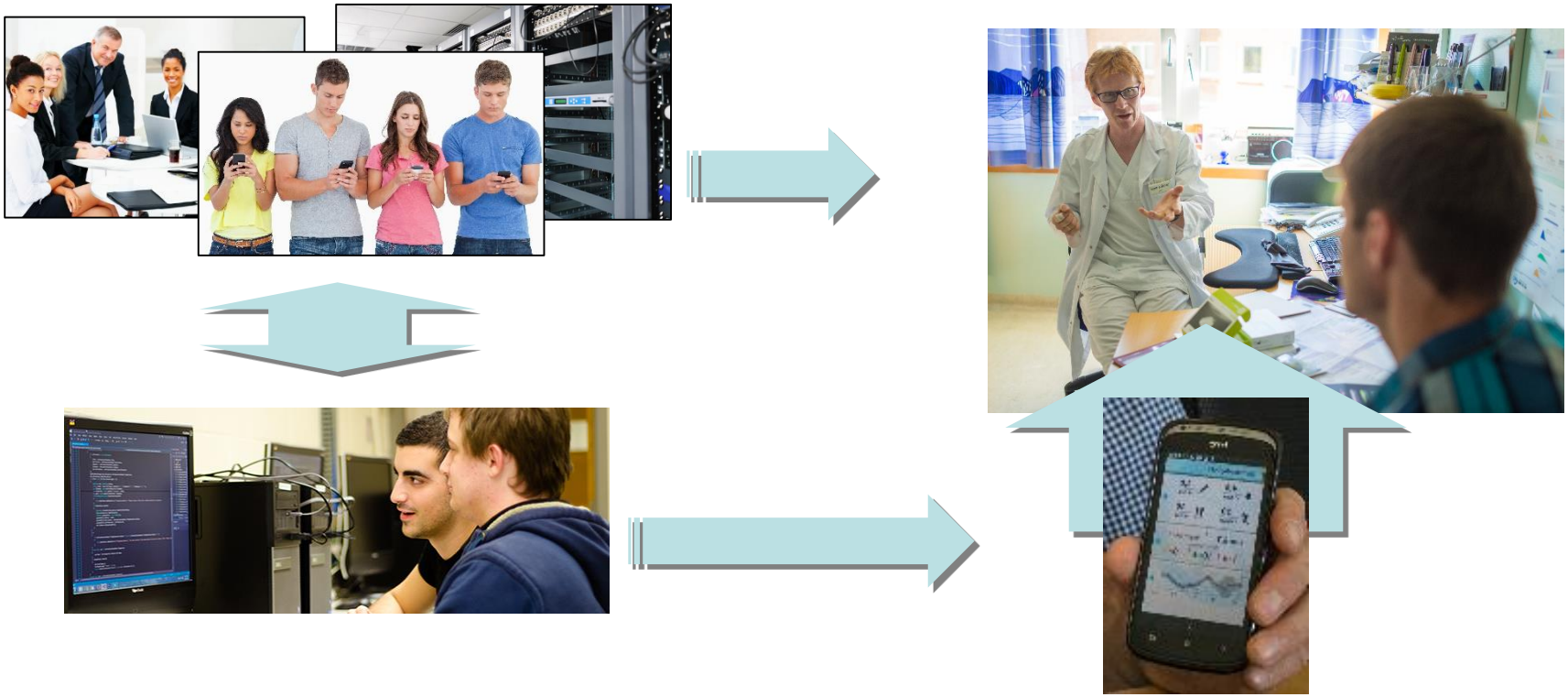
University of Applied Sciences and Arts Northwestern Switzerland
School of Engineering
i4DS | Centre for Requirements Engineering | © Prof. Dr. Samuel Fricker

Requirements Engineering
Motivation, Definitions and Key Ideas



An Illuminating Press Report

In a dry press release, Skyguide announced in July last year the end of the project "Atmas". The proposed system for air traffic control made "little economic sense“. Today politicians say that the system was outdated from the start. However, when the project was cancelled, 55 million francs (about 45M€) had been spent already. End of June Skyguide will explain how the expensive bad investment came about.

