

Requirements Engineering: Principles: Process & Roles CECS 590

Your Expectations

- Requirements analysis and specification
- Project planning and organization
- Good documentation and design
- Practical examples, industry experience
- Visual presentation, diagrams
- Interaction, questions
- Transferable to work in job
- (Preference: Due dates on Monday)

Comments on that

- Yep, we are on the same page.
- Interactive class and me asking questions: I don't want to put anyone on the spot, ever. If it happens, please tell me and be assured that I didn't mean to.
- Due dates on Monday. Ok.

Recap time!

- What is Requirements Engineering?
- Why do we perform RE?
- What are the challenges?
- What is a requirement?
- What are the four phases of RE?
- How do we distinguish between RE and Requirements Management?

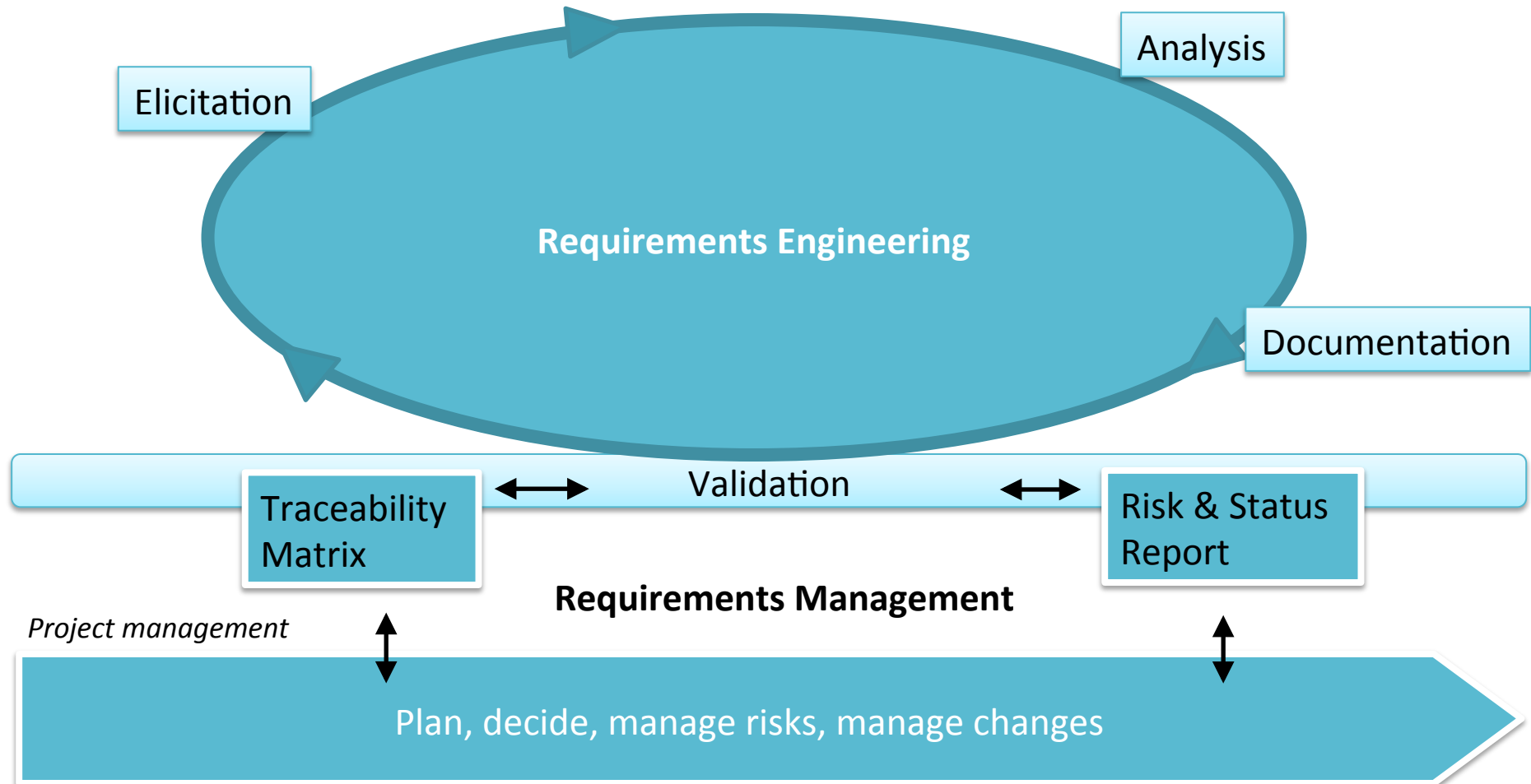
Requirements Engineering – Outline

- WHY do we need Requirements Engineering and what is it?
- **Principles: Process, roles, problem/solution view, artifact orientation**
- System Models: Decomposition and abstraction, system views
- Frameworks: What reference structures can I use for requirements?
- Business Case Analysis: Why are we building this system?
- Stakeholders: Who are the people to talk to about requirements?
- Goals and Constraints: What are the major objectives for the system?
