Test Management Aspects in UTP

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- sepp.med
  - IT service provider
  - For more than 30 years
  - Current headcount: approx. 120

- Safety relevant and regulated Environments
  - Medical, Pharma
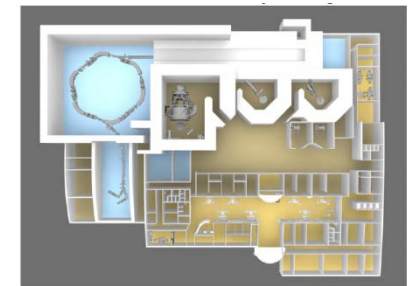 - Automotive, Embedded
  - …
- Complex Domains
  - Workflows & Business Processes
  - Distributed Development
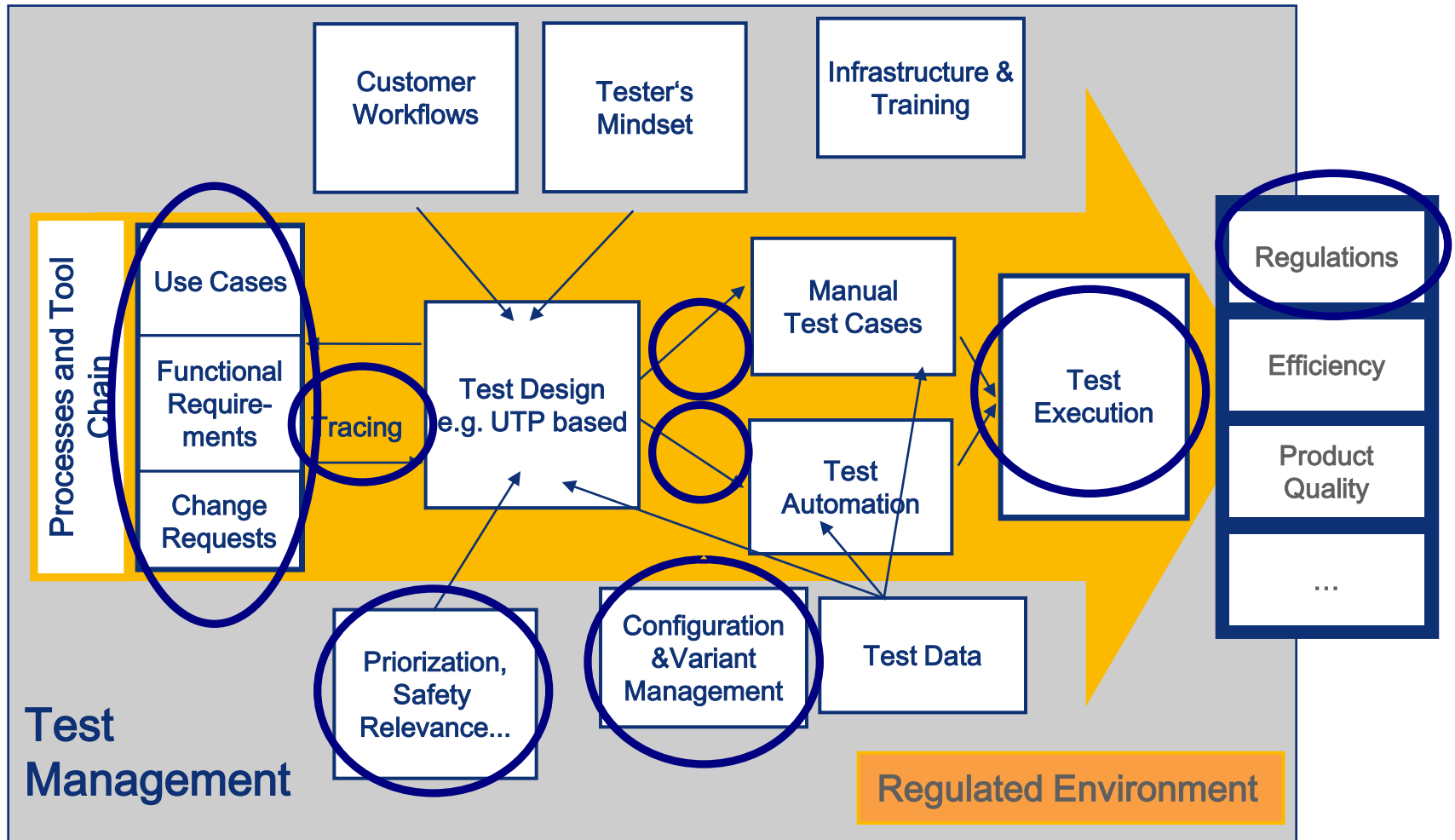 - Producs / Systems with many Subcomponents
  - Product Families, System Engineering