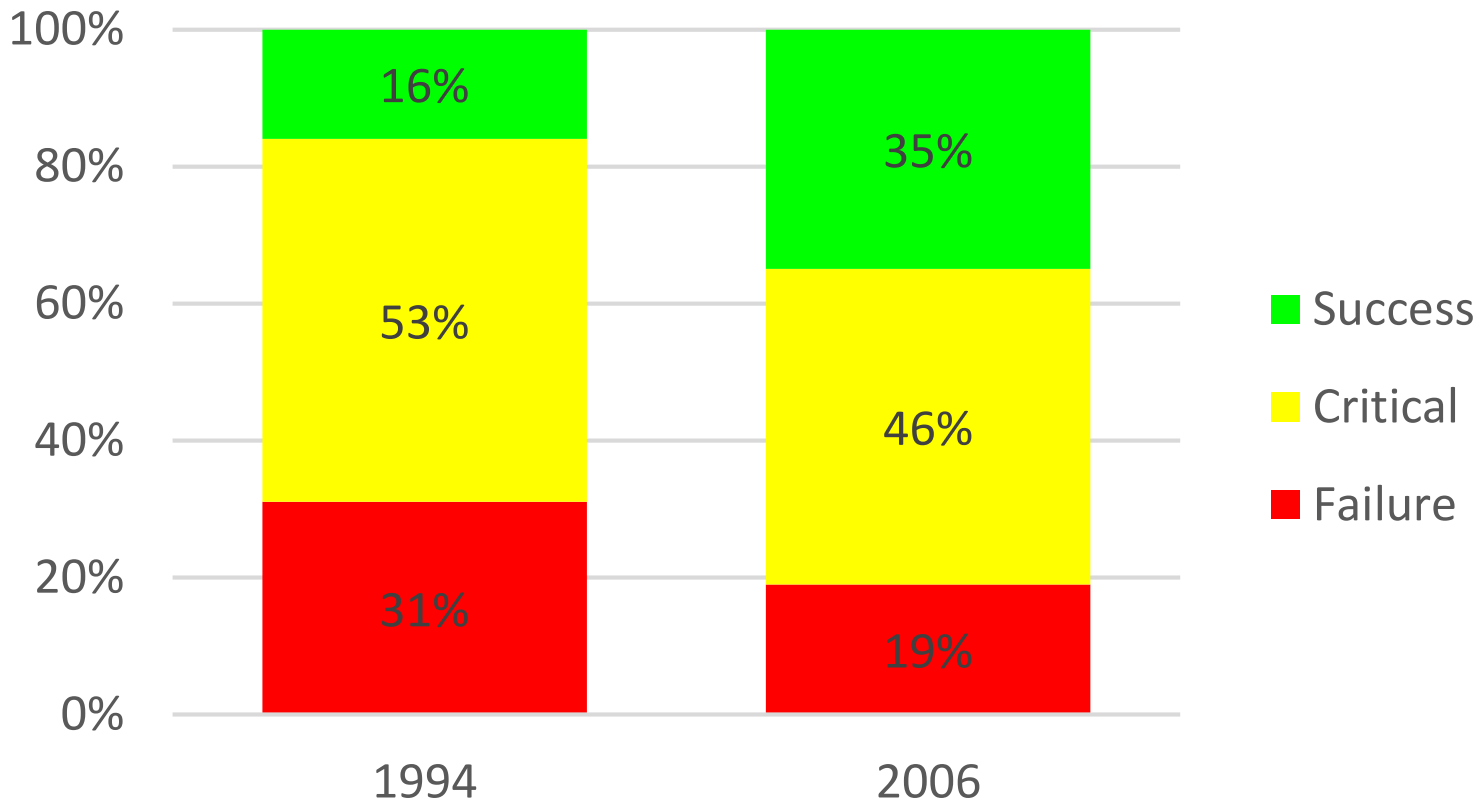
Politicians investigated the Skyguide case already during the last few days. "Tages-Anzeiger" received information from a meeting with members of the management audit and finance committees of the Parliament. The information shows that the Board of Skyguide, the staff responsible for Atmas supervision from the Swiss Traffic Department (Uvek), and the involved staff from the Swiss Defense Department (VBS) reacted too late.

Uvek requested a report about the disaster only in hindsight. That report shows that the Skyguide Board barely monitored the expensive project. Also, the project group consisted of many engineers but did not contain any future users. Finally, too few tests were conducted to test the promises of the Atmas manufacturer Thales.

Federal Councillor Moritz Leuenberger said at the meeting that the new President of the Board, Guy Emmenegger, warned him last summer with the following words: "Atmas is a bottomless pit - this cannot go on." After several meetings with the board the stop of the project was decided. "We now want to draw lessons from the case," says Hans Werder, Secretary General of Uvek. 25 of the 55 million are considered lost and written off. The rest was recorded by Skyguide as "valuable know-how".

