

MO-004d — External Resource Independence

[Go to MO-004 — Connected and Disconnected Operations](#)

Statement

Crucible SHALL execute each selected **Operational Lifecycle** activity in a **Disconnected Environment** without accessing an external resource outside the environment boundary.

Derived From

This requirement derives from:

- [MO-004 — Connected and Disconnected Operations](#)

The Original Requirement states:

The system SHALL support both connected and disconnected operational environments.[\[C1\]](#)

MO-004d preserves the implied requirement that **Crucible** operates within a **Disconnected Environment** without relying on external resources outside the environment boundary.

The separate requirements derived from MO-004 address:

- [MO-004a — Connected Environment Operation](#)
- [MO-004b — Disconnected Environment Operation](#)
- [MO-004c — Unauthorized Resource Prohibition](#)

Assessment

The Original Requirement does not identify the resource-availability constraint associated with operation in a Disconnected Environment.

The phrase **support both connected and disconnected operational environments** does not identify:

- The boundary of the Disconnected Environment
- The external resources unavailable within that boundary
- The resources required by each selected Operational Lifecycle activity
- The locally available replacements for external repositories, registries, services, and dependencies
- The behavior required when an external resource is unavailable
- The treatment of attempted external access
- The Evidence required to demonstrate independence from external resources

MO-004d:

- Identifies **Crucible** as the responsible actor
- Identifies execution of a selected Operational Lifecycle activity as the required behavior
- Identifies the Disconnected Environment boundary as the resource-availability boundary
- Prohibits access to external resources outside that boundary during execution
- Separates resource availability from resource authorization
- Separates External Resource Independence from the general requirement to execute within a Disconnected Environment

Rationale

A Disconnected Environment does not provide continuous access to resources outside its defined boundary.

External resources can include:

- External Artifact repositories
- External package repositories
- External image registries
- Public software repositories
- Cloud-hosted application programming interfaces
- External identity services
- External licensing services
- External configuration services
- External time services
- External vulnerability feeds
- External documentation services
- External telemetry services
- External update services
- External name-resolution services

Execution within a Disconnected Environment requires the necessary **Controlled Inputs**, dependencies, tools, repositories, registries, services, and other resources to exist within the environment boundary before execution begins.

Required resources can enter the Disconnected Environment through an approved transfer and admission process. After successful transfer, authorization, integrity verification, and admission, the resources become available within the environment boundary and no longer constitute external resources for the applicable execution.

External Resource Independence supports:

- Predictable execution without external connectivity
- Operation during network outages
- Operation within restricted network boundaries
- Operation in **Air-Gapped Environments**
- Controlled dependency capture
- Complete offline transfer preparation
- Reproducible execution

- Prevention of hidden external dependencies
- Evidence of disconnected operation

This requirement addresses resource availability. MO-004c separately prohibits access to resources that lack authorization for the applicable operational environment.

A resource can be available within the environment but unauthorized. A resource can also be authorized for use but unavailable within the environment. The two conditions require separate evaluation.

Applies To

This requirement applies to:

- [Crucible](#)
- [Disconnected Environments](#)
- [Air-Gapped Environments](#)
- Environment boundaries
- External resources
- Local resources
- [Operational Lifecycle](#) activities
- [Controlled Inputs](#)
- [Authorized Resources](#)
- [Artifacts](#)
- Transfer Bundles
- Imported dependencies
- Local Artifact repositories
- Local package repositories
- Local image registries
- Local network services
- [CI/CD Pipelines](#)
- [Infrastructure Deployments](#)
- [Provisioning](#)
- [Compliance Assessments](#)
- [Deployment Validation](#)
- [Evidence](#)
- [Provenance](#)
- [Traceability](#)

Verification

Verification confirms that:

1. The applicable Disconnected Environment boundary is identified
2. The selected Operational Lifecycle activity is identified
3. The resources required by the selected activity are identified
4. Each required resource is available within the Disconnected Environment boundary
5. External network connectivity is unavailable during execution

