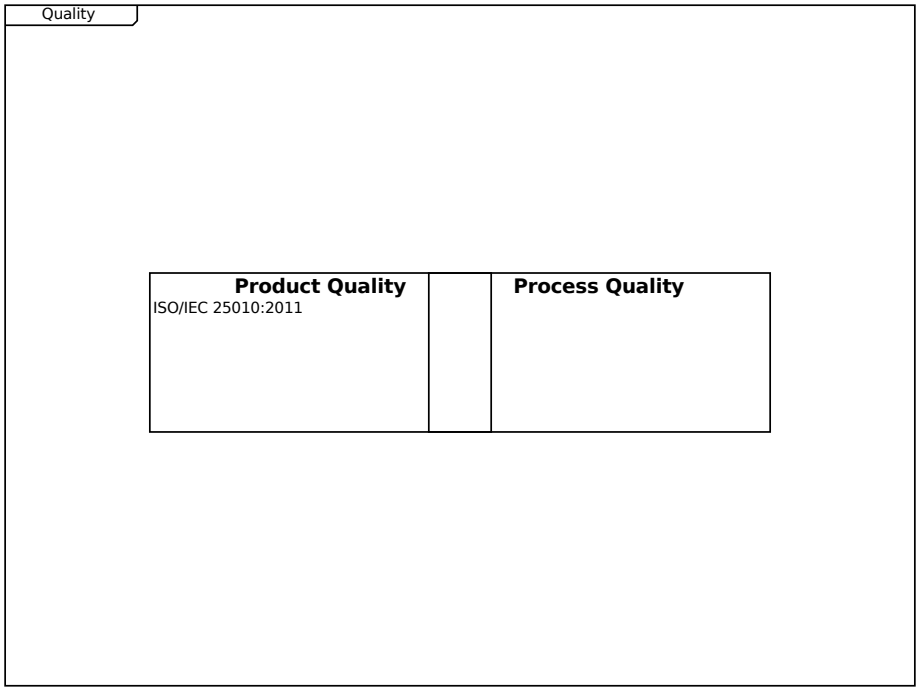
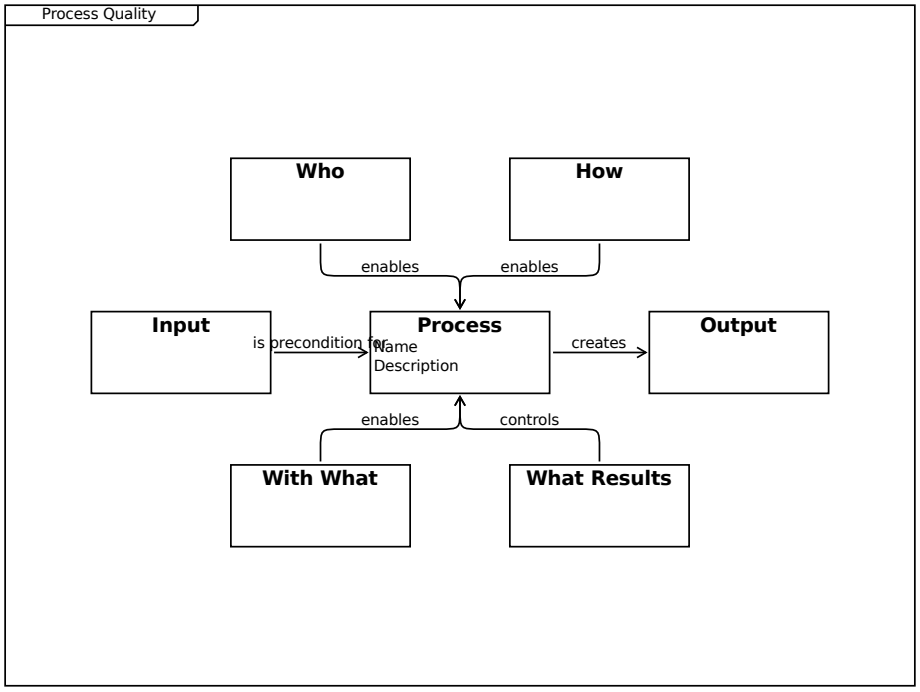
1 Quality Example