Tages-Anzeiger, May 19, 2005

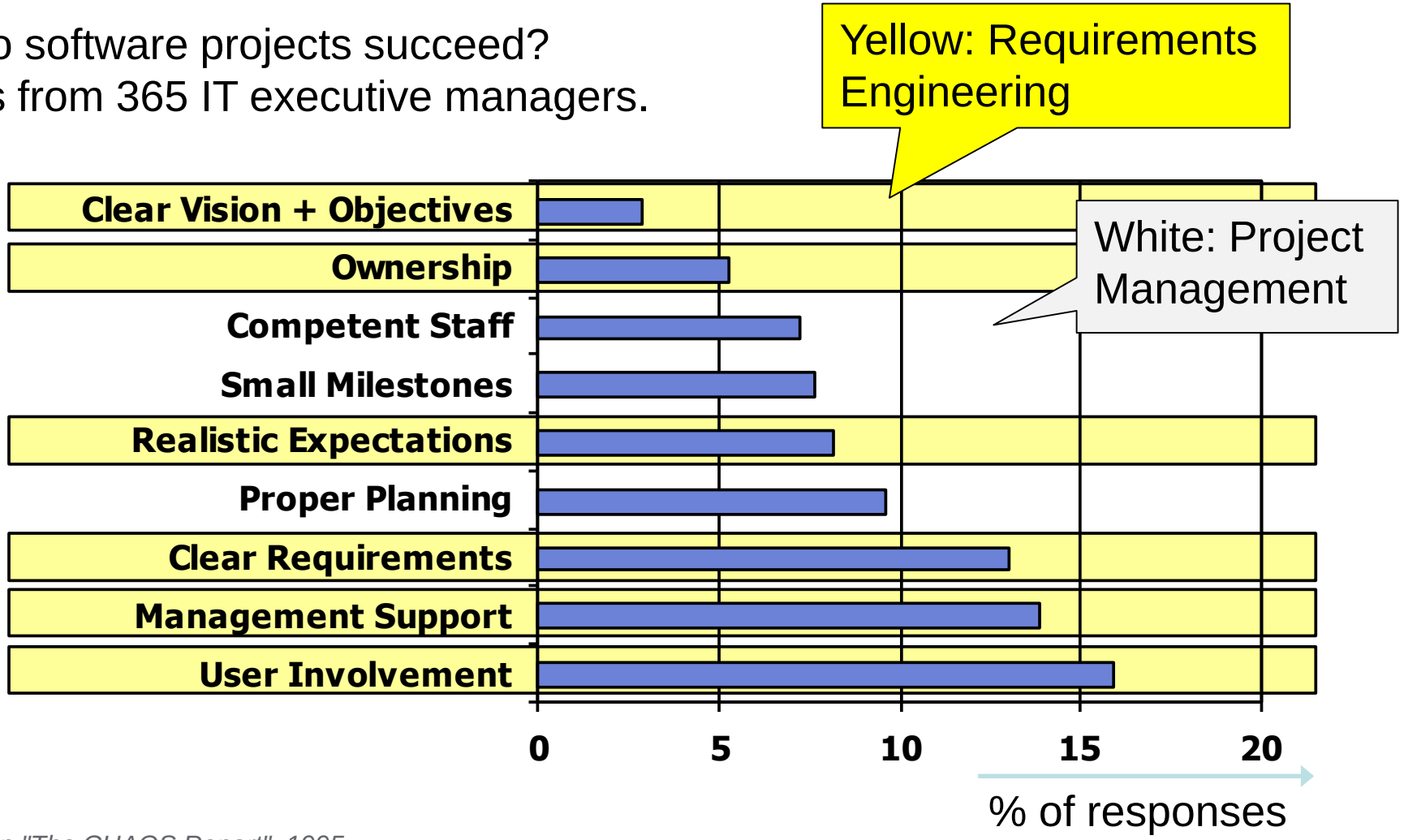
Success Rates of SW Projects



Success: project completed on-time, on-budget, and with all features.
Critical: project completed over-budget, delayed, or with reduced set of features.
Failure: project cancelled at some point during the development cycle.