- System Vision: What exactly do we want to achieve?
- Domain Models: What are the surrounding systems ours interacts with?
- Usage Models: How will the system interact with the user?
- Software quality models: How to determine the quality characteristics?
- Quality requirements: How to specify which qualities need to be met?
- Process requirements: How to specify constraints for development?
- Towards a system specification: How to hand over to design?
- Quality assurance: How to ensure that RE is done in a good way?
- Change management: How to evolve requirements?

Principles

- Process
- Roles and Interfaces in RE
- Activity-orientation and Artefact-orientation
- Problem-orientation vs. Solution-orientation

The RE process



Principles: **Roles** and Interfaces in RE

Major roles:

- Requirements Engineer
- Product Owner/Entrepreneur
/Business Analyst
- Domain expert
- Architect
- Tester

Principles: Roles and Interfaces in RE

The results of requirements engineering are used in

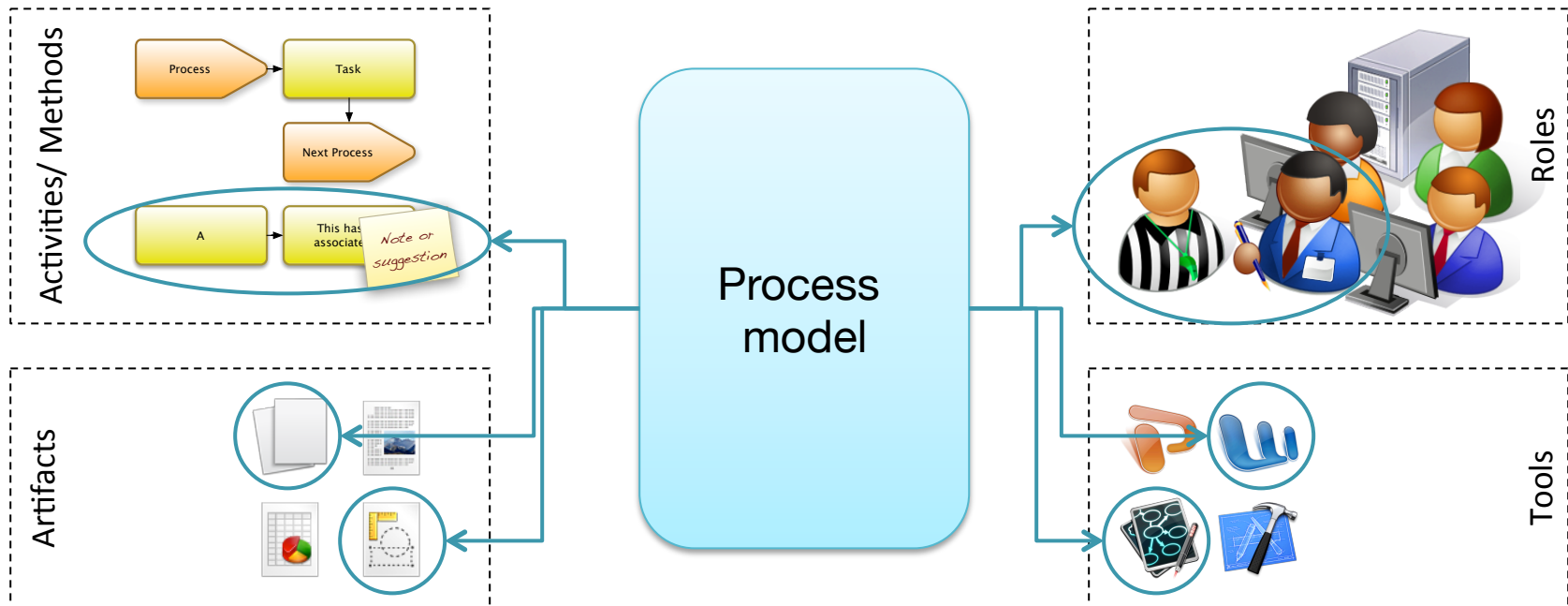
- Budget calculation
- Project planning (releases, test plan, etc.)
- Coordination between stakeholders (customer, user, developer, ...)
- Contract negotiation and assignment
- Design, implementation and integration
- Verification and acceptance (also test specification) within quality assurance
- System/user documentation
- Future development (evolution)

