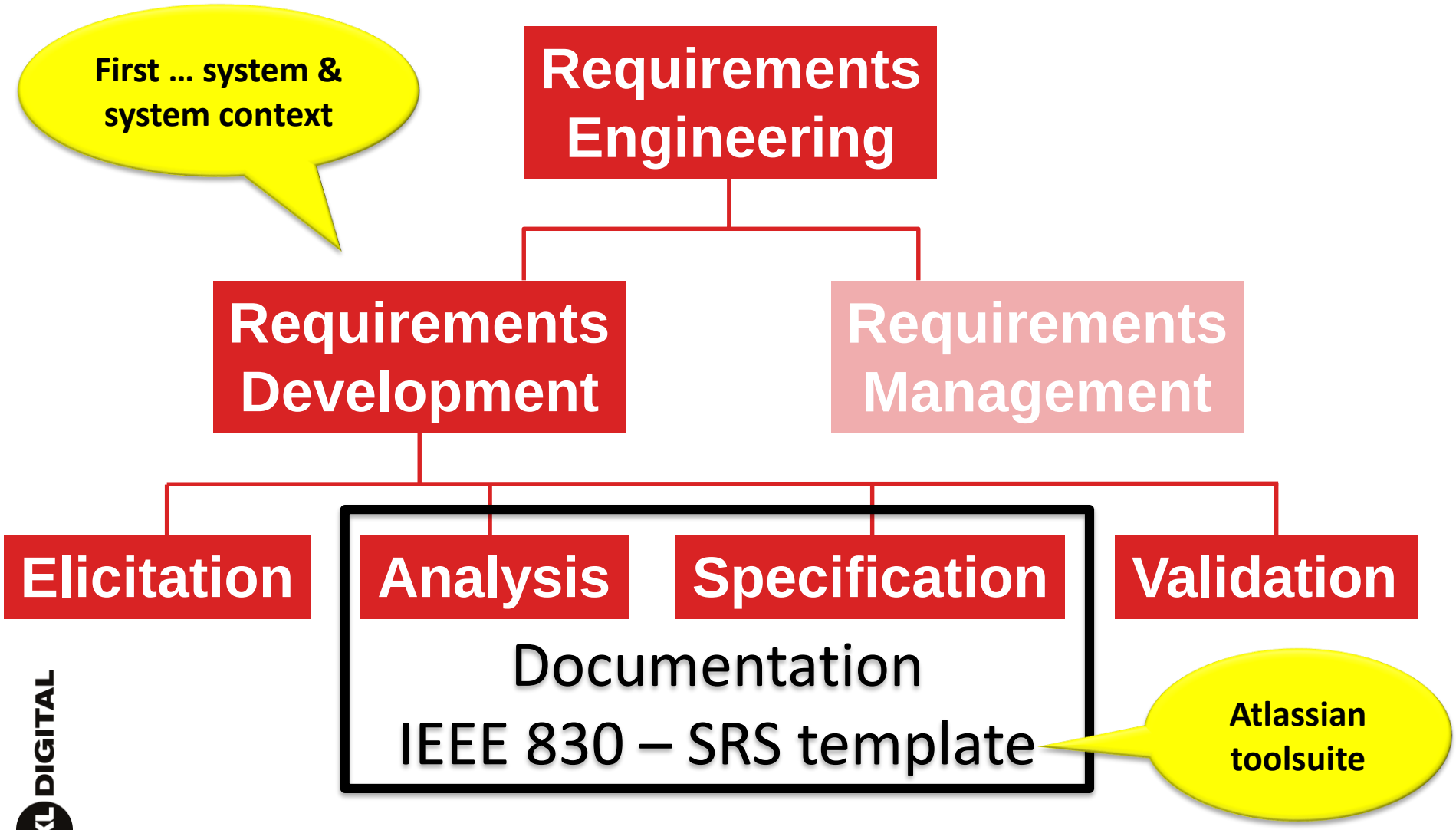
The process framework



Subdisciplines of Requirements Engineering



Subdisciplines of Requirements Engineering



System and system context

System and system context

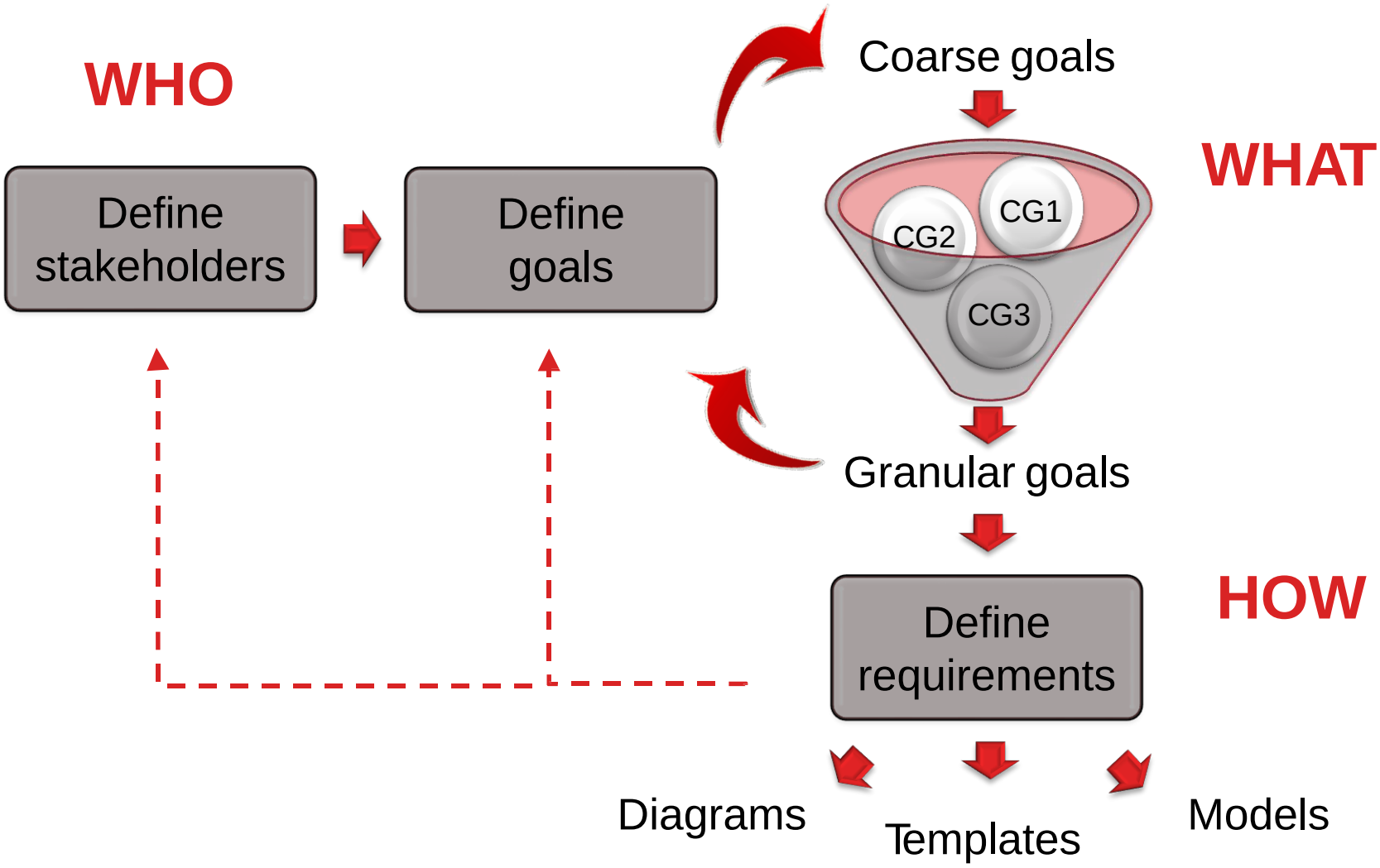
If you can’t describe what you are doing as a process, you don’t know what you are doing. (Edward Deming)

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



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 on blackboard, Corda case
  - 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

IEEE 830 – SRS template

1. **Introduction** (Purpose. Document conventions. Project Scope. References)
2. **Overall Description** (Product perspective. User classes and characteristics. Operating environment. Design and implementation constraints. Assumptions and dependencies)
3. **System Features** (System feature x1. Description. Functional requirements. System feature x2, …)
4. **Data Requirements** (Logical data model. Data dictionary. Reports. Data acquisition, integrity, retention, and disposal)
5. **External Interface Requirements** (User interfaces. Software interfaces. Hardware interfaces. Communications interfaces)
6. **Quality Attributes** (Usability. Performance. Security. Safety. Others)
7. **Internationalization and Localization Requirements**
8. **Other Requirements**

Appendix A: Glossary

Appendix B: Analysis Models

IEEE 830 – SRS template - Part 1

Table of Contents

Revision History

1. Introduction
   - 1.1 Purpose
   - 1.2 Product Scope ➔ Vision & Scope document
   - 1.3 Glossary ➔ preferable at the end of the document
   - 1.4 References
   - 1.5 Overview

2. Overall description
   - 2.1 Product Perspective
   - 2.2 User Classes and Characteristics
   - 2.3 Operating Environment
   - 2.4 Design and Implementation Constraints
   - 2.5 User Documentation
   - 2.6 Assumptions and Dependencies

See example Cafetaria Ordering System

IEEE 830 – SRS template – 1.1 Purpose

- 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!