Success Factors: Projects for a Customer

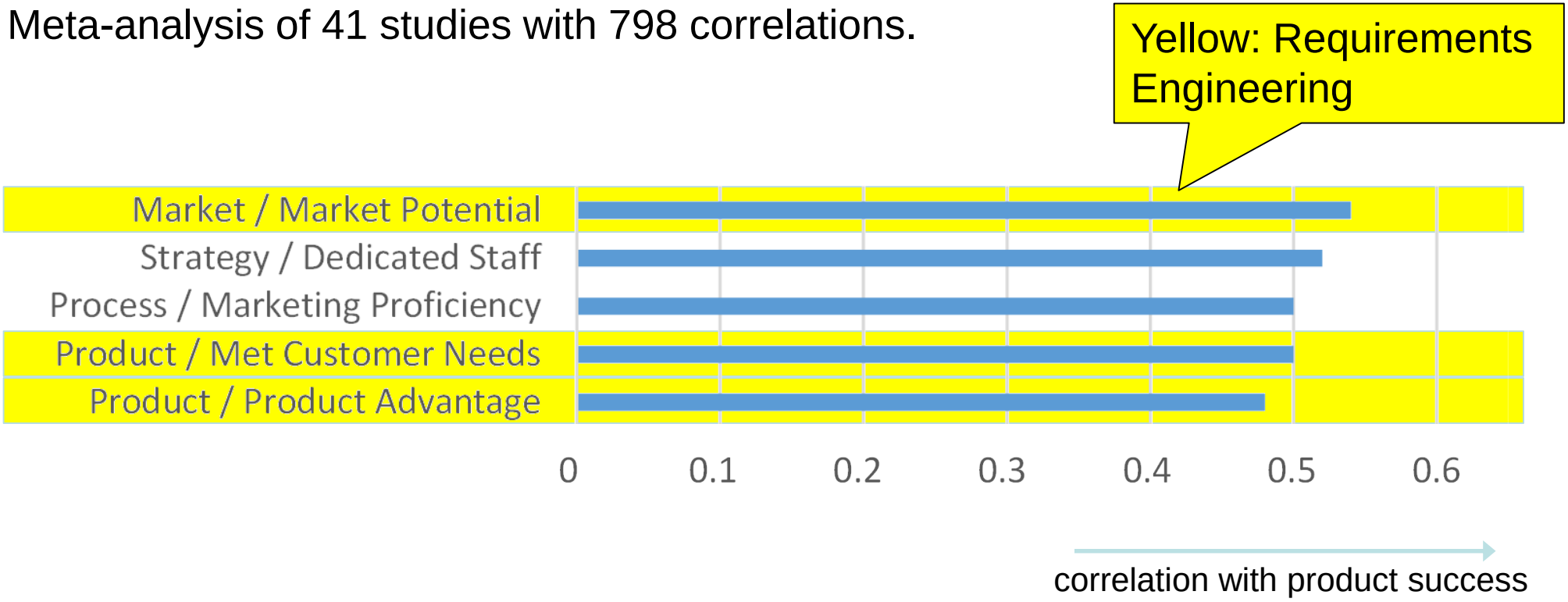
When do software projects succeed?
Answers from 365 IT executive managers.



Standish Group,"The CHAOS Report", 1995

Success Factors: Projects for a New Product

When do products offered to a market succeed?
Meta-analysis of 41 studies with 798 correlations.



Henard, Szymanski (2001): Why Some New Products are More Successful than Others. Journal of Marketing Research.

Requirements Engineering: Goals

Total	419	100%
Shared Understanding	214	51%
Specification Quality	197	47%
Clear Scope	160	38%
Efficiency	155	37%
User Satisfaction	145	35%
Timeliness	139	33%
Fit of Solution	94	22%
Estimation Reliability	65	16%
Architecture Quality	58	14%
Cost/Benefit Analysis	26	6%
Other	4	1%

Fricker, Grau, Zwingli: "Requirements Engineering: Best Practice", in: Requirements Engineering for Digital Health. Springer.

Requirements Engineering: Stakeholders

The Stakeholder of a system is

- a person, group of people or an organisation
- who has directly or indirectly
- influence on the requirements of the regarded system

Requirements Engineering: Process

Elicitation

- Active identification and collection of requirements

Analysis

- Understanding the impact of requirements, e.g. on software, tests, and project
- Checking formal properties of the requirements, e.g. for precision, completeness, and consistency

Documentation

- Building prototypes, e.g. of graphical user interface
- Writing down the requirements, e.g. with natural-language, graphical, or formal notations

Validation

- Checking the requirements against the real world, e.g. for correctness and completeness

Negotiation and Prioritization

- Grouping and ranking of requirements, e.g. according to importance or criticality
- Agreeing on the selection of requirements, e.g. for a software release

Management

- Use of the requirements for implementation control and changes

Requirements Engineering: Requirements

According to the IEEE Standard Glossary Std 610.12-1990, a requirement is a

1. A condition or capability needed by a user to solve a problem or achieve an objective.
2. A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed documents.
3. A documented representation of a condition or capability as in (1) or (2).

What is the difference between a requirement and

- an idea,
- a need, and
- a goal?