Principles for process model

- We have a rough idea what the process looks like.
- Now how do we get started?
- What do we need to define to organize our RE project?

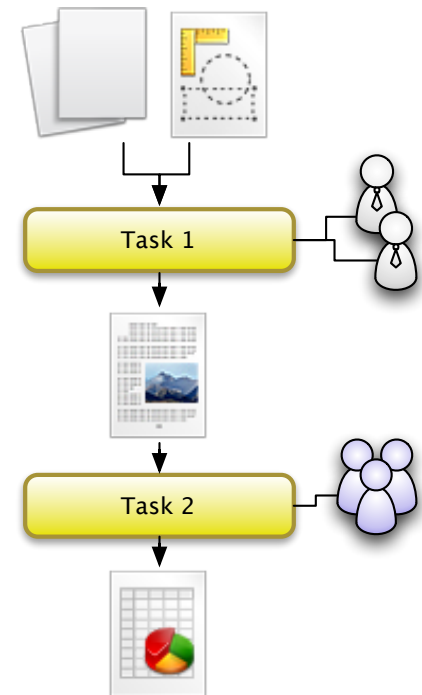
Principles: Activity-orientation and Artifact-orientation

- General process model



Principle: Activity-orientation

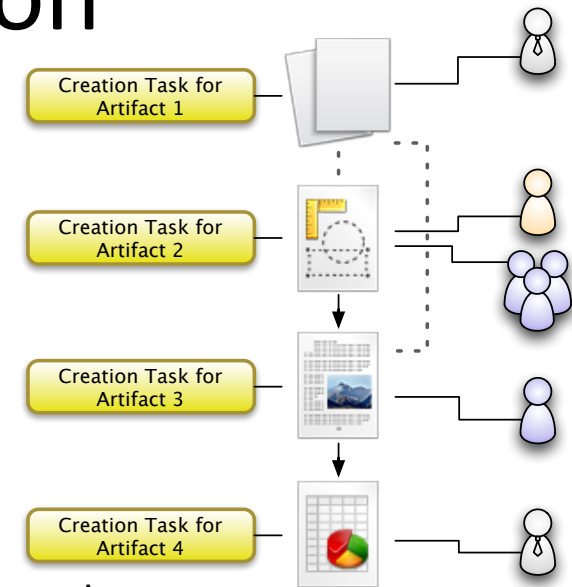
- Questions:
 - How do you **process** sth. during the project?
 - How to **perform** it?
- Focus:
 - Elements of activity model
 - Roles perform activities
 - Artefacts are in-/output



Advantage	Disadvantage
Description of the work process	Restrictive: „This way – only!“
Definition of order in time	Extensive planning required
Detailed instructions for action	Quality of results hard to assess
Reference to all affected artefacts	Underspecification of artefacts (error source)
Good integration of „active“ methods (see instructions for actions)	Quality and extent of activity descriptions crucial for efficiency

