

Operational Stability

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Discussion

Operational Stability is a [Quality Characteristic](#) concerning the degree to which the operational characteristics of a subject remain within permitted variation under specified conditions for a specified period.

Operational Stability can apply to:

- A [Candidate Solution](#)
- A [Distributed System](#)
- A [Node](#)
- A [Node Set](#)
- A service
- A software component
- A hardware component
- An [Execution Facility](#)
- An [Operational Resource](#)
- Another subject having observable operational characteristics

Operational characteristics can include:

- Response time
- Throughput
- Resource utilization
- Availability
- Error frequency
- Failure frequency
- Queue depth
- Data-processing rate
- State-transition rate
- Communication latency
- Storage utilization
- Energy consumption
- Another characteristic established by the [Acceptance Criteria](#)

Operational Stability can identify:

- The evaluated subject
- The selected operational characteristics
- The specified conditions
- The evaluation period
- The applicable workload
- The applicable [Test Environment](#)
- The applicable [Configuration](#)

- The applicable reference values
- The permitted variation
- The measurement intervals
- The measurement methods
- The measurement units
- The required measurement precision
- The treatment of transient behavior
- The treatment of warm-up periods
- The treatment of planned changes
- The treatment of nondeterministic behavior
- The applicable DIDO [Baseline](#)
- The applicable [Validation Criteria](#)
- The applicable Acceptance Criteria
- Its [Evidence](#)
- Its [Provenance](#)
- Its [Traceability](#)

Operational Stability can be evaluated using:

- Variation around a reference value
- Variation over time
- Frequency of excursions outside a permitted range
- Duration of excursions outside a permitted range
- Trend analysis
- Statistical dispersion
- Change-point detection
- Comparison with a controlling DIDO Baseline
- Another method established by the Acceptance Criteria

Definition

[Quality Characteristic](#) concerning the degree to which the operational characteristics of a subject remain within permitted variation under specified conditions for a specified period

Source

Adapted from:

- [ISO/IEC 25010:2023, Systems and software Quality Requirements and Evaluation \(SQuaRE\) — Product quality model](#)
- [Quality Characteristic](#)
- [Reliability](#)
- [Performance Efficiency](#)
- DIDO Reference Implementation Conceptual Model
- DIDO-TE draft Requirements Register
- DIDO-TE Broad Agency Announcement source material

The DIDO-TE source material identifies Stability as a central evaluation value but does not establish an independently measurable definition.

ISO/IEC 25010 does not identify Operational Stability as a separate top-level product-quality characteristic. This definition introduces Operational Stability to provide a measurable interpretation of stability for DIDO-TE comparative evaluation.

Note

Operational Stability differs from [Reliability](#):

- Operational Stability concerns variation in selected operational characteristics
- Reliability concerns performance of specified functions under specified conditions for a specified period

A subject can remain operational and reliable while exhibiting unacceptable variation in response time or resource utilization.

A subject can exhibit stable performance while consistently producing incorrect results.

Operational Stability differs from [Performance Efficiency](#):

- Operational Stability concerns variation over time or operating conditions
- Performance Efficiency concerns performance relative to resources used

Operational Stability does not mean the operational characteristics remain constant.

Normal operation can include permitted variation caused by:

- Workload changes
- Scheduling
- Communication delays
- Resource allocation
- Nondeterministic processing
- Maintenance activity
- Planned state transitions

The applicable Acceptance Criteria establish which variation is permitted.

The term **Stability** should not appear alone in a requirement when its intended meaning is Operational Stability.

Other meanings of stability can include:

- Numerical stability
- Configuration stability
- Interface stability
- Organizational stability
- Financial stability

Those meanings require separate terms or explicit qualification.

Example

DIDO-TE evaluates three Candidate Solutions for 24 hours under the same variable workload.

The Acceptance Criteria establish permitted ranges for:

- Response time
- Throughput
- Processor utilization
- Memory utilization
- Queue depth
- Communication latency

DIDO-TE records each characteristic at defined measurement intervals.

One Candidate Solution maintains every characteristic within the permitted variation. Another Candidate Solution completes the same work but exhibits repeated response-time and queue-depth excursions.

The comparative evaluation identifies the first Candidate Solution as having greater Operational Stability under the evaluated conditions.

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