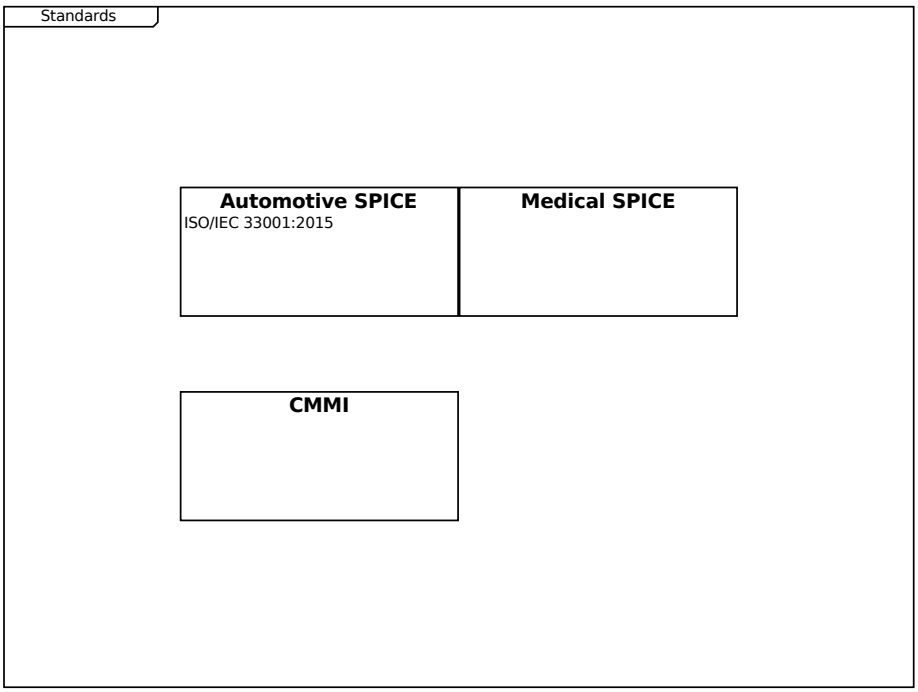

```
Quality


Product Quality
  ISO/IEC 25010:2011


Process Quality
```

2 Process Quality




```
Process Quality
| The turtle diagram shows the elements of a process.


Who
| Roles,
| Skills, Knowledge,
| Trainings
  enables --> Process


How
| Guidelines, Checklists,
| Templates
  enables --> Process


Input
  is precondition for --> Process
```

```
Process
  Name
  Description
  creates --> Output


Output
| Process output,
| Evidence on performed process


With What
  enables --> Process


What Results
  controls --> Process
```

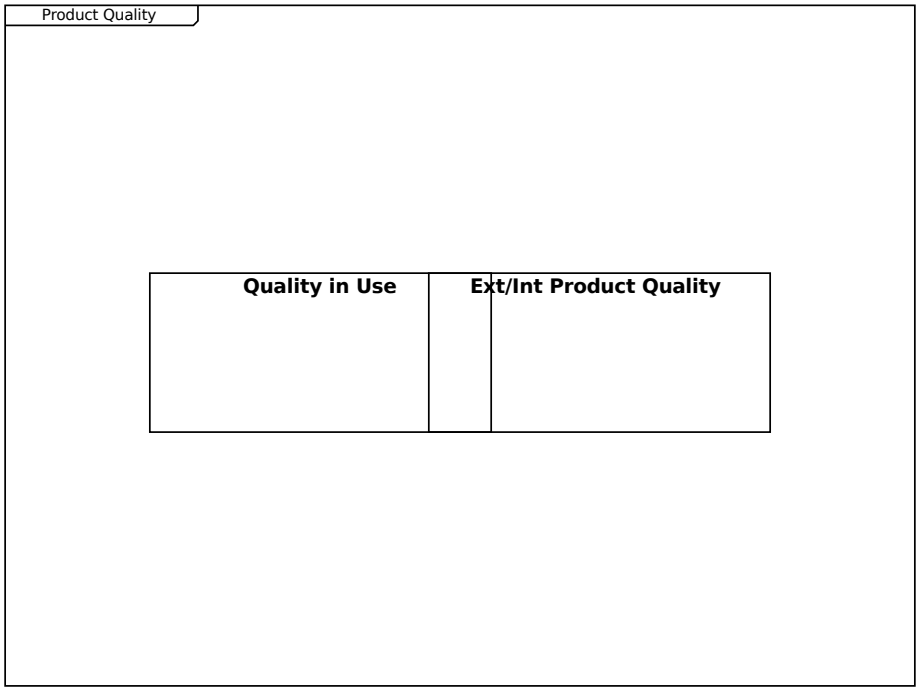



```
Standards


Automotive SPICE
  ISO/IEC 33001:2015
```