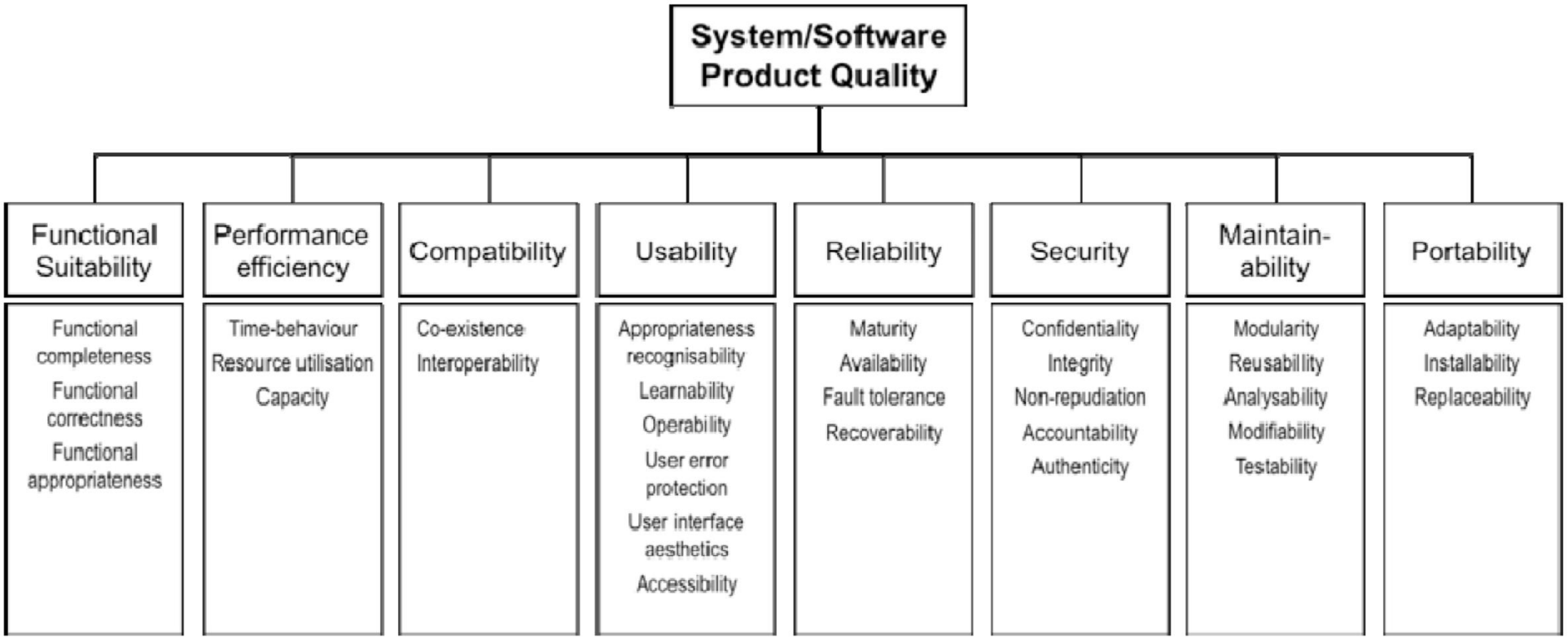
Requirements Engineering: Definitions

Requirements

- Functional Requirements
  - Usage: Processes, Scenarios
  - Domain: Data, Behaviour
- Non-Functional Requirements
  - Quality Requirements
  - Constraints
- Other
  - Goals
  - Machine-to-Machine Interfaces
  - Graphical User Interfaces