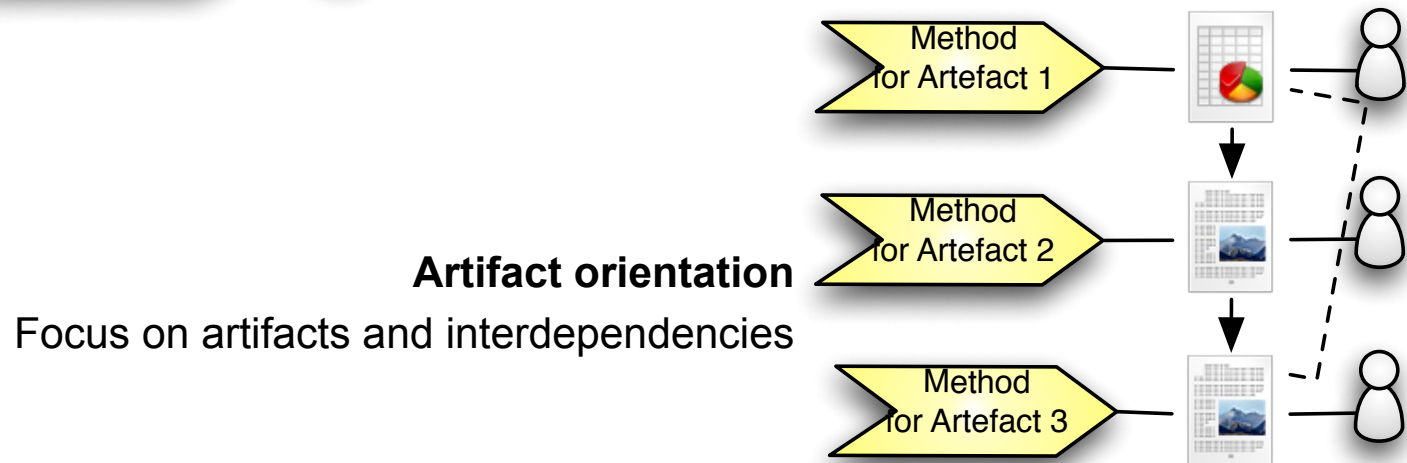
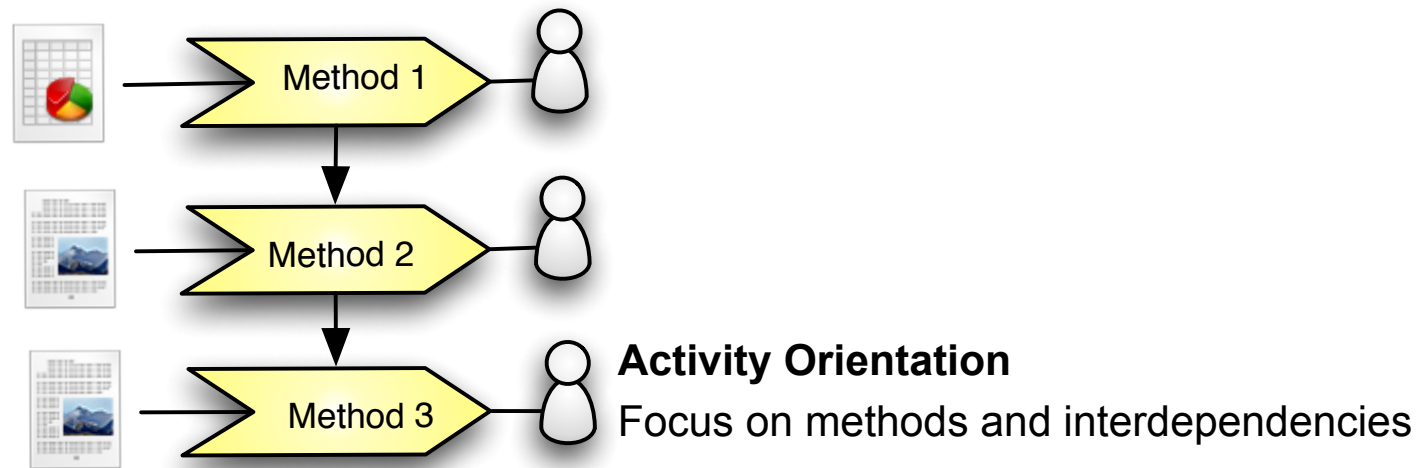
Principle: Artifact-orientation

