Graz University of Technology

Object-Oriented Analysis & Design (OAD)

OAD Introduction

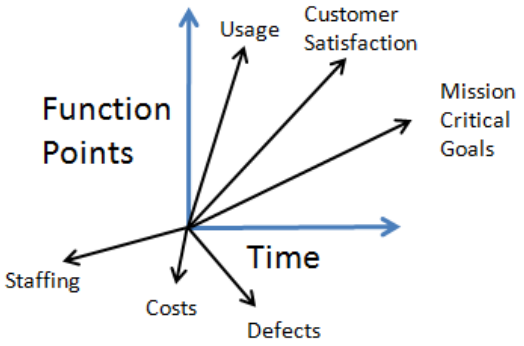
Alexander Felfernig
Institute for Software Technology
Inffeldgasse 16b/2

https://youtu.be/1YHbsxZCCqE

Software Systems

Graz University of Technology

- model part of the real world
- are often large and complex
- must be maintainable
- must be highly reliable
- must be user-friendly
- must be efficient



- to build high-quality systems we need
  - a process with clearly defined activities (e.g., **Unified Process**)
  - techniques for supporting the activities (e.g., **UML**)
  - tools for generating the products (e.g., **Visual Paradigm**)

Successful Software Development means …

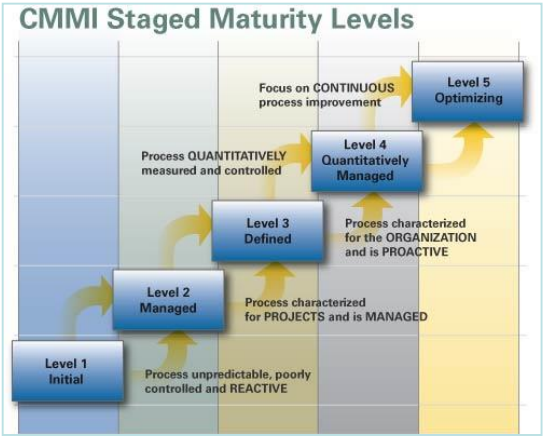
Graz University of Technology

- **understanding** the requirements
- **prioritizing** the requirements
- **tracing** the changes
- **knowing** the risks
- **assuring** the quality of artifacts
- …

Approximately 40% of the total project budget is related to rework costs triggered by low-quality requirement definitions!

