



# Non-Functional Requirements (NFR)

RE@bbv Community Day



Quality Attributes	System Constraints	Project Constraints
<ul style="list-style-type: none"><li>• Functional suitability</li><li>• Reliability</li><li>• Usability</li><li>• Security</li><li>• Performance efficiency</li><li>• Maintainability</li><li>• Portability</li><li>• Compatibility</li><li>• Manufacturability</li><li>• Safety</li><li>• Operability</li></ul>	<ul style="list-style-type: none"><li>• Platform usage</li><li>• Programming language given</li><li>• Standards to follow</li><li>• Production cost</li><li>• Operating cost</li><li>• Regulatory guidelines</li></ul>	<ul style="list-style-type: none"><li>• Launch date</li><li>• Given budget</li><li>• Supplier selection</li><li>• Process to follow</li><li>• Given organization</li><li>• Regulatory guidelines</li><li>• Transition into operation</li></ul>

## Definition

Non-functional Requirements define how well a system should perform.

## Classification

The grade of performance can be based on a variety of Elements.

## Quality Attributes

- Functional suitability
- Reliability
- Usability
- Security
- Performance efficiency
- Maintainability
- Portability
- Compatibility
- Manufacturability
- Safety
- Operability

## Overlapping's with Architecture

Quality attributes can be specified on the architectural level according to business goals and project needs. These architectural quality attributes cover different views on the projects and therefore do not match the quality attribute requirements 1:1.

## Overlapping's with HID/UX

Usability quality attributes can be specified/addressed by HID/UX.

## Overlapping's with Security Department

Security quality attributes are sometimes already specified/predefined by a security department.

## System Constraints

- Platform usage
- Programming language given
- Standards to follow
- Production cost
- Operating cost
- Regulatory guidelines

## Project Constraints

- Launch date
- Given budget
- Supplier selection
- Process to follow
- Given organization
- Regulatory guidelines
- Transition into operation

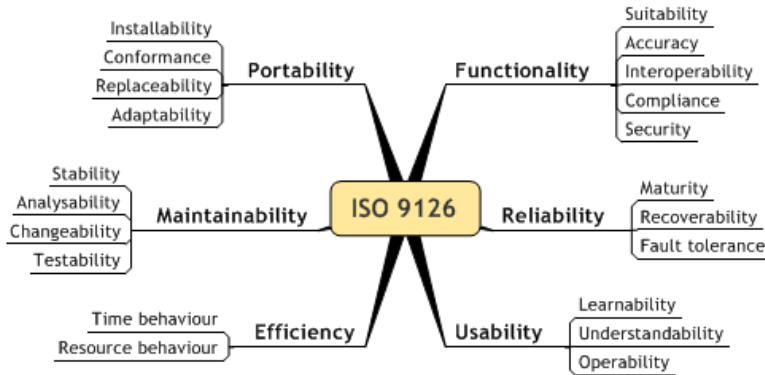
## Project management driven

Production and operating cost are often in the responsibility of the project management or steering board.

## Customer driven

Launch date, technology decisions and supplier selections are often driven by the customer of the project.

# Problem: NFR only for Quality Attributes



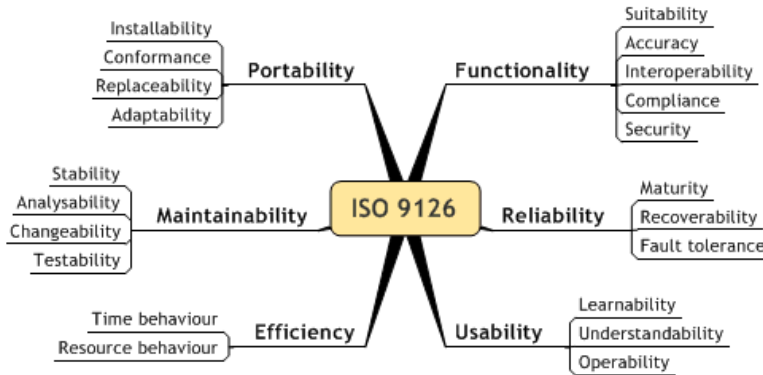
## Only Quality Attributes

- ✂ NRF covers very often only Quality Attributes, because System/Project Constraints are already given.

## Only selected topics

- ✂ NRF covers very often only selected topics of the Quality Attributes.

# Problem: NFR not tested/achieved



## Methodology/Technology

☁️ Testing of NFRs often requires special methodologies and/or technologies which is not available to the developers.

## Environment

☁️ NFRs often specifies a target environment which is not available to the developers.

## Costs

☁️ Achieving the goal of the NFRs is often cost intensive and are therefore often scoped out at a given point in time.

## Reference Hardware for Performance Requirements

For measuring the performance requirements, the following hardware shall be taken as the reference environment:

CPU: Intel Celeron Processor N2930 (Quad core)  
RAM: 4GB DRAM  
HDD: 64 GB mSATA Flash  
Network: 100 Mbit/s Ethernet

## Security: System Memory and CPU consumption

While signing or encrypting of content, the encryption unit shall use the system memory and CPU of the reference environment in a moderate way.

System memory usage: in average max. 70% of the not-reserved memory  
CPU usage: in average max. 70% of the overall CPU time (average of all cores)  
HDD I/O: in average max. 70% of the available I/O capacity

## Outgoing Message Throughput

The processing unit shall be able to send in 90% of the time at least 800 messages within a time span of 60 seconds over the communication interface, without interfering the incoming message throughput.

## Reference Environment

- 🔍 Define a reference environment (Hardware, Network, Software etc.) as the relevant base for testing the NFRs. Not needed if already given by the general requirements.

## Tolerance

- 🔍 Allow the system to have exceptional cases without failing the NFR.

## Observation context

- 🔍 Define a timespan for the test duration.

## Reproducible

- 🔍 Specify only scenarios which can be produced/reproduced.

## NON-FUNCTIONAL REQUIREMENTS IN USER STORIES

- Use “constraint stories” (static in backlog)
- Add to affected stories  
... I want to ... within **two** seconds  
when **100** other users are active
- Add to acceptance criteria  
... quantify!
- Use unformatted stress performance tests

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MAKING VISIONS WORK.  
**NFR'S**



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