Quality Requirements

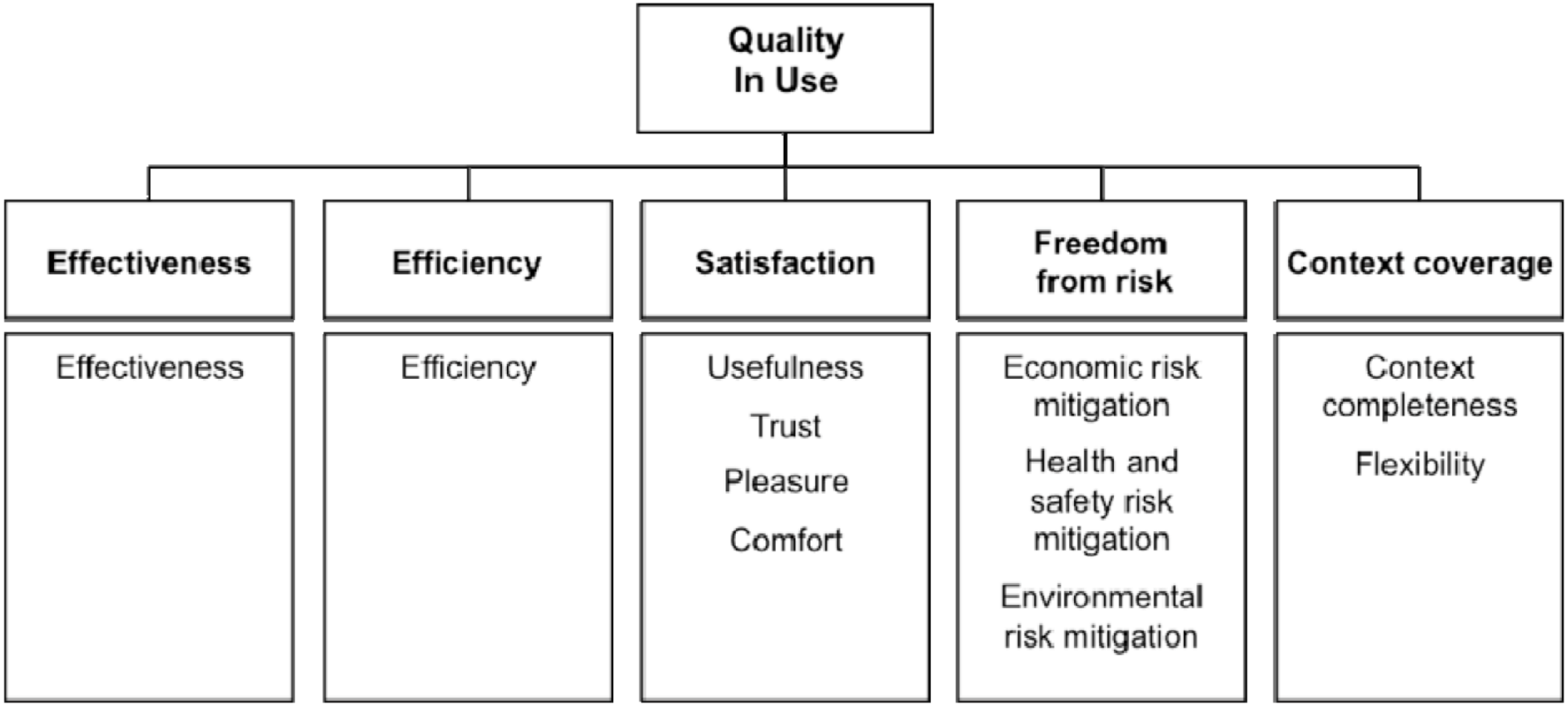
Common types of software qualities



ISO/IEC FDIS 25010-2010: System and Software Quality Models.

Requirements Engineering: Goals

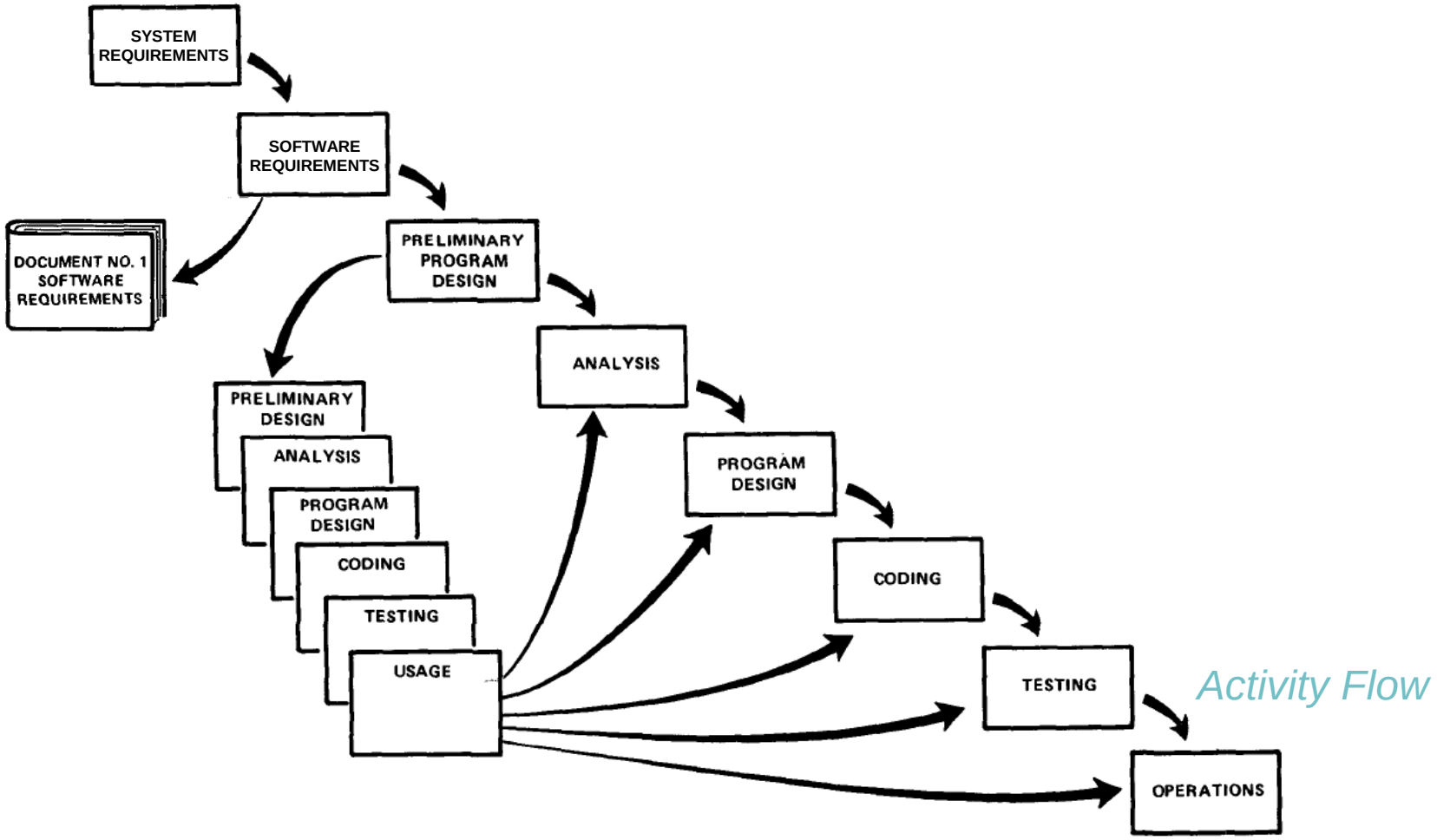
Common types of goals that stakeholders achieve with software