SRS - Cafetaria Ordering System

SRS - Cafetaria Ordering System - Vision & scope

IEEE 830 – SRS template – 1.2 Product scope

Stakeholder Profiles

- **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

Forgotten stakeholders means forgotten requirements!

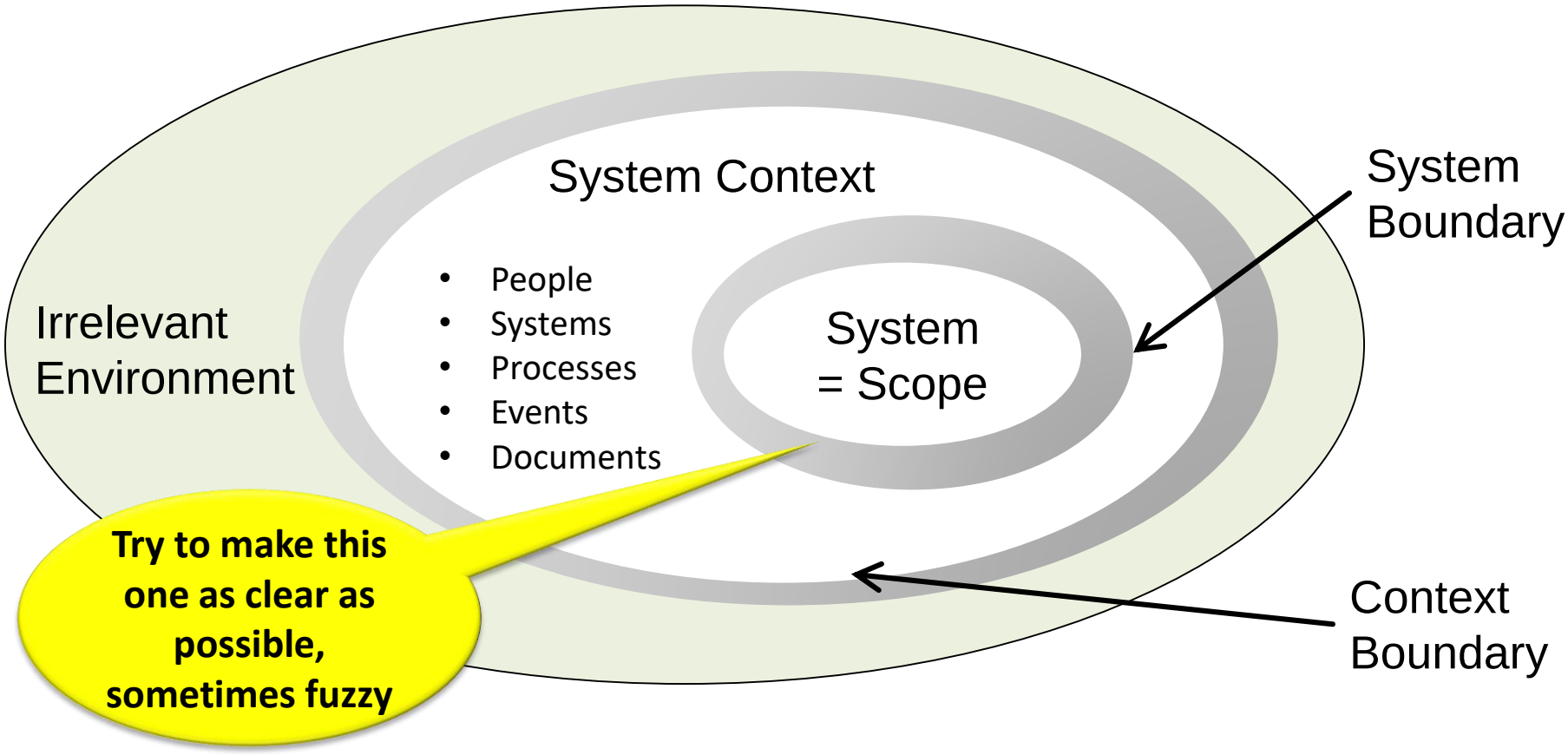
IEEE 830 – SRS template – 2.1 Product perspective

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***

IEEE 830 – SRS template – 2.1 Product perspective



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)

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

- 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)
  - **Business 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**
  - BPM = Business Process Modelling ➔ cf. 3SWM

IEEE 830 – SRS template – 1.3 Glossary (annex)

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?

The beginning of the specification …

- How much do you know?
- Enough to gather the requirements?
- 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?

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