Medical SPICE

CMMI

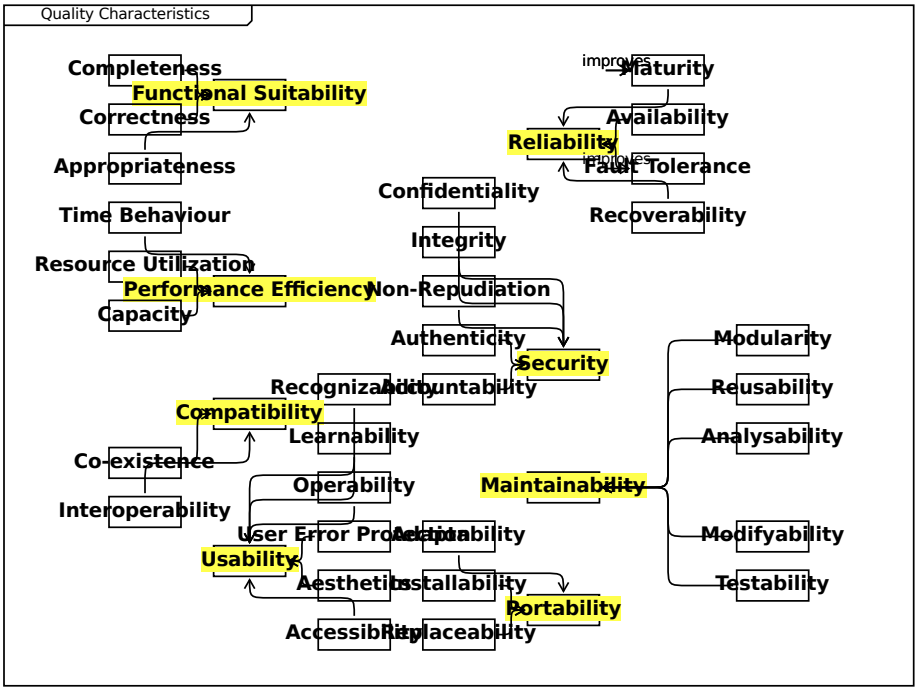
3 Product Quality



Product Quality

Quality in Use
| Quality in use can be measured when the product is already in use,
| e.g. the percentage of satisfied customers can be determined.

Ext/Int Product Quality
| Product quality are internal and externally visible qualities,
| such as memory consumption or startup timings.