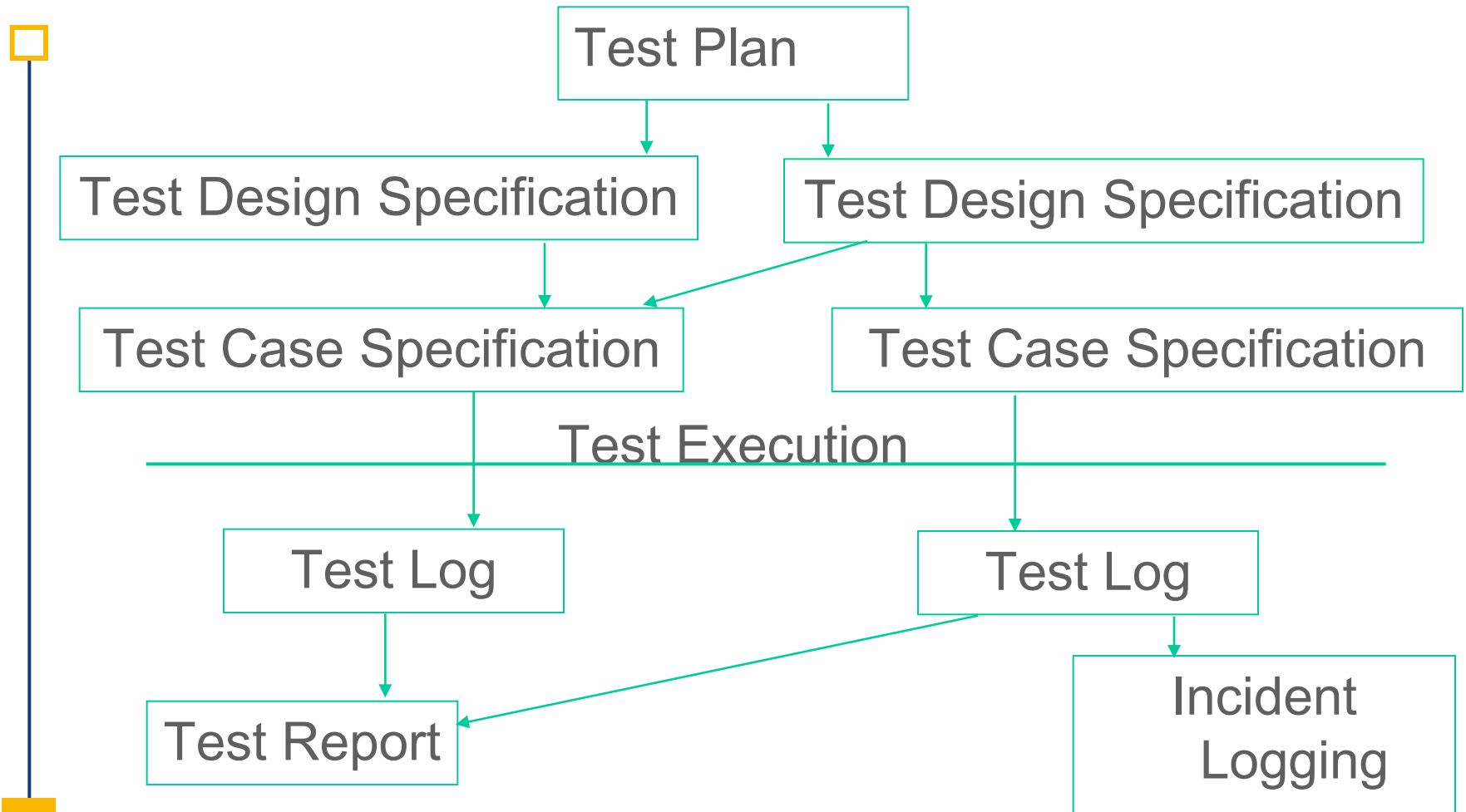# Agenda

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- **Motivation: Test Process and Test Management**

- Improving UTP Test Management Coverage

- Future Developments

Test Process and Test Management

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Processes and Tool Chain

Customer Workflows

Tester's Mindset

Infrastructure & Training

Use Cases

Functional Require-ments

Change Requests

Tracing

Test Design e.g. UTP based

Manual Test Cases

Test Automation

Test Execution

Test Data

Priorization, Safety Relevance...

Configuration &Variant Management

Regulations

Efficiency

Product Quality

…

Test Management

Regulated Environment

Test Management and Test Documentation

```
                        ┌──────────────┐
                        │  Test Plan   │
                        └──────┬───────┘
                    ┌──────────┴──────────┐
                    ▼                     ▼
┌───────────────────────────┐  ┌───────────────────────────┐
│ Test Design Specification │  │ Test Design Specification │
└─────────────┬─────────────┘  └─────────┬─────────────────┘
              ▼                           ▼
┌───────────────────────┐      ┌───────────────────────────┐
│ Test Case Specification│     │  Test Case Specification  │
└───────────┬───────────┘      └─────────┬─────────────────┘
```