6. Crucible executes the selected activity without accessing an external resource outside the environment boundary
7. Each attempted external resource access is detected and recorded
8. The selected activity reaches its defined completion condition
9. The selected activity produces its required outputs
10. The execution record preserves the required Evidence, Provenance, and Traceability

Verification includes:

- Disconnected Environment boundary inspection
- Operational Lifecycle activity inspection
- Required-resource inventory inspection
- Local repository inspection
- Local registry inspection
- Local service inspection
- Transfer Bundle inspection
- Imported dependency inspection
- Network-disconnection tests
- Network-traffic inspection
- Domain-name resolution inspection
- External-endpoint access testing
- Hidden-dependency testing
- Operational Lifecycle execution tests
- Completion-condition inspection
- Output inspection
- Audit-record inspection
- Evidence inspection
- Provenance inspection
- Traceability inspection

The verification record identifies:

1. The Disconnected Environment
2. The environment boundary
3. The selected Operational Lifecycle activity
4. The applicable activity identifier and revision
5. The resources required by the selected activity
6. The resources available within the environment boundary
7. The imported Artifacts and dependencies
8. The local repositories, registries, and services used during execution
9. The network-disconnection condition
10. Each attempted access to an external resource
11. The result of each attempted external access
12. The applicable starting condition
13. The applicable completion condition
14. The execution result
15. The outputs produced
16. Each identified hidden or unresolved external dependency
17. The observed result
18. The generated [Evidence](#)

Requirements Realized By

This requirement is realized by:

- [OR-002 — Deployment Environments](#)
- [OR-003 — Classified and Unclassified Environments](#)
- [OR-005 — Distributed Environment Management](#)
- [FR-CFG-001 through FR-CFG-005](#)
- [FR-IMG-001 through FR-IMG-006](#)
- [FR-DEP-001 through FR-DEP-007](#)
- [FR-AG-001 through FR-AG-005](#)
- [FR-DSO-001 through FR-DSO-006](#)
- [FR-BAS-001 through FR-BAS-004](#)
- [FR-DEPC-001 through FR-DEPC-005](#)
- [INT-001 through INT-007](#)

Related Architecture Sections

- [5. Descriptions, Composition, and Baselines](#)
- [6. Machine Images and Image Layers](#)
- [7. Infrastructure and Deployment](#)
- [8. Dependencies and Air Gap Operations](#)
- [9. Compliance and Security](#)
- [10. Reproducibility, Provenance, and Traceability](#)

Referenced By

The following pages reference this requirement:

- [3.1 Connectivity Conditions](#)
- [4.3 External Systems](#)
- [MO-004a — Connected Environment Operations](#)
- [MO-004b — Disconnected Environment Operations](#)
- [MO-004c — Authorized Resource Use](#)
- [Annex D: Requirements Traceability](#)

Delivery Phase

Phase 1 and subsequent phases

Implementation Status

Not Assessed

Implementation status requires verification that the current [Crucible](#) implementation executes selected Operational Lifecycle activities in a Disconnected Environment without accessing external resources outside the environment boundary.

Requirement Status

Draft

This requirement derives from MO-004 in the Crucible System Requirements Specification, Version 1.1 Draft.

Notes for Editors

This requirement page should retain the stable requirement identifier MO-004d.

This page is a leaf requirement page and omits a trailing :start from its namespace.

Changes to the Statement SHALL preserve the External Resource Independence intent derived from MO-004.

The applicable Disconnected Environment definition should identify:

- The environment boundary
- The permitted internal networks
- The unavailable external networks
- The local repositories
- The local registries
- The local services
- The required Controlled Inputs
- The imported Artifacts and dependencies
- The applicable transfer and admission processes
- The required monitoring and audit records
- The required Evidence

Material changes should receive review and should update the related verification criteria, requirements realization, related architecture sections, and source records.

To reference this requirement Statement from another wiki page, insert:

```
{{section>dido:02-crusible:99-annexes:annex-c-requirements:01-mission-objectives:mo-004:mo-004d#Statement&noheader&nofooter&noeditbtn}}
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