- Questions:
 - What is **developed** in the project?
 - What does the **result** look like?
 - Who is **responsible** for the result?
- Focus:
 - Elements of the artefact model
 - Roles responsible for results
 - Artifacts have dependencies
 - Activities serve exclusively for planning and elaborating results



Advantages	Disadvantages
Detailed description of quality req. for results	High learning curve (used to thinking in processes)
Method-neutral elaboration of consistent results	Selection and tailoring of adequate methods
Assessable quality due to description and dependencies (progress control)	Deduction of plans is costly
Good scalability in terms of results extent	
Clear responsibilities	
Consistent terminology across all projects	

Principles: Activity-orientation and Artifact-orientation



Exercise: What do you need?

- Let me build that for you.
- Ah, webpage for we dig holes – tell me what you need on there.

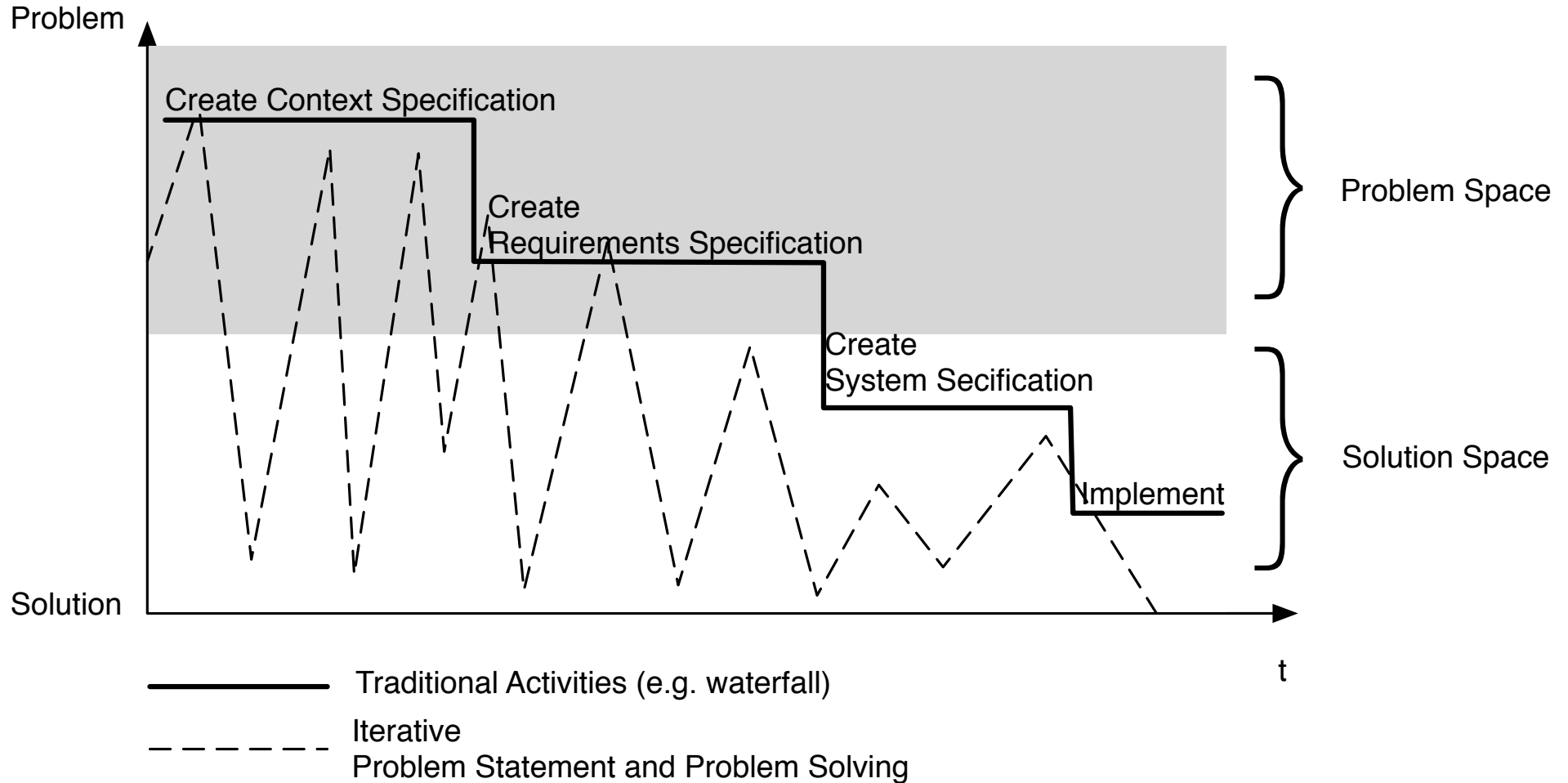
Exercise

- Team up in teams of 2 for this in-class exercise
- Student A receives a piece of paper with a drawing from me
- Student B is not allowed to see the drawing
- A instructs B on what to draw without naming what the result exactly depicts

Principles: Problem-orientation vs. Solution-orientation

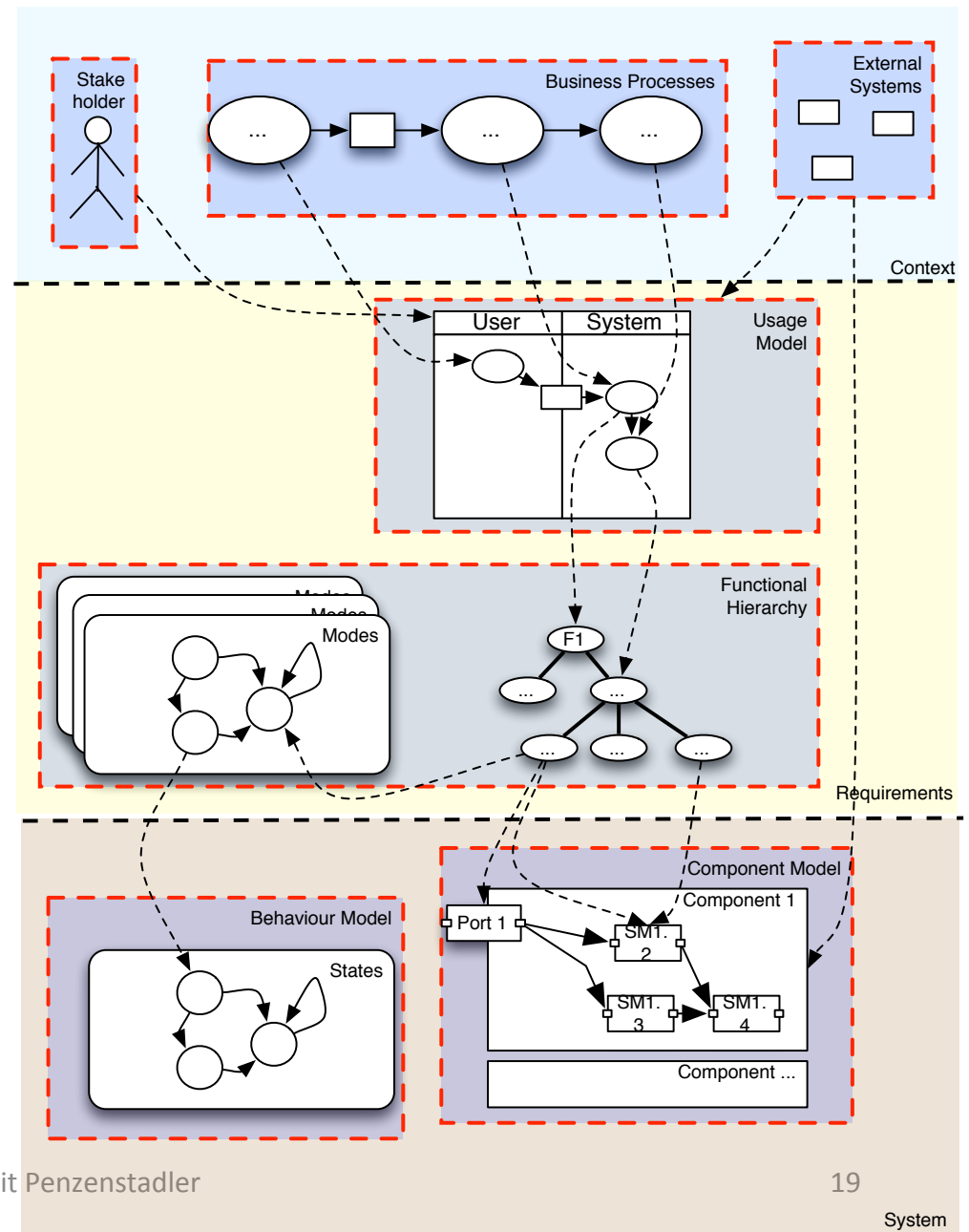
- Solution-orientation
 - Customer proposes solution instead of problem
 - Developer starts implementation
- Dangers:
 - Suboptimal solution
 - Mismatch between solution and problem
 - Work-around instead of solution
- Instead: focus on problem