Test Execution

```
┌───────────────┐                ┌───────────────┐
│   Test Log    │                │   Test Log    │
└───────┬───────┘                └───────┬───────┘
        ▼                                 ▼
┌───────────────┐                ┌───────────────┐
│  Test Report  │                │   Incident    │
└───────────────┘                │   Logging     │
                                 └───────────────┘
```
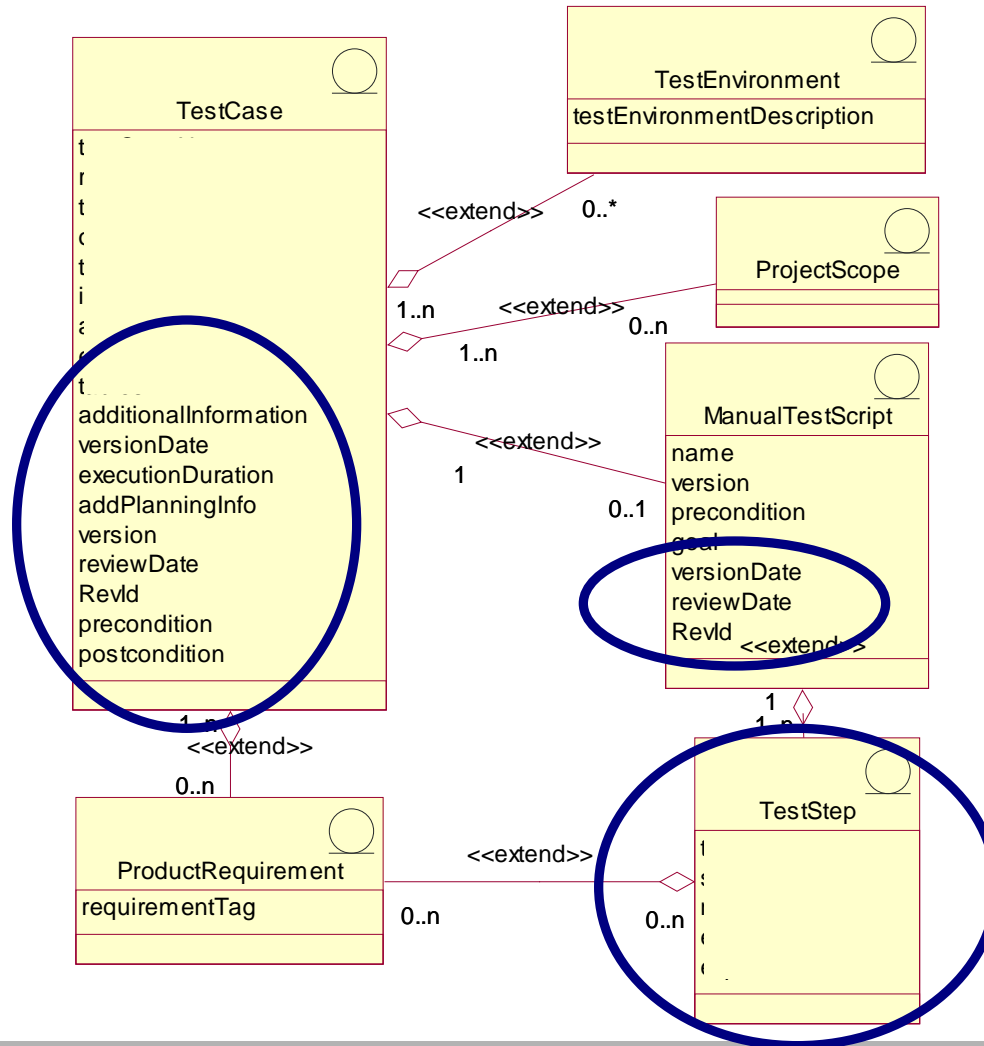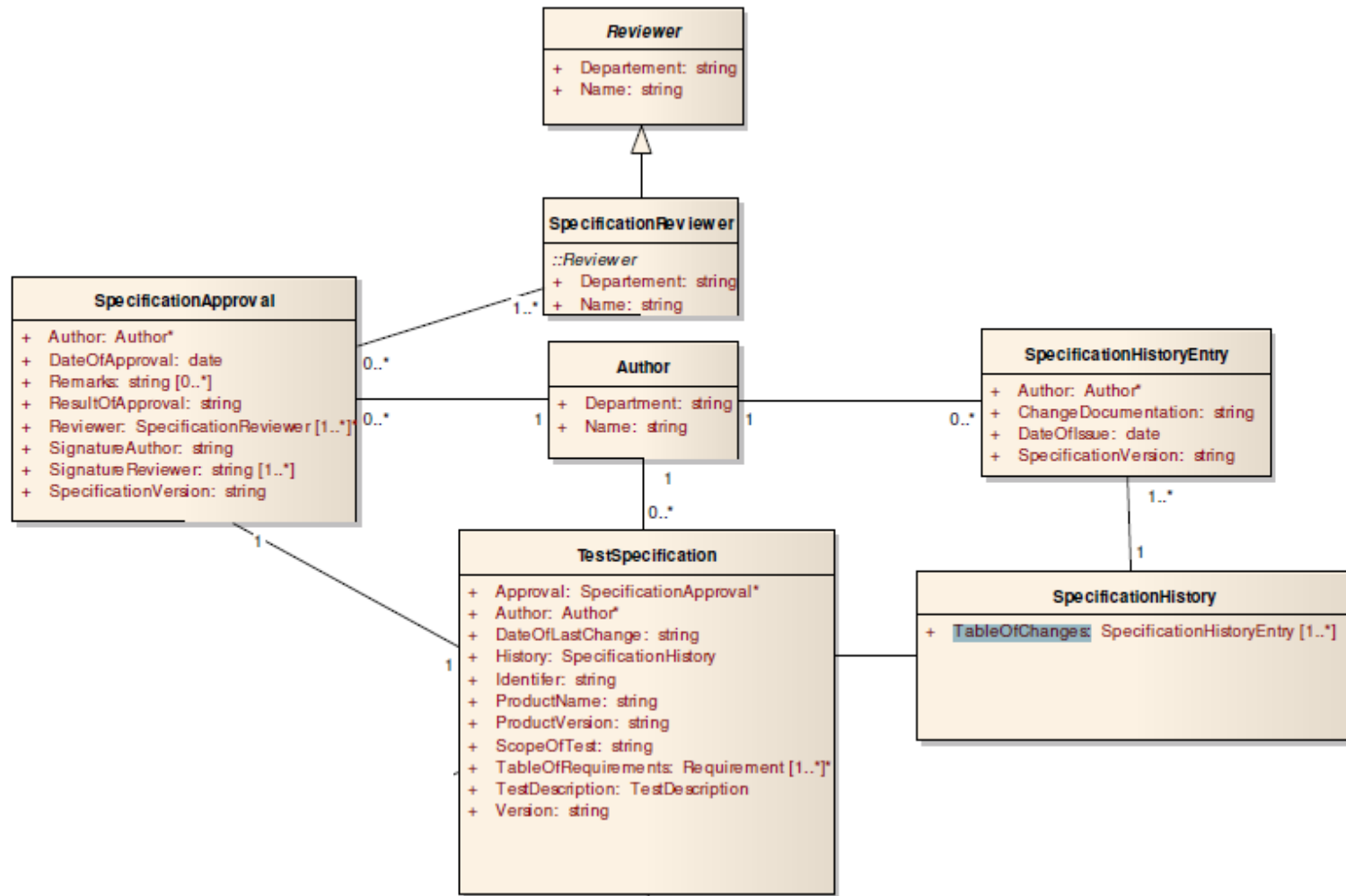
Test Management:
Steering and controlling the test process