Quality Characteristics
| according to ISO 25010

Completeness
--> Functional Suitability

Maturity
--> Reliability

Functional Suitability

Correctness
--> Functional Suitability

Availability
--> Reliability

```
Reliability


Appropriateness
   --> Functional Suitability


Fault Tolerance
   --> Reliability


Confidentiality
   --> Security


Time Behaviour
   --> Performance Efficiency


Recoverability
   --> Reliability


Integrity
   --> Security


Resource Utilization
   --> Performance Efficiency


Performance Efficiency


Non-Repudiation
   --> Security


Capacity
   --> Performance Efficiency


Authenticity
   --> Security
```

Modularity
   --> Maintainability

Security

Recognizability
   --> Usability

Accountability
   --> Security

Reusability
   --> Maintainability

Compatibility

Learnability
   --> Usability

Analysability
   --> Maintainability

Co-existence
   --> Compatibility

Operability
   --> Usability

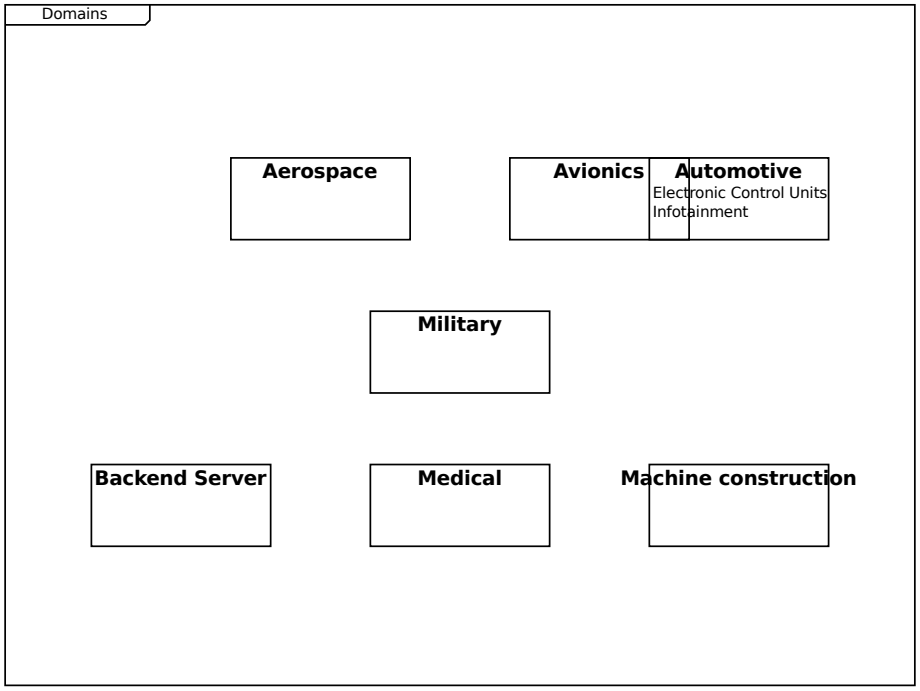
Maintainability

Interoperability
   --> Compatibility

User Error Protection

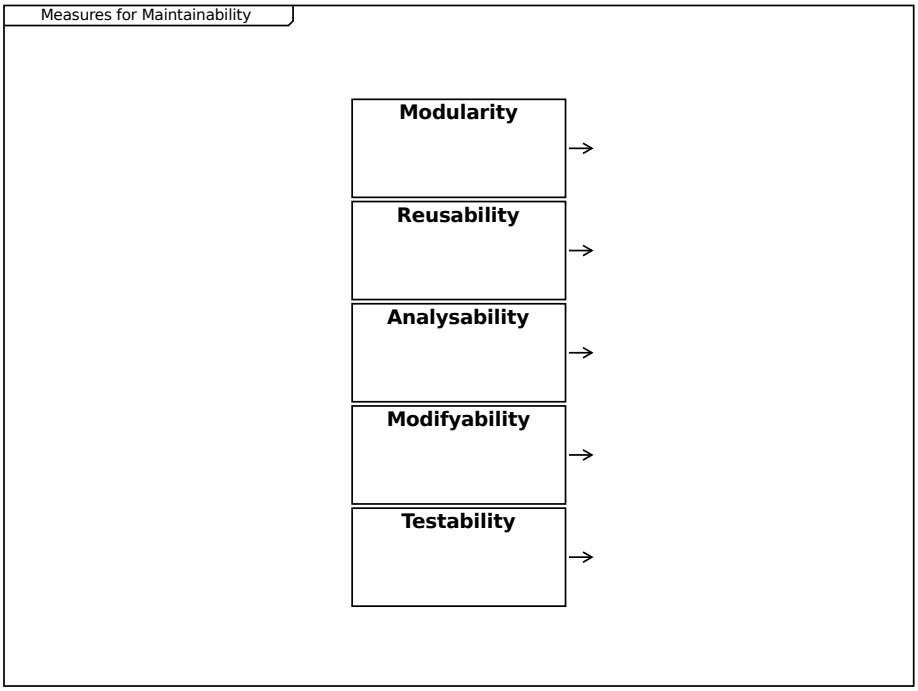
```
   --> Usability


Adaptability
   --> Portability


Modifyability
   --> Maintainability


Usability


Aesthetics
   --> Usability


Installability
   --> Portability


Testability
   --> Maintainability


Portability


Accessibility
   --> Usability


Replaceability
   --> Portability
```