Principles: Problem vs. Solution



Principles: Problem vs. Solution

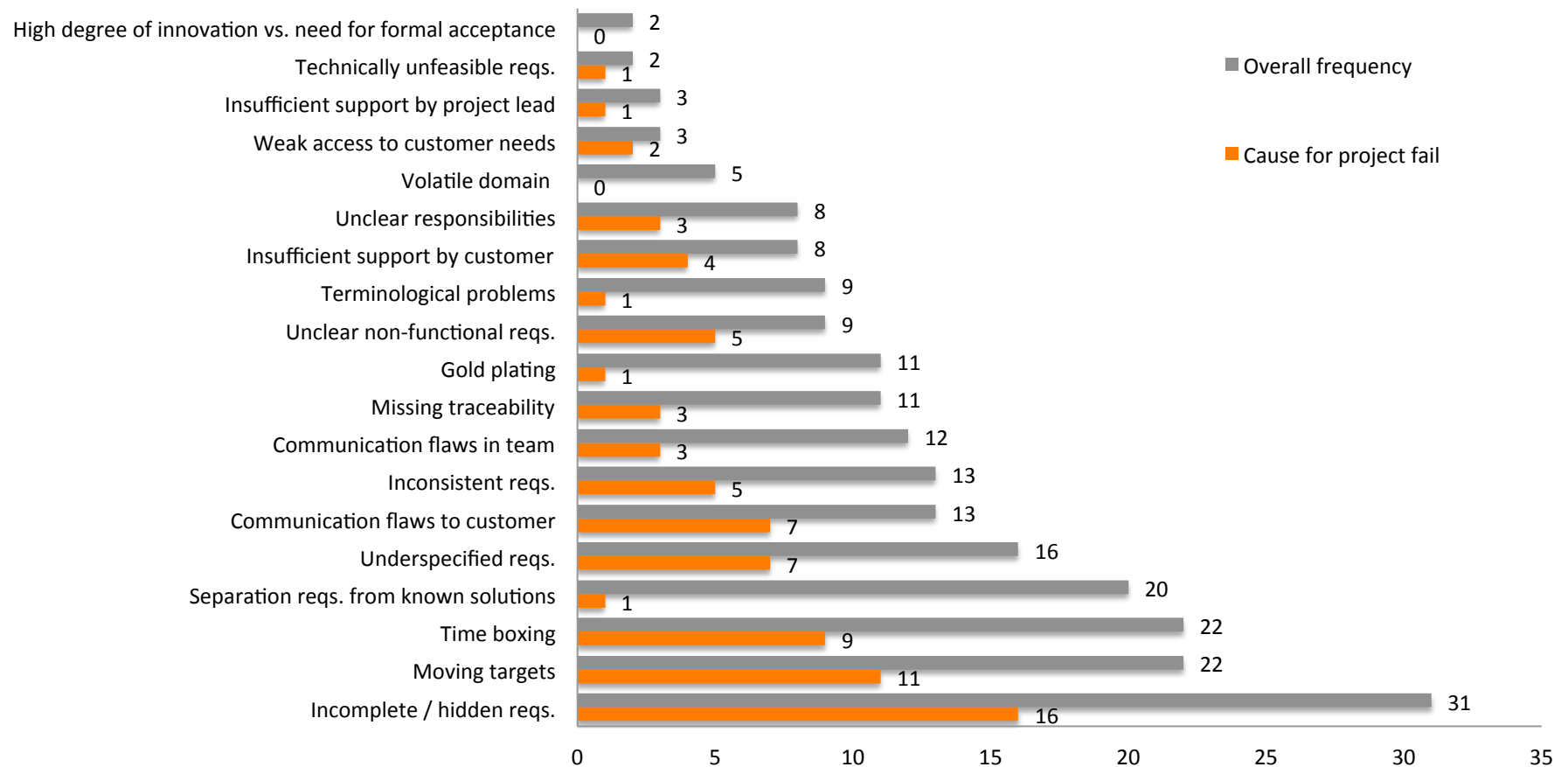
- Collect domain
 - Characteristics of system (family)
 - Terminology
 - Rules and relations
- Identify stakeholders
- Document goals and constraints
- Analyse the current situation (strengths, weaknesses, needs)
- Define scope
 - Delimit Problem and System
 - Document operational context
 - Interfaces
- Analyse the user-visible functionality
- Define the functionality and quality
- Iteratively transform into system specification