- **Resource planning and management**
  - ☐ Tester
  - ☐ Test Environment
  - ☐ SuT
- **Test case selection (-> essential!)**
  - ☐ Time & resource constraints
  - ☐ Test topics, test quality and coverage
  - ☐ Priority, criticality
- **Audit trail provision, review and release**
  - ☐ Who?
  - ☐ When?
  - ☐ What?

Test Management in UTP

- In principle, everything required by TM can be covered

- But: explicite definitions and explicite specification
  - Leads the user
  - Forces common understanding
  - Forces common approach
  - Thus, makes it easier to apply TM with UTP based MBT concepts

Agenda

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- Motivation: Test Process and Test Management

- **Improving UTP Test Management Coverage**

- Future Developments

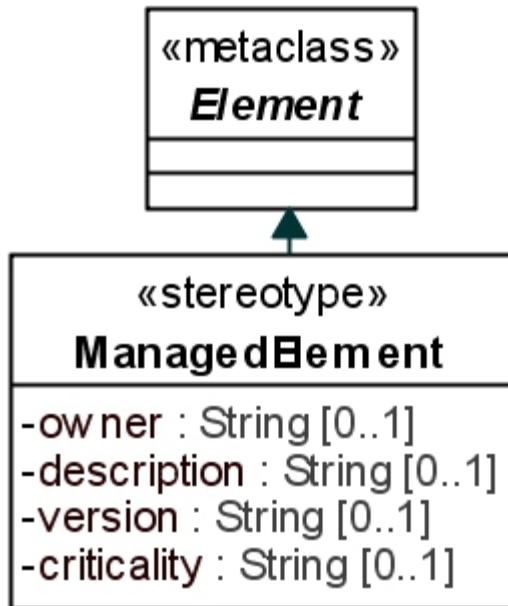# RTF UTP Issue 15913:
"Test Management should be supported"

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- **Idea:**
  - ☐ Provide test management with the required information
  - ☐ Using UTP

- **Goal:**
  - ☐ Wider integration of UTP models into test management driven test process
  - ☐ For both manual and tool based test management processes