Other: Compliance

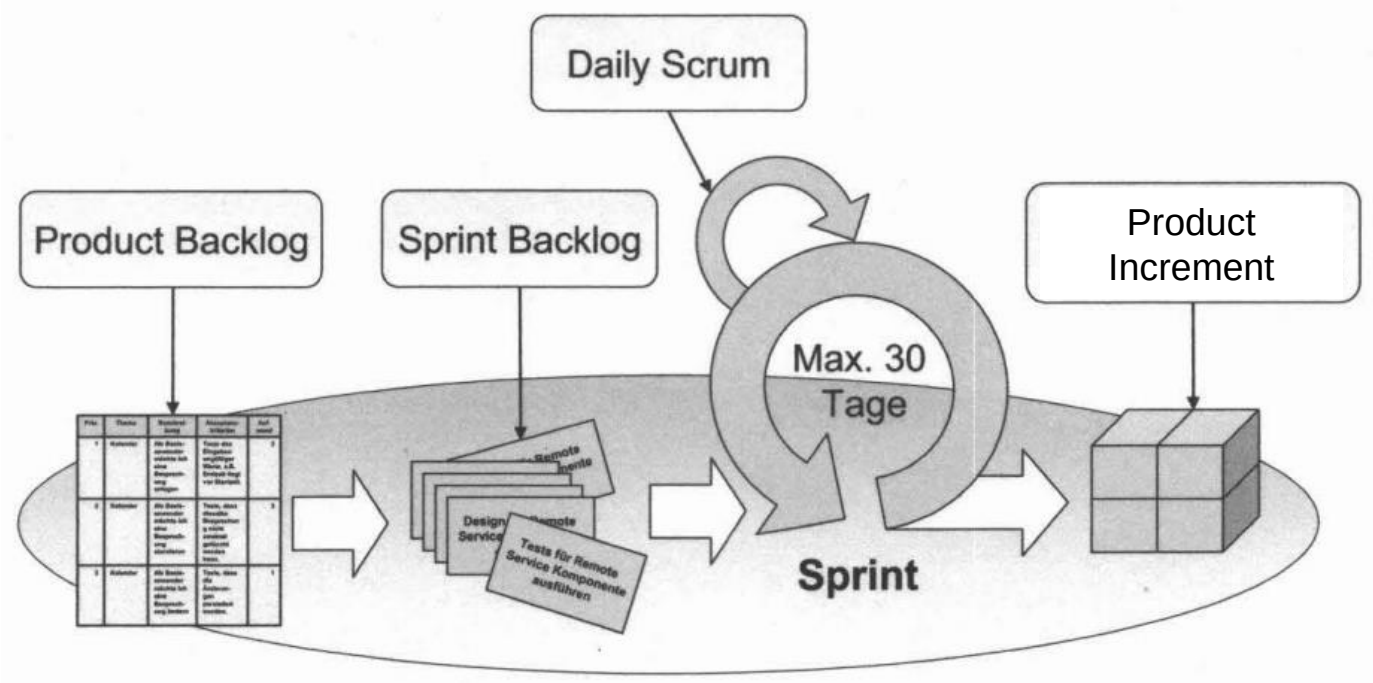
ISO/IEC FDIS 25010-2010: System and Software Quality Models.

