

ENV-005I — Record Distributed-System Emulation

[Go to ENV-005 — Emulate Distributed Systems](#)

Statement

The [DIDO-TE](#) SHALL record the distributed-system emulation performed during each applicable [Test Execution](#).

Derived From

- [ENV-005 — Emulate Distributed Systems](#)
- [ENV-005a — Emulate Distributed Topology](#)
- [ENV-005b — Emulate Participating Nodes](#)
- [ENV-005c — Emulate Communication Behaviour](#)
- [ENV-005d — Emulate Timing and Synchronisation](#)
- [ENV-005e — Emulate Resource Conditions](#)
- [ENV-005f — Emulate Node Failures](#)
- [ENV-005g — Emulate Communication Failures](#)
- [ENV-005h — Emulate Network Partitions](#)
- [ENV-005i — Emulate Membership and Topology Changes](#)
- [ENV-005j — Emulate Recovery Behaviour](#)
- [ENV-005k — Observe Distributed Interactions](#)
- [\[DTE5\] DIDO-TE Requirements Register](#), source requirement identifier and obligation to be assigned
- [\[DTE6\] Structured Information Processing Reference Architecture \(SIP-RA\)](#)
- [\[DTE7\] Federated Data Interpretation Systems Reference Architecture \(FDIS-RA\)](#)

Rationale

A distributed-system emulation record establishes what the DIDO-TE intended to emulate, what it actually emulated, when each emulated condition occurred, and which system elements participated.

The record covers the emulated topology, participating [Nodes](#), communication behaviour, timing conditions, resource conditions, failures, partitions, membership changes, topology changes, recovery behaviour, and observed distributed interactions applicable to the Test Execution.

Planned emulation values alone do not establish the conditions under which a test occurred. The record therefore preserves both specified values and measured or observed values, including deviations, interventions, incomplete actions, and unintended environmental conditions.

The resulting record supports reconstruction, comparison, diagnosis, validation, audit, and

Traceability without requiring reliance on operator recollection or transient runtime state.

Applies To

- Test Environment
- Test Definition
- Test Execution
- Test Object
- Node
- Test Resource
- Configuration
- Constraint
- Evidence
- Test Result

Verification

Verification confirms that:

- The DIDO-TE creates a uniquely identified distributed-system emulation record for each applicable Test Execution.
- The record identifies the applicable Test Definition, Test Execution, Test Environment, Test Object, and participating Test Resources.
- The record identifies the version or revision of each applicable Test Definition, configuration, executable, emulation definition, and supporting artifact.
- The record identifies the planned distributed topology and the topology present during Test Execution.
- The record identifies each participating Node, its role, identity, configuration, lifecycle state, and membership period.
- The record identifies each emulated communication path and its source, destination, direction, interface, protocol, and applicable communication conditions.
- The record identifies the planned and actual timing, synchronisation, latency, throughput, loss, duplication, reordering, corruption, and resource conditions, as applicable.
- The record identifies each emulated Node failure, communication failure, network partition, membership change, topology change, and recovery action.
- The record identifies the activation condition, planned activation time, actual activation time, duration, scope, and termination condition for each emulated event.
- The record identifies each observation point and observation source used to observe distributed interactions.
- The record preserves the identities, timestamps, sequence information, correlation values, and source information associated with recorded observations.
- The record distinguishes specified emulation actions from operator interventions, DIDO-TE control actions, Test Object actions, and unintended environmental events.
- The record distinguishes planned values from commanded, measured, observed, calculated, normalised, and inferred values.
- The record identifies the measurement method, unit, resolution, precision, accuracy, and applicable tolerance for each recorded quantitative condition.
- The record preserves the sequence and temporal relationships among emulation actions,

distributed interactions, observations, failures, changes, recovery actions, and results.

- The record identifies each emulation action that did not start, did not complete, started at the wrong time, exceeded its scope, or produced an unexpected condition.
- The record identifies missing, incomplete, conflicting, duplicated, late, or unavailable emulation data.
- The record identifies any loss of recording capability and the period, scope, and affected data associated with the loss.
- The DIDO-TE protects the emulation record against undetected alteration.
- The DIDO-TE preserves the original recorded values and identifies any subsequent normalisation, enrichment, correlation, aggregation, or transformation.
- The DIDO-TE records the identity and time of each authorised change made to the emulation record after Test Execution.
- The DIDO-TE associates each recorded deviation with the affected emulation condition, Node, Test Resource, Test Definition, and Test Execution.
- The DIDO-TE records the distributed-system emulation record as [Evidence](#).
- The DIDO-TE maintains Traceability among the emulation record, Test Definition, Test Execution, Test Environment, Test Object, participating Nodes, Test Resources, observations, deviations, and Test Results.
- A missing, incomplete, inaccurate, altered, unsupported, or untraceable mandatory emulation record constitutes nonconformance with this requirement.

Verification includes:

- Inspection of the distributed-system emulation record for a completed Test Execution
- Comparison of the emulation record with the applicable Test Definition and Test Environment configuration
- Comparison of planned, commanded, measured, and observed emulation values
- Inspection of recorded topology, Node membership, communication paths, timing conditions, resource conditions, failures, partitions, changes, and recovery actions
- Inspection of event identities, timestamps, sequences, durations, scopes, and termination conditions
- Confirmation that the record distinguishes emulation actions from system actions, operator interventions, and unintended events
- Confirmation that the record preserves observation sources, measurement methods, units, resolutions, accuracies, and tolerances
- A negative assessment involving a missing, incomplete, conflicting, or late emulation record
- A negative assessment involving an interruption or loss of recording capability
- A negative assessment involving an alteration to a completed emulation record
- Confirmation that original values remain distinguishable from transformed or enriched values
- Confirmation that the DIDO-TE detects and records emulation deviations
- Inspection of integrity protection, change history, Evidence, and Traceability records
- Confirmation that each mandatory recording deviation produces a nonconformance result

Referenced By

- [ENV-005m — Validate Emulation Fidelity](#)

Related Architecture Sections

- Add links to the architecture sections governing emulation control, event recording, observability, time synchronisation, record integrity, Evidence, Traceability, and retention.

Delivery Phase

Assign the applicable delivery phase.

Requirement Status

Draft

Statement Reference

Use the following syntax to reference this requirement's Statement section from another DokuWiki page:

```
{{section>dido:03-dido-te:99-annexes:annex-c-requirements:02-test-environment-requirements:env-005-emulate-distributed-systems:env-005-record-distributed-system-emulation#Statement&noheader&nofooter&noeditbtn}}
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