- **Formal basis:**
  - ☐ E.g. IEEE 829: Contents of test plans and designs

Issue 15913:
"Test Management should be supported"
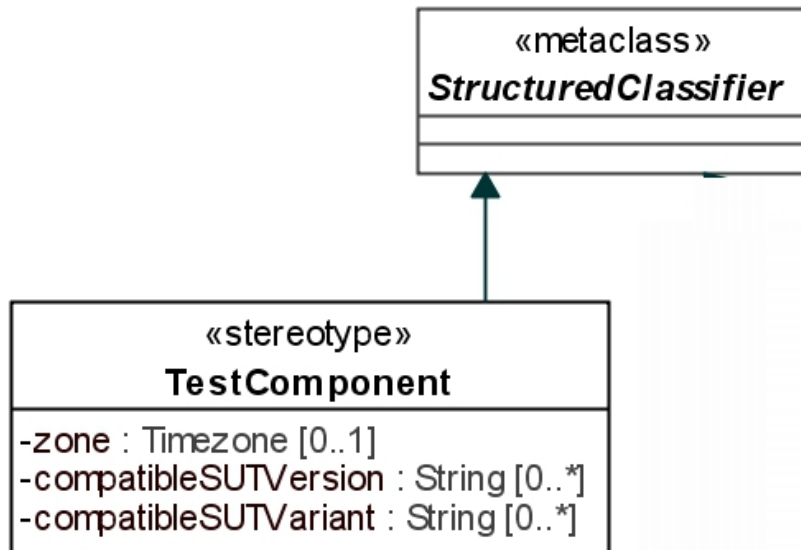
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- **What does this mean? Examples:**
  - □ A test case attribute "priority" in the model can be used, to include the design of prioritized test sets within the model used for stakeholder review and later for test suite management in the test management tool used.

  - □ Explicite tags for requirements as model attributes to test cases enable a traceable and efficient requirements based test design with UTP models and can be used as a basis for tool interfaces / synchronization tools between requirements engineering and test design.

Issue 15913:
"Test Management should be supported"

- Approaching the challenge:
  - defined a common set of important attributes which are reusable for a lot of test management aspects (like version, description…)

  - New stereotype called *ManagedElement*
    - Grouping the new attribute set

  - Add test-specific attributes directly into existing concepts
    - Enable them for test management purposes

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«metaclass»
Element

△

«stereotype»
ManagedElement

-owner : String [0..1]
-description : String [0..1]
-version : String [0..1]
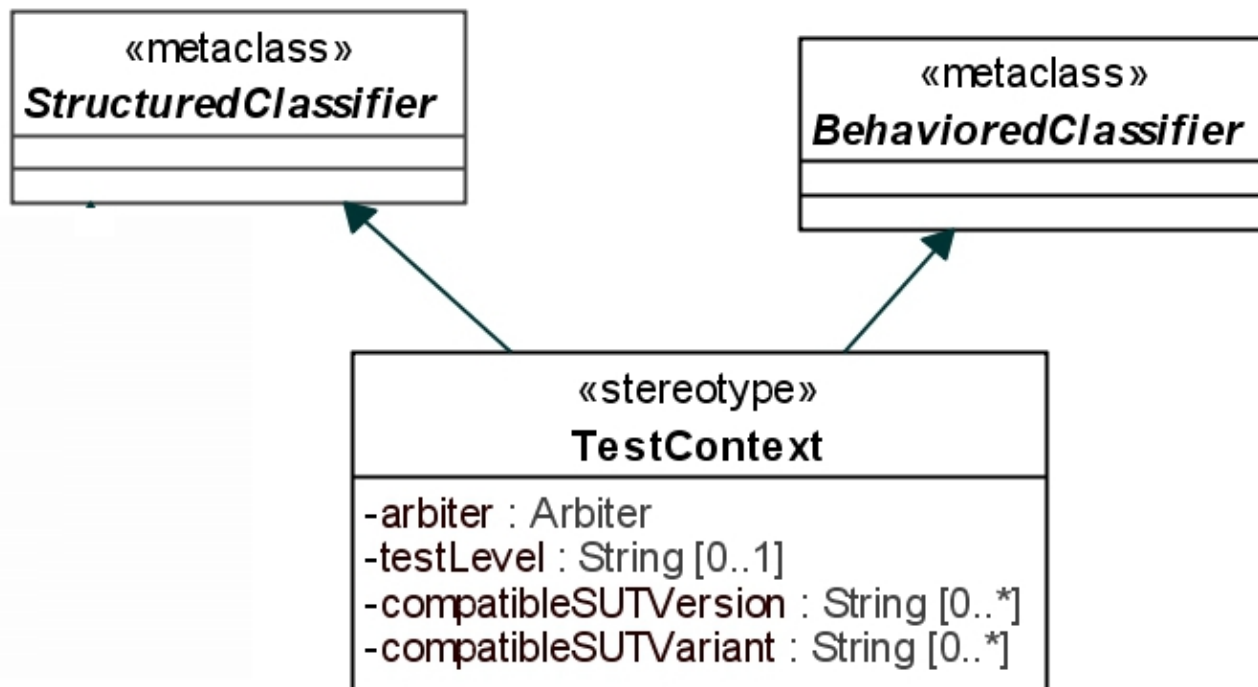-criticality : String [0..1]