Discussion

- What is activity orientation?
- What is artifact orientation?
- Why is it important to work problem-oriented at the beginning of RE?

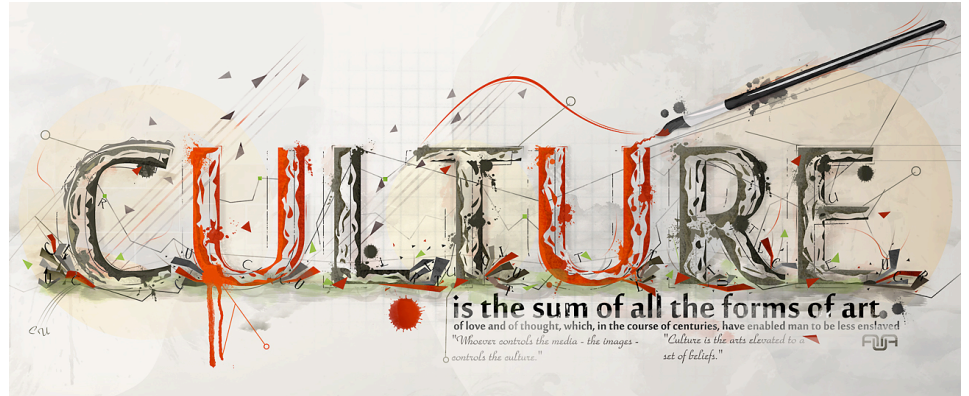
Remember: Current challenges



Mendez et al. Naming the Pain in Requirements Engineering – NaPiRE-Report

A culture of RE

- RE is significant w.r.t.
 - Cost effectiveness: savings potential
 - Quality assurance
 - Reusability of products and requirements
 - Test and Integration
 - Customer relations and market
- Need to gain awareness for RE on organizational level
 - Definition of clear roles and responsibilities
 - Establishing a framework and continuous improvement



1-minute paper

- I want you to propose an idea of what system you might want to develop (we might end up making the requirements specifications for it).
- I have a few ideas but I would like your input.
 - Something fun
 - Something useful (for whom?)
 - Something to improve life on campus
 - Something to improve life in Long Beach
 - Something to improve communication (with whom?)

Exercise: Basic Terms in RE

Structure the following list of terms, for example as graph or table, by naming the relations between the terms. You can choose the names of the relations freely, for example “X consists of Y”, “X is identical to Y”, “X checks Y”, “X uses Y”, “X is a special case of Y”.

List of terms: Elicitation, Requirements Engineering, Requirements Management, Specification, Requirements Document, Analysis, Validation, Verification, Stakeholder, Requirement, Requirements Source, Tracing, Development Process, Requirements Artefact, Process Requirement, System Requirement, Rationale, Constraint, Implementation Constraint, Functional Requirement, Quality Requirement, Potential Requirement, Accepted Requirement, Process Model, Artefact Model.