Software Process

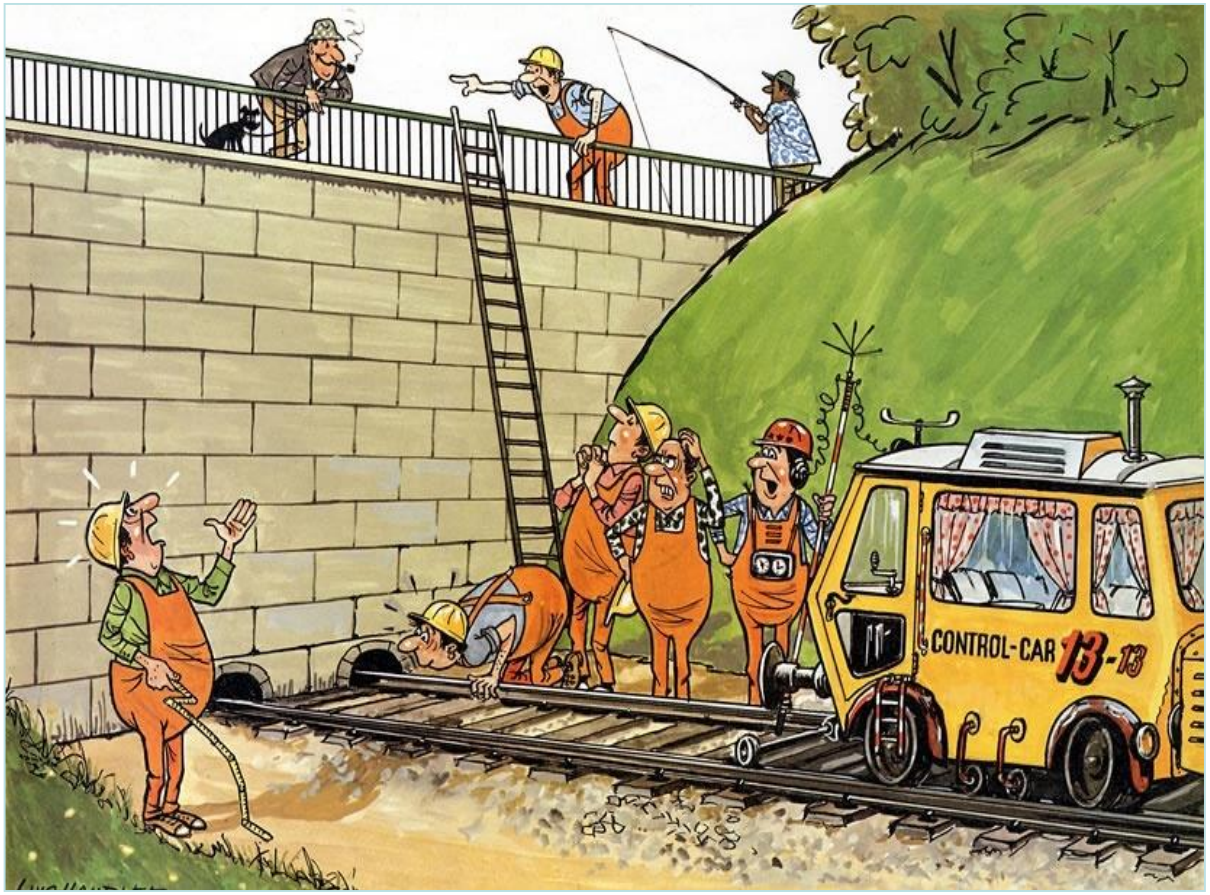
Graz University of Technology



- **goal**: producing **high-quality products** in a disciplined process
- described by a set of **activities that transform requirements into software**
- requirements state
  - services to be provided: **functional requirements**
  - **non-functional requirements** (e.g., response times, usability, etc.)
- **challenge**: requirements are incomplete, not understandable, unstructured, inconsistent
- **first activity**: **OOA (Object Oriented Analysis)**

Why OOA?

Graz University of Technology



- understanding of **what** we want to develop …
- **what**? vs. **how**? (analysis vs. design)
- **scenario** vs. **integrated state model**
- **object model** vs. **relational algebra**