- Provide additional information:
  - Owner
  - Description
  - Version
  - Criticality
- Used with other stereotypes
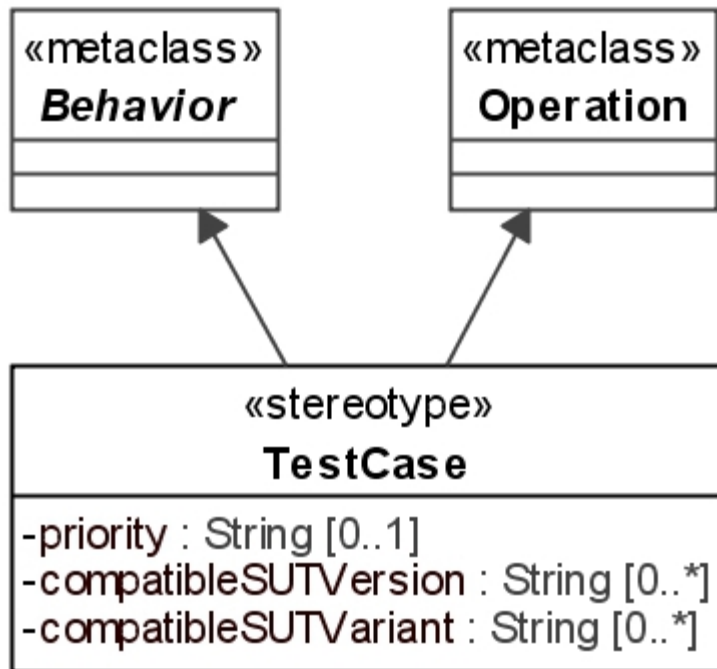- Expresses e.g. test context information

Test Management Concepts in UTP 1.1: *TestComponent*

«metaclass»
StructuredClassifier

«stereotype»
TestComponent

-zone : Timezone [0..1]
-compatibleSUTVersion : String [0..*]
-compatibleSUTVariant : String [0..*]

- Extention of the *TestComponent*:
  - timezone
  - SUT version
  - SUT variant
- Used for listing compatible versions and variants (e.g. configs) of the system under test

- Describes the dependencies of the test with regard to
  - □ SUT version and variant
  - □ Level (type, goal) of the test a test case is executed in

«metaclass»
StructuredClassifier

«metaclass»
BehavioredClassifier

«stereotype»
TestContext

-arbiter : Arbiter
-testLevel : String [0..1]
-compatibleSUTVersion : String [0..*]
-compatibleSUTVariant : String [0..*]