3.1 Product Quality Measures




```
Domains


Aerospace


Avionics


Automotive
  Electronic Control Units
  Infotainment


Military


Backend Server


Medical
```

Machine construction



Measures for Maintainability

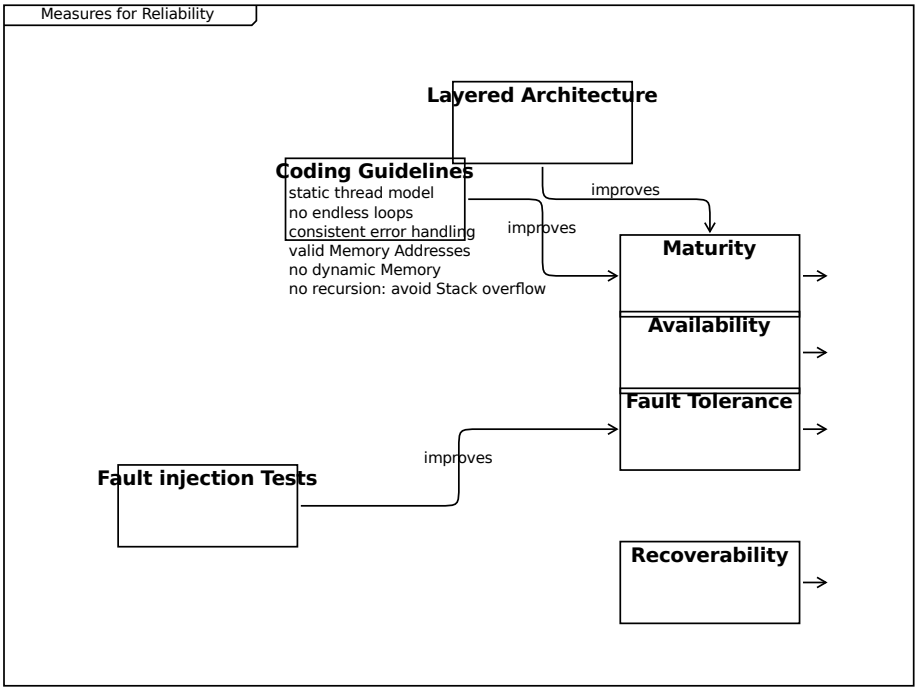
Modularity

Reusability

Analysability

Modifyability

Testability




```
Measures for Reliability


Layered Architecture
  improves --> Maturity


Coding Guidelines
  static thread model
  | Execution threads shall not be started/stopped dynamically
  no endless loops
  | Every loop shall have a counter to ensures that
  | after a predefined maximum value the loop is definitely quit
  consistent error handling
  | Inconsistencies in error handling make
  | bugs in error handling more likely
  valid Memory Addresses
  | Only valid memory addresses may be read/written.
  | E.g. Java solves this by prohibiting pointers
  no dynamic Memory
  no recursion: avoid Stack overflow
  improves --> Maturity
```

```
Maturity


Availability


Fault Tolerance


Fault injection Tests
  improves --> Fault Tolerance


Recoverability
```