RE in a Project that Follows the Waterfall Process



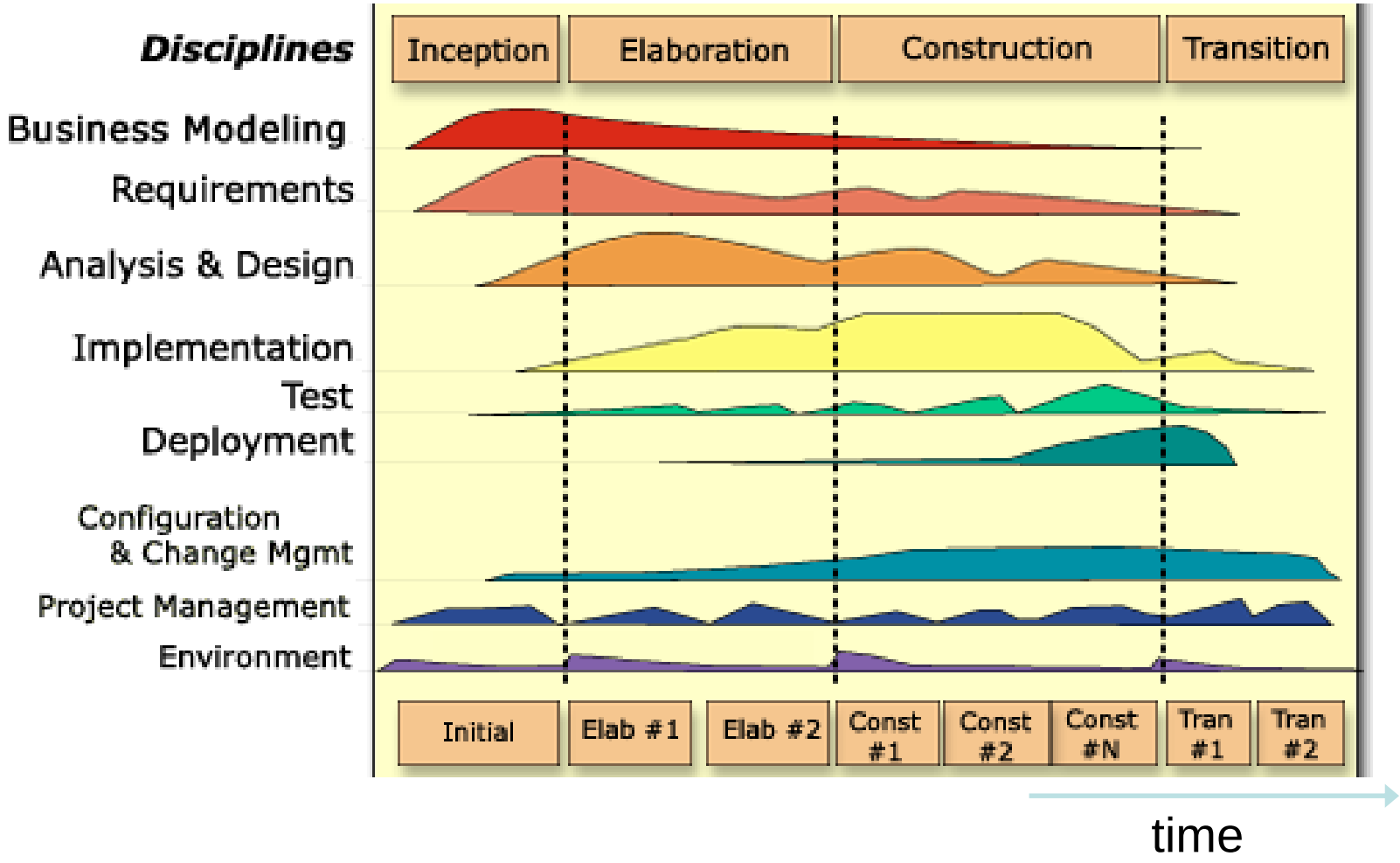
Royce (1970): "Managing the Development of Large Software Systems", IEEE WESCON.

RE in a Project that Follows the Agile Scrum Process



Pichler (2008): Scrum – Agiles Projektmanagement erfolgreich einsetzen. dpunkt.verlag.

RE in a Project that Follows the Hybrid Rational Unified Process



Kruchten (1996): A Rational Development Process. Crosstalk 9(7).

Questions & Answers