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- Fields are added allowing the definition of
  - Compatible SUT versions and variants
  - A value (*priority*) allowing the prioritization of a test case for
    - Review planing
    - Test execution
    - ...
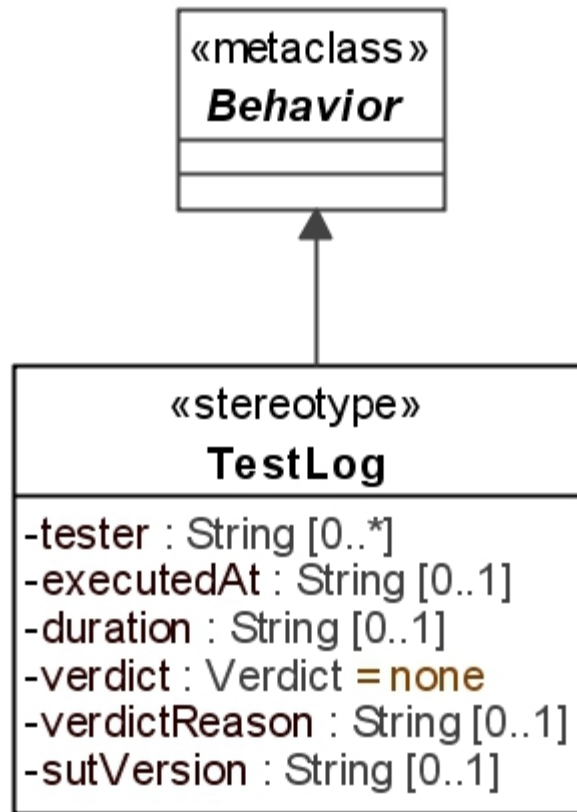
The *TestLog* now has fields defining

- The tester (ID) executing a test

- Time of execution

- Execution time (may be used for future test scheduling)

- Result of the arbiters decision and

- the rationale for it

- Identification of the used system under test

«metaclass»
Dependency

«stereotype»
TestObjective

-priority : String [0..1]
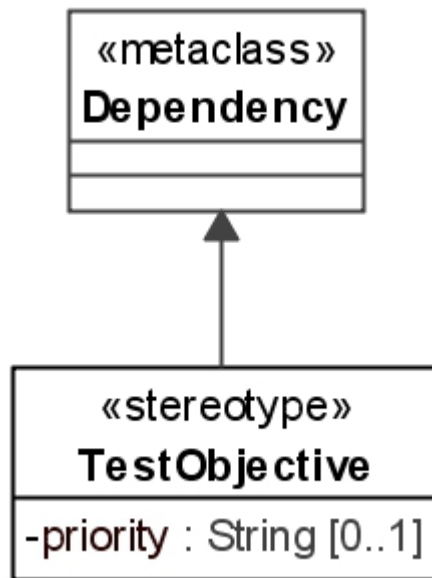
■ Extends the 1.0 *TestObjective* by adding a field *priority*:

□ Allows the comparison / ordering of objectives

□ May be used e.g. for prioritization in

■ Review planing

■ Test execution

■ ...

Test Management Concepts in UTP 1.1:
An Example

■ TBD

Agenda

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- **Future Developments**

Next Steps: Explicit Test Scheduling

■ Scheduling is an integral part of test management

■ Based on:
- ☐ Resource usage
- ☐ "Special requirements"
- ☐ Prioritization
- ☐ Test case interdependencies
- ☐ …

■ Current UTP specification allows model element assignement

■ Rule set is missing (issue no. 15914)

Conclusion and future developments

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■ Managing testing is essential in todays complex development processes

■ For the uptake of the UML Testing Profile the inclusion of test management aspects is essential

■ <u>Therefore we must continue to improve UTP to allow a seamless and beneficial integration of test models into current management processes and tooling environments!</u>

■ UTP 1.1: In Principle we are one Step further now

■ But: there still is Room for Improvement