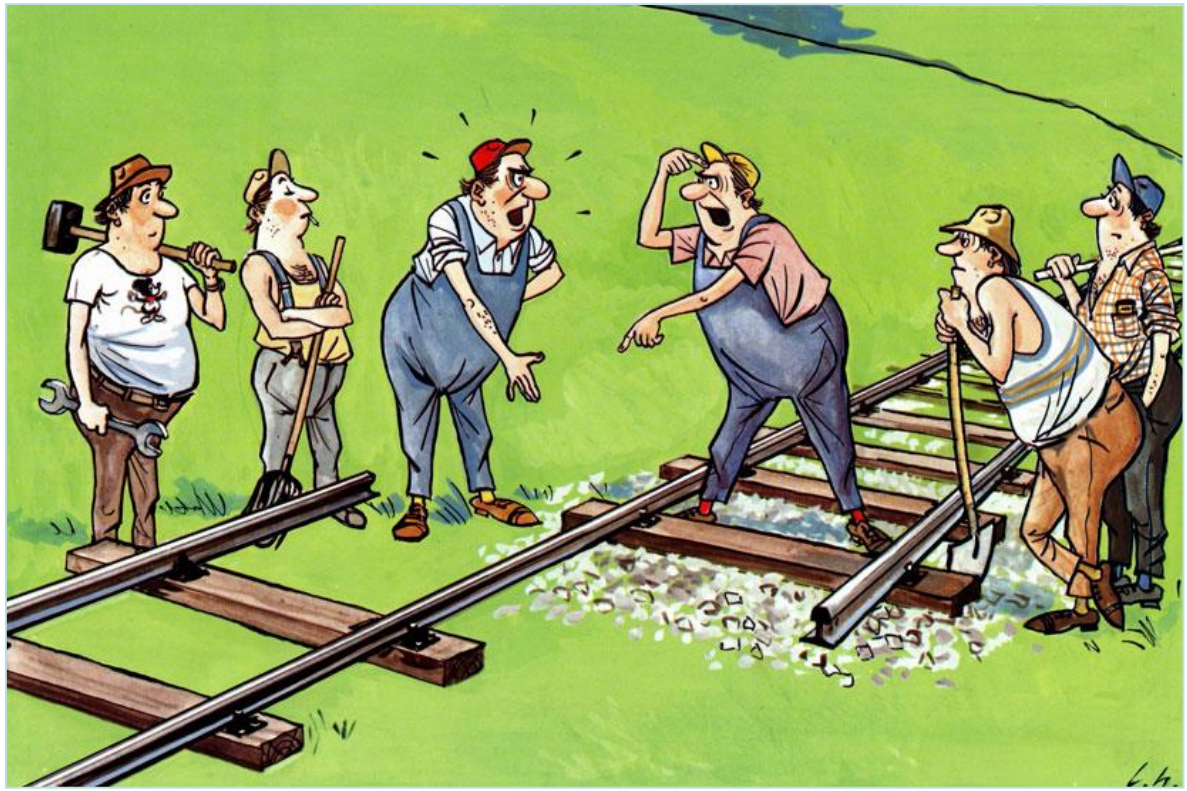
Requirements Engineering

Graz University of Technology

- main activity in OOA
- **requirements document**: relevant requirements for the software system
  - Glossar
  - Business case
  - Requirements (e.g., in terms of use cases)
  - Domain model
- late error discovery triggers high costs!
- **next phase**: **OOD (Object Oriented Design)**

Why OOD?

Graz University of Technology



- understanding of **how** we will develop the software …
- **integrated state model** vs. **implementation**
- **OCL constraints** vs. **implementation**
- **relational algebra** vs. **database**

Design

Graz University of Technology

- **logical design**
  - partitioning of requirements to components
  - how do components interact?
- **detailed design**
  - each component is designed individually
  - how does a component solve it‘s tasks?

Roles in Team

Graz University of Technology

- Analysts (A): eliciting and investigating requirements (relationship with customer)
- Developers (D): designing and implementing software
- Managers (M): managing and configuring the software engineering process
- Testers (T): testing the software
- General (G): further activities if needed

Enterprise Applications

Graz University of Technology

- support typical problem solving scenarios in enterprises (e.g., online selling applications)
  - in contrast to technical & scientific applications
  - in contrast to the system programming level (operating systems, hardware, computer networks, etc.)
- are data-intensive
  - high data volumes (e.g., millions of customers and items)
  - not (!) computational intensive (in contrast to technical & scientific applications …)
- are Input/Output (I/O)-intensive
  - major role of data/information collection and retrieval
  - no complex underlying algorithms

Enterprise Applications

Graz University of Technology

- are transaction oriented
  - information/data used in a distributed environment (e.g., www.amazon.com)
  - for instance, essential for functionalities related to booking, payment, etc.
- are end user oriented
  - applicable for users with different educational background (usability aspects, etc.)
  - optimal support for working processes crucial (e.g., recommendations)
  - flexibility/adaptability important (e.g., sales and marketing rules regarding the recommended items have to be continuously adapted)

Graz University of Technology

Thanks!

ase.ist.tugraz.at
www.felfernig.eu